

Catalog No. **DE303-04**

NDV DIAPHRAGM VALVE



NIPPON DAIYA VALVE CO., LTD.

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INTRODUCTION OF PRODUCTS

Weir Type Diaphragm Valve (Basic type: Type 400)

Manually Operated Diaphragm Valve: Type 400



Nominal Size(DN) : 15 - 300

Pneumatically Operated ON-OFF Diaphragm Valve: Type PO(PC, PN) 1400N

Nominal Size (DN):15-150

PO...Reverse Acting(Air to Open)

PC...Direct Acting(Air to Close)

PN...Double Acting



Pneumatically Operated ON-OFF Diaphragm Valve: Type HO(HC, HN) 1400N

Nominal Size (DN):100-300

HO...Reverse Acting(Air to Open)

HC...Direct Acting(Air to Close)

HN...Double Acting



●Large and high output type

Pneumatically Operated Flow Control Diaphragm Valve (1): Type 3400 [Rolling diaphragm type]

Nominal Size (DN):15-150

BO...Reverse Acting(Air to Open)

BC...Direct Acting(Air to Close)



Pneumatically Operated Flow Control Diaphragm Valve (2): Type HN3400N [Cylinder type]

Nominal Size (DN):150-300

HN...Double Acting



●Large and high output type

Electrically Operated Diaphragm Valve (1): Type MS4400

Nominal Size (DN): 25 - 300



Electrically Operated Diaphragm Valve (2): Type NR4400

Nominal Size (DN): 15 - 80



Photos in this catalog represent images of valves. Actual appearance may differ by specifications.

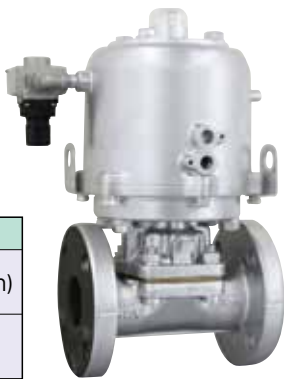
Straight Type Diaphragm Valve (Basic type: Type 500)

Manually Operated Diaphragm Valve: Type 500



Nominal Size (DN): 15 – 300

Pneumatically Operated ON-OFF Diaphragm Valve: Type PO(PN) 1500N



Nominal Size (DN): 15 – 100
PO…Reverse Acting(Air to Open)
PN…Double Acting

Pneumatically Operated ON-OFF Diaphragm Valve: Type HOT (HN) 1500N



Nominal Size (DN): 125 – 300
HOT…Reverse Acting(Air to Open)
HN…Double Acting

●Large and high output type

Electrically Operated Diaphragm Valve (1): Type MS4500



Nominal Size (DN): 25 – 300

Electrically Operated Diaphragm Valve (2): Type NR4500



Nominal Size (DN): 15 – 50

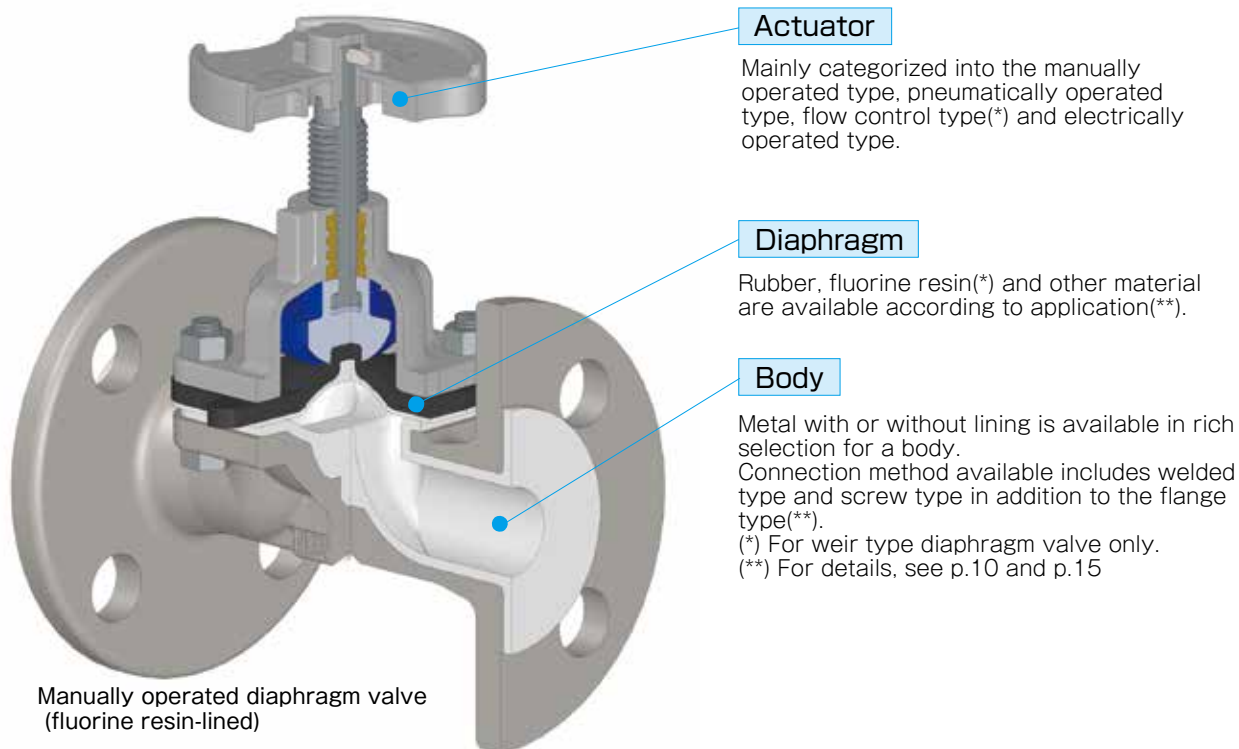
For the product specifications and details, contact our Sales Dept. or local representative.

OVERVIEW OF DIAPHRAGM VALVES

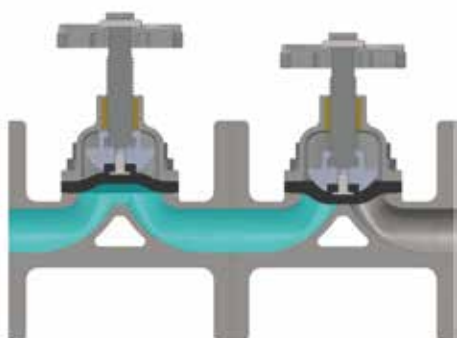
① Basic Structure and Mechanism of Diaphragm Valves

- Diaphragm valve generally refers to a valve having a diaphragm of rubber or other flexible material that opens or closes the fluid passage.
- The following diagram shows the basic structure of diaphragm valve that consists of three units, actuator, diaphragm and the body. The valve controls the liquid flow by pressing or depressing the diaphragm to or from the sealing surface on the inside of the body.
- Diaphragm valves are roughly categorized to two types; Weir type (Type 400) and Straight type (Type 500), but both types share the same basic structure.

Basic unit structure

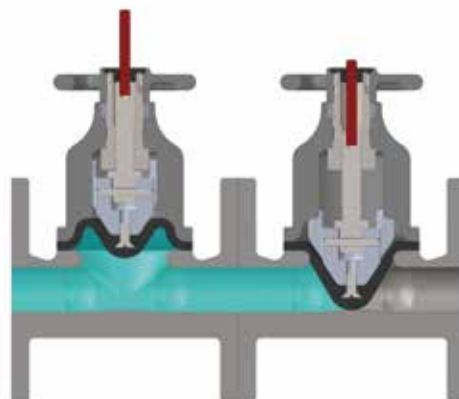


Weir type diaphragm valve: Type 400



- Basic structure of diaphragm valve having a weir at the fluid passage. The diaphragm and weir of the body are tightly closed for airtightness to achieve high valve seat sealing performance.
- Rich selection is available for the main body and diaphragm material to apply to a wide scope of fluid.
- Used for : Chemical, environment and water treatment, iron and steel, shipbuilding, medical, food, semiconductor, power generation, etc.

Straight type diaphragm valve: Type 500

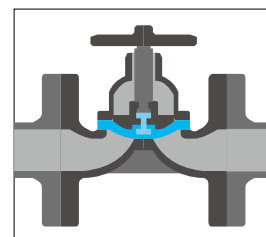


- The fluid passage is straight, which minimizes pressure drop and/or fluid accumulation.
- Applicable to viscous fluid, cellulose fluid, slurry, sledge and other fluids containing suspended solids.
- Used for : Water purifying plants, terminal treatment plant, etc.

② Features of Diaphragm Valves

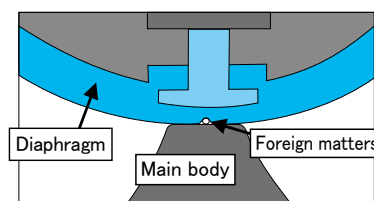
① Superb airtightness

- Actuator is isolated by the diaphragm. This prevents fluid leakage to outside or contamination of fluid by outside air.



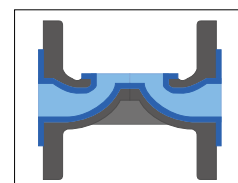
② Zero leak from valve seat

- Controlled by flexible diaphragm, no fluid leaks from the valve seat.
- In the case of rubber diaphragm, complete closing is available, even if some foreign matters are bitten into diaphragm due to its flexibility.



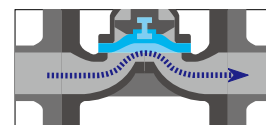
③ Superb corrosion and chemical resistance

- Simple body shape is suitable for the lining process.
- Combination of rich selection of diaphragm material and various lining bodies such as rubber and fluorine resin allows manufacture of valves applicable to a wide span of fluid specifications, which is more efficient costwise than special alloy combination.



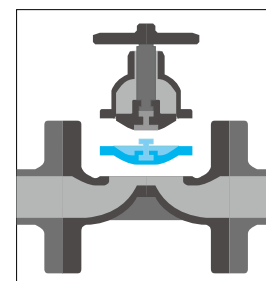
④ Good self-purifying performance

- Streamlined fluid passage without pockets provides self-purifying performance by minimizing fluid retention.



⑤ Superb maintainability

- Simple design of three parts. Actuator, Diaphragm and the Body makes it easy to disassemble/assemble the valve.
- Top entry structure adopted enables to change diaphragm by simply removing the nuts and bolts that joint the main body and the bonnet without disconnecting the valve from the piping.
- Each unit is interchangeable, enabling a system change with ease from manual to automatic operation.



⑥ Environment-friendly types

- Simple 3-unit construction of the Actuator, Diaphragm and the Body requires less number of parts than other valve types, saving consumable parts.

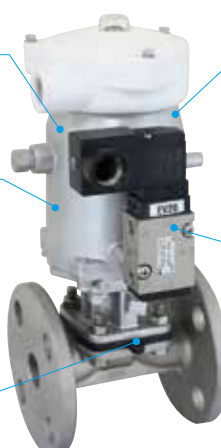
Environment-friendly type paint and lubricant free from hazardous heavy metal are used. (RoHS compliance)

Actuator for the pneumatically operated diaphragm valve is improved to have much higher durability, extending the replacement cycle for expendable parts.

Chloroprene diaphragm is lead-free.

Improved actuator for the pneumatically operated diaphragm valve has reduced air consumption. (Approx. 20% in average from the conventional products of ours.)

Solenoid valve to the pneumatically operated actuator can be installed directly without pneumatic piping, thus reducing material usage.



Type POM1400N

● LIST OF DIAPHRAGM VALVES

Specifications			Weir type diaphragm valve (Type 400)												Straight type diaphragm valve (Type 500)							
			Manually operated type	Pneumatically operated type ON-OFF diaphragm valve								Pneumatically operated flow control diaphragm valve				Electrically operated type	Manually operated type	Pneumatically operated ON-OFF diaphragm valve				Electrically operated type
				①Type PO(PC, PN) 1400N				②Type HO(HO, HN) 1400N				①[Rolling diaphragm type]						②[Cylinder type]				
				Reverse Acting	Direct Acting	Double Acting	Type	Reverse Acting	Direct Acting	Double Acting	Type	Reverse Acting	Direct Acting	Double Acting	Type			Reverse Acting	Double Acting	Reverse Acting	Double Acting	
Material (Base material)			Type PO1400N	Type PC1400N	Type PN1400N	Type HO1400N	Type HC1400N	Type HN1400N	Type	Type BO3400	Type BC3400	Type HN3400N	Type	Type PO1500N	Type PN1500N	Type HOT1500N	Type HN1500N	Type	Type			
Main body material and range of applicable nominal size (DN)	Gray cast iron	FC200	O1	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Ductile cast iron	FCD-S	O4	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Stainless steel	SCS13	07(2)/07	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
		SCS14	12(2)/12	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
		SCS16	13(2)/13	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Dissolved zinc plated	HDZ55(FC200)	71	15-300		15-150	100-200	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Hard natural rubber lined	(FC200)	30	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Soft natural rubber lined	(FC200)	33	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Chloroprene rubber lined	(FC200)	35	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Butyl rubber lined	(FC200)	36	15-300		1-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
	Polyethylene lined	(FC200)	50	20-200		20-150	100-200	150	125-200	20-150	150-200	20-200	20-200	—	—	—	—	—				
	PFA lined	(FCD-S)	59(M)	15-250		15-150	100-250	150	125-250	15-150	150-250	15-250	15-250	—	—	—	—	—				
		(SCS13)	59(2S)/59(S)	15-80		15-80	—	—	—	15-80	—	—	15-80	—	—	—	—	—				
	ETFE lined	(FCD-S)	60	15-100		15-100	100	—	—	15-100	—	—	15-100	—	—	—	—	—				
	Glass lined	(FCD-S)	40(O4)	15-200		15-150	125-200	150	125-200	15-150	150-200	15-200	15-200	—	—	—	—	—				
	Ceramic lined	(FCD-S)	80(O4)	15-80		15-80	—	—	—	15-80	—	—	15-80	—	—	—	—	—				
	Natural rubber	NR+BR	NR	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300				
Chloroprene rubber	CR	CR	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300					
Butyl rubber	IIR	BG	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300					
Nitrile rubber	NBR	AB	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300					
EPDM	EPDM	EP	15-300		15-150	100-250	150	125-300	15-150	150-300	15-300	15-300	15-100	125-150	125-300	15-300	15-300					
NEW PTFE/EPDM	NEW PTFE/EPDM	TX/CE	15-100		15-100	100	—	—	15-100	—	—	15-100	—	—	—	—	—					
NEW PTFE/EPDM+α	NEW PTFE/EPDM+α	TX/CX	15-100		15-100	100	—	—	15-100	—	—	15-100	—	—	—	—	—					
PTFE/EPDM	PTFE/EPDM	TF/CE	125-250		125-150	125-250	150	125-250	125-150	150-250	125-250	125-250	—	—	—	—	—					
PTFE/EPDM+α	PTFE/EPDM+α	TF/CX	125-200		125-150	125-200	150	125-200	125-150	150-200	125-200	125-200	—	—	—	—	—					
Diaphragm material and range of applicable nominal size (DN)																						

· This table outlines the standard manufacturing range of the flanged type body.
· For other material and/or nominal size, contact our Sales Dept. or local representative.

1

MANUALLY OPERATED DIAPHRAGM VALVE

1-1. Weir type Diaphragm Valve: Type 400

- ① Common specifications: Body material
- ② Common specifications: Diaphragm material
- ③ Actuator specification
- ④ Optional
- ⑤ Principal dimension list

1-2. Straight type Diaphragm Valve: Type 500

- ① Common specifications: Body material
- ② Common specifications: Diaphragm material
- ③ Principal dimension list

1-3. Reference materials

- ① Manually operated diaphragm valve: Stroke and Cv Value
- ② Maximum Working Pressure
- ③ Selection of material
- ④ Standard exterior paint color

1. Weir type Diaphragm Valve: Type 400

① Common specifications: Body material

● Metal material (without lining)



Type 400 (Flange type)



Type 400L (Flange type)



Type 400Rc (Screwed type)



Type 400SW (Welded type)

Name	Main material	Material code	Flange type		Screwed type Type 400Rc	Welded type Type 400(SW/BW)
			Type 400	Type 400L		
			Nominal Size (DN)	Nominal Size (DN)	Nominal Size (DN)	Nominal Size (DN)
Gray cast iron	FC200	01	15-300	15-100	—	—
Ductile cast iron	FCD-S	04	15-300	15-100	15-25	—
Stainless steel	SCS13	07(2)/07	15-300	15-100	15-40	15-50
	SCS14	12(2)/12	15-300	15-100	15-40	15-50
	SCS16	13(2)/13	15-300	15-100	—	15-50
Dissolved zinc plated	HDZ55(FC200)	71	15-300	15-100	—	—

Lined body with excellent corrosion, chemical and wear resistance

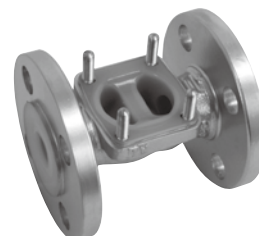
● Rubber lining

Name	Base material	Material code	Flange type	
			Type 400	Type 400L
			Nominal Size (DN)	Nominal Size (DN)
Hard natural rubber lined	FC200/FCD-S	30/30(04)	15-300	15-200
Soft natural rubber lined	FC200/FCD-S	33/33(04)	15-300	15-200
Chloroprene rubber lined	FC200/FCD-S	35/35(04)	15-300	15-200
Butyl rubber lined	FC200/FCD-S	36/36(04)	15-300	15-200



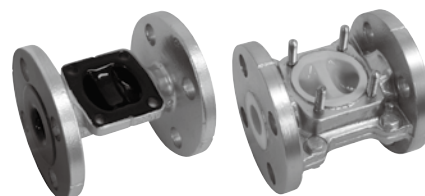
● Synthetic resin lining

Name	Base material	Material code	Flange type
			Type 400
			Nominal Size (DN)
Polyethylene lined	FC200	50	20-200
P F A lined *	FCD-S	59(M)	15-250
	SCS13	59(2S)/59(S)	15-80
E T F E lined *	FCD-S	60	15-100



● Glass lining and Ceramic

Name	Base material	Material code	Flange type
			Type 400
			Nominal Size (DN)
Glass lined *	FCD-S	40(04)	15-200
Ceramic lined	FCD-S	80(04)	15-80



*Those are dual use goods under export control by Japanese government.

In case of export, export license stipulated in the Foreign Exchange and Foreign Trade Control Law of Japan and/or if necessary, export-related laws and regulations of the United States of America and other countries is required.

② Common specifications: Diaphragm material

● Rubber diaphragm



DN15-20



DN25-80



DN100-

Name	Main material	Material code	Nominal Size (DN)	Applicable temperature
Natural rubber	NR+BR	NR	15-300	-40 to 80°C
Chloroprene rubber	CR	CR	15-300	-5 to 90°C
Butyl rubber	IIR	BG	15-300	-25 to 90°C
Nitrile rubber	NBR	AB	15-300	5 to 80°C
E P D M	EPDM	EP	15-300	-40 to 120°C

● Fluorine resin diaphragm

Wetted surface

Cushion rubber



DN100-

Wetted surface/Cushion rubber			Nominal Size (DN)	Applicable temperature
Name	Main material	Material code		
NEW PTFE/EPDM	NEW PTFE/EPDM	TX/CE	15-100	-20 to 143°C
NEW PTFE/EPDM+ α *	NEW PTFE/EPDM+ α *	TX/CX	15-100	-20 to 151°C
P T F E / E P D M	PTFE/EPDM	TF/CE	125-250	-20 to 143°C
P T F E / E P D M + α *	PTFE/EPDM+ α *	TF/CX	125-200	-20 to 151°C

*EPDM+ α has been developed by our company to improve heat resistance of EPDM.

Optional:

- Fluoro rubber cushion rubber
- Hastelloy diaphragm fixing bayonet pin

- The applicable temperature differs by the body material, fluid specifications (composition and pressure), opening/closing frequency and nominal size. In addition, vacuum specification is limited by the type of diaphragm and the nominal size because of the relationship between the degree of vacuum and the temperature. For further details, contact our Sales Dept. or local representative.
- This catalog lists the standard range of manufacture. For any material, nominal size and connection standards required other than listed here, please contact our Sales Dept. or local representative.

For the detail of material selection, refer to the material selection list on p.48.

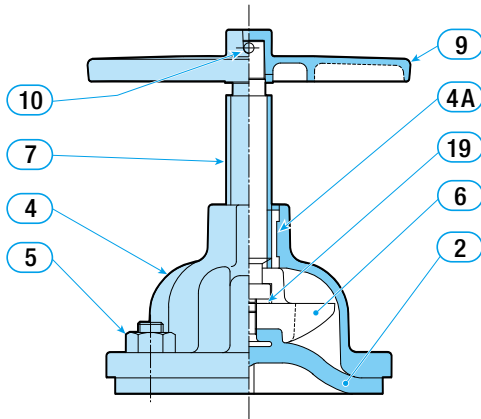
1. Weir Type Diaphragm Valve: Type 400

③

Actuator specifications

●Type 400: Standard manual handwheel

- Standard construction material: DN15 - 100



Part No.	Name	Material	Quantity	Applicable nominal Size DN
2	Diaphragm	(As per your specification)	1	
4	Bonnet	ADC12 (1)	1	15-50
		FCD450		65-100
4A	Stem bush	C3604	1	15-50
5	Bolt	SWCH	4SET	15-80
	Nut	SWRM	8SET	100
6	Compressor	ADC12 (2)	1	
7	Spindle	SUS403	1	
9	Handwheel	ADC12	1	15-65
		FCD450	1	80-100
10	Stop pin	S20C	1	
19	Thrust washer	SPCC+Polyacetal	1	

(1) : Also available in FCD

(2) : Also available in SCS13

Compared with FC200 and SCS13, ADC12 (aluminum die casting) is corroded in a short period of time by caustic soda and other alkaline chemicals, hydrochloric acid, sulfuric acid and other inorganic acids and chlorine gasses. Especially do not use for bromine.

④

Optional

●Type S400: With an opening indicator

- Valve opening can be checked with the scale.



Fully open



Fully closed

●Type L400: With a lock nut

- The valve opening can be set to the full opening, full closing or intermediate opening and the spindle can be fixed with the lock nut.



●Type M400: With a limit switch

- Commercially-supplied limit switch may be mounted.



Type M400NB: Closed only

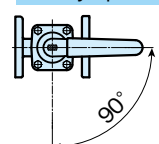
(Opening-closing type also available. Please inquire.)

●Type QL400NB: With quick opening-closing lever handle

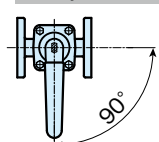
- A 90-degree lever handle operation makes opening/closing much easier compared with the conventional handwheel type.
- The 90-degree operation allows to see exact valve opening state from distance by the position of the lever handle.
- Constant torque application during the opening and closing of the valve allows any operator stable closing performance.
- Prevents overtightening when closing the valve. Gives no excessive load to the diaphragm to ensure longer life.



Fully open

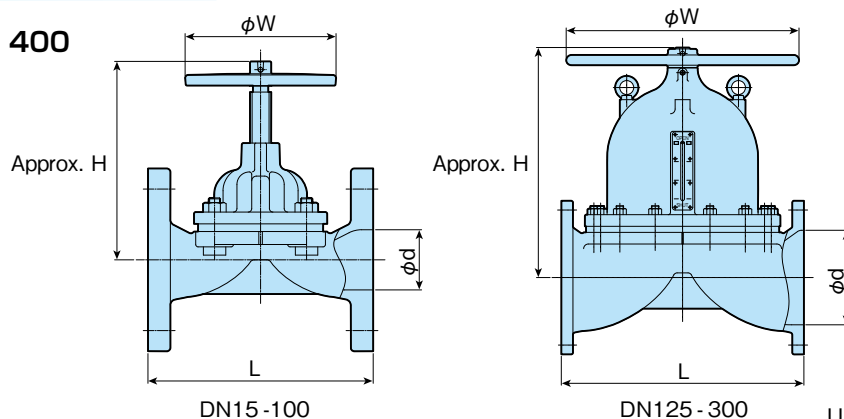


Fully closed



5 Principal dimension list

● Flange type① : Type 400



DN15-100

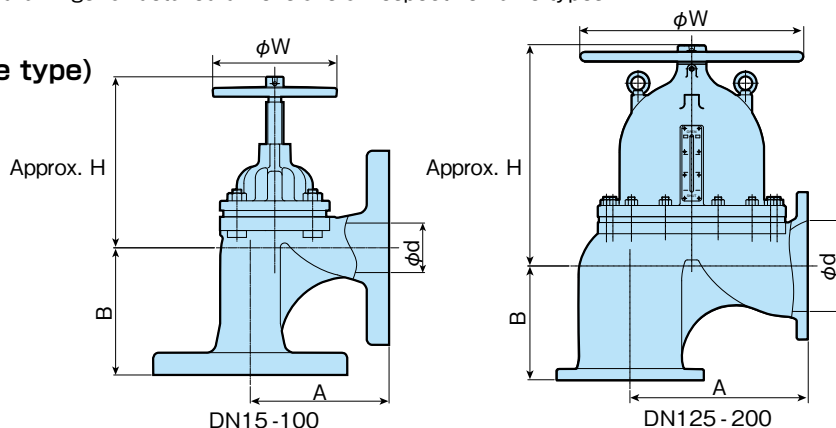
DN125-300

Unit:mm

Nominal Size (DN)	Diameter d		Face-to-face length L		Handwheel diameter W	Height H, approx.	Lining rubber thickness T	Mass approx.(kg)
	Other than rubber/resin-lined	Rubber/resin-lined	Other than rubber/resin-lined	Rubber/resin-lined				
15	13	15	102	107	63	115	3	2.0
20		19	118	123	63	125	3	2.3
25		25	127	132	80	129	3	3.5
40		38	159	165	100	155	3	5.4
50		51	191	197	125	172	3	7.2
65		64	216	222	125	209	3	12.5
80		76	254	260	160	235	3	18.0
100		102	305	313	224	297	4	28.0
125		127	356	364	300	325	4	47.0
150		152	406	414	350	365	4	72.0
200		203	521	529	500	500	4	140.0
250		254	635	645	600	585	5	226.0
300		305	749	759	700	680	5	340.0

Remarks : 1.The mass is for the body of cast iron (JIS 10K.)
 2.Height H represents the dimension when fully open.
 3.Because of narrow space for the hexagon piping nut on the back of the flange of nominal size DN15 - 80, use of continuous-thread stud and hexagonal nut of style 1(8-slit nut) is recommended.
 4.Check the drawings for detailed dimensions of respective valve types.

● Flange type② : Type 400L (Angle type)



DN15-100

DN125-200

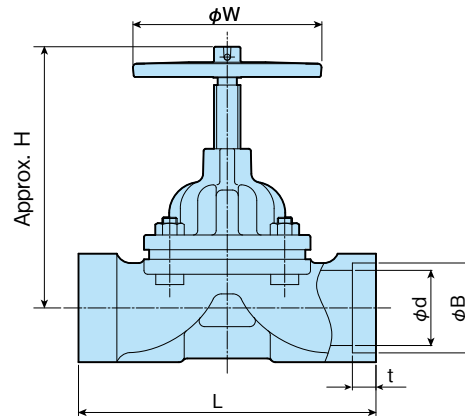
Unit:mm

Nominal Size (DN)	Diameter d		Face-to-face Ax B		Handwheel diameter W	Height H, approx.	Mass approx.(kg)
	Other than rubber/resin-lined	Rubber/resin-lined	Other than rubber/resin-lined	Rubber/resin-lined			
15	13	15	67×64	69.5×66.5	63	115	2.0
20		19	73×67	75.5×69.5	63	125	2.3
25		25	83×80	85.5×82.5	80	129	3.5
40		38	105×80	108×83	100	155	5.6
50		51	130×98	133×101	125	172	8.4
65		64	149×123	152×126	125	209	13.0
80		76	178×140	181×143	160	235	19.5
100	102	94	216×152	220×156	224	297	36.0
125	—	119	—	258×284	300	325	—
150	—	144	—	310×219	350	365	—
200	—	195	—	402×258	500	500	—

Remarks : 1. The mass is for the body of cast iron (JIS 10K).
 2. Height H represents the dimension in fully open valve state.

1. Weir Type Diaphragm Valve: Type 400

● Welded type (Socket Welded/JIS B 2316 Schedule 80)

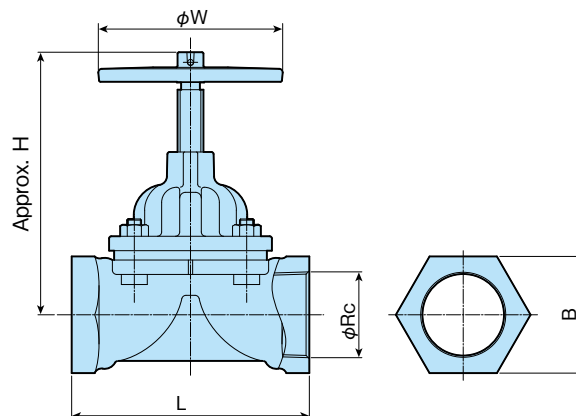


Unit: mm

Nominal Size DN	diameter d	Face-to-face length L	Handwheel diameter W	Height H, approx.	Inside diameter B of the joint	Joint depth t	Mass approx. (kg)
15	13	102	63	115	22.2	10	0.7
20	19	118	63	125	27.7	13	1.0
25	25	127	80	129	34.5	13	1.4
40	38	159	100	155	49.1	13	3.0
50	51	191	125	172	61.1	16	4.6

Remarks : 1. The mass is for the body of stainless steel.
 2. Height H represents the dimension in fully open valve state.
 3. Butt-welded type also available.

● Screwed type (Taper Pipe Threads/JIS B 0203, ISO 7-1)



Unit: mm

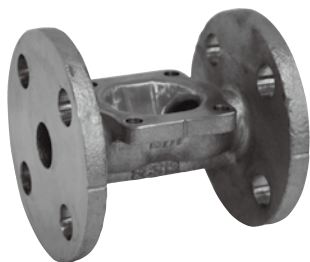
Nominal Size DN	Screw for pipe Rc	Face-to-face length L	Handwheel diameter W	Height H, approx.	Two face breadth B	Mass approx. (kg)
15	1/2	64	63	102	32	0.6
20	3/4	83	63	115	38	0.8
25	1	108	80	125	48	1.4
40	1 1/2	140	100	163	70	2.7

Remarks : 1. The mass is for the body of stainless steel.
 2. Height H represents the dimension in fully open valve state.

2. Straight Type Diaphragm Valve: Type 500

① Common specifications: Body material

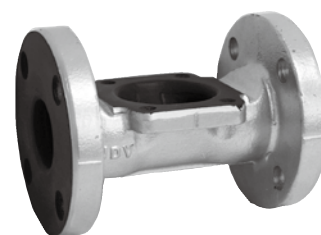
● Metal material (without lining)



Name	Main material	Material code	Flange type, Type 500
			Nominal Size(DN)
Gray cast iron	FC200	01	15-300
Ductile cast iron	FCD-S	04	15-300
Stainless steel	SCS13	07	15-300
	SCS14	12	15-300
	SCS16	13	15-300
Dissolved zinc plated	HDZ55(FC200/FCD-S)	71	15-300

● Rubber lining

Name	Base material	Material code	Flange type, Type 500 Nominal Size (DN)
Hard natural rubber lined	FC200/FCD-S	30/30(04)	15-300
Soft natural rubber lined	FC200/FCD-S	33/33(04)	15-300
Chloroprene rubber lined	FC200/FCD-S	35/35(04)	15-300
Butyl rubber lined	FC200/FCD-S	36/36(04)	15-300



② Common specifications: Diaphragm material

● Rubber diaphragm

Name	Main material	Material code	Nominal Size(DN)	Applicable temperature
Natural rubber	NR+BR	NR	15-300	-20 to 70°C
Chloroprene rubber	CR	CR	15-300	0 to 70°C
Butyl rubber	IIR	BG	15-300	-10 to 70°C
Nitrile rubber	NBR	AB	15-300	5 to 70°C
E P D M	EPDM	EP	15-300	-20 to 90°C



- The applicable temperature differs by the body material, fluid specifications (composition and pressure), opening-closing frequency and nominal size. Take note that vacuum specification is not applicable to the straight type diaphragm valve because of the characteristics of the diaphragm and the shape of the body.
- For any material, nominal size and connection standards required other than listed here, please contact our Sales Dept. or local representative.

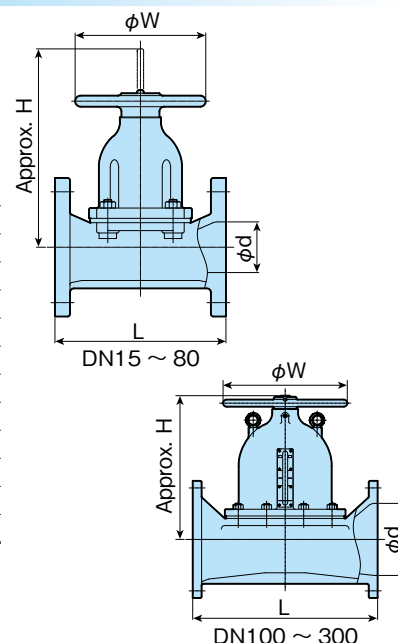
For the detail of material selection, refer to the material selection list on p.48.

③ Principal dimensions

● Flange type: Type 500

Nominal size (DN)	Diameter d		Face-to-face length L		Handwheel diameter W	Height H, approx	Lining rubber thickness T	Mass approx. (kg)
	Other than rubber-lined	Rubber-lined	Other than rubber-lined	Rubber-lined				
15	13	15	102	107	80	105	3	2.6
20		19	118	123	80	105	3	3.0
25		25	127	132	80	155	3	4.8
40		38	159	165	80	155	3	5.7
50		51	191	197	140	210	3	7.8
65		64	216	222	165	250	3	14.0
80		76	254	260	197	295	3	19.0
100		102	305	313	250	270	4	23.5
125		127	356	364	300	310	4	38.5
150		152	406	414	300	380	4	64.0
200		203	521	529	350	415	4	105.0
250		254	635	645	500	570	5	166.0
300		305	749	759	600	630	5	330.0

Remarks : 1. The mass is for the body of stainless steel.
2. Height H represents the dimension in fully open valve state.



Valve type Nominal Size DN	Weir type (Type 400)							Straight type (Type 500)		
	Main body Diaphragm Stroke (mm)	Without lining		Rubber-lined	Glass-lined	PFA-lined	PFA-lined ETFE-lined	Main body Diaphragm Stroke (mm)	Without lining	Rubber-lined
		Rubber	PTFE	Rubber	PTFE	59(M)/59(S) PTFE	59(2S)/60 PTFE			
15	6	4		4.2	4.2	2.3	3	12	8.5	—
20	10	11	10.5	8.7	11	7.8	7	12	8.5	—
25	12	23.5	17	15	22	10		28	37	30
40	20	55	49	33	58	27	30	28	74	66
50	28	83	76	61	99	42	57	40	124	104
65	34	115	95	97	123	64	71	52	232	190
80	40	172	176	166	229	112	111	62	330	264
100	52	303	306	194	291	210	161	68	588	480
125	68	355		310	405	230	—	80	924	720
150	80	530		440	585	330	—	110	1680	1260
200	120	1200		1000	1320	830	—	125	2040	1740
250	140	1600		1450	—	1170	—	180	3180	2700
300	164	2580	—	2090	—	—	—	190	6060	4880

* The Cv values of Material code "59(2S)" with DN65 or bigger are same as "59(M)/59(S)".

- The maximum working pressure is determined by the combination of diaphragm (rubber/PTFE) and the main body material.
(The following table outlines the values for fluids of ordinary temperature. The max. working pressure is reduced as the fluid composition changes or the fluid temperature rises.)
- Only weir type can be used under the vacuum environment with condition, please inquire separately.

Unit: Mpa

Valve type	Weir type (Type 400)				Straight type (Type 500)
Nominal Size DN	Diaphragm and body material combination				
	Rubber diaphragm		PTFE diaphragm		Rubber diaphragm
	Cast iron Stainless steel casting Rubber-lined Resin-lined	Glass-lined Ceramic-lined	Cast iron Stainless steel casting Resin-lined	Rubber-lined Glass-lined Ceramic-lined	Cast iron Stainless steel casting Rubber-lined
15	1.4	1.0	1.0	1.0	0.7
20				0.7	
25					
40					
50	1.0	0.7	0.7	0.5	0.6
65					
80					
100	0.8	0.5	0.7	0.5	0.35
125					
150					
200	0.7				
250	0.5				
300	0.4				

● Main body material

For application to chemical solution, select the body material by giving consideration to the composition and the temperature. If the fluid is of frictional type containing powder and/or solids, select wear resistant material, simultaneously giving full consideration to the fluid pressure, flow rate, valve opening and the installation position to the piping since these factors may affect the body material.

● Diaphragm

Similar to the selection of body material, to select material for the diaphragm, it is necessary to consider the frequency of open/close service in repetition in addition to the chemical resistance. You are also requested to check the maximum service pressure as it differs by the combination of the diaphragm and body materials. In the case of a weir type diaphragm valve, avoid the combination of PTFE diaphragm and soft rubber lining (Code Nos.33, 35 and 36).

For the detail of material selection, refer to the material selection list on p.48.

- Rust resistant coating (Gray) without top coating

2

PNEUMATICALLY OPERATED TYPE ON-OFF DIAPHRAGM VALVE

2-1. Pneumatically Operated ON-OFF Diaphragm Valve Actuator

- ① Features of actuator
- ② Actuator specifications

2-2. Weir Type Diaphragm Valve: Type PO(PC, PN)/HO(HC, HN) 1400N

- ① Actuator selection table
- ② Principal dimensions

2-3. Straight Type Diaphragm Valve: Type PO(PN)/HO(HN) 1500N

- ① Actuator selection table
- ② Principal dimensions

2-4. Reference Material

- ① Air chamber capacity and air consumption
- ② Accessories

① Features of actuator

① Smooth operation and sharp improvement of durability:

- Adoption of wear ring realizes smoother operation and improved durability.
- Adoption of stopper nut prevents the shortening of product life due to an excessive load to the diaphragm when the valve is closed, simultaneously eliminating the need for adjusting the working pressure on the direct and double acting types.

② Visibility-friendly indicators:

- The shape of the cone shape is divided into two colors (red and black) to give a change in visibility. In addition, a convex lens is provided only at the center of the top of the cap to give the indicator's appearance from the top surface a change (it appears small when closed) to make it easier to recognize the opening and closing.

③ Economical in actuator selection:

- Two to three types of actuator can be selected per nominal size. Selection of an optimum actuator for the working fluid is available.

④ Adoption of NAMUR connection standard*:

- Adoption of NAMUR dimensions to the solenoid valve mounting seat enables direct installation of the same standard solenoid valve without the mounting plate and pneumatic piping. (In the case of direct or double acting type, the pneumatic piping to the upper cylinder is required by using a spacer.)

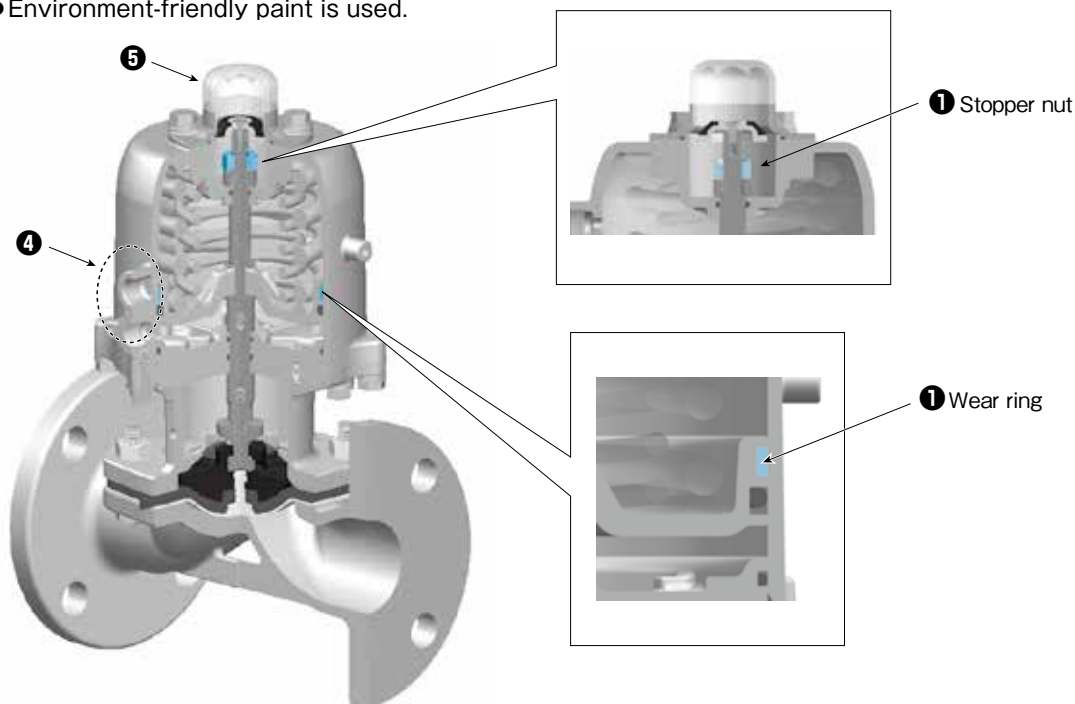
*VDI/VDE3845-2010

⑤ Rich selection of ancillary device (see the following page) is easy to install:

- Ancillary device includes manual operating device and opening limit device, etc.
- Ancillary device can be installed without disassembling the actuator by simply removing the cap on the top.
- Special compact limit switch box is expected to save space for the piping.

⑥ Air saving and use of environment-friendly paint :

- Compact actuator saves on air consumption.
- Environment-friendly paint is used.

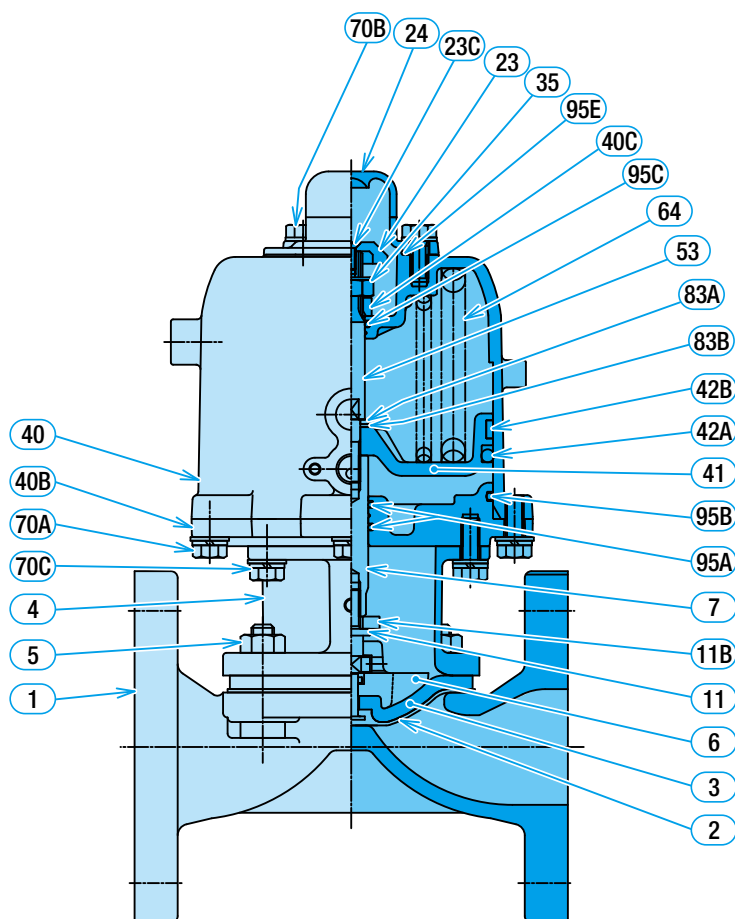
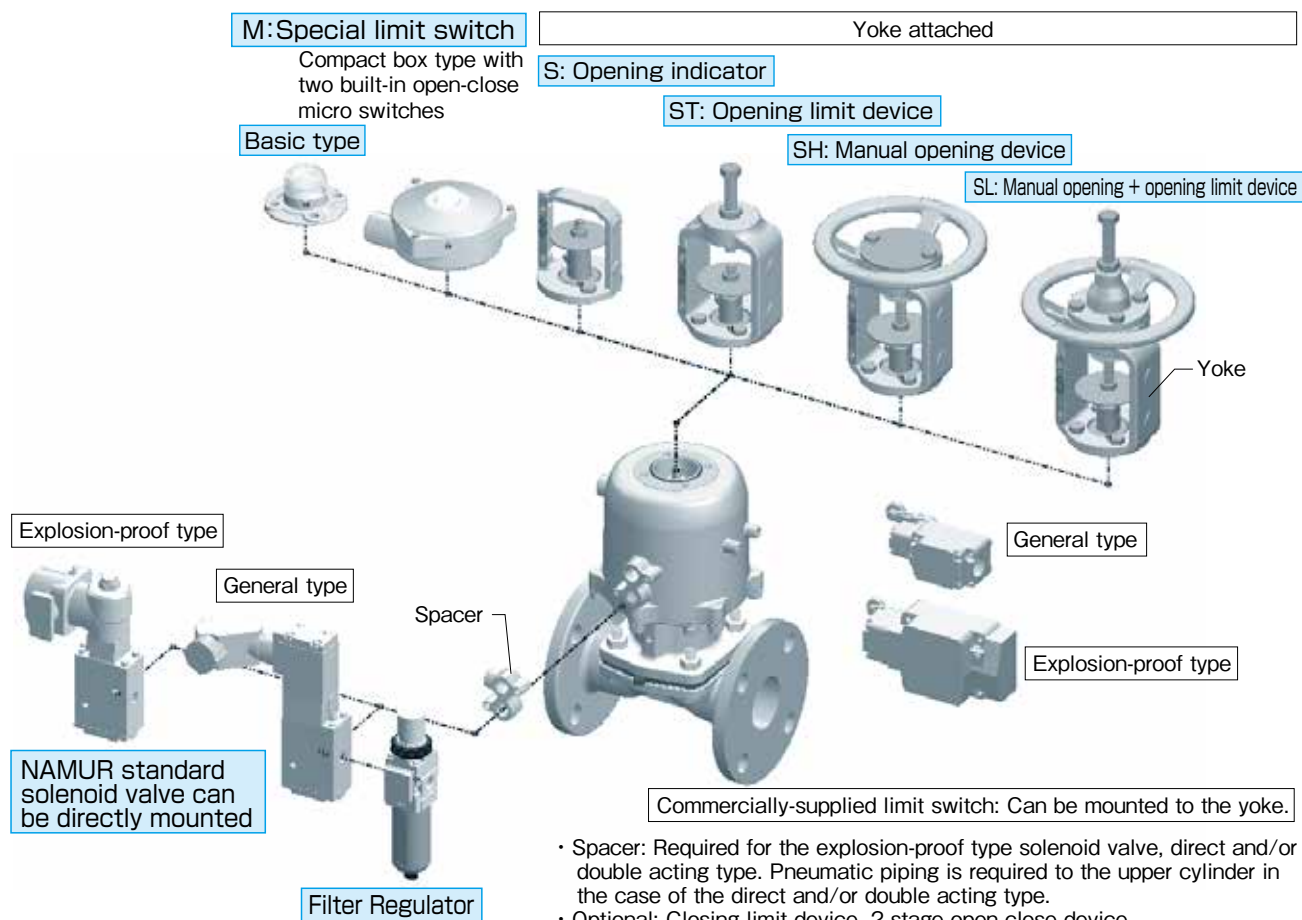


② Actuator specifications

● Standard specifications

Operation	Reverse acting type (Air to Open/Spring to Close): Type PO1400N, Type PO1500N Direct acting type (Air to Close/Spring to Open) : Type PC1400N Double acting type (Air to Open/Air to Close) : Type PN1400N, Type 1500N
Actuator type	Piston Type (With wear ring)
Operating pressure	0.4 ± 0.1 MPa, Optional: 0.3 ± 0.1 MPa
Bonnet material	SCPH2...DN100 or under, Optional: SCS13 FC200...DN125 or over, Optional: SCS13
Cylinder material	ADC12(Aluminum diecast), Optional: Cylinder base SCPH2
Standard exterior painting color	Silver (environment-friendly type)
Nameplate	Seal nameplate reading "Product name/LP/OP/SER No./TAG No." is attached on the exterior surface of the actuator.
Applicable nominal size range	DN15-150

Ancillary Devices



Part No.	Name
1	Main body
2	Diaphragm
3	Cushion rubber
4	Bonnet
5	Bolt
6	Compressor
7	Spindle
11	Compressor suspension
11B	Washer
23	Indicator
23C	Countersunk screw
24	Cap
35	Stopper nut
40	Cylinder
40B	Base
40C	Spacer
41	Piston

Part No.	Name
42A	O-ring
42B	Wear ring
53	Stem
64	Coil spring
	Hexagonal bolt
70A	Spring washer
	Plain washer
70B	Hexagonal bolt
	Plain washer
	Hexagonal bolt
70C	Spring washer
	Plain washer
83A	Washer
83B	Seal washer
95A	O-ring
95B	O-ring
95C	O-ring
95E	O-ring

①

Actuator selection table

● Reverse acting type:
Type PO1400NOperating pressure : $0.4 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15							07N							
20				07N							09N			
25	07N						09N					12N		
40	09N							12N					16N	
50			12N							16N				
65				16N										
80					20N			25N						
100		20N		25N										
125			25N											
150		25N												

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15				07N					09N					
20									09N					
25	07N				09N				12N					
40					12N									
50			12N					16N						
65				16N						20N				
80					20N				25N					
100		20N			25N									
125			25N											
150		25N												

Operating pressure : $0.3 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa (Optional)

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15							073N					093N		
20			073N						093N					
25	073N						093N					123N		
40			093N					123N					163N	
50				123N					163N					
65					163N					203N				
80						203N			253N					
100		203N			253N									

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15							093N							
20				093N										
25			093N						123N					
40				123N						163N				
50					163N									
65						203N			253N					
80							203N		253N					
100		203N			253N									

● Direct acting type:
Type PC1400NOperating pressure : $0.4 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15							07N							
20				07N							09N			
25			07N						09N			12N		
40			09N							12N				
50				12N								16N		
65					16N									
80						20N								
100							20N		25N					
125			20N			25N								
150				25N										

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15				07N					09N					
20							09N							
25	07N				09N				12N					
40						12N								
50				12N					16N					
65					16N					20N				
80						20N				25N				
100							20N		25N					
125								25N						
150									25N					

Operating pressure : $0.3 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa (Optional)

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15							07N					09N		
20				07N					09N					
25			07N							12N			16N	
40			09N								16N			
50				12N								16N		
65					16N						20N			
80						20N				25N				
100							20N		25N					

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15				09N										
20				09N										
25					09N				12N					
40						12N				16N				
50							16N				16N			
65								16N			20N			
80									20N			25N		
100										20N		25N		

● Double acting type:
Type PN1400NOperating pressure : $0.4 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15					07N									
20				07N									09N	
25				07N								09N		
40				09N						12N				
50					12N								16N	
65						16N								
80							20N							
100								20N		25N				
125									20N		25N			
150										20N		25N		

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15					07N					09N				
20					07N						09N			
25					07N							12N		
40					09N								16N	
50						12N								
65							16N							
80								20N						
100									20N		25N			
125										20N		25N		
150											20N		25N	

Operating pressure : $0.3 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa (Optional)

Rubber diaphragm (*1)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.1	1.2	1.3	1.4
15							07N							
20				07N							09N			
25			07N						09N			12N		
40			09N							12N			16N	
50				12N								16N		
65					16N									
80						20N				25N				
100							20N				25N			

PTFE diaphragm (*2)														
Nominal Size DN	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0				
15					07N					09N				
20					07N						09N			
25					07N							12N		
40					09N								16N	
50						12N								
65							16N							
80								20N				25N		
100									20N				25N	

(*)1 : — Max. allowable working pressure for other than the glass-lined and ceramic body
 Max. allowable working pressure for the glass-lined and ceramic body

● **Reverse acting type: Type HO1400N (For large bore and high output)**

Working pressure : $0.4 \begin{smallmatrix} +0.1 \\ -0 \end{smallmatrix}$ MPa

Rubber diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for other than the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100	3147ABC										
125	3147ABC										
150	3147ABC										
	4048BC										
200	3147ABC										
	4048ABC										
250	4048ABC										
Nominal Size DN	Actuator Code	Max. allowable working pressure for the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	3147AB										
150	3147ABC										
200	3147ABC										
	4048ABC										
250	4048ABC										

Working pressure : $0.4 \begin{smallmatrix} +0.1 \\ -0 \end{smallmatrix}$ MPa

PTFE diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for other than the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
100	3147ABC										
125	3147ABC										
150	3147ABC										
	4048BC										
200	3147ABC										
	4048ABC										
250	4048ABC										
Nominal Size DN	Actuator Code	Max. allowable working pressure for the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	3147ABC										
150	3147ABC										
200	3147ABC										
	4048ABC										
250	4048ABC										

● **Direct acting type: Type HC1400 (For large bore and high output)**

Working pressure: See MPa in the table below

Rubber diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for other than the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
150	3167		0.25		0.3	0.4					
Nominal Size DN	Actuator Code	Max. allowable working pressure for the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
150	3167		0.25		0.3						

Working pressure: See MPa in the table below

PTFE diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for other than the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
150	3167	0.25	0.4								
Nominal Size DN	Actuator Code	Max. allowable working pressure for the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
150	3167	0.25	0.4								

● **Double acting type: Type HN1400N (For large bore and high output)**

Working pressure: See MPa in the table below

Rubber diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for other than the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	31				0.2				0.25		
150	31		0.2		0.25	0.3			0.4		
	31	0.25	0.3	0.4							
200	40	0.2		0.25	0.3	0.4					
	31	0.25	0.4								
250	40	0.2	0.25	0.3	0.4						
	31	0.4									
300	31	0.4									
	40		0.4								
Nominal Size DN	Actuator Code	Max. allowable working pressure for the glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	31			0.2							
150	31		0.2		0.25	0.3					
200	31	0.25	0.3	0.4							
	40	0.2		0.25	0.3						
250	31	0.25	0.3								
	40	0.2	0.25	0.3	0.4						
300	31	0.4									
	40		0.4								

Working pressure: See MPa in the table below

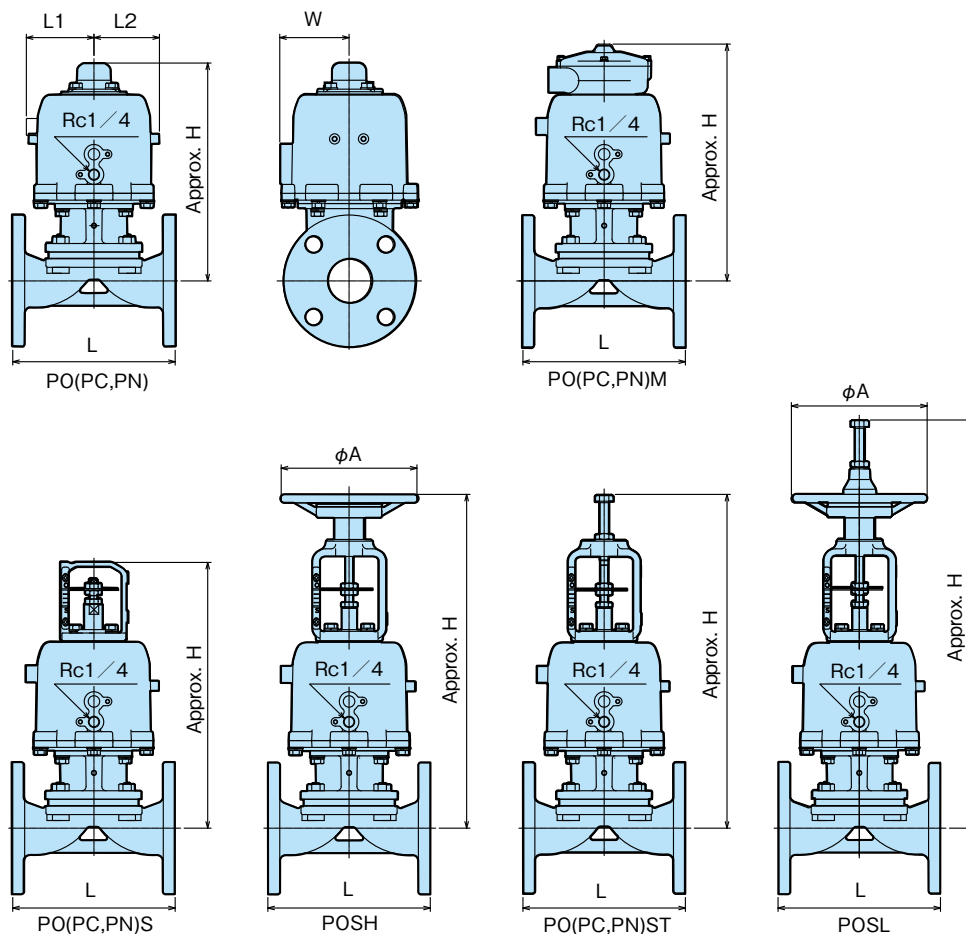
PTFE diaphragm											
Nominal Size DN	Actuator Code	Max. allowable working pressure for the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	31				0.2				0.25		
150	31		0.25			0.3			0.4		
	31	0.3		0.4							
200	40		0.25		0.3	0.4					
	31	0.3	0.4								
250	40		0.25	0.3	0.4						
	31	0.3	0.4								
Nominal Size DN	Actuator Code	Max. allowable working pressure for the hard rubber-lined, glass-lined and ceramic body									
		Fluid pressure(MPa)									
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
125	31			0.2							
150	31		0.25		0.3						
200	31	0.3		0.4							
	40		0.25		0.3	0.4					
250	31	0.3	0.4								
	40		0.25	0.3	0.4						

Remark : The stroke and Cv value are different between Type PO(PC,PN)1400N and Type HO(HC,HN)1400N, while choosing the same nominal size. For the details, contact our Sales Dept. or local representative.

Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

② Principal dimensions

● Type PO(PC, PN) 1400N Principal dimensions



Unit: mm

Nominal Size DN	Face-to-face length: L		Actuator Code	Principal dimensions									
	Other than rubber-lined and resin-lined	Rubber-lined and resin lined		Approx. H						A	W	L1	L2
				PO PC PN	POM PCM PNM	POS PCS PNS	POSH — —	POST PCST PNST	POSL — —				
15	102	107	07N	202	224	258	321	338	411	160	56	54	52
			09N	224	246	280	343	360	433	160	64	62	59
20	118	123	07N	198	220	254	319	334	409	160	56	54	52
			09N	220	242	276	341	356	431	160	64	62	59
			12N	227	249	283	348	363	438	160	82	80	77
25	127	132	07N	210	232	266	333	346	423	160	56	54	52
			09N	232	254	288	355	368	445	160	64	62	59
			12N	239	261	295	362	375	452	160	82	80	77
40	159	165	09N	239	261	295	366	375	456	160	64	62	59
			12N	246	268	302	373	382	463	160	82	80	77
			16N	272	306	373	499	507	603	250	101	98	96
50	191	197	12N	254	276	310	388	390	477	160	82	80	77
			16N	280	315	381	514	515	617	250	101	98	96
65	216	222	16N	297	357	398	535	532	639	250	101	98	96
			20N	348	408	449	586	598	705	250	122	119	117
80	254	260	20N	365	425	466	609	615	728	250	122	119	117
			25N	404	463	516	683	681	822	400	147	143	143
100	305	313	20N	382	441	483	636	632	755	250	122	119	117
			25N	420	479	532	710	697	849	400	147	143	143
125	356	364	20N	446	505	547	700	696	819	250	122	119	117
			25N	484	543	596	774	761	913	400	147	143	143
150	406	414	20N	468	527	569	722	718	841	250	122	119	117
			25N	506	565	618	796	783	935	400	147	143	143

※Height dimensions are for cast iron main body.

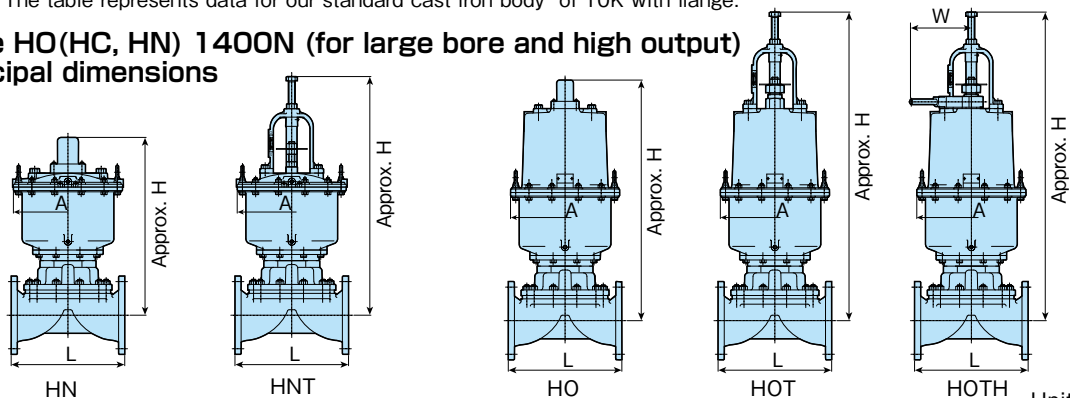
● Type PO(PC, PN) 1400N Mass table

Unit: approx. kg

Nominal Size DN	Operation Actuator Code	Basic type			Additional mass for ancillary device				
		PO	PC	PN	POM PCM PNM	POS PCS PNS	POSH — —	POST PCST PNST	POSL — —
15	07N	3.1	3	2.9	+0.5	+0.6	+2	+1.5	+2.5
	09N	3.6	3.5	3.3					
20	07N	3.3	3.2	3.1					
	09N	3.8	3.7	3.5					
	12N	5.6	4.7	4.3					
25	07N	4.6	4.5	4.4					
	09N	5.1	5	4.8					
	12N	6.9	6	5.6					
40	09N	7.2	7.1	6.9					
	12N	9	8.1	7.7					
50	16N	12.4	10.5	10	+1	+1.5	+6.2	+4.3	+7.9
	12N	11.3	10.4	10	+0.5	+0.6	+2	+1.5	+2.5
	16N	14.7	12.8	12.3	+1	+1.5	+6.2	+4.3	+7.9
65	16N	18.5	16.6	16.1					
	20N	24.5	21.5	20					
80	20N	29.3	26.3	24.8	+1.3	+2.6	+11.8	+7.5	+15
	25N	42.7	31	29.5					
100	20N	37.5	34.5	33	+1	+1.5	+6.2	+4.3	+7.9
	25N	50.9	39.2	37.7	+1.3	+2.6	+11.8	+7.5	+15
125	20N	64	61	59	+2	+1.5	+6.2	+4.3	+7.9
	25N	77	66	64	+2	+2.6	+11.8	+7.5	+15
150	20N	82	79	78	+2	+1.5	+6.2	+4.3	+7.9
	25N	95	84	82	+2	+2.6	+11.8	+7.5	+15

• The table represents data for our standard cast iron body of 10K with flange.

● Type HO(HC, HN) 1400N (for large bore and high output) principal dimensions



Unit: mm

Single acting type (HO)	Nominal Size DN	Face-to-facelength; L		Actuator Code	Principal dimensions				Mass: approx. kg			Air chamber capacity: l
		Other than rubber-lined and resin-lined	Rubber-lined and resin-lined		Approx. H		A	W	HO	HOT	HOTH	
					HO	HOT HOTH						
		125	356	364	3147AB	838	1062	396	238	146	157	159
3147ABC					838	1062	396	238	159	171	173	13.2
4048C					922	1226	495	412	220	241	245	22.6
150		406	414	3147AB	860	1084	396	238	162	174	176	13.2
				3147ABC	860	1084	396	238	175	187	189	13.2
				4048C	944	1258	495	412	236	257	261	22.6
				4048BC	944	1258	495	412	255	275	279	22.6
				3147ABC	952	1280	396	238	248	259	261	13.2
200		521	529	4048C	1036	1370	495	412	309	330	334	22.6
				4048ABC	1036	1370	495	412	332	353	357	22.6
				4048ABC	1107	1460	495	412	410	431	435	22.6

Double acting type (HN)	Nominal Size DN	Face-to-facelength; L		Actuator Code	Principal dimensions		Mass: approx. kg		Air chamber capacity: l		
		Other than rubber-lined and resin-lined	Rubber-lined and resin-lined		Approx. H		A	HN	HNT	Lower chamber	Upper chamber
					HN	HNT					
		150	406	414	31	630	990	396	133	142	13.2
200		521	529	31	720	1105	396	211	220	13.2	9.1
				40	790	1145	495	240	255	22.6	12.3
250		635	645	31	790	1180	396	290	299	13.2	10.6
				40	860	1220	495	312	333	22.6	14.8
300		749	759	31	826	1213	396	365	375	13.2	12.1
				40	903	1262	495	390	410	22.6	17.3

Remarks : 1.The air intake ports are Rc1/4.
2.Height dimensions are for cast iron main body.
3.The mass of product is for cast iron body of 10K with flange.

3. Straight Type Diaphragm Valve: Type PO(PN)/HO(HN)1500N

① Actuator selection table

● Reverse acting type: Type PO1500N

Working pressure : $0.4 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa

Nominal Size DN	Actuator Code	Fluid pressure(MPa)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
15/20	12BN							
25/40	16BCN							
50	20BCN							
65	25BCN							
80	25ABCN							
100	25ABCN							

● Double acting type: Type PN1500N

MPa in the table below

Nominal Size DN	Actuator Code	Fluid pressure(MPa)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
15/20	09N	0.25		0.3			0.35	
25/40	12N	0.25		0.3			0.35	
50	16N	0.2		0.25		0.3	0.35	
65	20N		0.2		0.25		0.3	
80	20N	0.25	0.25		0.3	0.35	0.4	
100	25N		0.2		0.25		0.3	

● Reverse acting type: Type HO1500N
(for large bore and high output)Working pressure : $0.4 \begin{smallmatrix} +0.1 \\ 0 \end{smallmatrix}$ MPa

Nominal Size DN	Actuator Code	Fluid pressure(MPa)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
125	3147ABC							
	4048BC							
150	4048BC							

● Double acting type: Type HN1500N
(for large bore and high output)

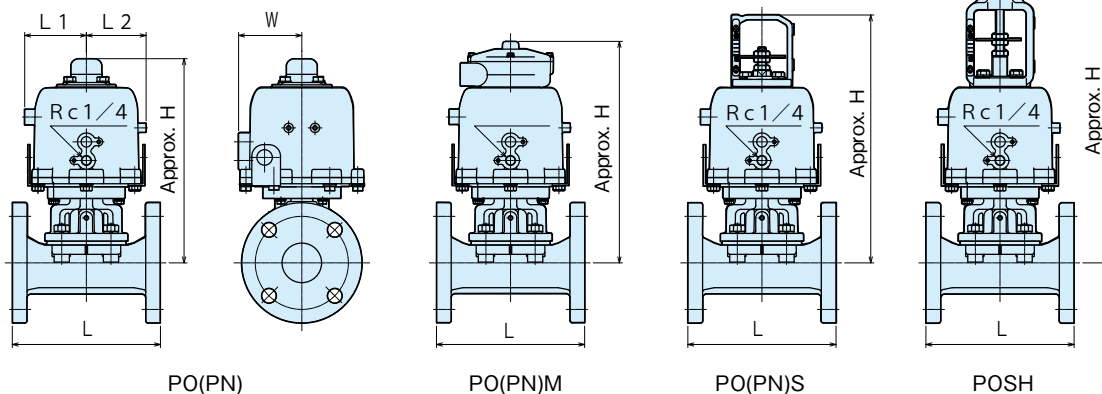
Working pressure : MPa in the table below

Nominal Size DN	Actuator Code	Fluid pressure(MPa)						
		0.1	0.2	0.3	0.4	0.5	0.6	0.7
125	31	0.15		0.2		0.25		
150	31	0.2	0.25	0.3	0.35			
200	3512	0.25	0.3	0.35	0.4			
250	3513	0.25	0.3	0.35	0.4			
300	4014	0.25	0.3	0.35	0.4			

Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

② Principal dimensions

● Type PO(PN) 1500N principal dimensions



PO(PN)

PO(PN)M

PO(PN)S

POSH

Unit: mm

Unit: mm												
	Nominal Size DN	Face-to-face length: L		Actuator Code	Principal dimensions							
		Other than rubber-lined	Rubber- lined		Approx. H				A	W	L1	L2
					PO PN	POM PNM	POS PNS	POSH				
Single acting type (PO)	15	102	107	12BN	234	256	290	357	160	82	80	77
	20	118	123	12BN	234	256	290	357	160	82	80	77
	25	127	132	16BCN	283	318	385	517	250	101	98	96
	40	159	165	16BCN	283	318	385	517	250	101	98	96
	50	191	197	20BCN	346	406	447	584	250	122	119	117
	65	216	222	25BCN	411	471	524	702	400	147	143	143
	80	254	260	25ABCN	432	492	545	723	400	147	143	143
	100	305	313	25ABCN	433	493	546	724	400	147	143	143
Double acting type (PN)	15	102	107	09N	227	249	283	—	—	64	62	59
	20	118	123	09N	227	249	283	—	—	64	62	59
	25	127	132	12N	257	280	314	—	—	82	80	77
	40	159	165	12N	257	280	314	—	—	82	80	77
	50	191	197	16N	294	354	396	—	—	101	98	96
	65	216	222	20N	373	433	474	—	—	122	119	117
	80	254	260	20N	394	454	495	—	—	122	119	117
	100	305	313	25N	433	493	546	—	—	147	143	143

※Height dimensions are for cast iron main body.

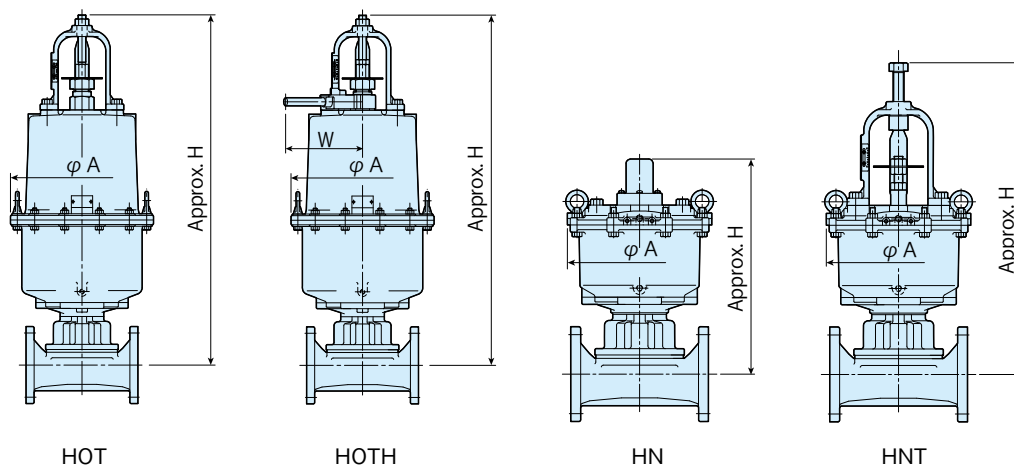
● Type PO(PN) 1500N table of mass

Unit : approx. kg

	DN	Actuator Code	Basic type		Added mass for ancillary device	
			PO PN	POS PNS	POM PNM	POSH
Single acting type (PO)	15	12BCN	6.2	+0.6	+0.5	+2
	20	12BCN	6.6	+0.6	+0.5	+2
	25	16BCN	12.0	+1.5	+1	+6.2
	40	16BCN	13.9	+1.5	+1	+6.2
	50	20BCN	24.7	+1.5	+1	+6.2
	65	25BCN	43.3	+2.6	+1	+11.8
	80	25ABCN	48.2	+2.6	+1	+11.8
	100	25ABCN	54.2	+2.6	+1	+11.8
Double acting type (PN)	15	09N	4.1	+0.6	+0.5	—
	20	09N	4.5	+0.6	+0.5	—
	25	12N	7.0	+1.5	+1	—
	40	12N	8.9	+1.5	+1	—
	50	16N	16.3	+1.5	+1	—
	65	20N	25.1	+2.6	+1	—
	80	20N	30.0	+2.6	+1	—
	100	25N	41.0	+2.6	+1	—

• The mass is for our standard cast iron body of 10K with flange.

● Type HO(HN) 1500N (for large bore and high output) principal dimensions



Unit : mm

Single acting type (HO)	Nominal Size DN	Face-to-face length: L		Actuator Code	Principal dimensions			Mass: approx. kg		Air chamber capacity: l
		Other than rubber-lined	Rubber- lined		Approx. H	A	W	HOT	HOTH	
					HOT HOTH					
	125	356	364	3147BC	977	396	238	171	173	13.2
			4048BC	1133	495	412	241	245	22.6	
150	406	414	4048BC	1171	495	412	275	279	22.6	

Double acting type (HN)	Nominal Size DN	Face-to-face length: L		Actuator Code	Principal dimensions			Mass: approx. kg		Air chamber capacity: l	
		Other than rubber-lined	Rubber- lined		Approx. H		A	HN	HNT	Lower chamber	Upper chamber
					HN	HNT					
	125	356	364	31	629	879	396	117	126	12.4	8.3
	150	406	414	31	667	976	396	133	142	13.2	9.1
	200	521	529	3512	705	-	460	226	-	16.0	20.0
250	635	645	3513	815	-	460	250	-	20.0	21.0	
300	749	759	4014	922	-	520	460	-	29.0	30.0	

Remarks : 1. The air intake ports are Rc1/4 with exception that air intake ports of actuator 3512, 3513 & 4014 is Rc3/8.
 2. Height dimensions are for cast iron main body.
 3. DN200 to 300 are for the double acting Type HN1500. For further details, contact our Sales Dept. or local representative.

① Air chamber capacity and air consumption

● Air chamber capacity: Type PO(PC/PN) 1400N / PO(PN) 1500N

	Actuator code	A : PO (Lower chamber)	B : PC (Upper chamber) C : PN (Upper chamber)	D : PN (Lower chamber)
Air chamber capacity: l	07N	0.1	0.1	0.2
	09N	0.2	0.3	0.3
	12N/12BCN	0.5	0.7	0.7
	16N/16BCN	1.0	1.1	1.4
	20N/20BCN	2.2	2.7	3.0
	25N/25BCN/25ABCN	3.1	4.7	5.5

● Air consumption

Cumulative air consumption needed for cylinder operation (one count per round of cylinder operation) can be calculated with the following equation.
[Equation for calculating the air consumption]

where; Q = Air consumption (NI), P = Working pressure (MPa)

A - D = Air chamber capacity (l), N = Number of operation (1 operation = 1 round of operation)

- PO (Reverse acting type): $Q=(10P+1)A \times N$
- PC (Direct acting type): $Q=(10P+1)B \times N$
- PN (Double acting type): $Q=\{(10P+1) \times (C+D)\} \times N$

② Accessories

● Limit switch

		Exclusive limit switch	Commercially-supplied limit switch	
Type		Rainproof type (IP67 comparable)	Rainproof type	Explosion-proof type (Ex de IIC T6)
Type No.		MDNB	1LS19-J	1LX7001-J
Rated voltage	AC	5A-125, 3A-250V	10A-125, 250, 480V	5A, 250V
	DC	—	0.8A-125V 0.4A-250V	0.8A-125V 0.4A-250V
Connector		G1/2(JIS B 0202)	G1/2(JIS B 0202)	
Manufacturer		NDV	Azbil	

● Exclusive limit switch

Special box with built-in micro switches is attached to the actuator. Compact in size and can be commonly applied to Types PO, PC, PN 1400N.

● Commercially-supplied limit switch

Please designate rainproof type or explosion-proof type. Commercially-supplied limit switch will be installed with an opening indicator installed (to the yoke.) If a limit switch other than our standard switch is required, mounting parts will be specially designed.

(In case of DN20 or less, only 1LS19-J is applicable. In case that other products are required, contact our Sales Dept. or local representative.)

● Solenoid

Type	Rainproof type		Explosion-proof type		Rainproof type		Explosion-proof type	
Type No.	EC20	EC20R	EC30	EC30R	EV20	EV20R	EV30	EV30R
Actuator	PO, PN	PC	PO, PN	PC	PO, PN	PC	PO, PN	PC
Rated voltage	AC100V, 110V, 200V, 220V, DC24V				AC100V, 200V, DC24V		AC100V, 110V, 200V, 220V, DC24V	
Connection bore	Rc1/4				Rc1/4			
Explosion-proof performance	—		d 2G4		—		d2G4,Ex d IIB T4	
Connector	G1/2(JIS B 0202)				G1/2(JIS B 0202)			
Manufacturer	CKD				SMC			

Solenoid for NAMUR standard connection can be directly installed.

● Filter Regulator

Type No.	AW20-02EH-CR-B-X2227
Connection bore	Rc1/4
Supply pressure	MAX:1.0MPa
Filtration granularity	5 μm
Manufacturer	SMC

Type PN1500N will be standard installed with a regulator (AR20K-02EH-B-X2256) on the closing side.

Accessories other than stated above can be installed as designated. For the details, contact our Sales Dept. or local representative.

3

PNEUMATICALLY OPERATED TYPE FLOW CONTROL DIAPHRAGM VALVE

3-1. Rolling Diaphragm Type: Type BO(BC) 3400

- ① Features of actuator
- ② Actuator specification
- ③ Actuator selection table
- ④ Principal dimensions

3-2. Piston Type: Type HN3400N

- ① Features of actuator
- ② Actuator specifications
- ③ Actuator selection table
- ④ Principal dimensions

3-3. Reference Material

- ① How to select valve size
- ② Valve stroke and Cv value
- ③ Specific flow rate characteristics

① Features of Actuator

① Smooth operation

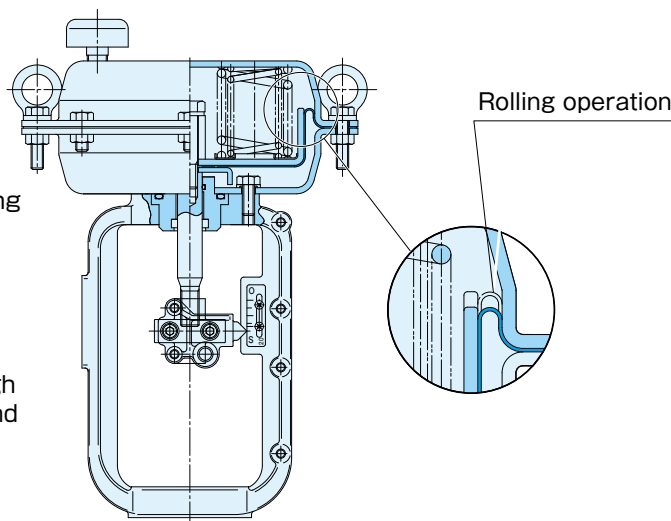
Due to its rolling operation (rolling movement), the rolling diaphragm restrains wear and friction loss.

② Stable output

Compared with the piston type, the rolling diaphragm has larger compressed area, realizing excellent response and output precision.

③ Compact and lightweight

Adoption of multi-spring system realizes compact design and lightweight and high output (closing force). These help expand maximum working pressure.



② Actuator specifications

● Standard specifications

Operation*1	Reverse acting type: Type BO3400 (Air to Open/Spring to Close) Direct acting type: Type BC3400 (Air to Close/Spring to Open)	
Actuator system	Rolling diaphragm type	
Applicable nominal size	DN15-150	
Minimum supply pressure*2	0.14 or 0.3MPa	
Bonnet material	FCD450	
Cylinder material	SPHE or SS400P	
Standard exterior painting color	Silver (Environment-friendly type)	
Lubricant	Standard/High temperature: Idemitsu Kosan Daphne molybdenum grease No.2	
	Low temperature: Idemitsu Kosan Daphne Super Coronex No.1	
Machine characteristics*3	Linear characteristics (Relationship between signal pressure and valve opening)	

*1 : Double acting type is outside the manufacturing range.

*2 : For detail, see the actuator selection table.

*3 : For the machine with the positioner.

● Positioner

	Our standard type	
Operating system	Pneumatic/Pneumatic	Electric/Pneumatic
Type No.	NPN11	NE11
Manufacturer	NDV	

● Filter Regulator

	Type
For NPN11	XR108-S/M0J3
For NE11	XR108-S/M0R1

Accessories other than stated above can be installed as designated. For further details, contact our Sales Dept. or local representative.

3 Actuator selection table

● Reverse acting type: Type B03400

Nominal Size DN	Actuator Code	Supply pressure (MPa)	Rubber diaphragm(*1) Fluid pressure (MPa)										PTFE diaphragm(*2) Fluid pressure (MPa)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	5221LA	0.14																				
20		0.3																				
25																						
40																						
50	5227LA																					
	5235LA																					
65	5227LA																					
	5235LA																					
80	5235LA																					
	524SLA																					
100	524SLA																					
	524LLA																					
	526SLA																					
125	524ELA																					
	526SLA																					
150	524ELA																					
	526SLA																					

● Direct acting type: Type BC3400

Nominal Size DN	Actuator Code	Supply pressure (MPa)	Rubber diaphragm(*1) Fluid pressure (MPa)										PTFE diaphragm(*2) Fluid pressure (MPa)									
			0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	5221LA	0.14																				
20		0.3																				
25																						
40																						
50	5227LA																					
	5235LA																					
65	5227LA																					
	5235LA																					
80	5235LA																					
	524SLA																					
100	524SLA																					
	524LLA																					
	526SLA																					
125	524ELA																					
	526SLA																					
150	524ELA																					
	526SLA																					

(*1) : — Max. allowable working pressure for other than the glass-lined and ceramic body

..... Max. allowable working pressure for the glass-lined and ceramic body

(*2) : — Max. allowable working pressure for other than the hard rubber-lined, glass-lined and ceramic body

..... Max. allowable working pressure for the hard rubber-lined, glass-lined and ceramic body

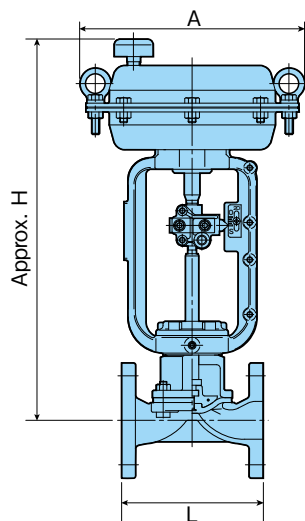
Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

1. Rolling Diaphragm Type: Type BO(BC)3400

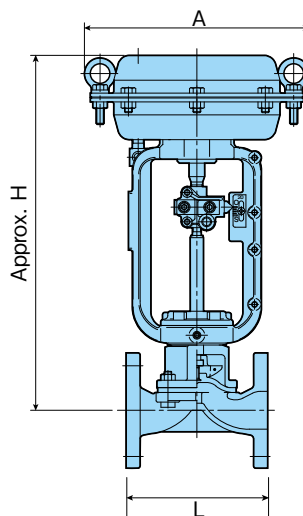
④

Principal Dimensions

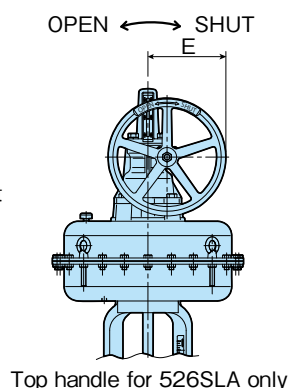
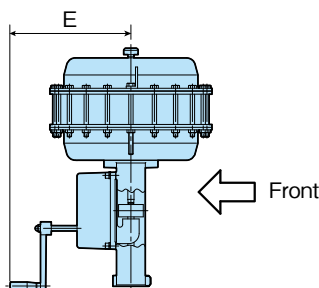
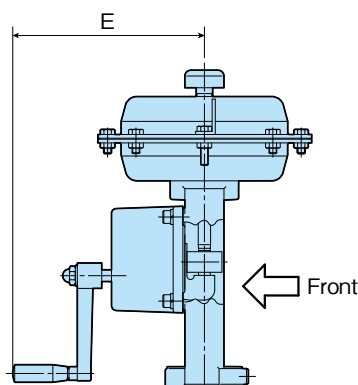
● Reverse acting type: Type BO3400



● Direct acting type: Type BC3400



● With handle



Unit: mm

Nominal Size DN	Face-to-face length L		Actuator Code	Type BO3400					Type BC3400				
	Other than rubber-lined and resin-lined	Rubber-lined and resin-lined		Approx. H	A	E	Mass: Approx. (kg)		Approx. H	A	E	Mass: Approx. (kg)	
							Without handle	With handle				Without handle	With handle
15	102	107	5221LA	404	231	196	12.0	16.0	364	231	196	12.0	16.0
20	118	123		404	231	196	12.5	16.5	364	231	196	12.5	16.5
25	127	132		404	231	196	13.5	17.5	364	231	196	13.5	17.5
40	159	165		416	231	196	15.5	19.5	375	231	196	15.5	19.5
50	191	197	5227LA	514	283	230	21.5	31.5	474	283	230	21.5	31.5
			5227LA	527	283	230	24.5	34.5	487	283	230	24.5	34.5
65	216	222	5235LA	562	283	230	46.5	56.5	522	367	230	46.5	56.5
			5227LA	539	283	230	28.0	38.0	499	283	230	28.0	38.0
80	254	260	5235LA	574	367	230	50.0	60.0	534	367	230	50.0	60.0
			5235LA	592	367	230	56.5	66.5	552	367	230	56.5	66.5
100	305	313	524SLA	702	472	336	84.5	96.5	662	472	336	84.5	96.5
			524SLA	699	472	336	94.5	107.0	659	472	336	94.5	107.0
			524LLA	839	472	336	117.0	140.0	799	472	336	117.0	140.0
125	356	364	526SLA	918(1318)	678	265	222.0	262.0	—	—	—	—	—
			524ELA	888	472	336	131.0	154.0	848	472	336	131.0	154.0
150	406	414	526SLA	910(1310)	678	265	236.0	276.0	910(1310)	678	265	236.0	276.0
			524ELA	920	472	336	148.0		880	472	336	148.0	
			526SLA	942(1342)	678	265	253.0	302.0	942(1342)	678	265	253.0	302.0

Dimension H (parentheses) is for actuator code 526SLA with handle.

2. Piston Type:Type HN3400N

① Features of Actuator

Control valve equipped with the piston type actuator (double acting type). Realizes high output by using high working pressure compared with the rolling diaphragm type.

② Actuator specifications

● Standard specifications

Action	Double acting type: HN3400N (Air to Open/Air to Close)
Actuator system	Piston type
Applicable range of nominal size	DN150-300
Supply air pressure	0.2 to 0.5MPa
Bonnet material	FC200
Cylinder material	FC200
Standard exterior painting color	Silver (Environment-friendly type)
Lubricant	Shell Alvania EP2 grease
Machine characteristics*	Linear characteristics (relationship between the signal pressure and valve opening)

* : For the valve with positioner

③ Actuator selection table

● Rubber diaphragm

Working pressure: MPa in the table below

Rubber diaphragm		Max. working pressure for other than glass-lined							
Nominal Size DN	Actuator Code	Fluid pressure (MPa)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
150	31		0.2		0.25	0.3	0.4		
200	40		0.2	0.25	0.3	0.4	0.45		
250	40	0.2	0.3	0.35	0.45				
300	40	0.3	0.4	0.5					

Max. working pressure for glass-lined		Fluid pressure (MPa)							
Nominal Size DN	Actuator Code	Fluid pressure (MPa)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
150	31		0.2		0.25	0.3			
200	40		0.2	0.25	0.3	0.35			

● PTFE diaphragm

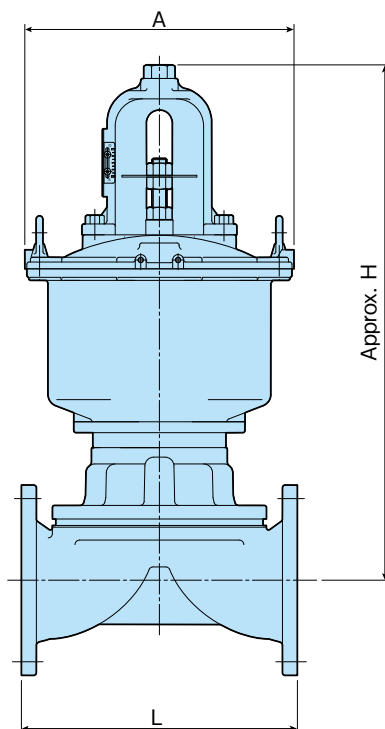
Working pressure: MPa in the table below

PTFE diaphragm		Max. working pressure for other than hard rubber-lined and glass-lined							
Nominal Size DN	Actuator Code	Fluid pressure (MPa)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
150	31		0.2		0.25	0.3	0.35	0.4	
200	40		0.2	0.25	0.3	0.35	0.4		
250	40	0.25	0.3	0.35	0.4				
300	40	0.3	0.35	0.4	0.45				

Max. working pressure for hard rubber-lined and glass-lined		Fluid pressure (MPa)							
Nominal Size DN	Actuator Code	Fluid pressure (MPa)							
		0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
150	31		0.2		0.25	0.3			
200	40		0.2	0.25	0.3	0.35			

Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

④ Principal dimensions



Unit: mm

Nominal Size DN	Actuator Code No. HN34N-	L	A	Approx. H
150	31	406	396	738
200	40	521	495	945
250	40	635	495	1016
300	40	749	495	1057

① How to Select Valve Size

Valve size is determined by calculating the valve coefficient of volume (Cv value) from the flow rate of a fluid, fluid pressure, differential pressure, specific gravity, etc. and comparing it with the Cv value in the table of the next section.

Generally, the following Cv value calculation formulas are used except for the special correction items:

	$\Delta P < \frac{P_1}{2}$	$\Delta P \geq \frac{P_1}{2}$
Liquid	$C_v = 11.56 V \sqrt{\frac{G}{(P_1 - P_2)}}$	Same as the left
Gas	$C_v = \frac{Q}{2.93} \sqrt{\frac{G(273+t)}{\Delta P(P_1 + P_2)}}$	$C_v = Q \frac{\sqrt{G(273+t)}}{2.538 P_1}$
Vapor	$C_v = \frac{WK}{0.1391 \sqrt{\Delta P(P_1 + P_2)}}$	$C_v = \frac{WK}{0.1205 P_1}$

V : Flow rate of a fluid m³/h

Q : Flow rate of a gas nm³/h
(at 15.6°C, 101.3 kPa·A)

G : Specific gravity of fluid
for liquid, water = 1
for gas, air: 1

P1: Absolute pressure on the primary side kPa·A*

P2: Absolute pressure on the secondary side kPa·A*

t : Temperature of the fluid °C

W: Flow rate of vapor kg/h

K: 1+(0.0013 × degree of superheat °C)

Degree of superheat:

Difference between the saturation temperature to the absolute pressure on the primary side(P1) and the primary side temperature.
In the case of saturation vapor, the degree of superheat reads 0 (zero).

(*A : Absolute pressure = Gauge pressure + 101.3 kPa)

② Valve Stroke and Cv value

● Rolling diaphragm type: Type BO(BC)3400

Nominal Size DN	Stroke (mm)	Main body Diaphragm		Without lining		Rubber-lined	Glass-lined	PFA-lined	PFA-lined ETFE-lined	Ceramic
				Rubber	PTFE	Rubber	PTFE	59(M)/59(S) PTFE	59(2S)/60 PTFE	PTFE
15	6			4		4.2	4.2	2.3	3	5.9
20	8			10		8.5	11	7.5	7	10
25	10			23	15	15	19	10		14
40	14			46	32	30	40	25		28
50	20			78	71	57	82	41	54	52
65	24			106	78	93	99	62	68	63
80	30			161	166	156	219	104	107	128
100	40			303	306	194	291	210	161	—
125	50			355		310	405	230	—	—
150	60			530		440	585	330	—	—

* The Cv values of Material code "59(2S)" with DN65 or bigger are same as "59(M)/59(S)".

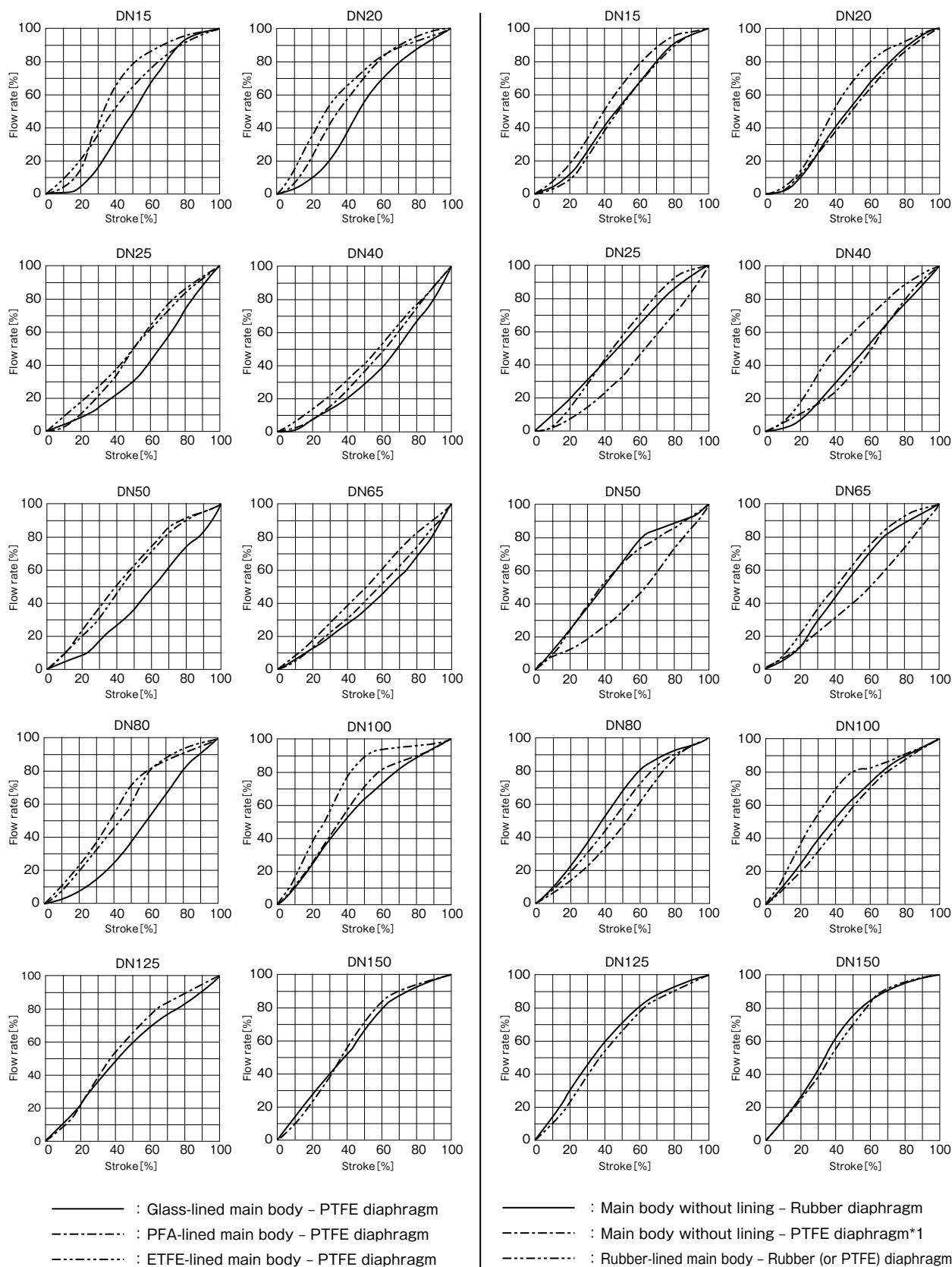
* The above-mentioned Cv values need to be corrected when using the PTFE diaphragm and the pressure on the primary side is lower than 0.15 MPa. In such a case, please contact us.

● Piston type: Type HN3400N

Nominal Size DN	Stroke (mm)	Main body without lining	Main body with rubber lining	Main body with glass lining	Main body with PFA lining
150	55	520	435	570	325
200	75	1025	880	1120	800
250	95	1435	1295	1920	1160
300	110	2280	1840	2350	—

③ Specific Flow Rate Characteristics

● Rolling Diaphragm Type: Type B0 (BC) 3400



- The charts show the specific flow rate characteristics actually observed by this company. In actual service, the flow rate characteristics may vary depending on the pressure, temperature, flow velocity, piping and other condition.
- Piston type: Type HN3400N, contact our Sales Dept. or local representative for the details.

MEMO

4

ELECTRICALLY OPERATED DIAPHRAGM VALVE

4-1. Specifications of Electrically Operated Valve

- ① MS type: Seibu Electric & Machinery Model
- ② NR type: Nihon KOSO Model

4-2. Weir Type Diaphragm Valve: Type MS(NR)4400

- ① Actuator selection table
- ② Principal dimensions

4-3. Straight Type Diaphragm Valve: Type MS(NR)4500

- ① Actuator selection table
- ② Principal dimensions

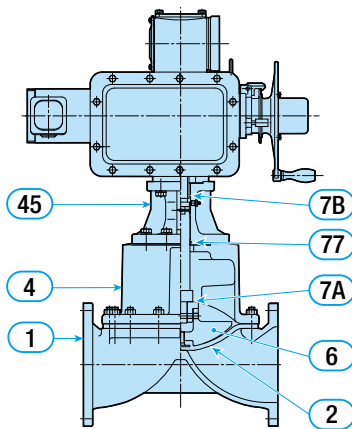
● Features

- ① Widely used by the government office for water treatment facilities and for power plants.
- ② Manual return type is the standard for safety purpose.
- ③ Rich selection of accessories (motor with the brake, electric positioner, etc.)
- ④ Control valve is also available in addition to the ON-OFF valve.

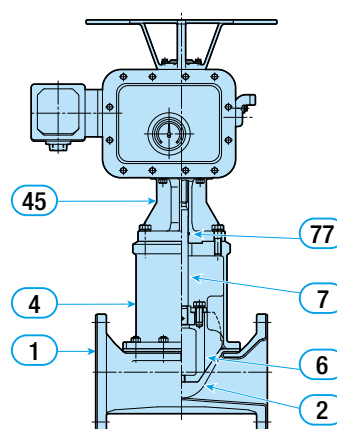
● Standard Specifications

Valve type	Types MS4400 (Weir type), MS4500 (Straight type):	
Power supply	Motive power	3-phase AC power supply, 200/220 VAC, 400/440 VAC, 50/60Hz
	Operation	Single-phase AC power supply, 100/110 VAC, 200/220 VAC, 50/60Hz
Motor	Structure	Flange type fully closed outdoor type(MRS is a built-in type fully closed outdoor type.)
	Number of pole	4 poles
	Brake	None
	Insulation	Type B(MRS), Type E(MAS-MFS)
	Rating	15 min
Operating machine	Structure	Outdoor type (IP55)
	Selection system	Manual return system with selection lever
Switch	Position switch	Contact configuration: 1a1b contact (each one provided to OPEN and CLOSE sides)
	Torque switch	Contact configuration: 1c contact (each one provided to OPEN and CLOSE sides)
	Interlock switch	Contact configuration: 1c contact
Accessory	Space heater	With 30 W (10 W for MRS type)
	Opening indicator	0 ⇔ 100% indication
Standard exterior painting color		Silver (environment-friendly type)
Optional		Special power supply, motor with the brake, automatic return system, explosionproof type, various types of transmitters, etc. can be arranged.

● Structure and Materials for Major Parts



Type MS4400

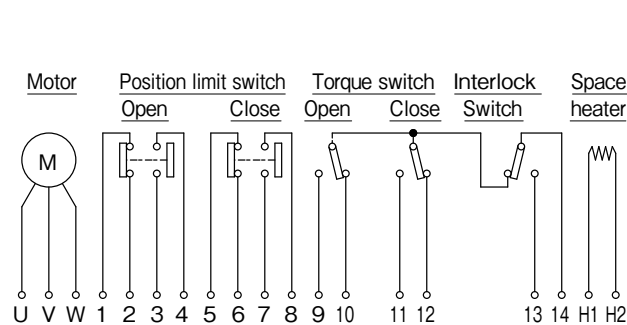


Type MS4500

Part No.	Part No.	Material
1	Main body	
2	Diaphragm	
4	Bonnet	FC200
6	Compressor	Note (1) FC200
7	Spindle	SUS304
7A	Spindle A	SUS304
7B	Spindle B	SS400
45	Yoke	FC200
77	O-ring	NBR

Note (1) Nominal size DN25-100
for Type 4400 is SCS13.)

● Internal Connection Diagram (For reference)



1and2	OFF when fully open
4and3	ON when fully open
5and6	OFF when fully closed
8and7	ON when fully closed
9and14	ON with overtorque in OPEN direction
10and14	OFF with overtorque in OPEN direction or with manual operation
11and14	ON with overtorque in CLOSE direction
12and14	OFF with overtorque in CLOSE direction or with manual operation
13and14	ON with manual operation
H1,H2	Space heater terminals
U,V,W	Motor terminals

Limiterorque (Nippon Gear), Rotork (Shimadzu) and other electrically operated machines are installable in addition to MS type and NR type above. For the details, contact our Sales Dept. or local representative.

② NR type: Nihon KOSO Model

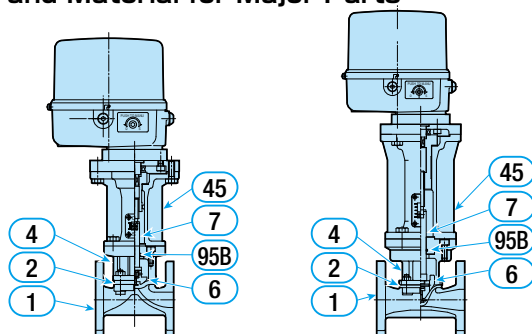
● Features

- ① Compact motor-operated machine for small bore valve.
- ② Operable with a single-phase power supply
- ③ Economical as it consumes only little power compared with MS type.
- ④ Valve open-close operation with a single select switch.
- ⑤ Control valve is also available in addition to the ON-OFF valve.

● Standard Specifications

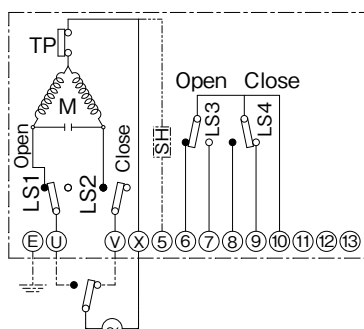
Valve type		Types NR4400 (Weir type), NR4500 (Straight type)
Power supply		Single-phase AC power supply, 100/110 VAC, 200/220 VAC, 50/60Hz
Motor	Structure	Reversible motor (with thermal protector)
	Number of pole	4 poles
	Brake	With permanent brake
	Insulation	Type E
	Rating	30 min
Operating machine	Structure	Outdoor type (IP55)
	Selection system	Manual spindle pushing
Switch	Position switch	Contact configuration: 1b contact (each one provided to OPEN and CLOSE sides)
	Auxiliary switch	Contact configuration: 1c contact (two provided)
	Torque switch	None
	Interlock switch	None
Accessory	Opening indicator	O(OPEN) ⇔S (SHUT) indication
Standard exterior painting color		Metallic blue *Any special paint is not applicable.
Optional		Space heater, electric-electric positioner, separate terminal box

● Structure and Material for Major Parts



Part No.	Name	Material
1	Main body	
2	Diaphragm	
4	Bonnet	FC200
6	Compressor	SCS13
7	Spindle	SUS304
45	Yoke	FC200
95B	O-ring	NBR

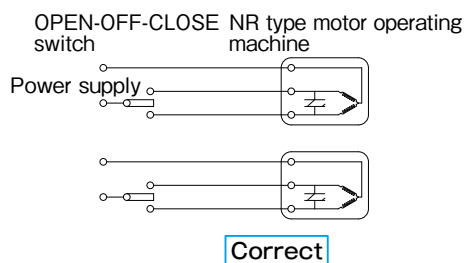
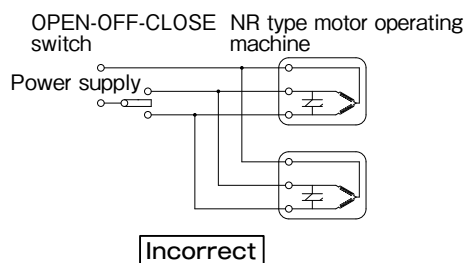
● Internal Connection Diagram



U-X	Turn to CCW direction (OPEN direction)
V-X	Turn to CW direction (CLOSE direction)
7-10	ON at hinged end of CCW (fully open position)
9-10	ON at hinged end of CW (fully closed position)
TP	Thermal protector
SH	Space heater (optional)
LS3,LS4	Limit switch can be set for activation at an arbitrary position.

Turning direction is as viewed from the top of the operating machine. The diagram shows a hinged end at CW (fully closed position.)

If the 2 units of electric operating machines are simultaneously operated with the wiring as shown in the lower left-hand corner, a detour circuit is established through the capacitor leading to abnormal operation. Always arrange for the operating switches separately as shown to the right.



①

Actuator selection table

● Type MS4400 selection table

Diaphragm type			Rubber diaphragm										PTFE diaphragm									
Power supply frequency			50Hz										60Hz									
Nominal Size DN	Actuator		Fluid pressure (MPa)										Fluid pressure (MPa)									
	Type	Output (kW)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
25	MRS	0.1																				
	MAS	0.2																				
40	MRS	0.1																				
	MAS	0.2																				
50	MRS	0.1																				
	MAS	0.2																				
65	MRS	0.1																				
	MAS	0.2																				
80	MRS	0.1																				
	MAS	0.2																				
100	MRS	0.1																				
	MAS	0.2																				
125	MRS	0.1																				
	MAS	0.2																				
150	MRS	0.1																				
	MAS	0.2																				
	MBS	0.4																				
	MBS	0.75																				
200	MAS	0.2																				
	MBS	0.4																				
	MBS	0.75																				
	MCS	1.5																				
250	MBS	0.4																				
	MBS	0.75																				
	MCS	1.5																				
300	MBS	0.4																				
	MBS	0.75																				
	MCS	1.5																				
	MDS	2.2																				

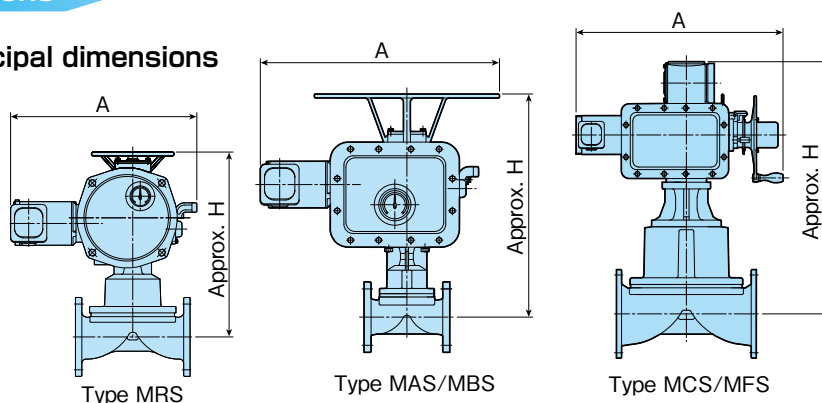
● Type NR4400 selection table

Diaphragm type			Rubber diaphragm										PTFE diaphragm									
Power supply frequency			50/60Hz										50/60Hz									
Nominal Size DN	Actuator		Fluid pressure (MPa)										Fluid pressure (MPa)									
	Type	Output (W)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0
15	NRA	20																				
20	NRB																					
25	NRC																					
40	NRD																					
50	NRE																					
65	NRF																					
80	NRF																					

Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

② Principal dimensions

● Type MS4400 principal dimensions

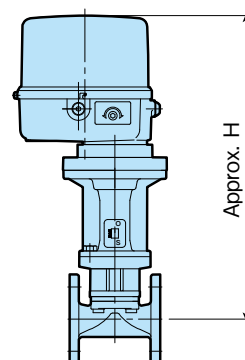


Nominal Size DN	Actuator		Principal dimensions (mm)				Stroke (mm)		Operating time (sec)				Mass approx. (kg)
	Type	Output (kW)	Face-to-face		A	Approx. H	ON-OFF valve	Control valve	50Hz		60Hz		
			Other than rubber-lined	Rubber lined					ON-OFF valve	Control valve	ON-OFF valve	Control valve	
25	MRS	0.1	127	132	430	390	10	—	12	—	9	—	52
	MAS	0.2			587	475							69
40	MRS	0.1	159	165	430	400	18	14	22	—	17	—	55
	MAS	0.2			587	485			21	26	16	22	72
50	MRS	0.1	191	197	430	435	25	20	21	—	18	—	58
	MAS	0.2			587	520			20	28	17	24	75
65	MRS	0.1	216	222	430	455	30	24	25	—	21	—	64
	MAS	0.2			587	540			24	34	20	28	81
80	MRS	0.1	254	260	430	465	35	30	24	—	20	—	69
	MAS	0.2			587	550			23	34	19	28	86
100	MRS	0.1	305	313	430	500	50	40	34	—	28	—	82
	MAS	0.2			587	605			32	45	27	38	99
125	MRS	0.1	356	364	430	540	65	50	44	—	36	—	95
	MAS	0.2			587	645			42	57	35	47	112
150	MRS	0.1	406	414	430	595	70	60	47	—	39	—	123
	MAS	0.2			587	700			45	68	38	57	140
	MBS	0.4			600	740			38	57	32	48	170
		0.75			625	740			—	—	28	32	180
200	MAS	0.2	521	529	587	870	110	85	71	96	59	80	210
	MBS	0.4			600	905			59	81	50	67	240
		0.75			625	905			53	55	44	46	250
	MCS	1.5			837	955			62	60	—	—	290
250	MBS	0.4	635	645	600	985	130	95	70	90	59	75	325
		0.75			625	985			63	61	52	51	335
	MCS	1.5			837	1030			47	45	39	38	380
		0.4			600	1140			86	110	72	91	440
300	MCS	0.75	749	759	625	1180	160	115	—	—	65	62	450
		1.5			837	1180			57	55	47	46	495
	MDS	2.2			950	1250			65	79	55	66	575

Remarks: Dimension A and mass are for a motor without the brake.

● Type NR4400 principal dimensions

Nominal Size DN	Actuator		Principal dimensions (mm)				Stroke (mm)		Operating time (sec)		Mass approx. (kg)
	Type	Output (W)	Face-to-face Other than rubber-lined	Rubber lined	Approx. H	ON-OFF valve	50Hz ON-OFF valve	60Hz ON-OFF valve	50Hz ON-OFF valve	60Hz ON-OFF valve	
15	NRA	20	102	107	436	6	11	9	16	16	16
20	NRB		118	123	440	8	15	12	16	16	16
25	NRC		127	132	444	10	12	10	17	17	17
40	NRD		159	165	457	14	17	15	19	19	19
50	NRE		191	197	508	20	39	32	23	23	23
65	NRF		216	222	531	24	47	39	28	28	28
80	NRF		254	260	542	30	47	39	34	34	34



● Type MS4500 selection table

Power supply frequency			50Hz								60Hz							
Nominal Size DN	Actuator		Fluid pressure (MPa)								Fluid pressure (MPa)							
	Type	Output (kW)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.1	0.2	0.3	0.4	0.5	0.6	0.7		
25	MRS	0.1																
	MAS	0.2																
40	MRS	0.1																
	MAS	0.2																
50	MRS	0.1																
	MAS	0.2																
65	MRS	0.1																
	MAS	0.2																
80	MRS	0.1																
	MAS	0.2																
100	MRS	0.1																
	MAS	0.2																
125	MRS	0.1																
	MAS	0.2																
150	MRS	0.2																
	MAS	0.2																
200	MBS	0.75																
	MCS	0.75																
250	MCS	0.75																
	MCS	1.5																
300	MCS	1.5																
	MDS	1.5																

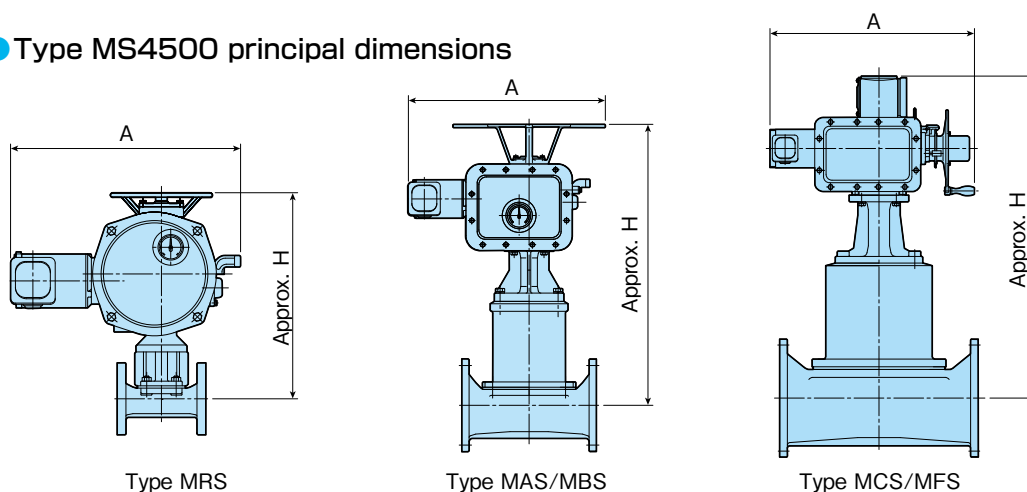
● Type NR4500 selection table

Nominal Size DN	Actuator		Fluid pressure (MPa)							
	Type	Output (W)	0.1	0.2	0.3	0.4	0.5	0.6	0.7	
15	NRG	20								
20	NRG									
25	NRH									
40	NRH									
50	NRJ									

Actuator selection table in this catalog represents the data when the secondary pressure is atmospheric with the valve fully closed. Refer to 6. Reference Material for more detail.

② Principal dimensions

● Type MS4500 principal dimensions

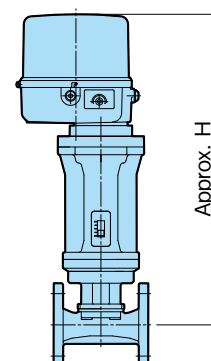


Nominal Size DN	Actuator		Principal dimensions (mm)				Stroke (mm)	Operating time (sec)		Mass approx. (kg)
	Type	Output (kW)	Face-to-face		A	Approx. H		50Hz	60Hz	
			Other than rubber-lined	Rubber -lined			ON-OFF valve	ON-OFF valve	ON-OFF valve	
25	MRS	0.1	127	132	430	440	25	28	23	53
	MAS	0.2			587	545		27	22	70
40	MRS	0.1	159	165	430	440	25	28	23	55
	MAS	0.2			587	545		27	22	72
50	MRS	0.1	191	197	430	450	30	25	21	59
	MAS	0.2			587	555		24	20	76
65	MRS	0.1	216	222	430	475	35	29	25	64
	MAS	0.2			587	580		28	24	81
80	MRS	0.1	254	260	430	520	50	34	28	73
	MAS	0.2			587	625		32	27	90
100	MRS	0.1	305	313	430	545	50	34	28	83
	MAS	0.2			587	670		32	27	100
125	MRS	0.1	356	364	430	640	70	47	41	98
	MAS	0.2			587	765		45	38	
150	MRS	0.2	406	414	430	730	110	74	62	118
	MAS				587	855		71	59	135
200	MBS	0.75	521	529	625	860	110	53	44	225
	MCS				800	960		83	69	270
250	MCS	0.75	635	645	800	1160	160	90	75	325
		1.5			837			57	48	330
300	MCS	1.5	749	759	837	1195	190	68	57	535
	MDS				934	1260		78	65	575

Remarks: Dimension A and mass are for a motor without the brake.

● Type NR4500 principal dimensions

Nominal Size DN	Actuator		Principal dimensions (mm)			Stroke (mm)	Operating time (sec)		Mass approx. (kg)
	Type	Output (W)	Face-to-face		Approx. H		50Hz	60Hz	
			Other than rubber-lined	Rubber -lined		ON-OFF valve	ON-OFF valve	ON-OFF valve	
15	NRG	20	102	107	446	10	19	16	16
20	NRG		118	123	446	10	19	16	16
25	NRH		127	132	533	25	31	25	20
40	NRH		159	165	533	25	31	25	22
50	NRJ		191	197	544	30	58	48	27



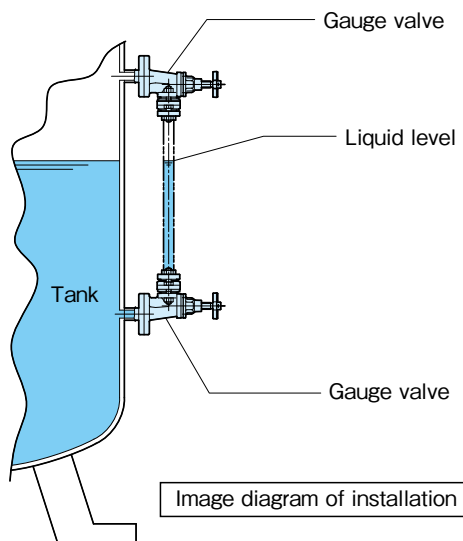
[illegible]

5

INTRODUCTION OF RELATED PRODUCTS

① Gauge Valve type: Type 400G

- Liquid level inspection valve using the structure and features of weir type diaphragm valve.
- Main body made of lining material (hard natural rubber, glass, etc.) is corrosive liquid resistant.
- Applicable nominal size: DN20



② Rubber-lined Check Valve

- Check valve with rubber lining material is manufactured using technology for rubber lining processing.
- Sealing system for DN15 – 80 is a ball type valve body and DN100 and 150 a swing type valve body.
- This valve is exclusively for a vertical piping. (Swing type valve body is applicable to level installation as well.)



③ Bioclean Diaphragm Valve series

- Valves of optimal sanitary specifications are available for the production lines of pharmaceutical, cosmetic, food, semiconductor and other industries. Bioclean Diaphragm Valve series most utilize the advantages of diaphragm valve structure that "contaminates no fluid and provides superb self-purifying performance."
- For more details, please refer to our Sanitary-related Valve Product Guide.



Order made system available to develop products meet customers' need;
Inquire us for other options for actuators, special shaped body, special material products, etc.

6

REFERENCE MATERIALS

- ① Flange dimensions: Basic dimensions and standard face-to-face dimensions for JIS 10K flange
- ② Special specifications: Nameplate, Painting, Photography and Witness inspection
- ③ How to read the product code number
- ④ Material selection table
- ⑤ Actuator selection table
- ⑥ Inspection Pressure

①

Flange dimensions: Basic dimensions and standard face-to-face dimensions for JIS 10K flange

Unit: mm

Nominal Size DN	Outside Size D	Thickness t			Bolt hole			Bolt nomination	Raised face (RF)		Standard face-to-face dimension		
		FC	Other than FC	Rubber-lined, resin-lined	Diameter C of center circle	Quantity	Diameter h		g	f	Other than rubber-lined, resin-lined	Rubber-lined, resin-lined	Screwed type
10	90	13	10	3	65	4	15	M12	46	1	102	107	—
15	95	13	10	3	70	4	15	M12	51	1	102	107	64
20	100	13	10	3	75	4	15	M12	56	1	118	123	93
25	125	13	10	3	90	4	19	M16	67	1	127	132	108
32	135	16	13	3	100	4	19	M16	76	2	159	165	—
40	140	16	13	3	105	4	19	M16	81	2	159	165	140
50	155	19	14	3	120	4	19	M16	96	2	191	197	165
65	175	19	14	3	140	4	19	M16	116	2	216	222	203
80	185	19	14	3	150	8	19	M16	126	2	254	260	254
100	210	22	17	4	175	8	19	M16	151	2	305	313	—
125	250	22	17	4	210	8	23	M20	182	2	356	364	—
150	280	22	17	4	240	8	23	M20	212	2	406	414	—
200	330	25	19	4	290	12	23	M20	262	2	521	529	—
250	400	25	19	5	355	12	25	M22	324	2	635	645	—
300	445	29	22	5	400	16	25	M22	368	3	749	759	—

Flange type**1. Flange standard:**

The above standard comply with JIS B2220 (steel pipe flange with nominal pressure of 10K).
The flange thickness t shall comply with BS10 Part 2-TABLE D (British Standard Class D).

2. The flange thickness t shall be classified as follows:

FC: Gray casting, ductile steel casting

Other than FC: Steel casting, stainless steel casting, and bronze casting

3. Packing face:

Standard face shall be flat face. The above table shall apply to stainless steel casting, particularly when raised face is specified. The standard of this company shall apply to ETFE-, PFA-, and glass-lined material for the main body that constitute a raised face from their manufacturing method.

4. Other Standards:

We also manufacture flanges under other standards such as ANSI Class 125/150. Standards of Japan Water Works Association, DIN PN10/16. The thickness of flanges shall be all as per above-mentioned table. (Depending on body materials, either of ANSI Standard Class 125 or 150 is applied, but the both flange bolt hole pattern is same.)

5. Face-to-face dimension:

Complies with ISO 5752.

6. Bolt and nut:

Because of narrow space for the hexagon piping nut on the back of the flange of nominal size DN15 – 80, use of continuous-thread stud and hexagonal nut of JIS Standard (8-slit nut) is recommended.

②

Special specifications: Nameplate, Painting, Photography and Witness inspection

1. Nameplate:

Nameplates indicating the valve name and other special naming are available by option.

2. Painting:

Standard painting shall be as follows:

Manually operated valves: Rust resistant paint (Gray) without top coating

Automatically operated valves (pneumatic and electric): Rust resistant paint and silver top paint

For special coating, please specify details for separate estimate.

3. Photography:

Photography is available by option.

4. Witness inspection:

Witness inspection by inspection agency is option.

③ How to read the product code number

● Basic system for product code number

P	O	S	T	1	4	3	0	(04)	N	-	EP	-	1	0	0	-	20N	-	J10KFF
①	②	③	④	⑤	⑥	*					⑦		⑧				⑨		⑩
Operating system	Ancillary device	Operating section	Valve type	Material of main body	Special body/lining base material						Material of diaphragm		Nominal size				Actuator code		Connection standard

① Operating system	
Manually operated valve	None Standard handwheel type G Gear operated type QL Quick open-close type
Pneumatically operated valve	PO(HO) ON-OFF valve, reverse acting type PC(HC) ON-OFF valve, direct acting type PN(HN) ON-OFF valve, double acting type BO Rolling diaphragm type control valve, reverse acting type BC Rolling diaphragm type control valve, direct acting type
Electrically operated valve	MRS MS type actuator (Manufactured by Seibu Denki) M#S NR# NR type actuator (Manufactured by Nihon Koso)

② Ancillary device	
None	Standard actuator
L	With the lock nut
S	With the opening indicator
M	With a limit switch/exclusive limit switch box
SH	With the manual opening device: for Types PO1400N(1500N)
ST	With the opening limit device: for Types PO(PC, PN)1400N(1500N)
SL	With the manual opening + opening limit device: for Types PO1400N(1500N)
T	With the opening limit device: for Types HO(HC, HN)1400N(1500N)
TH	With the manual opening + opening limit device: for Types HO1400N(1500N)
H	With the manual operated device: for Types BO(BC)3400

③ Operating section	
None	Manually operated valve
1	Pneumatically operated type ON-OFF valve
3	Pneumatically operated type flow control valve
4	Electrically operated valve

④ Valve type	
4	Weir type diaphragm valve: Type 400
5	Straight type diaphragm valve: Type 400

⑤ Material of main body... See p10 and p15

⑥ Special body/lining base material	
None	Standard two-face body
L	Angle type
S, O4 etc. Lining base material: ⑤ Dependent on a main body material code (Also depend on requested material and type.)	

⑦ Diaphragm material... See p.11 and 15.

⑧ Nominal size: (DN or A)
Compliant with ISO 6708 and JIS B 2001.

⑨ Actuator code: Compliant with respective selection tables. (In the case of an electrically operated valve, our 8-digit code number will be given according to requested valve specifications.)

⑩ Connection standard	
J10KFF	JIS 10KFF
J10KRF	JIS 10KRF
A125FF	ANSI CL125FF
A150RF	ANSI CL150RF
PT	Tapered screw for the piping
JT	General TIG welded joint
SW	Insert welded type
(Other standard may be arranged as requested.)	

*Improved product ID code (To be determined at the time of valve selection. Requires no selection by customer.)

None	First time
N	First improvement
NB	Second improvement
NC	Third improvement

[Notation example]

· Example for a manually operated valve

	S		4	0	1	()	NB	-	CR	-	0	2	5	-		-	J10KFF
①	②	③	④	⑤	⑥	*			⑦		⑧				⑨		⑩
					Base material: None				Diaphragm: Chloroprene						Actuator code: None		JIS 10KFF
					Main body: FC200										Nominal size: DN25		
					Weir type diaphragm valve												
					Manually operated valve: None												
					With the opening indicator												
					Standard handwheel type: None												

· Example for a pneumatically operated ON-OFF valve

P	O	S	L	1	4	5	9	(M)	N	-	TX/CE	-	0	5	0	-	16N	-	J10KRF
①	②	③	④	⑤	⑥	*					⑦		⑧				⑨		⑩
					Base material: FCD-S						Diaphragm: NEW PTFE/EPDM						Actuator code: 16N		JIS 10KRF
					Main body: PFA-lined												Nominal size: DN50		
					Weir type diaphragm valve														
					Pneumatically operated ON-OFF diaphragm valve														
					With manual opening + opening limit device														
					Pneumatically operated ON-OFF diaphragm valve reverse acting type														

The above-mentioned product codes represent the standard system. A separate code number may be given to a product manufactured according to requested specifications. For any question on the detail of product coding, contact our Sales Dept. or local representative.

④ Material Selection Table

This valve selection table outlines typical reference materials based on our tests and rich performance data.
(The following table represents excerpts of reference materials. For application under other fluid, concentration, temperature and other conditions than stated in the table, please contact our Sales Dept. or local representative.)

Material evaluation symbol

◎: Comprehensively recommended ○: Applicable △: Conditionally applicable ×: Inapplicable —: Applicability unknown

Fluid name	Concentration%	Temperature℃	Main body material code*1														Diaphragm material code*2						
			01	04	07	12	13	30	33	35	36	40	59	60	80	NR	CR	BG	EP	AB	TX		
Sodium nitrite	60	20 to 60 61 to 80	△ △	△ △	○ ○	○ ○	○ ○	◎ ◎	○ △	○ △	○ △	○ △	○ ○	○ ○	-	○	○	○	◎ △	○ ×	○ ○		
Sulfite solution	5	20 to 60 61 to 80	×	×	○ ○	○ ○	○ ○	◎ ◎	△ △	○ △	△ △	○ △	○ ○	○ ○	-	○	◎ ×	○ ×	○ ×	△ ×	○ ◎		
Sodium sulfite	20 or under	20 to 60 61 to 80	×	×	○ ○	○ ○	○ ○	◎ ◎	△ △	○ △	△ △	○ ○	○ ○	○ ○	-	○	◎ ○	○ △	◎ ◎	△ ×	○ ○		
Ammonia water	28	20 to 50	○	○	○	○	○	◎	○	○	○	×	○	○	-	○	◎	○	○	-	○		
Ethylene glycol	100	20 to 60 61 to 80 81 or over	◎ ◎ ○	○ ○ ◎	○ ○ ○	○ ○ ○	○ ○ ○	○ ○ ×	○ △ ×	○ △ ×	○ △ ×	○ △ ○	○ ○ ○	○ ○ ○	○	○	◎ ○	○ △	◎ ◎	○ △ ×	○ ○ ◎		
Ammonium chloride	35 55 77	20 to 50 60 98	×	×	×	×	×	◎ ◎ ×	○ △ ×	○ △ ×	○ △ ×	○ △ ○	○ ○ ○	○ ○ ○	-	○	◎ ○ ×	○ △ ×	◎ ◎ △	○ ×	○ ◎		
Hydrochloric acid	5 or under	20 to 60 61 to 80 81 to 100	×	×	×	×	×	◎ ◎ ×	○ ×	○ ×	○ △	○ △	○ ○	○ ○	-	◎ ○	○ △	○ ◎	○ △	○ ○			
		6 to 20	20 to 60 61 to 80 81 to 100	×	×	×	×	×	◎ ◎ ×	×	×	×	○	○	◎ ○	-	◎ △	○ △	○ △	○ △	○ ◎		
			21 to 30	20 to 50 51 to 70 71 to 80	×	×	×	×	×	◎ ◎ ○	×	×	×	△	○	○ ○	-	○ △	○ △	◎ △	△ △	○ ◎	
	31 to 35			81 to 90 20 to 35 36 to 60	×	×	×	×	×	×	×	×	×	○	◎ ◎ ○	○ - ○	-	△ △	×	○ ○	×	◎ ◎	
		36		61 to 80 20 to 35 36 to 70	×	×	×	×	×	○ ○ ○	×	×	×	×	○	◎ ◎ ◎	-	×	×	×	○ ×	◎ ◎	
			Fuming hydrochloric acid	37.2 or over	20 to 35 36 to 60	×	×	×	×	×	○ △	×	×	×	○	◎ ◎	○ ○	-	×	×	×	×	◎ ◎
	Chlorine gas (wet)			20 to 35 36 or over	×	×	×	×	×	△ ×	×	×	×	○	◎ ◎	○ ○	-	×	×	×	△ ×	◎ ◎	
	Chlorine gas (dry)		20 to 35 36 or over	×	△ △	△ △	△ △	△ ×	×	×	×	×	○	◎ -	-	×	×	×	△ ×	×	◎ ◎		
	Sodium chlorate	20 or over	20 to 50 51 or over	×	×	○ ○	○ ○	○ ×	△ ×	△ ×	△ ×	○ ×	○ ○	◎ ◎	-	△ ×	△ ×	×	×	-	◎ ◎		
	Chlorine water	0.3 or under	20 to 35 36 or over	×	×	×	×	×	◎ ×	×	×	×	○	○ ◎	○ ○	-	×	×	×	×	◎ ◎		
	Seawater		20	×	×	×	×	×	◎	○	○	○	-	○	○	-	○	◎	○	-	○		
	Acetic acid	5 or under	20 to 50 51 to 60 61 to 80	×	×	○ ○ ○	○ ○ ○	○ ○ ○	◎ △ ×	△ △ ×	○ △ ×	○ ×	×	○ ○	○ ○	-	○	◎ ○	○ △	△ △	×	○ ◎	
6 to 20			20 to 35 36 to 50 51 to 80	×	×	○ ○ ○	○ ○ ○	○ ○ ○	◎ ×	×	○ ×	×	×	○ ○	○ ○	-	×	○ △	◎ △	×	×	○ ◎	
			21 to 40	20 to 35 36 to 50 51 to 80	×	×	○ ○ ○	○ ○ ○	○ ◎ ×	×	×	×	×	×	○ ◎	○ ○	-	×	×	○ ×	×	×	◎ ◎
		41 to 60		20 to 35 36 to 50 51 to 80	×	×	○ ○ ○	○ ○ ○	○ △ ×	×	×	×	×	×	◎ ◎	○ ○	-	×	×	×	×	×	◎ ◎
61 to 80				20 to 35 36 to 50 51 to 80	×	×	○ ○ ○	○ ○ ○	○ △ ×	×	×	×	×	×	◎ ◎	○ ○	-	×	×	×	×	×	◎ ◎
			96 to 100	20 to 35 36 or over	×	×	○ ○	○ ○	○ ×	×	×	×	×	×	◎ ◎	○ ○	-	×	×	×	×	×	◎ ◎
		Sodium hypochlorite		0.1 or under	20 to 35 36 to 50 51 to 60	×	×	×	×	×	◎ ◎ ×	△ ×	△ ×	△ ×	○ ○	○ ○	-	△ ×	△ ×	△ ×	◎ △	△ ×	○ ◎
0.11 to 1.0					20 to 35 36 to 50 51 or over	×	×	×	×	×	◎ ○ ×	△ ×	△ ×	△ ×	○ ○	○ ◎	-	△ ×	△ ×	△ ×	◎ △	×	○ ◎
			1.1 to 2.0		20 to 35 36 to 50 51 or over	×	×	×	×	×	◎ ○ ×	×	×	△ ×	○ ○	○ ◎	-	×	△ ×	△ ×	◎ △	×	○ ◎
				2.1 to 5.0	20 to 35 36 to 50 51 or over	×	×	×	×	×	◎ ○ ×	×	×	△ ×	○ ○	○ ◎	-	×	×	△ ×	◎ △	×	○ ◎
5.1 to 10					20 to 35 36 or over	×	×	×	×	×	○ ×	×	×	×	×	○ ◎	○ -	-	×	×	×	○ ×	◎ ◎
			11 to 13		20 to 35 36 or over	×	×	×	×	×	△ ×	×	×	×	×	○ ◎	○ -	-	×	×	×	△ ×	×

Material evaluation symbol

◎: Comprehensively recommended ○: Applicable △: Conditionally applicable ×: Inapplicable —: Applicability unknown

Fluid name	Concentration%	Temperature°C	Main body material code*1																Diaphragm material code*2					
			01	04	07	12	13	30	33	35	36	40	59	60	80	NR	CR	BG	EP	AB	TX			
Nitric acid	0.5 or under	20 to 35	x	x	○	○	○	◎	○	○	○	○	○	○	-	○	○	○	◎	○	○			
		36 to 50	x	x	○	○	○	◎	△	△	○	○	○	○	-	○	○	○	◎	△	○			
		51 to 80	x	x	◎	○	○	x	x	x	x	○	○	○	-	x	x	x	○	x	◎			
		81 or over	x	x	◎	○	○	x	x	x	x	○	○	○	-	x	x	x	x	x	◎			
	0.6 to 10	20 to 35	x	x	○	○	○	◎	x	x	△	○	○	○	-	△	△	△	◎	x	○			
		36 to 50	x	x	○	○	○	○	x	x	x	○	○	○	-	x	x	x	◎	x	◎			
		51 or over	x	x	◎	○	○	x	x	x	x	○	○	△	-	x	x	x	x	x	◎			
	11 to 20	20 to 35	x	x	◎	○	○	△	x	x	x	x	○	○	○	-	x	x	x	○	x	◎		
		36 to 50	x	x	◎	○	○	x	x	x	x	○	○	○	-	x	x	x	○	x	◎			
		51 or over	x	x	◎	○	○	x	x	x	x	○	○	○	-	x	x	x	x	x	◎			
	21 to 70	20 to 60	x	x	◎	○	○	x	x	x	x	x	○	○	○	-	x	x	x	x	x	◎		
		61 or over	x	x	△	△	△	x	x	x	x	○	◎	△	-	x	x	x	x	x	◎			
Sodium hydroxide (caustic soda)	5 or under	20 to 50	○	○	○	○	○	◎	○	○	○	x	○	○	x	◎	○	○	○	○	○			
		51 to 80	○	○	○	○	○	◎	x	○	○	x	○	○	x	○	○	△	◎	△	○			
		81 to 100	○	○	○	○	○	x	x	x	△	x	◎	○	x	x	x	x	△	x	◎			
	6 to 10	20 to 50	○	○	○	○	○	◎	x	○	○	x	○	○	x	◎	○	○	○	○	○			
		51 to 80	○	○	○	○	○	◎	x	○	○	x	○	○	x	○	○	△	◎	△	○			
		81 to 100	○	○	○	○	○	x	x	x	△	x	◎	○	x	x	x	x	△	x	◎			
	11 to 20	20 to 50	○	○	○	○	○	◎	○	○	○	x	○	○	x	◎	○	○	△	○	◎			
		51 to 80	○	○	○	○	○	◎	x	○	○	x	○	○	x	○	○	△	◎	△	○			
		81 to 100	○	○	○	○	○	x	x	x	△	x	◎	○	x	x	x	x	△	x	◎			
	21 to 40	20 to 50	○	○	○	○	○	◎	○	○	○	x	○	○	x	◎	○	○	△	○	◎			
		51 to 80	△	△	○	○	○	◎	x	○	○	x	○	○	x	△	△	△	◎	△	○			
		81 to 100	△	△	△	△	△	x	x	x	△	x	◎	○	x	x	x	x	△	x	◎			
	41 to 50	20 to 50	△	△	○	○	○	◎	○	○	○	x	○	○	x	◎	○	○	△	○	◎			
		51 to 80	△	△	△	△	△	◎	x	○	○	x	○	○	x	△	△	△	○	△	◎			
		81 to 100	△	△	△	△	△	x	x	x	△	x	◎	○	x	x	x	x	△	x	◎			
	51 to 60	20 to 50	△	△	○	○	○	◎	○	○	○	x	○	○	x	◎	△	△	○	x	○			
		51 to 80	x	x	△	△	△	◎	x	○	○	x	○	○	x	x	x	x	○	x	◎			
		81 to 100	x	x	x	x	x	x	x	x	x	x	◎	○	x	x	x	x	x	x	◎			
	Phthalic acid (alcoholic solution)	10 or under	20 to 60	△	△	○	○	△	x	x	x	x	○	◎	○	-	x	x	x	△	-	◎		
Hydrofluoric acid	1 or under	20 to 60	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
		61 to 80	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
	2 to 5	20 to 60	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
		61 to 80	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
	6 to 9	20 to 60	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
		61 to 80	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
	10 to 30	20 to 60	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
		61 or over	x	x	x	x	x	x	x	x	x	x	○	◎	-	x	x	x	x	x	◎			
30 or under	20~100	x	x	x	x	x	x	x	x	x	x	◎	○	-	x	x	x	x	x	◎				
Polyaluminum chloride		20 to 80	△	△	○	○	◎	○	○	○	○	○	○	-	◎	○	○	○	-	◎				
Sulfuric acid	20 or under	20 to 60	x	x	x	x	x	◎	○	○	○	○	○	-	○	◎	○	○	x	○				
		61 to 70	x	x	x	x	x	◎	△	△	△	○	○	-	○	○	△	◎	x	○				
		71 to 90	x	x	x	x	x	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
	21 to 50	20 to 60	x	x	x	x	x	◎	○	○	○	○	○	-	○	○	○	○	x	◎				
		61 to 70	x	x	x	x	x	○	x	△	△	○	○	◎	-	△	○	△	○	x	◎			
		71 to 90	x	x	x	x	x	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
	51 to 80	20 to 70	x	x	x	x	x	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
		71 to 90	x	x	x	x	x	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
		81 to 97	20 to 90	x	x	x	x	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
	98 or over	20 to 35	◎	○	○	○	○	x	x	x	x	○	○	○	-	x	x	x	x	x	◎			
		36 or over	△	△	△	△	△	x	x	x	x	○	◎	○	-	x	x	x	x	x	◎			
Fuming sulfuric acid		20	○	○	○	○	○	x	x	x	x	○	◎	○	-	x	x	x	x	○	◎			
Phosphoric acid	40 or under	20~40	x	x	x	x	x	○	◎	○	○	○	○	-	◎	○	○	○	○	○				
		41~60	x	x	x	x	x	◎	○	○	△	○	○	-	◎	○	○	○	△	○				
		61~80	x	x	x	x	x	◎	x	x	x	○	◎	○	-	△	△	△	◎	△	○			
	41 to 65	20~40	x	x	x	x	x	○	◎	○	○	○	○	-	◎	○	○	○	△	○				
		41 to 60	x	x	x	x	x	◎	○	○	△	○	○	-	◎	○	○	○	△	○				
		61 to 80	x	x	x	x	x	○	x	x	x	○	○	◎	-	△	△	△	◎	△	○			
	66 to 85	20 to 40	x	x	x	x	x	○	◎	○	○	○	○	-	◎	○	○	○	△	○				
		41 to 60	x	x	x	x	x	◎	○	○	△	○	○	-	◎	○	○	○	△	○				
		61 to 80	x	x	x	x	x	○	x	x	x	○	○	◎	-	△	△	△	○	x	◎			
86 to 100	20 to 40	x	x	x	x	x	◎	○	△	○	○	○	-	◎	○	○	○	△	○					
	41 to 60	x	x	x	x	x	◎	△	△	△	○	○	-	◎	△	○	○	△	○					
	61 to 80	x	x	x	x	x	○	x	x	x	○	◎	○	-	△	x	x	△	x	◎				

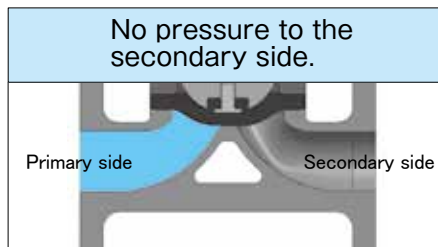
*1 : See p.10 and 15. *2 : See p.11 and 15.

[Note]

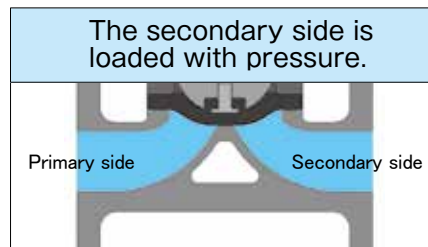
- This table is applicable only for the diaphragm valve materials used by our company. The data is not applicable to composite chemical solution. For specific chemicals, contact our Sales Dept. or local representative.
- Rubber-lined bodies are not applicable to by-product hydrochloric acid (hydrochloric acid obtained as a by-product in the manufacturing process of chloromethane, chloroform, vinyl chloride, trichloroethylene and chlorobenzene). Bodies with ETFE or PFA lining are recommended.

⑤ Actuator Selection Table

Fluid pressure stated in the actuator selection table in this catalog represents the pressure to the primary side when no pressure is applied to the secondary side (atmospheric pressure). If the secondary side is loaded with the pressure when the valve is closed, a greater output may be required. In such a case, please contact our Business Dept.



Use the selection table in this catalog.



Contact us as correction is required.

⑥ Inspection Pressure

The test medium is water or nitrogen when the Inspection pressure exceeds 0.6MPa, but it is air when the Inspection pressure is 0.6MPa or less.

● Manually Operated Diaphragm Valve : Inspection Pressure

Unit : MPa

Valve type	Weir type(Type 400)				Straight type(type 500)
Nominal Size DN	Diaphragm and body material combination				
	Rubber diaphragm		PTFE diaphragm		Rubber diaphragm
	Cast iron Stainless steel casting Rubber-lined Resin-lined	Glass-lined Ceramic-lined	Cast iron Stainless steel casting Resin-lined	Rubber-lined Glass-lined Ceramic-lined	Cast iron Stainless steel casting Rubber-lined
15	1.6	1.2	1.2	1.2	0.85
20				0.85	
25					
40					
50	1.2	0.85	0.85	0.6	0.75
65					
80					
100					
125	1.0	0.6	0.85	0.6	0.4
150					
200					
250					
300	0.5				

● Pneumatically Operated Type On-Off Diaphragm Valve / Flow Control Diaphragm Valve , Electrically Operated Diaphragm Valve : Inspection Pressure

Unit : MPa

Item Valve type Nominal Size DN	Shell test ★1		Seat leakage test	
	Weir type (Type 400)	Straight type (type 500)	Weir type (Type 400)	Straight type (type 500)
125 or less	0.6	0.6	Maximum operating pressure	
150	0.6	0.4		
200	0.6	0.4		
250	0.6 ★2	0.4		
300	0.5	0.4		

★1 : Shell test pressure is as described in the table above or at the customer's maximum operating pressure x 1.2, whichever is higher.

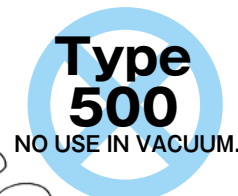
★2 : When the diaphragm material is PTFE or the main body lining material is glass, porcelain or polyethylene, the diaphragm material is 0.5MPa.



SAFETY INSTRUCTIONS

1 Cautions for selecting the valve

- ① Products described in this catalog have respective range of application specified according to the official standards and our own standard. Customers are requested to check on your conditions for usage (fluid, pressure, temperature, etc.) before selecting an optimum product.
- ② Select the material for the main body (lining), diaphragm, bonnet, compressor, base and other depending on the fluid you are to handle. As to the materials for the main body (lining) and diaphragm, please refer to the material selection table in the catalog or contact us. Please note that certain types and sizes of bonnet, compressor, base, etc. are standard manufactured using aluminum alloy. Optionally these products are also manufactured using steel material (FC200, SCS13, etc). When handling some liquid that erodes aluminum alloy, using steel material is recommended for the sake of safety. Please discuss this matter when placing orders.
- ③ When using Type 500 (Straight type), care should be taken for the following matters due to valve characteristics:
 - (1) Avoid using it in a vacuum environment.
 - (2) Avoid controlling it or using it with the opening set to intermediate level.
 - (3) Avoid using it for handling a fluid of 70°C or over continuously with the valve fully open.
 - (4) Avoid using it with the valve fully closed at a discharge side of a pump for example where high pressure or pulsation is momentarily loaded.
 - (5) Avoid using it for an abrasive fluid with the valve almost fully closed.

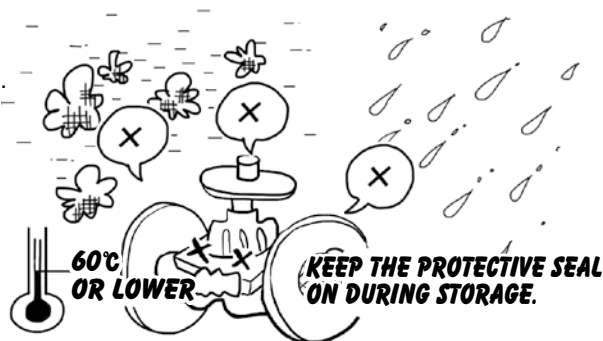


2 Cautions at Receiving and during Delivery

- ① Upon receipt of valves, check that the product and quantity are as ordered. Also check if the package and packing are undamaged.
- ② Certain items weigh heavy. When unloading or delivering the product, mind the safety by using an appropriate hoisting machines, etc. in conformity to Occupational Safety and Health Act or equivalent law. Never enter directly below a hoisted product package or operate the hoist from under the raised package.
- ③ If wetted, cardboard boxes may lose packing strength. In such a case, handle them with utmost care.
- ④ When handling a main body with the lining of hard rubber or glass lining or ceramic body, handle carefully and protect it from a strong impact or the lining may be damaged.

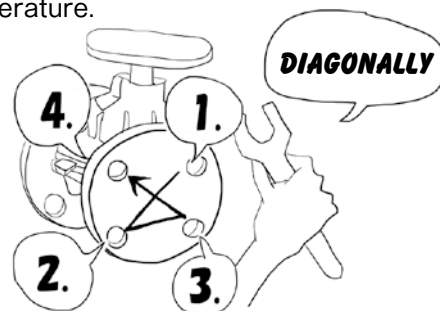
3 Cautions for Storage

- ① Users are recommended to keep the product in packed state until starting installation to the piping.
- ② When storing the valve in unpacked condition for a period of time, always keep the protective seal (a cap) on to the face of the flange for piping.
- ③ To prevent the valve from rust or rubber and plastic material from degradation, store the valve in the following conditions:
 - (1) Keep away from the rainwater.
 - (2) Keep away from direct sunlight.
 - (3) Keep it at the ambient temperature of 60°C or lower.
 - (4) Keep away from high humidity and dusty atmosphere.



4 Cautions for Installation to the Piping

- ① Remove the protective seal (a cap) from the connecting flange face of the main body. Check the inside of the valve for any contamination or attachment of foreign matters. Also check the piping system to connect the valve to for cleanliness and any foreign matters. Apply a gas blowing or liquid flushing as may be needed. Foreign matters inside the valve if any may cause leakage when caught between the valve base of the main body and the diaphragm.
- ② Provide a space around the valve necessary for overhauling. Such a space should allow to replace the diaphragm with the main body remaining connected to the piping. Particularly, when hoisting the bonnet, necessary space must be provided for the hoisting operation.
- ③ When installing the valve to the piping, prevent it from receiving abnormal tension, compression or bending stress.
- ④ In the case of a flat face flange, use a gasket that fully covers the flange face. If a soft rubber-lined body is covered with a gasket that fails to cover the flange face completely, the lining may be damaged or leakage may occur.
- ⑤ Use rubber gasket to the rubber-lined main body.
- ⑥ For connection to the piping, use the bolts of a length that makes no contact with the bonnet flange or use continuous thread studs and adjust the length of the protruding head of the stud. Tightening the bolt in contact with the bonnet flange may cause external leakage or damage the bonnet, causing the valve failure.
Particular care is required to the contact of the bonnet flange with the piping bolt when installing a valve of DN15 to 80 to the piping.
Users are recommended to use a double-end stud for the piping bolt and the nut of Style 1 (JIS B 1181), Class 1 or 2 (JIS B 1181 Attachment 1). Make adjustment to prevent contact between the bonnet flange and the piping bolts.
Adjustment position should read a position where the end face of the bolt is flush with the end face of the nut. (Select a bolt so that the fit length of the thread will be definitely at least 80% or higher of the height of the nut.)
- ⑦ When installing the valve to the piping, tighten individual bolts alternately and diagonally under identical torque. Unevenly clamped bolts may cause leakage from the connecting flange face.
- ⑧ Products with the air vent port (manually operated valve of DN125 and over, pneumatically operated valve and electrically operated valve) should be protected from the entry of rainwater, etc. through the port.
- ⑨ When connecting the valve with welded joint, always remove the bonnet including the diaphragm from the main body before welding. Reinstall the bonnet and all including the diaphragm after the temperature of the welded portions reaches the normal temperature.
- ⑩ Care should be given to the following points for wiring:
 - (1) Before closing the switch cover, make sure that the gasket is perfectly applied and the mating face is cleaned. Close the switch cover by tightening the mounting bolts steadily.
 - (2) Outlet port for the outside lead wire should be made rainwater-proof.
 - (3) Always keep the switch cover closed.
 - (4) Positively never carry on outdoor wiring work in the rain.
 - (5) After making wire connection, always check operation.



5 Cautions for Machine Operation

- ① Opening/closing the valve with part of an operator's body or wear carelessly in contact with the moving parts inside or outside of the valve may lead to a serious injuries. Never touch the inside or moving parts of the valve.
- ② When opening/closing the valve, don't operate the handwheel by hooking an auxiliary pipe or wrench on it. Or an excessive load will be applied to the valve component possibly to damage it.
- ③ When operating the handwheel to close the valve, stop the closing operation at maximum 15 to 20 degrees after sensing the valve resistance to the closing motion.
Excessive tightening may cause a shorter diaphragm life. Particular care is required when handling a fluid in high temperature.
- ④ If the handwheel operation is felt heavier in the middle of a valve closing operation, certain foreign matters might have been caught with the valve seat. In such a case, open the valve once, let the fluid flow through, and check if the foreign matters are washed away, then start the closing operation again.
- ⑤ If ambient temperature or fluid temperature changes greatly while the fluid is sealed inside the piping, thermal expansion of the fluid causes the pressure to change, possibly leading to external leakage or damaged diaphragm.

In addition, if the valve is operated to open/close while the valves before and after the diaphragm valve are closed and the inside fully filled with the fluid, the same phenomenon may occur, for which care should be taken.

- ⑥ If the fluid fully inside the valve is frozen, the valve may be freeze-fractured. For application in an environment where freezing may likely happen, take anti-freeze measures by providing the piping with thermal insulation or if the valve is not in use, to extract liquid from inside the valve, etc.
- ⑦ Rubber is used for the material of diaphragm. The nuts that clamp the diaphragm may be loosened due to vibration during transportation or stress relaxation after a long period of operation. In such a case, render the diaphragm unloaded by nullifying the fluid pressure, then apply prescribed torque to tighten the nuts to the required level.

6 Cautions for the Actuators of Pneumatically, Electrically Operated Valve

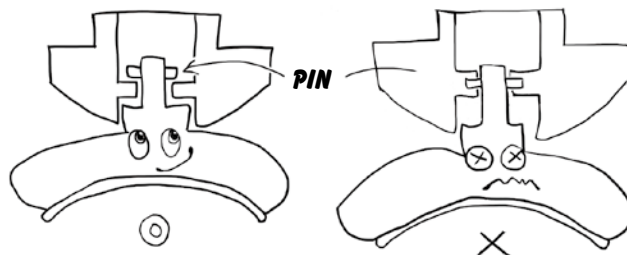
- ① Protective sealing (cap) is provided to the air intake port and the electric wiring connection port. Don't remove the sealing (cap) until the connection joint is installed.
- ② Actuators are shipped factory-adjusted. Don't disassemble and reassemble them. If any adjustment is required, please contact us.
- ③ Dehumidify the air and filter it clean before leading to the valve for application.
- ④ For the operating pressure and power supply, see the nameplate or the specifications of delivered product.
- ⑤ Protect the products with the air vent port against the entry of rainwater.

7 Cautions for Disassembly and Assembly

This is general information. Do not disassemble before you read necessary manual in details.

- ① When removing or disassembling the valve, ensure the following matters or you may be risking a serious hazard:
 - (1) The object valve should have been separated from other piping.
 - (2) The fluid pressure and temperature inside the piping and the valve should be atmospheric and normal.
 - (3) There remains no residual fluid inside the piping, and no fluid leakage occurs when the mounting bolts and nuts are loosened.
- ② Provide maintenance work for the diaphragm and actuator periodically.
 - (1) Rubber diaphragm is screwed in. When mounting to the compressor, apply appropriate pressure to screw it in. Slightly bring it back from where it stopped to align the bolt hole positions.
 - (2) PTFE diaphragm is of a bayonet type. To install to the compressor, push the center of a diaphragm firmly with fingertips. Ensure that the pin has fully entered the compressor before turning it 90 degrees clockwise or counterclockwise.
In the case of a reverse seat type diaphragm, turn it over before installation. Turning the diaphragm before the pin fully enters the compressor may damage the pin.
 - (3) When reassembling to the valve, run centering, and tighten the bolts and nuts evenly by applying prescribed torque.
 - (4) For detailed maintenance instructions, see the instruction manual or contact our Sales Dept. or local representative.

Fully insert
the pin



- The ISO 9001・14001 certificate was awarded



ISO 9001 99QR-167
ISO 14001 08ER-701



CAUTION

Specifications and performance figures of products contained in this catalog are based on the design calculations, in-house tests, actual records of product application, and the official standards and specifications. They are presented as the user guide on the use of product concerned under general service conditions. Users intending to use the product under a special condition are required to receive engineering advice from this company in advance or to make their own studies and evaluation to verify performance on their own responsibility. This company shall not be liable for any damages, material or human, that may arise without following this procedure. Inasmuch as full care was taken in editing this catalog, users are kindly requested to make contact with this company for any questions or discrepancies found. This catalog is subject to change without notice for the purpose of correcting error, supplementing or improving insufficient content, updating the content to the improved product performance, design change, discontinuation of product and other reasons. Revised version automatically invalidates catalogs issued prior to the current version. Check the version with our Sales Dept. or local representative before you place orders.



WARNING



CAUTION

There are some instructions for use of diaphragm valve because of a constructional characteristic. When valve is delivered, the leaflet related to instruction on Safety is bundled. Please read this instruction thoroughly before beginning of use and handling to use your product safely and stably for a prolonged life.

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