



TECHNICAL DATA

# Electronic Valve<sup>®</sup>

# AR2000



Patent, utility model or design already registered or applied for registration. We are ready to adopt any suggestions of the Customers made on any field of our products.

***Fujikin Incorporated***



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# Electronic valve (digital control valve) technical description

## Contents

<b>1. Outline</b> .....	2
<b>2. Types</b> .....	3
<b>3. Appearance</b> .....	4
Order Form .....	5
<b>4. Driving Units</b> 4-1. Specification .....	6
4-2. Connector terminal block .....	6
4-3. Connecting chart .....	7
4-4. Driving unit structure .....	8
<b>5. Functional Parts Features and Specifications</b>	
A. Body .....	9~10
B. Seat and disc .....	11
<b>6. Explosion-proof Models</b> .....	12
<b>7. Accessory Functional Parts</b> A. Bellows seal .....	13
B. Limit switch .....	14
<b>8. Valve Characteristics</b> .....	15
<b>9. Resolution Characteristics</b> .....	16
<b>10. Cv Calculations</b> .....	17
Properties of typical gases and liquids .....	18
<b>11. Cv Selection</b> .....	19~20

## 1

# Outline

The Fujikin AR2000 electronic valve achieves outstanding control precision, repeatability, resolution, and other high-performance characteristics through the use of a stepping motor with a high positioning precision for drive power. In addition, AR2000 valves realize high-speed operation in a compact body, characteristics unachievable with conventional motor drive valves.

AR2000 valves are the ideal choice for the automation of chemical plants, processing lines, research labs, and other applications.

## Features

### 1. Operation with a 4 - 20 mA instrumentation signal

Also compatible with 1 - 5 V, 0 - 5 V, 0 - 10 VDC signal input.

### 2. Outstanding resolution

Standard models take 2133 steps per full stroke.

### 3. Less than 0.1 % hysteresis

AR2000 electronic valves use a stepping motor for extremely high stroke positioning precision.

### 4. Direct computer control possible

Simply install an interface to enable direct computer control.

### 5. No electro-pneumatic converter required

The electro-pneumatic converter required by conventional pneumatic control valves is no longer needed. Installation of a dedicated drive unit into the control panel enables extension of the cable and full control from up to 100 m away.

(Cable resistance must be less than 0.5  $\Omega$ .)

### 6. Explosion-proof designs (d2G4) also available

### 7. Compact design

AR2000 electronic valves are far more compact than conventional motor-operated valves.



Model: CON1-115

# 2 Types

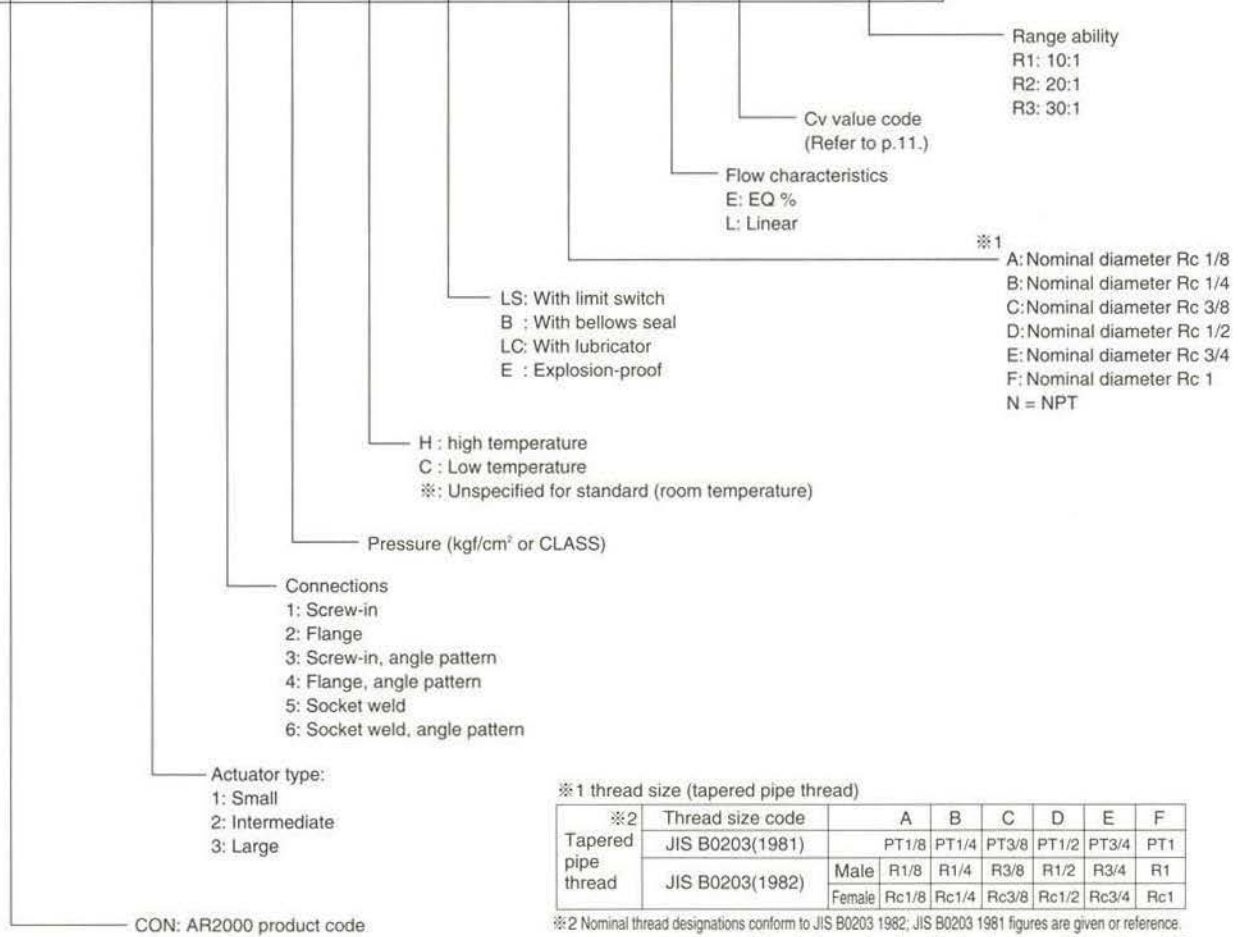
AR2000 valves are classified as shown below according to the temperature of the working fluid, accessories, and connection. Manufacture of all possible combinations is possible.

Operating temperature range	Accessories	Connections	
Standard type (room temperature) (-50 to +150°C) Type of. 0.7 Cv or more (-25 to +150°C)	With bellows seal	RC internal thread	Globe
			Angle
High temperature type (150 to 500°C)	With lubricator	Flange	
Low temperature type (-50 to -250°C) Type of. 0.7 Cv or more (-25 to -250°C)	With limit switch	Weld connection	

## AR2000 code designation

- AR 2000 codes are designated as specified below.
- For inquiry, please specify the code number.

**CON 1-1 15 H LS BN-E03 R2**



※1 thread size (tapered pipe thread)

※2	Thread size code	A	B	C	D	E	F	
Tapered pipe thread	JIS B0203(1981)	PT1/8	PT1/4	PT3/8	PT1/2	PT3/4	PT1	
	JIS B0203(1982)	Male	R1/8	R1/4	R3/8	R1/2	R3/4	R1
		Female	Rc1/8	Rc1/4	Rc3/8	Rc1/2	Rc3/4	Rc1

※2 Nominal thread designations conform to JIS B0203 1982; JIS B0203 1981 figures are given or reference.

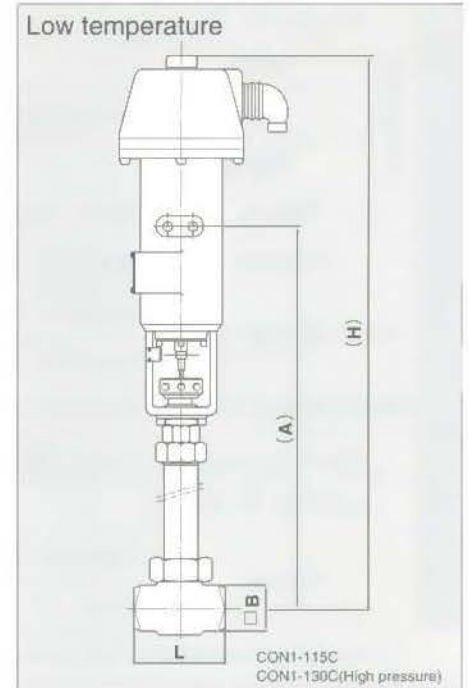
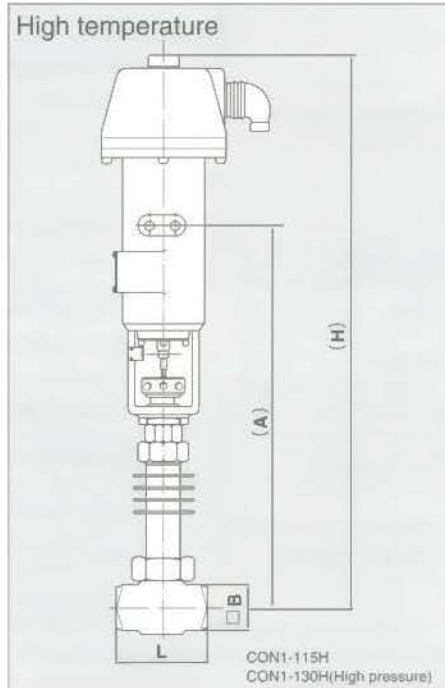
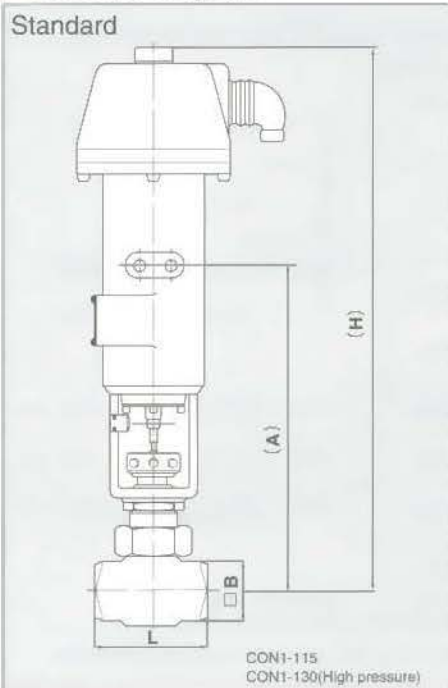
○When placing an order, please fill in the order entry specification shown on P.5



# 3 Appearance



External diagram



Photographs, diagrams, and dimensions are given for compact models.

If Cv exceeds 0.7, nominal diameter is 3/4 (E) even with 3/8 (C) and 1/2 (D) models. NOTE: Dimensions and weight are subject to change without notice.

Unit: (mm)

Code number	Nominal diameter code	H	L	□B	A	Weight (kg)
CON1-115	A · B · C · D	331	70	35	199	4.0
	E · F	349	100	60	217	4.5
CON1-115H	A · B · C · D	427	70	35	295	4.5
	E · F	445	100	60	313	5.0
CON1-115C	A · B · C · D	559	70	35	467	4.5
	E · F	577	100	60	485	5.0

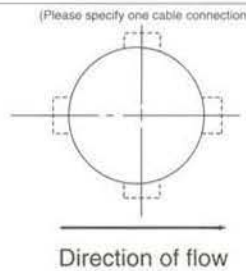
Code number	Nominal diameter code	H	L	□B	A	Weight (kg)
CON1-130	A · B · C · D	340	80	40	208	4.5
	E · F	346	80	50	214	5.0
CON1-130H	A · B · C · D	445	80	40	313	5.0
	E · F	451	80	50	298	5.5
CON1-130C	A · B · C · D	577	80	40	485	5.0
	E · F	563	80	50	470	5.5

# Order Form

Please fill all the order specifications

Company name				Order date	
End users name				Required delivery	
Equipment name				Quantity	
Model & code				Drawing No.	△
High pressure gas approval grade	YES, NO	*5 Your spec. No.		TAG No.	

Fluid specification	Fluid name			#5 GAS. LIQ.	Permissible leakage (ratio to rated Cv) ※6	Standard	Control valve		1 × 10 <sup>-4</sup>		
	Input pressure (kgf/cm <sup>2</sup> G) (MPa)	P <sub>1</sub>	max	nor			min	1 × 10 <sup>-5</sup> , 2 × 10 <sup>-6</sup> , 1 × 10 <sup>-6</sup>			
	Output pressure (kgf/cm <sup>2</sup> G) (MPa)	P <sub>2</sub>	max	nor			min				
	Differential pressure (kgf/cm <sup>2</sup> G) (MPa)	ΔP	max	nor			min				
	Max. cutoff pressure (kgf/cm <sup>2</sup> G) (MPa)	P <sub>0</sub>							Other		
	Operating temperature (°C)	t	max	nor			min	Driving unit specification	Explosion-proof model		Required (d2G4), Not required ※5
	Flow rate (m <sup>3</sup> /h) (Nm <sup>3</sup> /h) ※1	Q	max	nor			min		Cable connection		Standard connector, Other
	Specific gravity ※2	G							Painting		Standard: (Cobalt blue, Munsell 10B4/10) Other
Viscosity (C. S.)					Cable connecting direction		Input signal				
Body specification	Connections	Orifice			Required documents	Drawing for approval		YES (Copies: _____, 2nd master _____), NO ※5			
		Type	Flange, Screw-in, Socket weld ※5			Inspection certificate		YES (Copies: _____, 2nd master _____), NO ※5			
		Rating				Certificate of materials		YES (Copies: _____, 2nd master _____), NO ※5			
	Pattern	Globe, Angle ※5				Address Branch office *, Direct to buyers Inspection by third party (Application for third party's inspection shall be exhibited.)		Required (Date: _____), Not required ※5			
	Materials	Standard: SUS 316, other									
	Bonnet	Standard, Finned ※5 Extension, Bellows seal									
Gland packing material	Standard: (PTFE), other										
Seat, stem (trim) specification	Characteristics		Linear, EQ % ※5								
	Specified Cv ※3										
	Material		Standard: SUS 316 and stelling Other								



If other special specification or fluid name can not be disclosed, valves will be manufactured but sometimes quality guarantee may be unavailable.

### Notes on completing the order form. (Make an entry by fully referring to the Technical Manual.)

- ※1 Please specify flow rate in the following units: liquid, m<sup>3</sup>/h; gas, Nm<sup>3</sup>/h; vapor, kgf/h. These units are used in all calculations for AR2000 valves. Normal operation is atmospheric pressure (1.033 kgf/cm<sup>2</sup>) at 15 °C.
- ※2 Specific gravity should be fixed up water as 1 for liquids; for gas, air is 1. Density (kg/cm<sup>3</sup>) specification is also Ok.
- ※3 Required Cv value is not necessary to specify. If Cv is specified, select the standard Cv in the catalog according to the calculated Cv. Please be sure to fill in all other items.
- ※4 Standard colors are cobalt blue for bonnet and silver for yoke.
- ※5 Circle the appropriate answer.
- ※6 Circle the appropriate answer. Standard permissible leakage will be assumed if not specified.

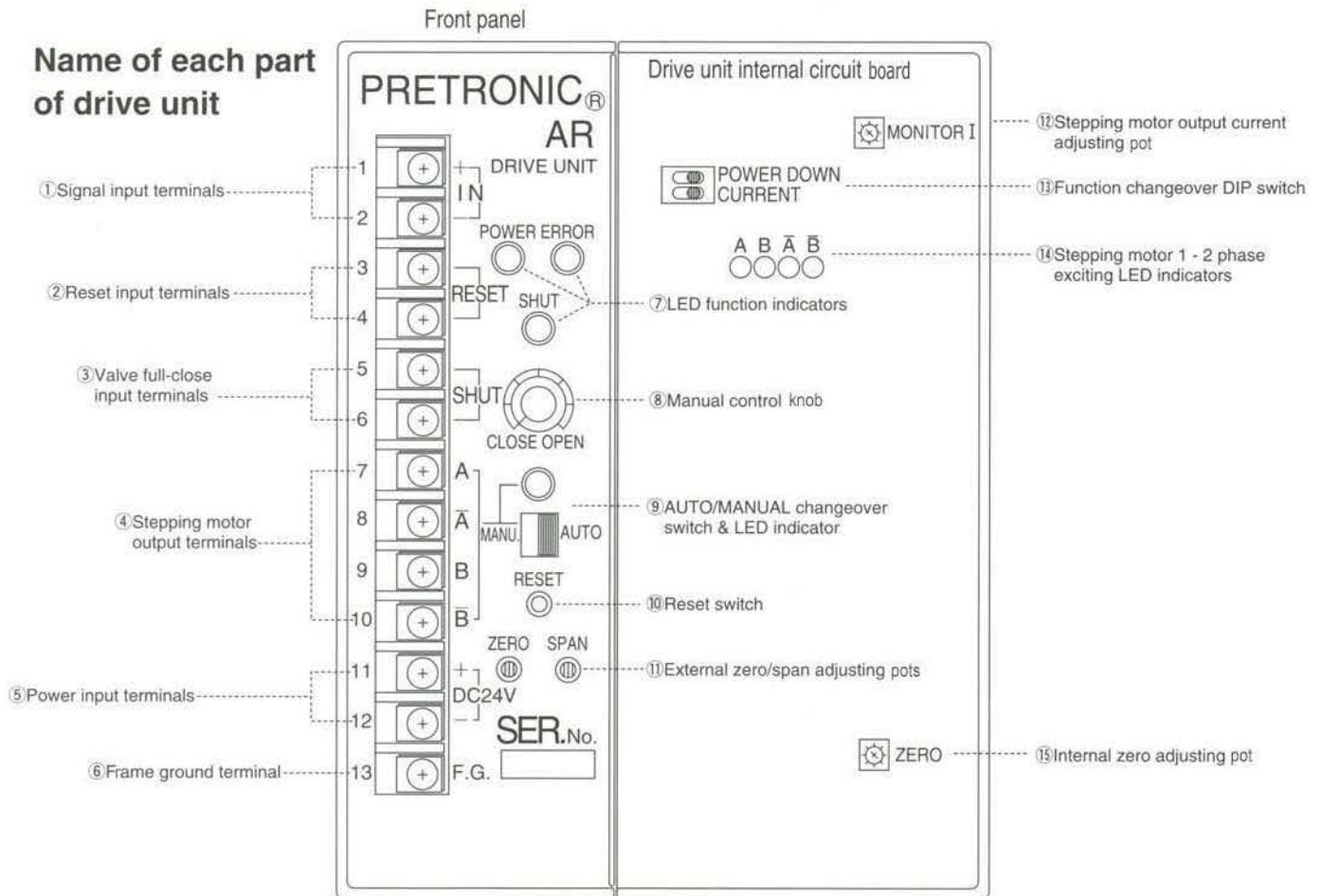
Authorized signatures for approving the above specification	Fujikin Incorporated.	Approved by	Checked by	Issued by
	<b>Fujikin</b>			

# 4 Driving Units

## 1. Specification

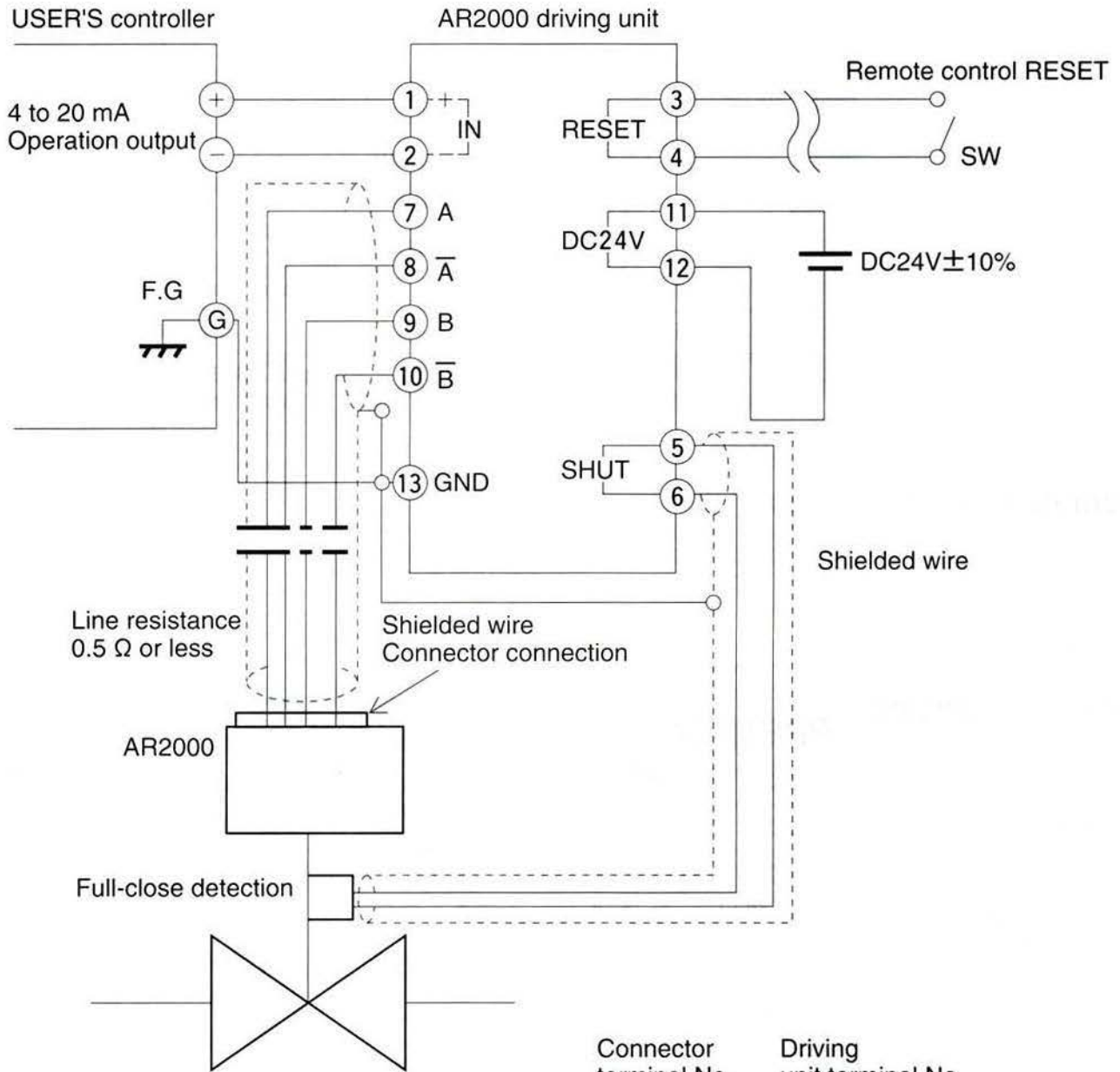
1	Supply power	Rated voltage	DC 24 V	
		Power consumption	CON1	48W
			CON2	58W
CON3	87W			
2	Input	4 to 20 mA		
3	Output	CON1	1.2 A/phase	
		CON2	1.5 A/phase	
		CON3	1.88 A/phase	
4	Driving method	Rated current chopper		
5	Excitation method	1 - 2 phase		
6	Total pulse No.	Approx. 2133 pulse/full span		

## 2. Connector terminal block





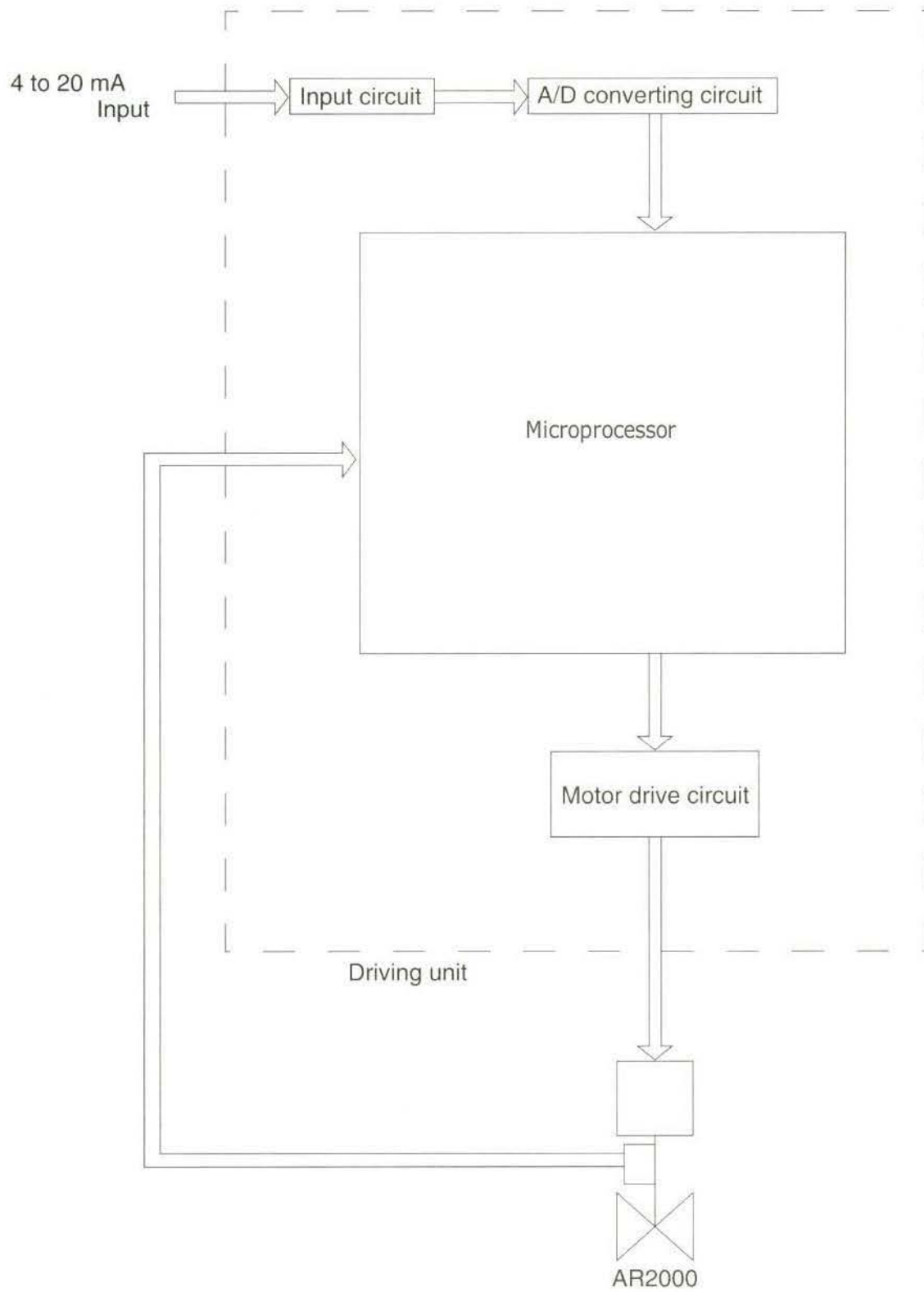
### 3. Connecting chart



Connector terminal No.	Driving unit terminal No.
(A) —————	(7) - - - - - A
(B) —————	(8) - - - - - A̅
(C) —————	(9) - - - - - B
(D) —————	(10) - - - - - B̅



## 4. Driving unit structure



# 5

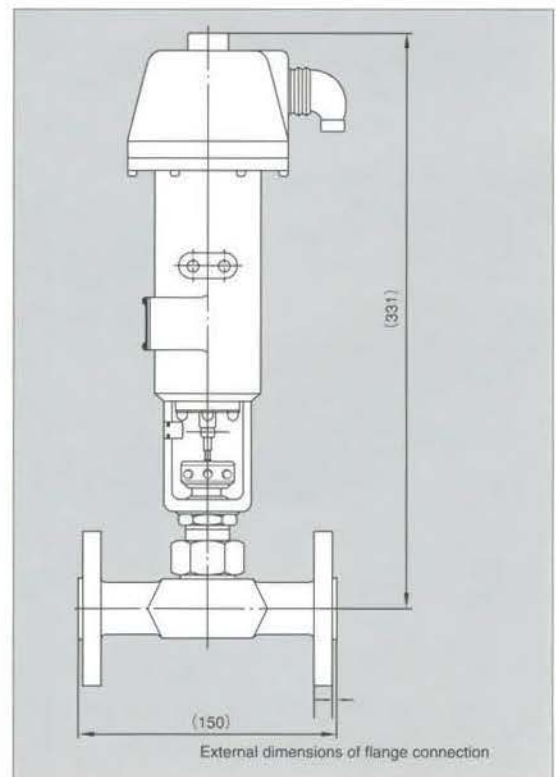
# Functional Parts Features and Specifications

## A. Body

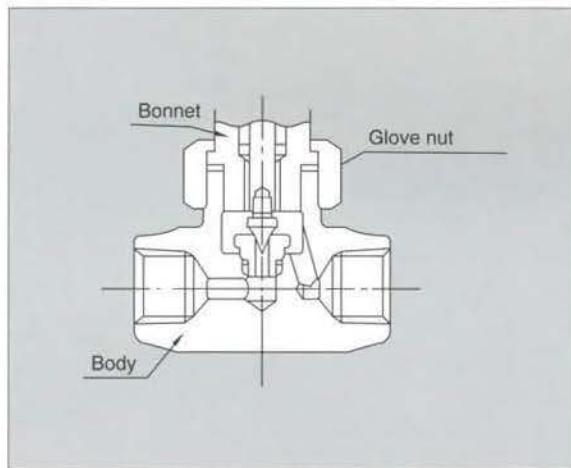
- (1) Standard connecting diameters are 1/8<sup>ø</sup>, 1/4<sup>ø</sup>, 3/8<sup>ø</sup>, 1/2<sup>ø</sup>, 3/4<sup>ø</sup>, and 1<sup>ø</sup>.
- (2) The valve body and bonnet are connected with a glove unit for easier disassembly and reassembly.
- (3) The standard body is made of SUS 316. The body can also be manufactured of hastelloy, titanium, tantalum, and other special alloys. Usable materials are shown in the table below.

Special body materials	
Hastelloy C	Tantalum
Hastelloy B	Carpenter #20
SUS 304 L	Zirconium
SUS 316 L	
SUS 321	
Titanium	

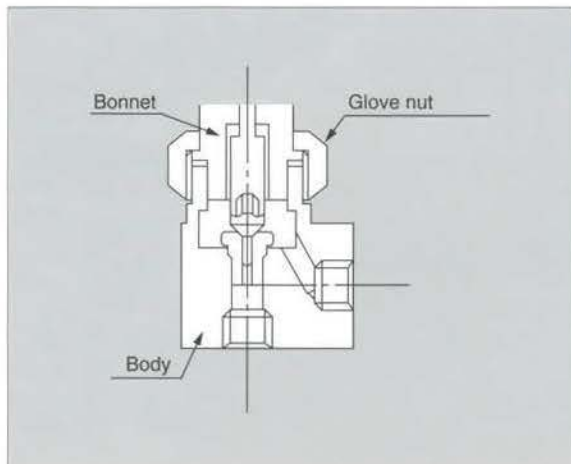
Model : CON1-215



Globe pattern

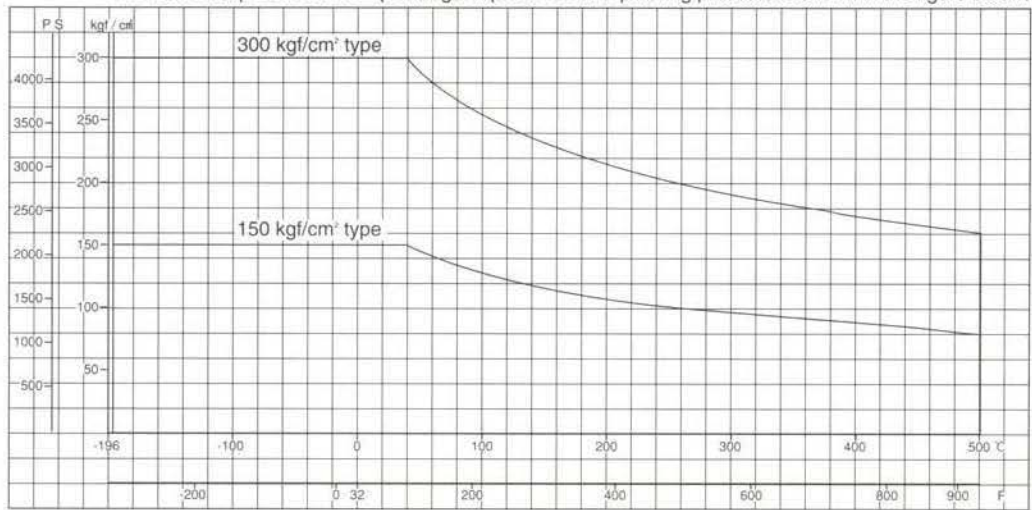


Angle pattern

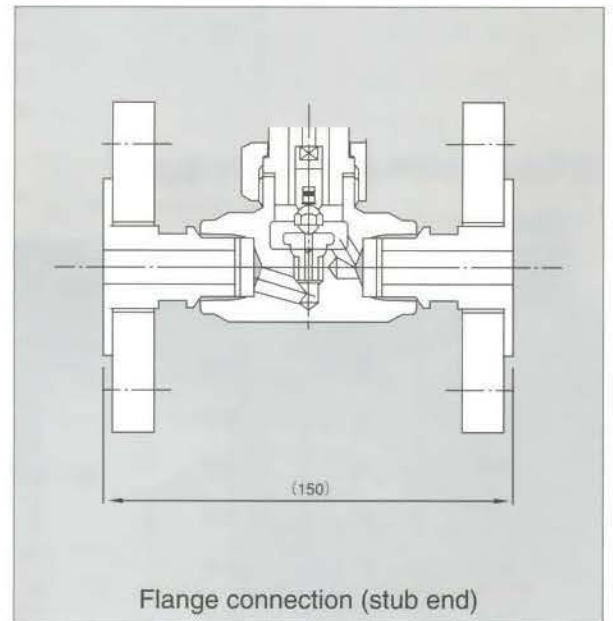
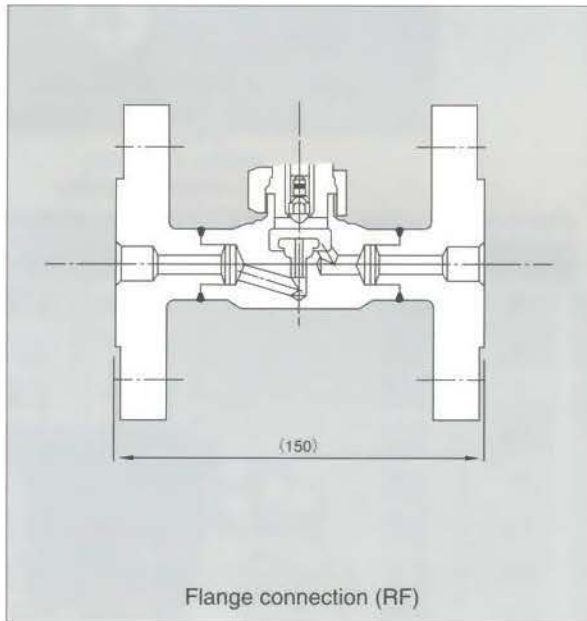


4) Temperature-pressure rating

The relationship between the operating temperature and operating pressure is shown in the figure below.



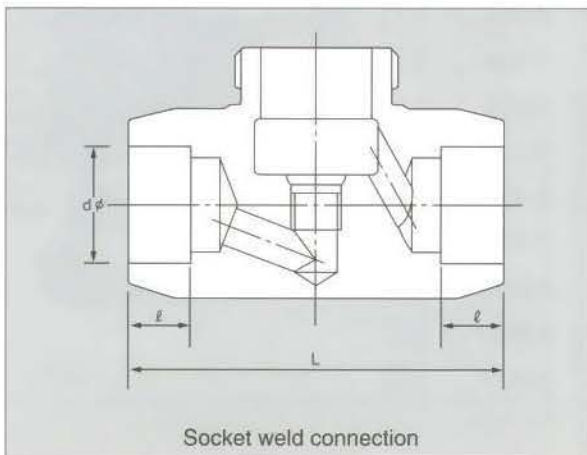
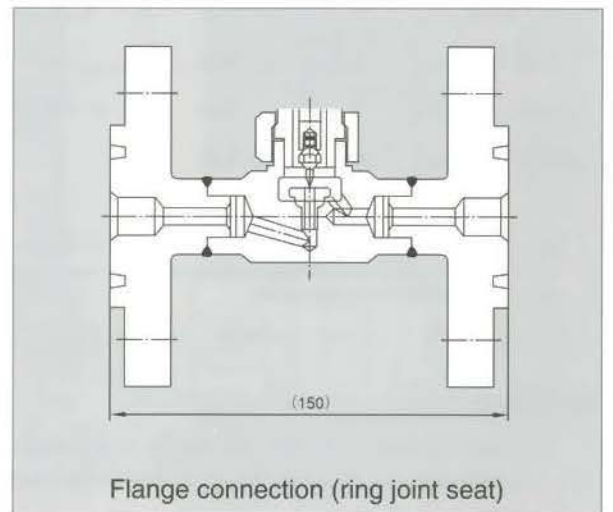
5) Connection



Dimensions

Size	d	L	ℓ
1/8B	11	80	10
1/4B	14.3	80	10
3/8B	17.8	80	13
1/2B	22.2	80	13
3/4B	27.7	110	16
1B	34.5	110	16

Unit: mm



Rating

JIS	10K	20K	30K	63K
ANSI JPI	150#	300#	600#	900#

Standard face to face distance is 150 mm regardless of flange specification.

## B. Seat and disc

### 1) Valve characteristics

Two types are available : Linear and Equal Percent types.

### 2) Structure

The valve seat is screwed into the body for easy replacement.

For seat, Stellite (No. 6)

For disc, Stellite (No. 12)

For disc stellite, the filling is applied as shown on the right as far as the Cv value is 0.7 or more, and is applied over the entire length of "h" for lower Cv values. The disc may be screwed into the spindle, and may be replaced alone.

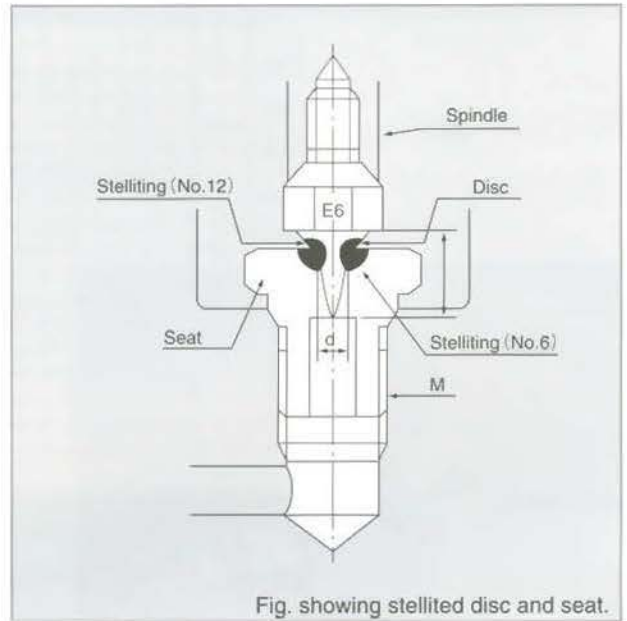


Fig. showing stellite disc and seat.

### 3) Classification of seats and disc

#### (Seat)

Cv value	Code	Orifice diameter (mm) d	Mounting screw size (M)
5	A	15.0	M20×2
3	B	10.6	
2	C	8.6	
1.5	D	7.2	
1	E	6.2	
0.7	F	4.8	
0.5	G	4.0	M10×1.25
0.35	H	3.5	
0.25 to 0.05	I	3.0	
0.035 to 0.01	J	2.6	
0.007 or less	K	1.0	

Seat can be replaced if the size of mounting screw is the same, but the disc also must be replaced at the same time. For Cv = 5 models, the body has a surface functioning as a seat instead of being attached with the separate seat.

#### 4) Filters

Foreign substance in the fluid may clog the valve passage for the valve having lower Cv. A filter should therefore be mounted before the valve.

Additional information is available upon request.

(Disc) L indicates a linear characteristics; E indicates an equal percent characteristics.

Cv value	Code	Shape	Cv value	Code	Shape
5	L 01 E 01		0.0010	L 23 E 23	
3	L 02 E 02		0.0007	L 24 E 24	
2	L 03 E 03		0.0005	L 25 E 25	
1.5	L 04 E 04		0.00035	L 26 E 26	
1	L 05 E 05		0.00025	L 27 E 27	
0.7	L 06 E 06		0.00015	L 28 E 28	
0.5	L 07 E 07		0.00010	L 29 E 29	
0.35	L 08 E 08		0.00007	L 30 E 30	
0.25	L 09 E 09		0.00005	L 31 E 31	
0.15	L 10 E 10		0.000035	L 32 E 32	
0.10	L 11 E 11		0.000025	L 33 E 33	
0.07	L 12 E 12		0.000015	L 34 E 34	
0.05	L 13 E 13		0.000010	L 35 E 35	
0.035	L 14 E 14	0.000007	L 36 E 36		
0.025	L 15 E 15	0.000005	L 37 E 37		
0.015	L 16 E 16	0.0000035	L 38 E 38		
0.010	L 17 E 17	0.0000025	L 39 E 39		
0.007	L 18 E 18	0.0000015	L 40 E 40		
0.005	L 19 E 19				
0.0035	L 20 E 20				
0.0025	L 21 E 21				
0.0015	L 22 E 22				



## 6

## Explosion-proof Models

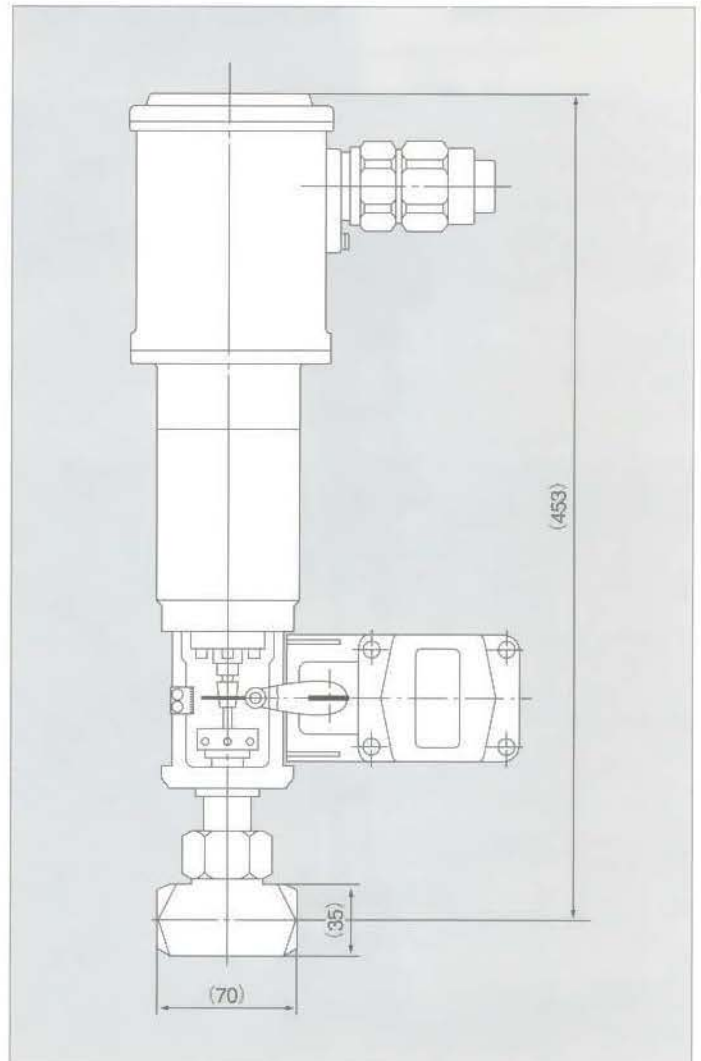
## 1. Specification

item	Contents
Explosion proofing	d2G4 (pressure resistant explosion proof) inspection No. 34006
Rated current	1.2 A
Driving method	Bi-polar chopper rated current
Excitation method	1-2 phase excitation
Operating pressure	Max. 225 kgf/cm <sup>2</sup>
Operating fluid temperature	-250 to 500 °C ※
Accessories	Positioning limit switch (d2G4) (Motoyasu barrier i2G4)

※Low temperature, standard temperature, and high temperature types are available.

## Operating fluid for explosion class and ignition temperature

Ignition temperature Explosion class	G1	G2	G3	G4
1	Acetone Ammonia Carbon monoxide Ethane Acetic acid Ethyl acetate Toluene Propane Benzene Methanol Methane	Ethanol Isopentyl acetate 1-butanol Butane Acetic anhydride	Gasoline Hexane	Acetaldehyde Ethyl ether
2	Coal gas	Ethylene Ethylene oxide		



## 7

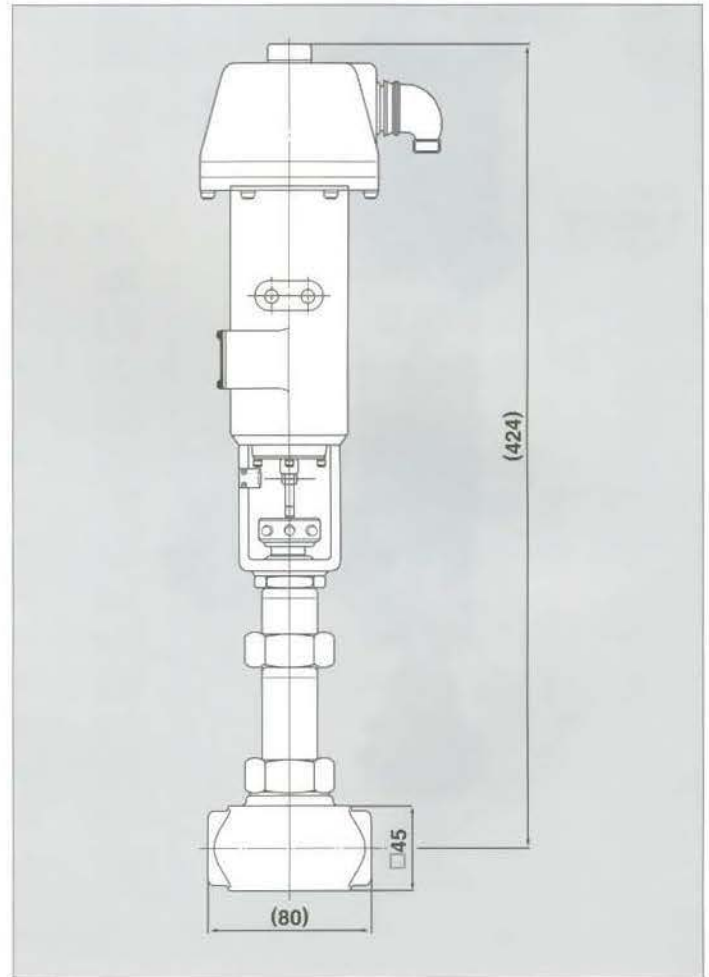
## Accessory Functional Parts

## A. Bellows seal

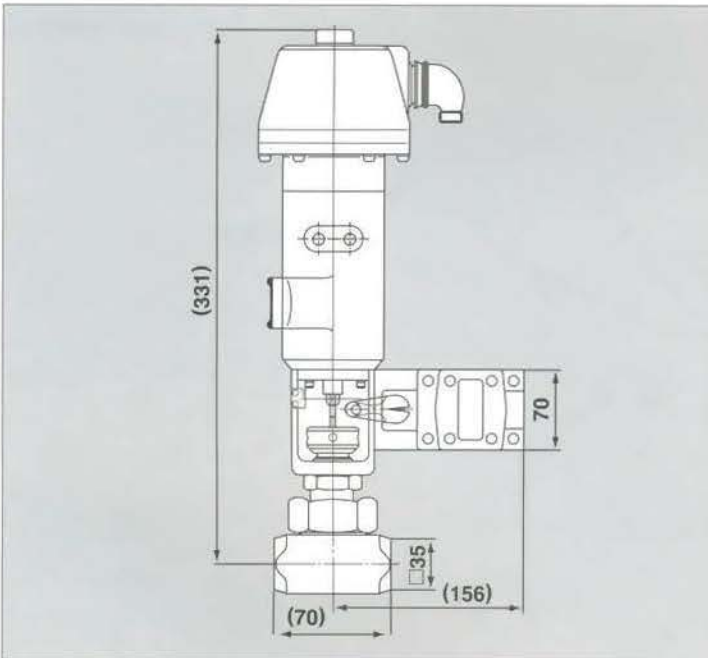
Gland section has dual-seal structure such that a PTFE O-ring gland seal is provided on top of the bellows.

## Bellow valve specification

Max. operating pressure	Bellows material SUS 316L : 10 kgf/cm <sup>2</sup> Inconel : 50 kgf/cm <sup>2</sup>
Max. operating temperature	150°C (standard type)
Bellows type	Formed bellows
Materials	SUS 316L, or Inconel
Cv	5 to 0.0000015



## B. Limit switch



Installed for remote control of on-off signals.

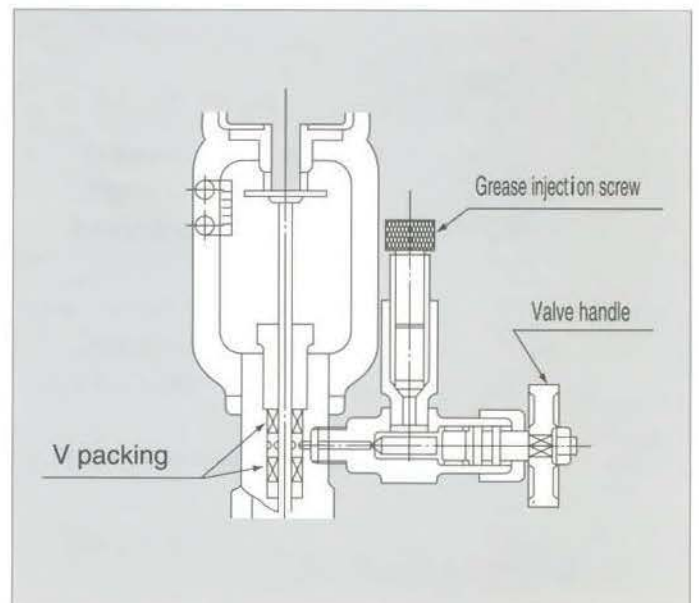
### Specification of limit switch (explosion-proof model)

Product code (Yamatake-Honeywell mfg.)		1LX5001
Withstand voltage (50/60Hz/ min)	Between nonconnected terminals	1000V
	Between terminals and noncharged metal parts	2000V
	Between terminals and ground	20000V
Insulation resistance (500VDC megger)		Min. 100 M $\Omega$
Initial contact resistance		Max. 25 m $\Omega$
Shock resistance		25G
Vibration resistance (2 hrs. continuous)		Double amplitude: 1.5 mm , 10 to 55 Hz
Allowable operating speed		1 mm/s to 0.5 m/s
Mechanical operating frequency		Max. 120 times/min
Operating temperature		-10°C to 70°C
Operating humidity		Max. 100 % RH

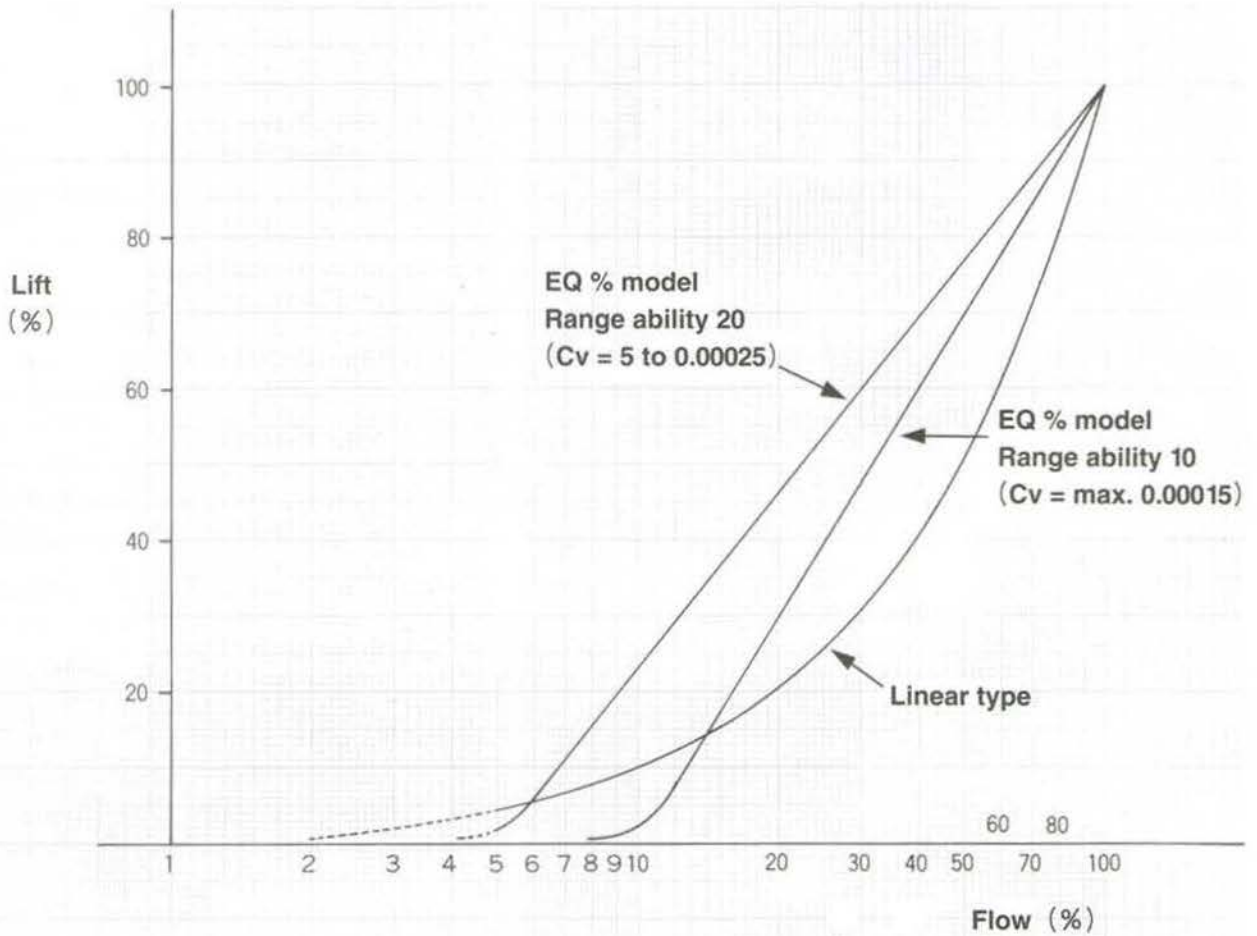
## C. With lubricator

The lubricator eliminates leak from the gland for high pressure gas services and enables smooth stem operation.

Turn the valve handle to the opening direction, inject grease with the grease injection screw, and then close the valve by turning handle. A silicon grease should be used.



# 8 Valve Characteristics

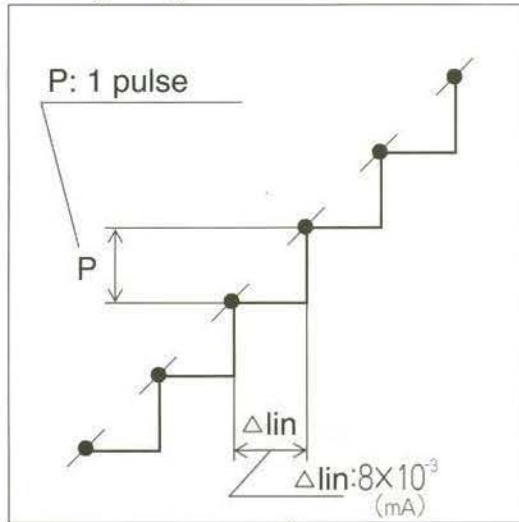


- 1) Range ability (standard)
  - Cv 5 to 0.00025 .....20
  - Max. Cv 0.00015 .....10
  
- 2) Manufacture of higher range ability is possible if required.  
 Consult your distributor.  
 (Example) Cv 5 to 0.1 .....100
  
- 3) Allowable leak is less than 1/10,000 of max. flow in standard.

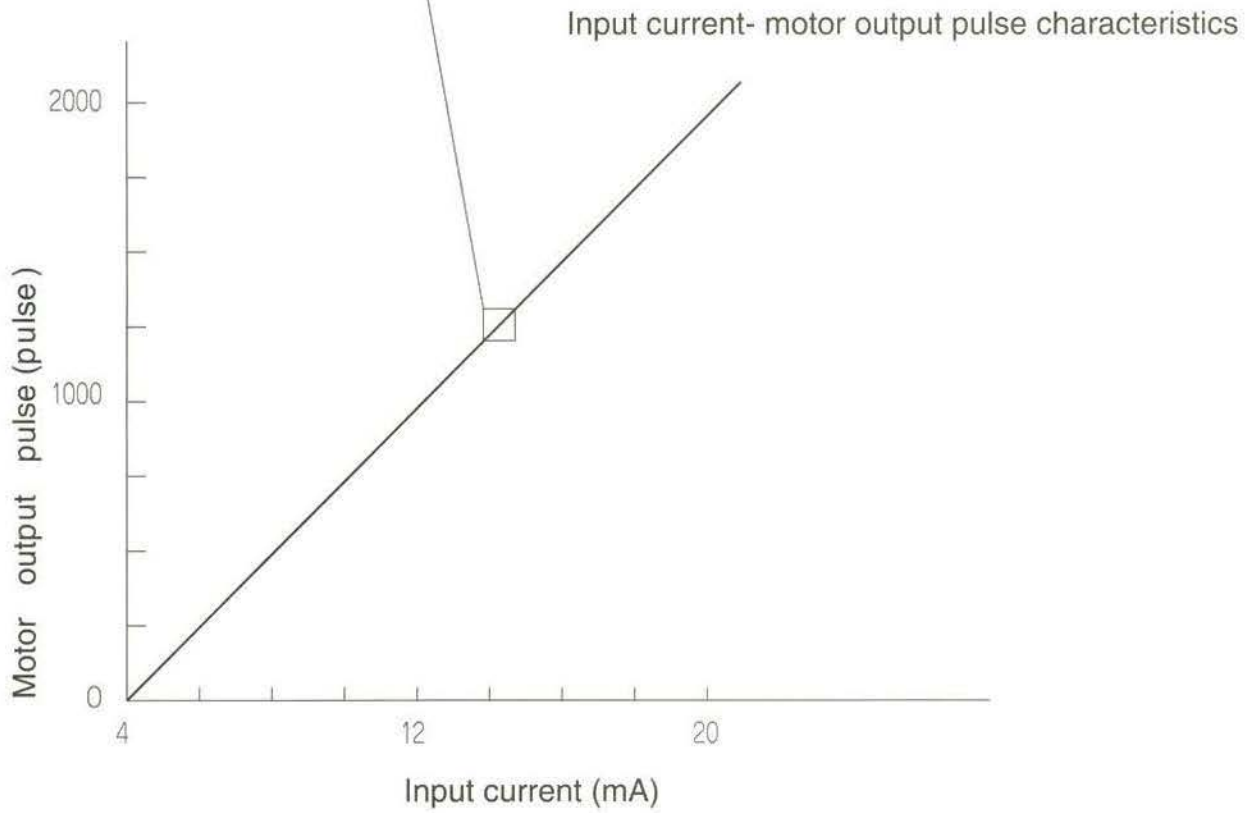


# 9 Resolution Characteristics

Enlarged figure



Resolution (Calculation)  
 (Resolution: 1/2000)  
 Stroke/resolution  
 $= \frac{8}{2000}$   
 $= 4 \times 10^{-3} \text{ (mm)}$



# 10 Cv Calculations

Fluid		Differential pressure condition	$P_2 > \frac{P_1}{2}$	$P_2 \leq \frac{P_1}{2}$
		Liquid	General	
High viscosity:			$C_v = 1.17 Q_l k_v \sqrt{\frac{G_l}{P_1 - P_2}}$	See left
Gas			$C_v = \frac{Q_g}{406} \sqrt{\frac{G_g(273+t)}{(P_1 - P_2)P_2}}$	$C_v = \frac{Q_g}{203 P_1} \sqrt{G_g(273+t)}$
Steam	Saturated		$C_v = \frac{Q_s}{19.4 \sqrt{(P_1 - P_2)P_2}}$	$C_v = \frac{Q_s}{9.7 P_1}$
	Superheated		$C_v = \frac{Q_s}{19.4 \sqrt{(P_1 - P_2)P_2}} (1+0.0013S)$	$C_v = \frac{Q_s}{9.7 P_1} (1+0.0013S)$
	Damp		$C_v = \frac{Q_s X}{19.4 \sqrt{(P_1 - P_2)P_2}}$	$C_v = \frac{Q_s X}{9.7 P_1}$

## (Notation)

$Q_l$  (m<sup>3</sup>/h) : Flow rate of liquid

$t$  (°C) : Fluid temperature

$Q_g$  (Nm<sup>3</sup>/h) : Flow rate of gas under standard condition (15°C, 760 mm Hgabs)

$G_l$  : Specific gravity of liquid (water = 1)

$Q_s$  (kg/h) : Flow rate of steam

$G_g$  : Specific gravity of gas (air = 1)

$P_1$  (kgf/cm<sup>2</sup> abs) : Absolute pressure of primary side

$S$  (°C) : Superheated temperature of steam

$P_2$  (kgf/cm<sup>2</sup> abs) : Absolute pressure of secondary side

$X$  : Dryness of steam (dry saturated steam  $X = 1$ )

$k_v$  : Viscosity fudge factor

## Properties of typical gases and liquids

Name	Chemical symbol	Molecular weight	Density 0°C/1atm (kg/m <sup>3</sup> )	Specific gravity (air = 1)	Liquid density (g/cm <sup>3</sup> )	Boiling point (°C)	Melting point (°C)	Critical temperature (°C)	Critical pressure (atm)	Critical density (kg/cm <sup>3</sup> )	Flash point (°C)	Ignition point (°C)	Explosion limit (%)		Risk factor	Combustibility	Toxicity	Permissible level (ppm)	Corrosiveness	Effects by inhalation	Color, smell, etc.	Water solubility	Transporting status
													Lower	Upper									
Nitrous oxide (laughing gas)	N <sub>2</sub> O	44.01	1.98	1.53	(-81) 1.23	-88.6	-90.9	36.5	71.7	0.46						△				Intoxication	Colorless, Sweet taste Sweet smell	Moderate	Liquid
Acetylene	C <sub>2</sub> H <sub>2</sub>	26.04	1.17	0.90	(-82) 0.62	-83.6	-81.8	35.7	61.5	0.23	-18	305	2.5	100	39.0	○				Simple suffocation	Colorless, Garlic-like smell	Moderate	Solution
Sulfurous anhydride	SO <sub>2</sub>	64.06	2.93	2.26	(-10) 1.46	-10.0	-75.5	157.5	77.8	0.52							○	5	○	Stimulation	Colorless, Irritating smell	Good	Liquid
Argon	Ar	34.94	1.78	1.38	(-185.7) 1.40	-185.7	-189.2	-122.4	48.0	0.53										Single suffocation	Colorless, Inertness	Slight	Gas-liquid
Ammonia	NH <sub>3</sub>	17.03	0.77	0.59	(-79) 0.82	-33.4	-77.7	132.3	111.3	0.24	Gas	630	15	28	0.9	○	○	100	○	Stimulation	Colorless, Strong irritating smell	Very good	Liquid
Carbon monoxide	CO	28.01	1.25	0.97	(-195) 0.81	-191.5	-205.0	-140.2	34.5	0.30	Gas	605	12.5	74	4.9	○	○	100		Chemical suffocation	Colorless, Odorless	Moderate	Gas
Nitrogen monoxide	NO	30.01	1.34	1.04	(-161) 1.27	-161	-151	-94.0	64.0	0.52									Stimulation, chronic toxicity	Colorless, Blue liquid	Good	Gas	
Ethane	C <sub>2</sub> H <sub>6</sub>	30.07	1.36	1.05	(-172) 0.69	-88.5	-172.0	32.3	48.2	0.21	-130	515	3.0	12.4	3.1	○			Simple suffocation by oxygen anoxia	Colorless, Odorless	Slight	Liquid	
Ethylene	C <sub>2</sub> H <sub>4</sub>	28.05	1.26	0.97	(-145) 0.62	-103.7	-169.2	9.5	50.7	0.22	Gas	490	2.7	36	12.3	○			Anesthesia	Colorless, Sweet smell	Slight	Gas-liquid	
Ethyl chloride (chloroethyl)	C <sub>2</sub> H <sub>5</sub> Cl	64.52		2.22	(6) 0.92	12.3	-136.4	187.2	52.0	0.33	-50	510	3.8	14.8	2.9	○		1000	○	Anesthesia	Colorless, Scorching taste	Soluble	Liquid
Methyl chloride (chloromethyl)	CH <sub>3</sub> Cl	50.49	2.31	1.78	(-20) 1.01	-23.7	-97.7	143.1	65.9	0.37	< 0	625	7.1	18.5	1.6	○	○	100	○	Chronic toxicity	Colorless	Good	Liquid
Vinyl chloride	C <sub>2</sub> H <sub>3</sub> Cl	62.50		2.16	(-13) 0.97	-13.9	-159.7	156.5	55.2		13	415	3.6	33	8.2	○		500	○	Anesthesia	Yellow, Slight sweet smell	Slight	Liquid
Chlorine	Cl <sub>2</sub>	70.91	3.21	2.49	(-34) 1.56	-34.1	-100.9	144.0	76.1	0.57			Explosive reaction with flammable substance				○	1	○	Stimulation	Yellow	Good	Liquid
Ozone	O <sub>3</sub>	48.00	2.14	1.71	(-183) 1.57	-112	-193	-5	92.3	0.54						△	○	0.1			Pale blue, Irritating smell	Good	
Air (dry)		28.96	1.293	1.00	(-194) 0.87	[-193]	[-213]	-140.7	37.2	0.31						△					Colorless		Gas
Ethylene oxide	C <sub>2</sub> H <sub>4</sub> O	44.05		1.52	(6) 0.89	10.7	-111.3	195.8	7.2		< -18	440	3.6	100	26.8	○	○	50		Stimulation	Colorless		
Oxygen	O <sub>2</sub>	32.00	1.43	1.11	(-183) 1.14	-183.0	-218.9	118.8	50.1	0.43						△					Colorless, Pale blue liquid	Moderate	Gas-liquid
Hydrogen cyanide	HCN	27.03		0.93	(20) 0.69	25.7	-13.3	-183.5	53.0	0.20	< -20	535	5.6	40	6.1	○	○	10		Permeation through skin	Colorless, Slight smell of bitter almonds		Liquid
Steam	H <sub>2</sub> O	18.02	0.77	0.59	1.00	100.0	0																
Hydrogen	H <sub>2</sub>	2.02	0.09	0.07	(-253) 0.07	-252.8	-259.2	-239.9	12.8	0.03	Gas	400	4.0	75	17.8	○				Asphyxiant action	Colorless	Moderate	Gas
Carbon dioxide	CO <sub>2</sub>	44.01	1.98	1.53	(-37) 1.11	-56.6	-78.5	31.0	72.8	0.46								5000		Anesthesia of respiratory system	Colorless, Odorless	Moderate	Liquid
Nitrogen	N <sub>2</sub>	28.02	1.25	0.97	(-196) 0.81	-195.8	-209.9	-147.1	33.5	0.31									Asphyxiant action	Colorless	Moderate	Gas-liquid	
Neon	Ne	20.18	0.90	0.70	(-246) 1.20	-245.9	-248.6	-228.7	26.9	0.48									Suffocate action	Colorless, Inertness	Slight	Gas	
Dichloro difluoro methane	CCl <sub>2</sub> F <sub>2</sub>	120.92		4.17	(20) 1.29	-30	-158													Anesthesia	Colorless, Almost odorless	Slight	Liquid
Butadiene (1 to 3)	C <sub>4</sub> H <sub>6</sub>	54.09		1.87	(20) 0.62	-4.4	-108.9	152.0	42.7		< -7	420	2.0	12	5.0	○		1000		Anesthesia	Colorless, Polymerability	Insoluble	Liquid
Butane	C <sub>4</sub> H <sub>10</sub>	58.12	2.70	2.09	(20) 0.85	-0.5	-135.0	152.0	37.5	0.23	-72	405	1.8	8.4	3.7	○			Simple suffocation	Colorless	Very good	Liquid	
Propane	C <sub>3</sub> H <sub>8</sub>	44.09	2.02	1.56	(-44.5) 0.59	-42.1	-187.7	96.8	42.0	0.22	-102	450	2.1	9.5	3.5	○			Anesthesia	Colorless	Soluble	Liquid	
Propylene	C <sub>3</sub> H <sub>6</sub>	42.08	1.92	1.48	(-79) 0.65	-47.0	-185.2	92.0	45.6	0.23	Gas	460	2.4	11	3.6	○			Anesthesia		Slight	Liquid	
Helium	He	4.00	0.18	0.14	(-270) 0.15	-268.9	-272.2	-267.9	2.3	0.07											Colorless	Good	Gas
Phosgene	COCl <sub>2</sub>	98.92	4.53	3.42	(0) 1.43	8	-128	182	56	0.52							○	1	○	Suffocation	Colorless, Fresh straw smell	Slight	Liquid
Methane	CH <sub>4</sub>	16.04	0.72	0.55	(-114) 0.42	-161.6	-182.7	-82.1	45.8	0.16	-187	540	5.0	15.0	2.0	○			Simple suffocation	Colorless, Tasteless, Odorless	Moderate	Gas	
Hydrogen sulfide	H <sub>2</sub> S	34.08	1.54	1.19	0.96	-60.2	-85.5	100.4	88.9	0.35	Gas	270	4.0	44	10.0	○	○	20	○		Colorless, Foul smell	Very good	Liquid

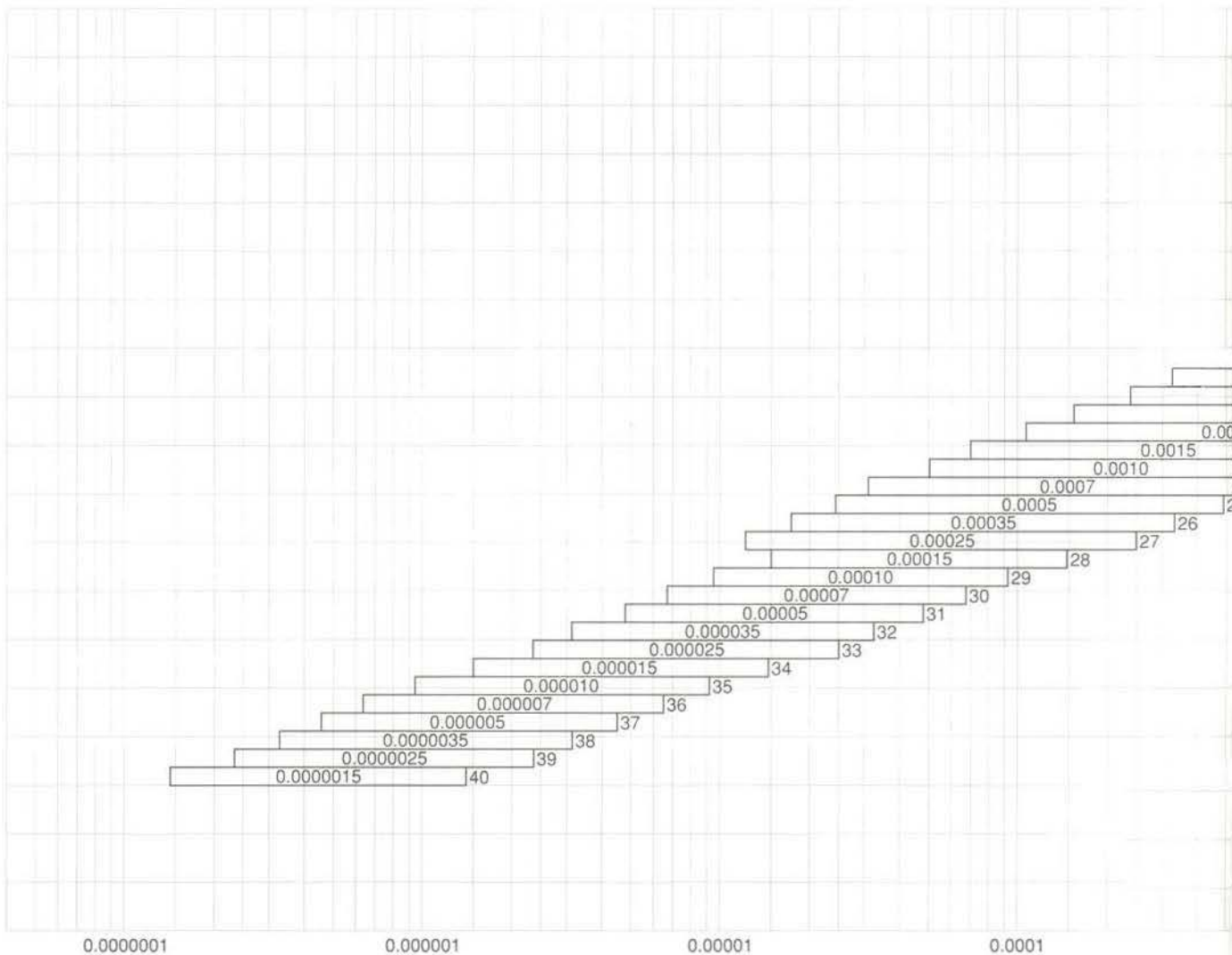
※The table is for the purpose of calculation of Cv values. As for corrosion resistance, consult your distributor.



# 11 Cv Selection

- 1) Standard AR2000 Cv values are shown in the table below.  
 Select the desired valve in accordance with the Cv value calculated by the formula given earlier. Be sure to leave at a 20 to 30 % safety factor when determining the Cv value.
- 2) ■ Cv value and applicable diameter range (Manufacturable Cv values for each bore are given in the table below.)

Bore	1/8(A)	1/4(B)	3/8(C)	1/2(D)	3/4(E)
Cv value	Max. 0.25	Max.0.7	Max.1.0	Max.3.0	Max.3.0





### 3) Cv value and usable fluid pressure

Unit; (kgf/cm<sup>2</sup>)

Item		Cv value		0.0000015	0.05	0.35	0.7	1.0	1.5	2	3	5
		~0.035	~0.25	~0.5								
Com- pact	Primary side max. pressure	150	150	90	75	53	38	23	15	7.5		
	Secondary side max. pressure	90			75	53	38	23	15	7.5		
Inter- mediate	Primary side max. pressure	300	300	180	150	105	75	45	30	15		
	Secondary side max. pressure	180			150	105	75	45	30	15		
Large	Primary side max. pressure	500	500	360	300	210	150	90	60	30		
	Secondary side max. pressure	360			300	210	150	90	60	30		

●When the secondary pressure acts on the spindle, the seat becomes not to be completely sealed owing to a limit to the output of actuator; so that maximum usable pressure is limited as shown above.

### 4) Cv value and filter

●For the valves with Cv value less than 0.01, a filter should be installed before the valve input to prevent unsteady flow and stopping up passage by cumulative effects of foreign substance, especially against slide of the disc. Appropriate filter mesh is 0.5 $\mu$ .

