

**Fujikin®**



Electronic Valves

# AR2000



Internet  
"Beyond the Flow"  
of Things



**Fujikin® Carp® Group**

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



AR2000 is the electronic valve which concentrated the aggregate power of this craftsmanship of **Fujikin®** and was manufactured.

Adoption of the stepping motor excellent in position accuracy realized the high-speed response, close control, and high resolution which are not in the conventional electric motor valve. 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.

## ■ Features

### Resolution: 2000: 1

High resolution by adopting stepping motor driven actuator.

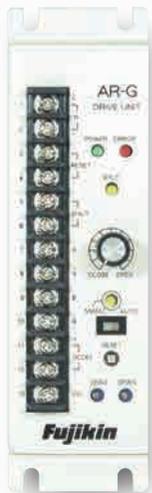
### Explosion - proof model is also available

d2G4 explosion - proof type actuator is available.

### Wide Cv Value Selection Range

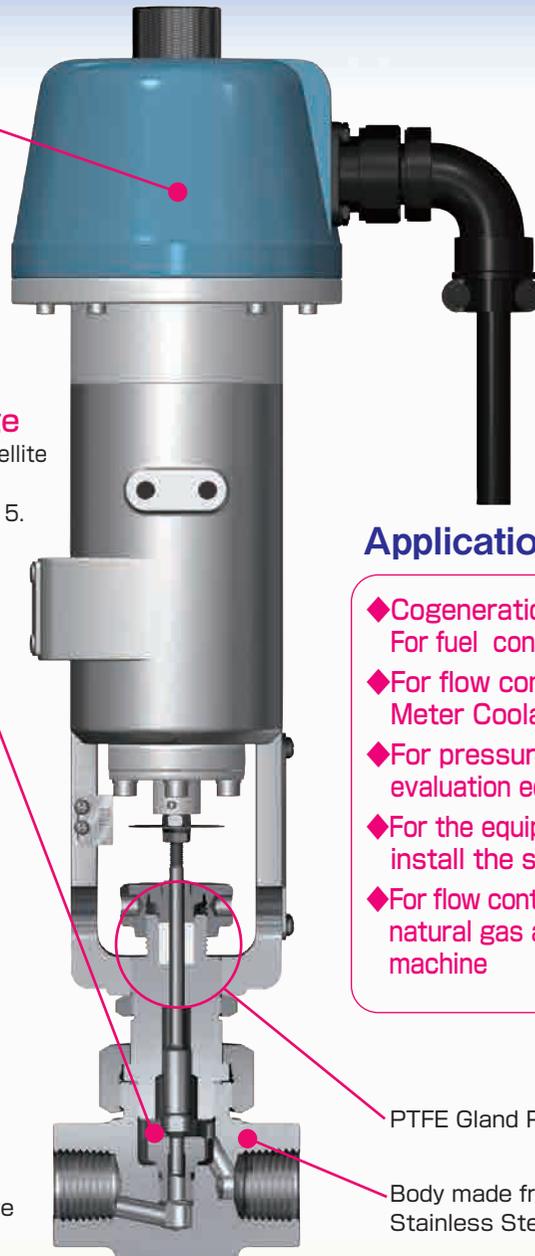
Stem & Disk are made by SUS316 + Stellite cladding, excellent for against abrasion.

Wide Cv Value range available, 0.0000015 to 5.



### Drive Unit

If an electric signal 4 - 20mA is inputted into a drive unit for exclusive use, the valve will operate to predetermined valve travel.



## Application of AR2000

- ◆ Cogeneration  
For fuel control of generator
- ◆ For flow control of Calorie Meter Coolant
- ◆ For pressure control in the evaluation equipment of fuel cell
- ◆ For the equipment which cannot install the source of air
- ◆ For flow control of a compressed natural gas automobile filling machine

PTFE Gland Packing

Body made from forged Stainless Steel (SUSF316)

## ■ Contents

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### Selection of AR2000 / Inquiry

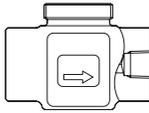
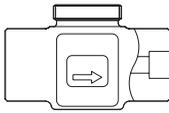
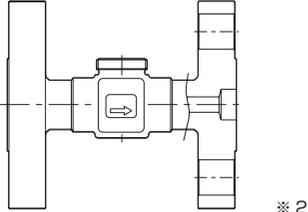
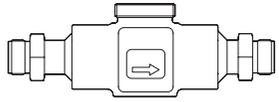
■ Selection Guide	P10 - P12
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# Specifications

## Body

### Body Types

- ◆Globe type is standard.
- ◆Standard material of body is SUSF316.
- ◆KHK certified models available.

Connections	Female Thread (Rc)	Socket Weld	Flange (JIS)	Flange (ANSI·JPI)	Remarks (Please ask 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 pres 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) 

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

※2: RF flange type or RJ flange type

### Bonnet Types

- ◆All the wetted parts of standard are made from SUS316 and with union bonnet structure.
- ◆A gasket is metal type made from SUS316.
- ◆When fluid is a liquid or steam with 0.7 or more Cv Value. 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 grand part.

Bonnet Types		Operating Temperature Range	
		Cv Value 0.7 or more	Cv Value 0.5 or less
Standard Types	PTFE Grand Packing	- 25 °C - 150 °C	- 50 °C - 150 °C
	C - PTFE Grand Packing	- 25 °C - 230 °C	- 50 °C - 230 °C
High Temperature Type (with Fin)		- 50 °C - 500 °C	
Low Temperature Type (with Extension)		- 253 °C - 150 °C	

### 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.
- ◆Bellows sealing type is available. (option, please refer to P9)

### Oil - Free Specifications

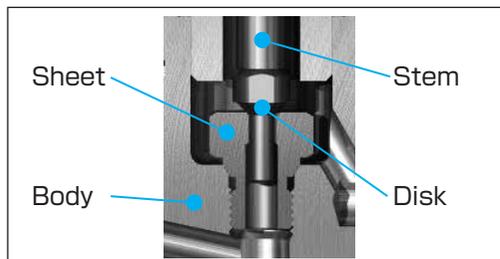
It corresponds to oil - free oxygen specification as standard.

Although manufacture by oil - free specification (first - class oil - free) is also heard, we have applied fluoric grease to the thread part of Disk and Sheet, and also Gasket thinly .

Moreover, the type which uses a grand part O - Rings has applied also to O - Ring thinly.

## Disc & Seat

Disk and Sheet have the structure threaded and connected to a body and a stem in each, and are exchangeable. (Except in the case of Cv Value 5.)



## Specifications

Material	SUS316 + Stellite cladding (standard)	
Flow Characteristics	EQ %	Linear
Cv Value	0.0000015 - 5	
Range - ability	Cv Value 0.00025 or more 20: 1(standard) Cv Value 0.00015 or less 10: 1(standard)	
Allowable Leak Rate	$1 \times 10^{-4} \times \text{Rated Cv Value}$	

## Actuator

- ◆ It is the precise actuator which adopted the stepping motor as the drive source and which is proud of the resolution 2000: 1.
- ◆ Since the precision ball screw is used, hysteresis is small and excellent reproducibility is shown.
- ◆ An actuator has two kinds such as C1 type (small) with which outputs differ, and C3 type (large - sized), and it can choose it according to a Cv Value and an operating pressure range.(Refer please P12 regarding Cv Value and pressure which can be used.)

## Specifications

Actuator Types	Standard Types		Explosion Proof Types	
	C1	C3	C1E	C3E
Type of Actuator	Stepping Motor + Ball Thread Drive System, Signal to open			
Supply Voltage	DC24V			
Power Consumption	20W	40W	20W	40W
Amperage Rating	1A / Phase	1.5A / Phase	1A / Phase	1.5A / Phase
Input signal	4 - 20 mA / 1 - 5 V			
Ambient - Air - Temperature	0 - 50 °C (No freezing)			
Drive System	Bipolar Chopper Constant Current Type			
Magnetization System	1 - 2 Phase Magnetization			
Construction	Indoor Type		Pressure / Explosion Proof (d2G4) or Intrinsically safe Explosion Proof	
Closed Detection Mechanisms	Built In (Touch Switch Type)		Pressure /Explosion Proof (d2G4) : External Limit Switch or Intrinsically Safe Explosion Proof Built in (Touch Switch Type) + using Safety Barrier	
Materials	Yoke		A5052	
	Yoke	AC2A+ A5052P	A5052	
Painting	Cover	AC2A	AC2A + A5052P	AC2A
	Baking paint			
Yoke	Silver			
	Cover	Cobalt Blue		
Max. Operating Pres.	14.7 MPa	49 MPa	14.7 MPa	49 MPa
Rated Strokes				
Cv Value	0.00015 or less	6 mm		
	0.00025 - 3	8 mm		
	5	10 mm		
Hysteresis	1.5 % F, S, or less			
Linearity	5 % F, S, or less			

Power consumption was downed sharply.  
Power consumption realized the 50% down of the conventional model of our company by adoption of a new style motor.

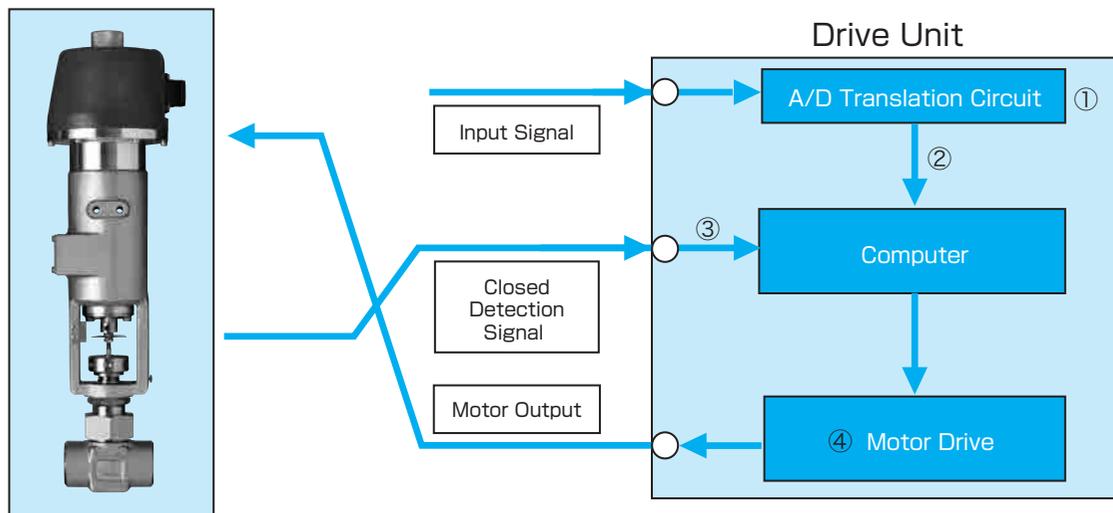
## Drive Unit

- ◆ AR2000 is controlled by a drive unit for exclusive use.
- ◆ If a power supply is supplied to a drive unit, the position of the close position will be detected automatically and the valve will operate to the valve travel according to an input signal after that.
- ◆ When a valve is in the closed position, the "SHUT" lamp lights up.
- ◆ Even when the motor loses of synchronism during operation, or when abnormal operation is carried out, AR2000 has the safe function which can make a contact signal able to add to a reset button or a reset input terminal, and AR2000 can make reset operation.

## Specification

Items	Specifications
Ambient temperature range	-10 - 50 °C (No freezing)
Ambient humidity range	85% RH or less (No condensation)
Supply voltage	24 V DC ± 10 %
Power consumption	C1, C1E / 2.4 A or less      C3, C3E / 3.4 A or less
Input signals	4 - 20 mA DC / 1 - 5 V DC / 1 - 10 V DC / Other
Construction	Indoor type
Applicable cable	4 - core shielded cable of 0.75 mm <sup>2</sup> or more in cross - sectional area (Line resistance: 0.5Ω or less)
Terminal block thread size	M3
Mass	0.6 kg

## Principle of Operation



AR2000 Control Block Diagram

- ① The analog input signal is A/D converted.
- ② The signal is sent to the computer built in.
- ③ Next, the closed position used as the standard which determines the valve travel of a valve is detected.
- ④ A computer divides a valve lift into 2133 steps, changes it into a pulse signal, and outputs signal current to a valve actuator.

## Fluid can be used

- ◆ Inert Gases, such as Nitrogen, Helium, Air, and Carbon Dioxide, and Oxygen
- ◆ Combustible Gases (Hydrogen, Methane, Ethylene, etc.)
- ◆ Poisonous Gases (Carbon Monoxide, Butadiene, etc.)
- ◆ Water, Fuel Oil, Liquefied Gas, etc.
- ◆ However, you can not use it for the following fluid.
  - Fluid which corrodes wetted parts (body, bonnet, inner valve, grand parts)
  - Fluid containing a solid or slurry

# Ordering Numbers

## Actuator

## Valve Body

## Cv Value & Characteristics of Disc and Seat

C1E	-	5	15	H	D	-	E	07	R2
①		②	③	④	⑤		⑥	⑦	⑧

### Actuators

	①	Types
Actuator Types	C1	Small Type
	C3	Large Type
	C1E	Small Explosion Proof Type (d II G4)
	C3E	Large Explosion Proof Type (d II G4)

### Body

	②	③	④	⑤	Specifications
Connections	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				Union Type Globe type
	8				Union Type Angle Type
	9				2 Compression Ring Fitting Globe Type
	0				2 Compression Ring Fitting Angle Type
Ratings & Flanges	15				14.7 MPa Type
	30				29.4 MPa Type
	50				49 MPa Type
	J1				JIS 10 K
	J2				JIS 20 K
	J3				JIS 30 K
	J4				JIS 40 K
	J6				JIS 63 K
	A2				ANSI 150 (JPI 150) ※
	A3				ANSI 300 (JPI 300) ※
A6				ANSI 600 (JPI 600) ※	
A9				ANSI 900 (JPI 900) ※	
A15				ANSI 1500(JPI 1500) ※	
Constructions of Gland & Bonnet	なし				V - Packing
	W				V - Packing + O - Ring
	B				Bellows Seal Type
	H				High Temperature Type
	C				Low Temperature Type
Sizes	B				1/4 (8 A)
	C				3/8 (10 A)
	D				1/2 (15 A)
	E				3/4 (20 A)
	F				1 (25 A)

※ Item No. of JPI Flange Type: [A] → [JP]

<Example of Ordering Numbers >  
 ◆ 115 B: Rc1/4, 14.7 MPa Type, V - Packing  
 ◆ 2JP3WHD: JPI 300 15 A 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.

### Others

In the case of special edition, it expresses at the ordering number end as the alphabet of less than three characters.

### Disc & Seat

	⑥	⑦	⑧	Specifications
Charac - teristics	E			EQ%
	L			Linear
Cv Value	01	-	40	The number (01 - 40) corresponding to Cv Value: (5 - 0.0000015) enters (refer to following table).
	40			
Range - ability	R1	-	R10	Ordering Number (R1 - R10) correspond - ing to (10:1 - 100:1) enters (refer to following table).
	R10			

Please refer to the following table for the combination of the valve characteri - stic which can be manufactured, a Cv Value, and range - ability.  
 <Example of Ordering Number>  
 ◆ E15R4...EQ%, Cv Value: 0.025, Range - ability: 40: 1

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

Cv No.	Cv Value	Range - ability									
		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										

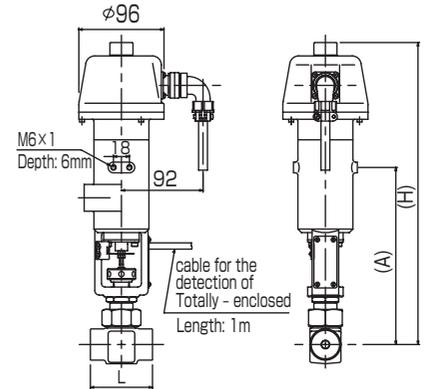
■: Can be manufactured

# ■ Dimensions

## Standard Type

Fluid temperature range which can be used Cv Value 0.7 or more: -25 - 150 °C  
Cv Value 0.5 or less: -50 - 150 °C

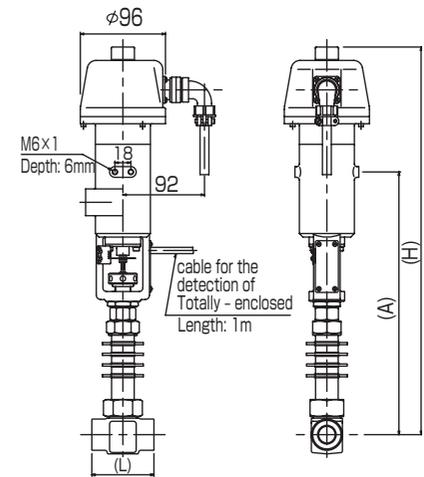
	Pressure Classes	Body Connections	Cv Value	Ordering Numbers (Type)	Dimensions [mm]		
					L	H	A
C1 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C1 - 115	70	339	199
		Rc1/4 - 1	0.7 or more		100	356	216
		SW1/4 - 1/2	0.5 or less	C1 - 515	80	339	199
		SW1/4 - 1B	0.7 or more		110	356	216
C3 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C3 - 115	70	362	198
		Rc1/4 - 1	0.7 or more		100	379	216
		SW1/4 - 1/2	0.5 or less	C3 - 515	80	362	199
		SW1/4 - 1	0.7 or more		110	379	216
	29.4 MPa	Rc1/4 - 1/2	0.5 or less	C3 - 130	80	376	213
		Rc1/4 - 1	0.7 or more		100	384	221
		SW1/4 - 1/2	0.5 or less	C3 - 530	90	376	213
		SW1/4 - 1	0.7 or more		110	384	221
	49 MPa	Rc1/4 - 1/2	0.5 or less	C3 - 150	100	413	250
		SW1/4 - 1/2	0.5 or less	C3 - 550	110	413	250



## High Temperature Type (Radiating Fin Bonnet Type)

Fluid temperature range which can be used: -50 °C - 500 °C

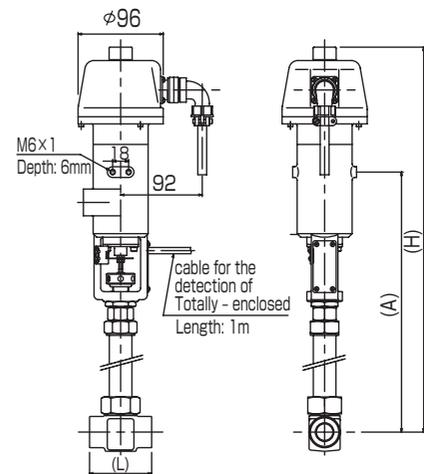
	Pressure Classes	Body Connections	Cv Value	Ordering Numbers (Type)	Dimensions [mm]		
					L	H	A
C1 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C1 - 115H	70	434	294
		Rc1/4 - 1	0.7 or more		100	474	334
		SW1/4 - 1/2	0.5 or less	C1 - 515H	80	434	294
		SW1/4 - 1	0.7 or more		110	474	334
C3 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C3 - 115H	70	457	294
		Rc1/4 - 1	0.7 or more		100	497	334
		SW1/4 - 1/2	0.5 or less	C3 - 515H	80	457	294
		SW1/4 - 1	0.7 or more		110	497	334



## Low Temperature Type (Extension Bonnet Type)

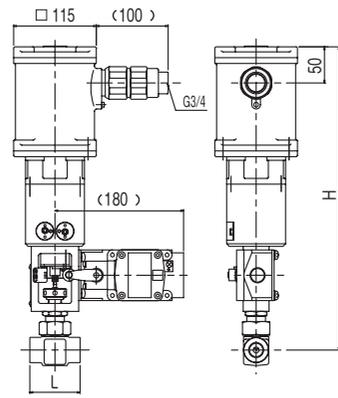
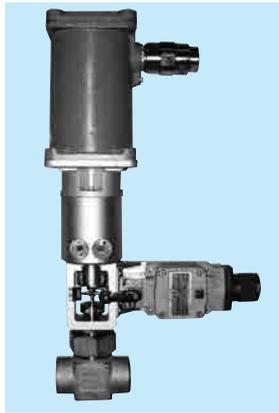
Fluid temperature range which can be used: -196 °C - 150 °C

	Pressure Classes	Body Connections	Cv Value	Ordering Numbers (Type)	Dimensions [mm]		
					L	H	A
C1 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C1 - 115C	70	545	405
		Rc1/4 - 1	0.7 or more		100	583	443
		SW1/4 - 1/2	0.5 or less	C1 - 515C	80	545	405
		SW1/4 - 1	0.7 or more		110	583	443
C3 Type	14.7 MPa	Rc1/4 - 1/2	0.5 or less	C3 - 115C	70	568	405
		Rc1/4 - 1	0.7 or more		100	606	443
		SW1/4 - 1/2	0.5 or less	C3 - 515C	80	568	405
		SW1/4 - 1	0.7 or more		110	606	443



## Explosion Proof Type

- ◆ A pressure terminal etc. are used to each terminal and it connects with a M3 screws.
- ◆ The conformity cable outside diameter of a cable ground is  $\phi 12.1 - 16$  mm.



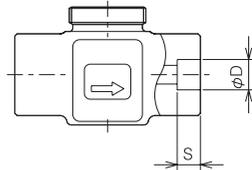
C1E Type					
Pressure Class	Body Connections	Cv Value	Ordering Numbers (Type)	Dimensions [mm]	
				L	H
14.7 MPa	Rc1/4 - 1/2	0.5 or less	C1E - 115	70	419
	Rc1/4 - 1	0.7 or more		100	437
	SW1/4 - 1/2	0.5 or less	C1E - 515	80	419
	SW1/4 - 1B	0.7 or more		110	437

C3E Type					
Pressure Class	Body Connections	Cv Value	Ordering Numbers (Type)	Dimensions [mm]	
				L	H
14.7 MPa	Rc1/4 - 1/2	0.5 or less	C3E - 115	70	464
	Rc1/4 - 1	0.7 or more		100	482
	SW1/4 - 1/2	0.5 or less	C3E - 515	80	464
	SW1/4 - 1	0.7 or more		110	482

## SW(Socket Weld) Type Body

(Unit: mm)

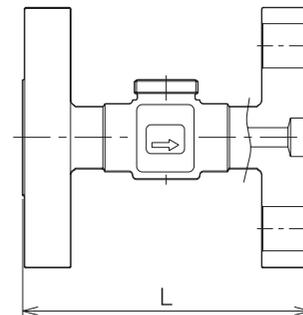
Sizes	D	S
1/4	14.3	13
3/8	17.8	
1/2	22.2	16
3/4	27.7	
1	34.5	



## Face to Face Dimensions of JIS Standard Flange Type Body

- ◆ JIS Standard (L)mm

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

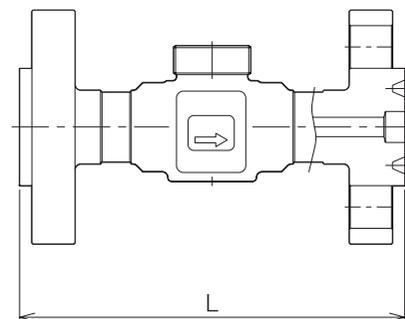


◆ Flange Type Body (RJ Type)

## Face to Face Dimensions of ANSI-JPI Standard Flange Type Body

- ◆ ANSI-JPI Standard (L) mm

Cv Value	Pressure Classes	RF Flange Types			RJ Flange Types		
		Sizes			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					

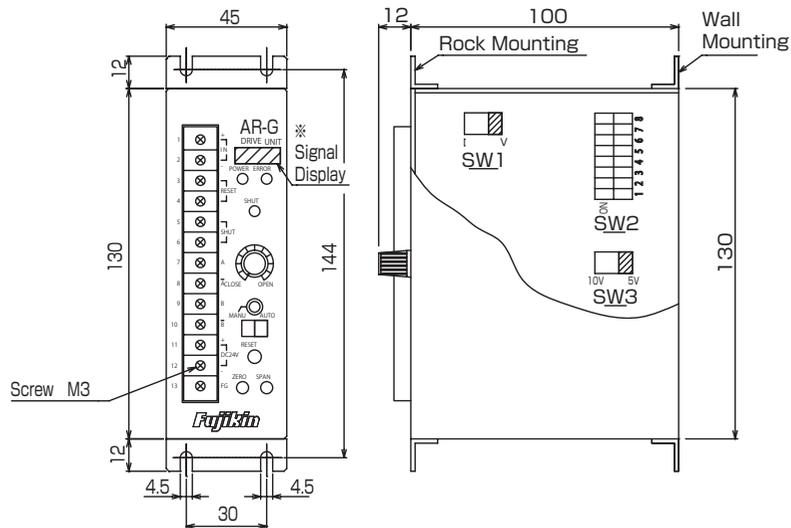
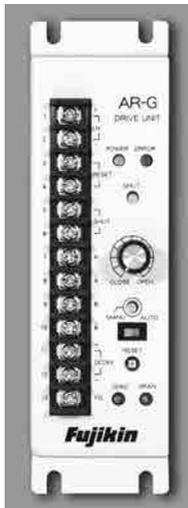


◆ Flange Type Body (RJ Type)

## ■ Connection of Actuator

- ◆ It connects with each terminal of a connector by soldering.
- ◆ A conformity cable outside diameter is  $\phi 8$ .
- ◆ 1m of the length of all the cables for closed detection is a standard.

## ■ Drive Unit



## Terminal Connection Diagram

### Note

In the case of non-wire connection, please keep in mind ⑤ and ⑥ watch terminal that there is a possibility that an actuator may break down.

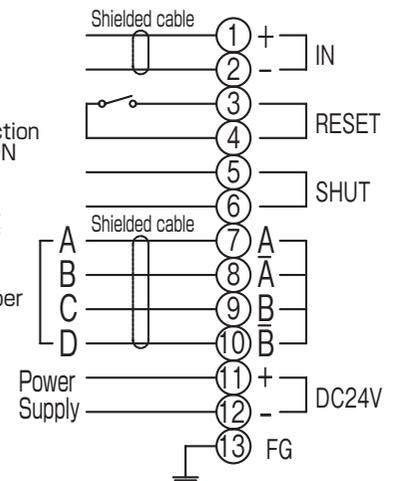
\* In use in an explosion proof type, the closed detection should connect with No. 1 of a limit switch, and a No. 2 terminal.

INPUT SIGNAL  
DC4 - 20mA (1 - 5V)

External Reset  
Compulsive closed detection  
at the point of contact ON

The closed detection  
To an actuator main part  
\*

Motor drive output  
Connector terminal number



## Options / Accessories

### Materials of Wetted Parts

- ◆ In accordance with use fluid, we corresponds also to manufacture with the following materials.
- ◆ In addition, please consult to **Fujikin** also about material.

#### ①Body

SUS316L, Nickel Alloy(Hastelloy B - 2, C - 22, C - 276 Fairly), Zirconium, Titanium, Titanium Alloy, etc.

#### ②Disc & Seat

Materials	Remarks
SUS316L	In case of Cv Value 0.007 or less, available to Stellite cladding.
SUS630	For wear - proof at the time of cavitation generating. (available only in case that Cv Value is 0.01 or more)
Tungsten Carbide + SUS316	
Nickel Alloy	Available only in case that Cv Value is 0.01 or more.
Zirconium	
Titanium, Titanium Alloy	

#### ③Gland Packing

C - PTFE, PFA and each combining packings are available.

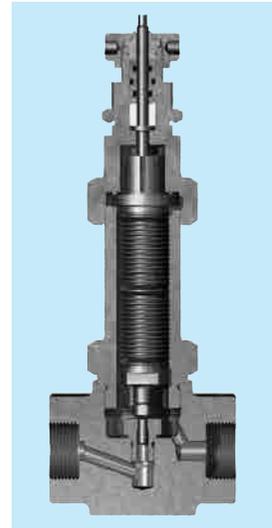
### O - Ring Seal

Double sealing construction by adding O - Rings to Gland Packing is available. The materials of O - Rings are Fluorolic rubber, EPDM, HNBR, Kalrez®, etc., corresponds according fluid. We select the suitable material for various fluid.

### Bellows Seal

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

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



### Limit Switches

- ◆ For detecting open - close position by electric signal
- ◆ Roller lever type
- ◆ Conduit: 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

Explosion Proof Constructions	Item Numbers
General	1LS19 - J
General/Dust & Weather Proof	1LS19 - JS
Exde II CT6	1LX7001 - J



# Selection Guide

Please select due to below flow.

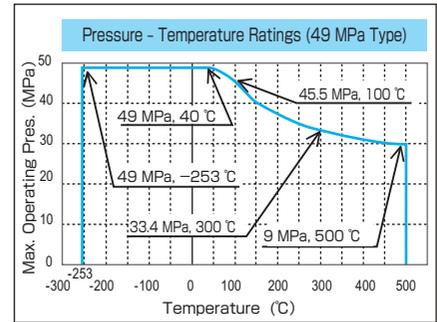
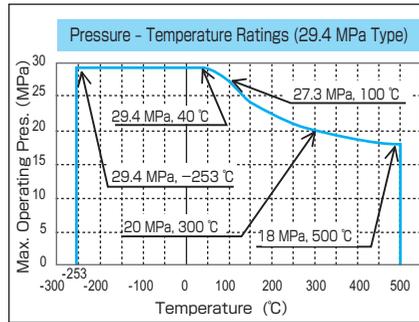
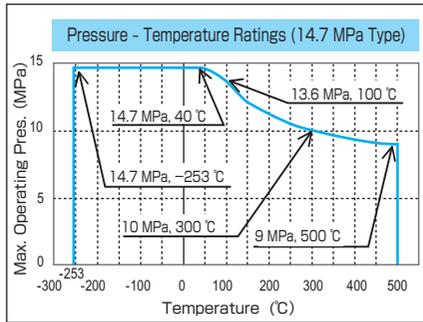
## ① Entry of the "AR2000 Detailed Order Sheet"

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 "AR2000 Detailed Order Sheet" (P13). Please be sure to enter within the limit of a thick line.

## ② 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 standards (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) / inch<sup>2</sup> (= 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 <sup>3</sup> /h] Liquid Flow Rate $Q_G$ [m <sup>3</sup> /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

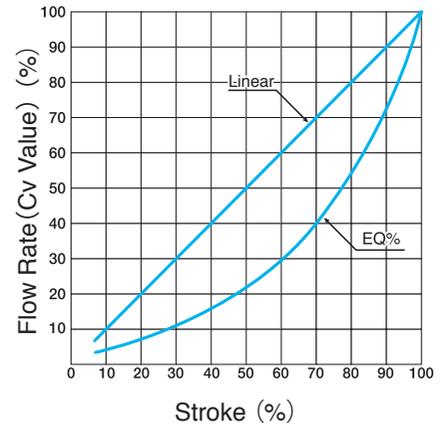
Select please EQ% or Linear.

##### ◆ 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.



#### 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 EQ% ..... 1.5
- ② 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)

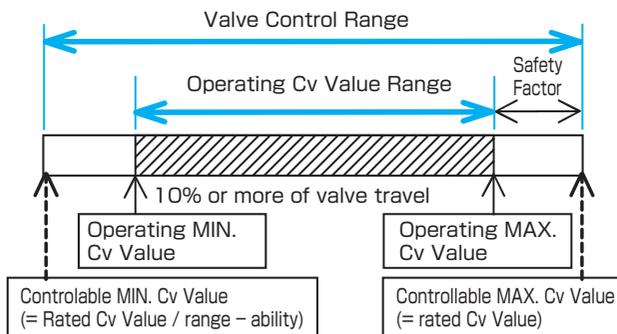
**WARNING**

**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**

AR2000 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, Cv No., Range - ability, the table of combination which can be manufactured

Cv No.	Cv Value	Range - ability									
		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										

■ : Manufacture of Disc & Seat combination which applied blue is possible.

## 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 Max. Operation Pressure

Actuator Types		Cv Value									Unit: MPa
		0.035 or less	0.05 - 0.25	0.35 - 0.5	0.7	1	1.5	2	3	5	
C1 Type C1E Type	MAX. Inlet Pres.	14.7	14.7	9	7.5	5.3	3.8	2.3	1.5	0.75	
	MAX. Outlet Pres.	9	9	9	7.5	5.3	3.8	2.3	1.5	0.75	
C3 Type C3E type	MAX. Inlet Pres.	49	49	36	29.4	21	15	9	6	3	
	MAX. Outlet Pres.	36	36	36	29.4	21	15	9	6	3	

## ⑧ Check of a Valve Connection Size

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

### Scope of a Cv Value and caliber

The Cv Value of which can be manufactured is as follows.

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

## ⑨ Selection of Accessories and Options

Select please accessories and options needed. For details, please refer to P9.

### WARNING

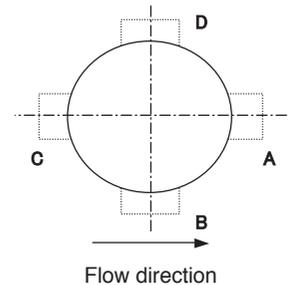


**Fujikin** shall bear no liability regarding product selection criteria or decisions, nor shall **Fujikin** be liable (including direct, special or consequential damages including, but not limited to, lost profits or income) in regard to any product which has been damaged by misuse, improper handling 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.

# AR2000 Detailed Order Sheet

Customer Name		Q'ty	pcs
End User's Name		Req'd delivery date	
Equipment Name		TAG No.	
Ordering No.		Product No.	

Specification for Valve	Designed pressure [ MPa G ]		Type of Actuation		Signal increase to open		
	Designed temperature [ °C ]		Explosion - Proof		<input type="checkbox"/> Required (d2G4) <input type="checkbox"/> Not Required		
	Maximum closed valve [ MPa G ]		Actuating Signal		<input type="checkbox"/> 4 – 20 mA <input type="checkbox"/> Others ( )		
	Connection	Type	<input type="checkbox"/> Threaded Socket <input type="checkbox"/> Socketweld <input type="checkbox"/> Flange <input type="checkbox"/> Others ( )		Supply Source		<input type="checkbox"/> DC24V <input type="checkbox"/> Others ( )
		N. Dia. & Spec.			Type of Cable Connection		by connector (For Explosion – Proof: terminal block)
	Type	<input type="checkbox"/> Globe <input type="checkbox"/> Angle		Specification for drive unit		Position of Cable Connection (A: Standard) <input type="checkbox"/> Position: A <input type="checkbox"/> Position: B <input type="checkbox"/> Position: C <input type="checkbox"/> Position: D	
	Body Material	<input type="checkbox"/> SUS316 or SUSF316 (Fujikin's Standard) <input type="checkbox"/> Others ( )					
	Valve Disc and Seat Material	<input type="checkbox"/> SUS316+Stellite cladding (Fujikin's Standard) <input type="checkbox"/> Others ( )		Accessories		Painting Color Cover <input type="checkbox"/> Cobalt Blue: Munsell No.10B4/10 (Standard) <input type="checkbox"/> Others ( ) York <input type="checkbox"/> Silver (Standard) <input type="checkbox"/> Others ( )	
	Type of Bonnet	<input type="checkbox"/> Fujikin's Standard <input type="checkbox"/> Extension <input type="checkbox"/> radiating fins <input type="checkbox"/> Others ( )					
	Type of Grand Seal	<input type="checkbox"/> Fujikin's Standard (PTFE Paking used) <input type="checkbox"/> O-ring seal <input type="checkbox"/> Bellow Seal <input type="checkbox"/> Others ( )		Tolerable Leak Rate (against Rated Cv Value)		Standard <input type="checkbox"/> Required <input type="checkbox"/> Not required Cable <input type="checkbox"/> Required <input type="checkbox"/> Not required m	
	Valve Characteristic	<input type="checkbox"/> Linear <input type="checkbox"/> EQ% <input type="checkbox"/> ON – OFF					
	Cv Value	<input type="text"/> <input type="checkbox"/> by Customer <input type="checkbox"/> by Fujikin		Standard		1x10 <sup>-4</sup> or less	
	Range – ability	<input type="text"/> : 1 <input type="checkbox"/> by Customer <input type="checkbox"/> by Fujikin					
	N/A			Specified			
	Oil – Free	<input type="checkbox"/> Specified <input type="checkbox"/> Fisrt Grade Oil-Free <input type="checkbox"/> Others ( )					



Fluid Specification	Fluid Name	<input type="text"/> <input type="checkbox"/> GAS <input type="checkbox"/> LIQ <input type="checkbox"/> STEAM <input type="checkbox"/> N/A			Remarks	
	Flow Rate	$\frac{m^3}{h}$	MAX FLOW	NOR FLOW		MIN FLOW
		$\frac{m^3}{h}$ (normal) $\frac{kg}{h}$				
	Inlet Pressure [ MPa G ]					Note: * 1 There will no guranteee for the performance if fruid name is not provided. * 2 For gases, unit of [m3/h(normal)] is based on: at15 °C and atmosphere pressure (0.1013MPa) * 3 For Fluid Specification columns, please provide the information for each condition. Flow Rate is at MAX, NOR, and MIN
	Outlet Pressure [ MPa G ]					
	Differential Pressure [ MPa ]					
	Temperature [ °C ]					
	Gravity [ H2O=1 , AIR=1 ]					
Viscosity [ mPa·s , m <sup>2</sup> ·s <sup>-1</sup> ]						

Customer	<b>Fujikin Incorporated</b>	Fujikin	
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## Introduction of Other Products

### SR100



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

### SR100E



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

### PRE-UBV Series



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

### MINUCON



- ◆ Diaphragm Operate Mini Control Valves
- ◆ Proportional Solenoid Driven
- ◆ From low to High Pressure

### AP·APR Series



- ◆ From low to High Pressure
- ◆ Compact Design
- ◆ Soft Sealing Type

### COSMIX™



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



**Fujikin Carp Group**



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

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