Compact Type High Purity Air Operated Chemical Liquid Valve

Clean Wet Series

New

RoHS

Space saving, compact model available

Compact type model is introduced as a new series to complement conventional LVC series with integral fittings.
Select a series according to the flow rate and installation requirements.
Mounting base dimensions conform to SEMI Standard, F65-1101.
(Except for the LVD10 and LVD60)

Body: New PFA
Diaphragm: PTFE
Actuator section: PPS

Series LVD Page 3

New Material of actuator section: PVDF resin

Body: New PFA
Diaphragm: PTFE
Actuator section: PVDF

Choice of buffer materials
FKM, EPDM

Air operated

Manually operated

Series LVD-F/FN Page 13

Series LVD

SMC

CAT.EUS70-24B-UK

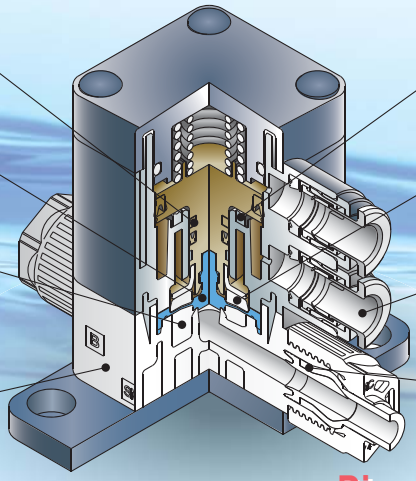
Compact Type High Purity Air Operated Chemical Liquid Valve *Series LVD*

Guide ring
Eliminates lateral motion of the poppet which reduces internal leakage.

Diaphragm (PTFE)
Special diaphragm construction ensures gentle opening and closing that prevents the formation of micro-bubbles.

Minimal residual liquid
Residual liquid is minimised by the tapered shape and integral fitting construction, allowing liquid to flow smoothly, achieving improved swept flow characteristics.

Body (New PFA)
Compatible with chemicals such as acids, bases and ultrapure water.



Piston bumper
Absorbs piston momentum to minimise impact-induced particle generation.

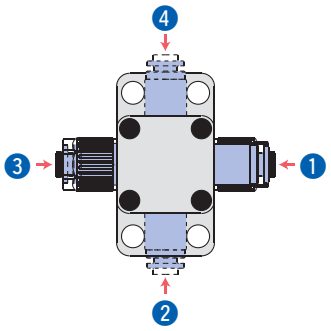
Buffer
Protects diaphragm from deformation and damage due to back pressure.

Pilot port
Integral clean One-touch fitting construction
Can select female thread (M5 x 0.8).

Integral fitting construction
Offers quadruple seal construction. Nut lock mechanism. High flexural strength. Different tubing sizes can be selected.

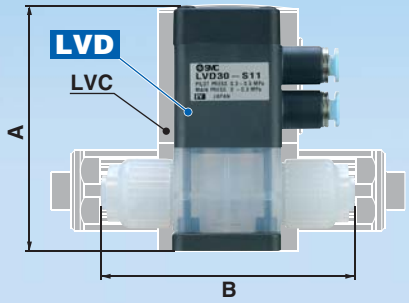
Integral fitting construction
Hyper Fitting, the LQ1 series is used.

Piping from 4 directions are possible.



Integral clean One-touch fitting construction
(The KP series is used.)
Can select female thread (M5 x 0.8).

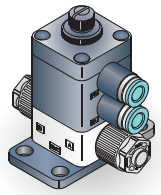
Dimension across inlet/outlet ports: Reduced by up to 29 %



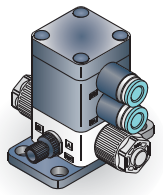
[mm]

	Class 2		Class 3		Class 4		Class 5	
	LVC20	LVD20	LVC30	LVD30	LVC40	LVD40	LVC50	LVD50
A	54.5	**54.5**	79	**79.5**	96	**82**	129	**105.5**
B	79	**67**	106	**83**	131	**93**	154	**114**

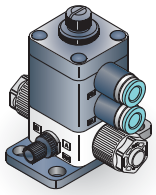
Options



With flow rate adjustment



With bypass



With flow rate adjustment & bypass

Suck Back

Page 5

Variations

[Integral fittings] ··· Page 3

Orifice diameter	Flow-rate characteristics Av x 10^{-6} m^2 (Cv)	Model	Applicable tubing O.D.													
			Metric size								Inch size					
			3	4	6	8	10	12	19	25	1/8	3/16	1/4	3/8	1/2	3/4	1
2	2.1 (0.09)	LVD10	○	○							○						
4	8.4 (0.35)	LVD20	●	●	○						●	●	○				
8	31.2 (1.3)	LVD30			●	●	○						●	○			
10	45.6 (1.9)	LVD40					●	○						●	○		
16	120 (5)	LVD50						●	○						●	○	

[Tube extensions] ··· Page 10

Orifice diameter	Flow-rate characteristics Av x 10^{-6} m^2 (Cv)	Model	Applicable tubing O.D.								
			Metric size					Inch size			
			6	8	10	12	19	1/4	3/8	1/2	3/4
4	8.4 (0.35)	LVD20	○					○			
8	31.2 (1.3)	LVD30		○					○		
10	45.6 (1.9)	LVD40			○					○	
16	120 (5)	LVD50				○					○

● With reducer ○ Basic size

SMC

New

Air Operated **Series LVD-$^{F}_{FN}$** Page 13

Manually Operated **Series LVDH-$^{F}_{FN}$** Page 23

Body: PFA
Actuator section: PVDF
Buffer: FKM/EPDM (Selection)

Pilot port can be selected from 4 directions.
∗ Inapplicable to the LVD60.

Type of fitting: Either "LQ1", "LQ3" or "tube extensions" can be selected.

Options: With flow rate adjustment, With bypass, With indicator, High back pressure (0.5 MPa)

LVD40-Z13-F1
With flow rate adjustment

LVD40-Z13-F

LVDH40-Z13-F

Variations

[LQ1 integral fittings]··· Pages 13, 23

Orifice diameter	Flow-rate characteristics Av x 10^{-6} m² (Cv)	Model	Applicable tubing O.D.													
			Metric size								Inch size					
			3	4	6	8	10	12	19	25	1/8	3/16	1/4	3/8	1/2	3/4	1
4	8.4 (0.35)	LVD20-F/FN	●	●	○						●	●	○				
8	31.2 (1.3)	LVD30-F/FN			●	●	○						●	○			
10	45.6 (1.9)	LVD40-F/FN					●	○						●	○		
16	120 (5)	LVD50-F/FN						●	○						●	○	
22	192 (8)	LVD60-F/FN							●	○						●	○

● With reducer ○ Basic size

[LQ3 integral fittings]··· Pages 17, 25

Orifice diameter	Flow-rate characteristics Av x 10^{-6} m² (Cv)	Model	Applicable tubing O.D.									
			Metric size						Inch size					
			6	8	10	12	19	25	1/4	3/8	1/2	3/4	1
4	8.4 (0.35)	LVD20-F/FN	○						○				
8	31.2 (1.3)	LVD30-F/FN		○	○					○			
10	45.6 (1.9)	LVD40-F/FN				○					○		
16	120 (5)	LVD50-F/FN					○					○	
22	192 (8)	LVD60-F/FN						○					○

[Tube extensions]··· Pages 20, 27

Orifice diameter	Flow-rate characteristics Av x 10^{-6} m² (Cv)	Model	Applicable tubing O.D.									
			Metric size						Inch size					
			6	8	10	12	19	25	1/4	3/8	1/2	3/4	1
4	8.4 (0.35)	LVD20-F/FN	○						○				
8	31.2 (1.3)	LVD30-F/FN			○					○			
10	45.6 (1.9)	LVD40-F/FN				○					○		
16	120 (5)	LVD50-F/FN					○					○	
22	192 (8)	LVD60-F/FN						○					○

Air Operated
Insert Bushing, Integral Fittings
Series LVD

RoHS

How to Order

LVD 1 0 – S 03 □ □ □ – □ □

Body class

Symbol	Body class	Orifice dia.
1	1	Ø 2
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16

Valve type

0	N.C.
1	N.O.
2	Double acting

Note) Refer to "Variations" in the table below for valve type combinations.

LQ1 integral fittings

Applicable tubing size

Symbol	Connecting tubing size	Body class 1	2	3	4	5
Metric size						
03	3 x 2	○	●			
04	4 x 3	○	●			
06	6 x 4		○	●		
08	8 x 6			●		
10	10 x 8			○	●	
12	12 x 10				○	●
19	19 x 16					○
Inch size						
03	1/8" x 0.086"	○	●			
05	3/16" x 1/8"		●			
07	1/4" x 5/32"		○	●		
11	3/8" x 1/4"			○	●	
13	1/2" x 3/8"				○	●
19	3/4" x 5/8"					○

○Basic size ●With reducer

Note) Refer to page 32 for details on the applicable tubing sizes.

Pilot port type

Symbol	Body class	Type
—	1	Ø 4 One-touch fitting
	2, 3, 4, 5	Ø 6 One-touch fitting
2	1, 2, 3, 4, 5	M5 x 0.8

Port B (OUT) different diameter size

Symbol	Application
—	Ports A & B same size
Refer to the applicable tubing table to the left.	Different diameter tubings can be selected within the same body class. Different diameter tubing can not be selected for the body size 1.

Option

—	None
1	With flow rate adjustment
2	With bypass
3	With flow rate adjustment & bypass

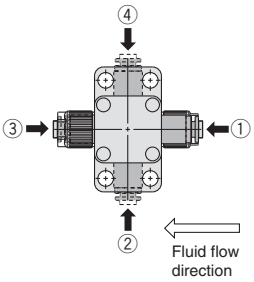
Note) Refer to "Variations" in the table below for option combinations. Options can not be combined each other.

Material

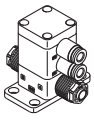
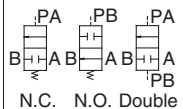
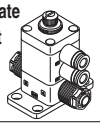
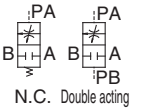
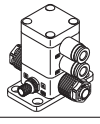
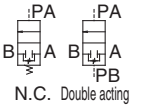
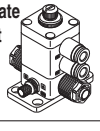
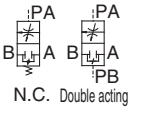
Symbol	Body	Actuator section / End plate	Diaphragm	Note
—	PFA	PPS	PTFE	—
N	PFA	PPS	PTFE	Ammonium hydroxide compatible

Pilot port position

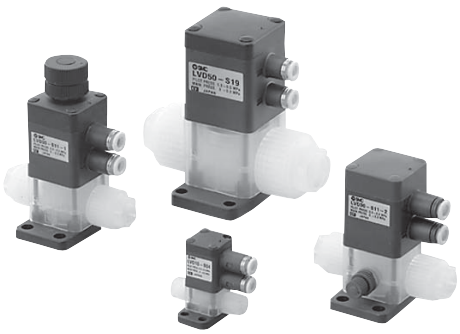
Symbol	Position
—	①
P2	②
P3	③
P4	④



Variations

Type	Symbol	Model / Orifice diameter / Tubing O.D. (Metric / Inch) / Valve type	LVD10 Ø 2	LVD20 Ø 4	LVD30 Ø 8	LVD40 Ø 10	LVD50 Ø 16
				3, 4, 6	6, 8, 10	10, 12	12, 19
				1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4
Basic 	 N.C. N.O. Double acting	N.C.	○	○	○	○	○
		N.O.	○	○	○	○	○
		Double acting	○	○	○	○	○
With flow rate adjustment 	 N.C. Double acting	N.C.	○	○	○	○	○
		Double acting	○	○	○	○	○
With bypass 	 N.C. Double acting	N.C.	—	○	○	○	○
		Double acting	—	○	○	○	○
With flow rate adjustment & bypass 	 N.C. Double acting	N.C.	—	○	○	○	○
		Double acting	—	○	○	○	○

SMC



⚠ Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

Standard Specifications

Model		LVD10	LVD20	LVD30	LVD40	LVD50
Tubing O.D. Note)	Metric	3, 4	3, 4, 6	6, 8, 10	10, 12	12, 19
	Inch	1/8	1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4
Orifice diameter		Ø 2	Ø 4	Ø 8	Ø 10	Ø 16
Flow-rate characteristics	Av x 10^{-6} m^2	2.1	8.4	31.2	45.6	120
	Cv	0.09	0.35	1.3	1.9	5
Withstand pressure [MPa]		1				
Operating pressure [MPa]	A→B flow	0 to 0.5		0 to 0.3		
	B→A flow	0 to 0.2		0 to 0.1		
Back pressure [MPa]		0.3 or less		0.2 or less		
Valve leakage [cm^3/min]		0 (With water pressure)				
Pilot air pressure [MPa]		0.3 to 0.5				
Pilot port size	One-touch fitting	Ø 4 x Ø 3 tubing	Ø 6 x Ø 4 tubing			
	Threaded	M5 x 0.8				
Fluid temperature [°C]		0 to 100				
Ambient temperature [°C]		0 to 60				
Weight [kg]		0.04	0.09	0.16	0.19	0.40

Note) Refer to page 32 for details of the applicable tubing sizes.

Different Diameter Tubing Applicable with Reducer

Different diameter tubing can be selected (within a body class) by using a nut and insert bushing (reducer). Different diameter tubing cannot be selected for the body size 1.

● With reducer

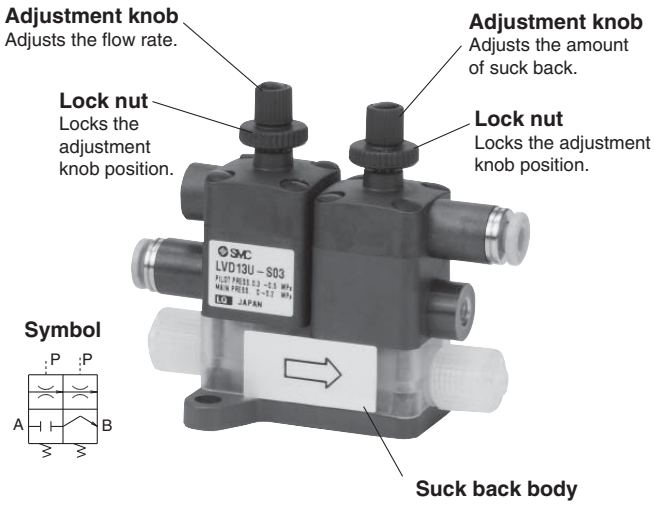
Body class	Tubing O.D.												
	Metric size							Inch size					
	3	4	6	8	10	12	19	1/8	3/16	1/4	3/8	1/2	3/4
1	○	○	—	—	—	—	—	○	—	—	—	—	—
2	●	●	○	—	—	—	—	●	●	○	—	—	—
3	—	—	●	●	○	—	—	—	—	●	○	—	—
4	—	—	—	—	●	○	—	—	—	—	●	○	—
5	—	—	—	—	—	●	○	—	—	—	—	●	○

Note) Refer to page 29 for information on changing tubing sizes.

Suck Back

A change of volume inside the suck back valve pulls in liquid at the end of the nozzle to prevent dripping.

Pilot port with One-touch fittings



Pilot port threaded type

Standard Specifications

Model		LVD13U
Tubing O.D. Note)	Metric size	3, 4
	Inch size	1/8
Orifice diameter		Ø 2
Flow-rate characteristics	Av x 10^{-6} m^2	2.1
	Cv	0.09
Withstand pressure [MPa]		1
Operating pressure [MPa]		0 to 0.2
Maximum suck back volume [cm^3]		0.03
Pilot air pressure [MPa]		0.3 to 0.5
Pilot port size	One-touch fitting	Ø 4 x Ø 3 tubing
	Threaded	M5 x 0.8
Fluid temperature [°C]		0 to 100
Ambient temperature [°C]		0 to 60
Weight [kg]		0.07

Note) Refer to page 32 for details on the applicable tubing sizes.

How to Order

LVD 1 3 U – S 03 □

Body class

Symbol	Body class
1	1

Valve type

3	Suck back valve

Applicable tubing size Note)

Symbol	Connecting tubing size
03	3 x 2, 1/8" x 0.086"
04	4 x 3

Note) Refer to page 32 for details on the applicable tubing sizes.

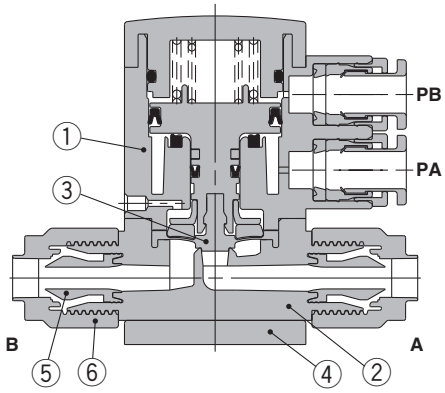
Pilot port configuration

—	Ø 4 One-touch fitting
2	M5 x 0.8

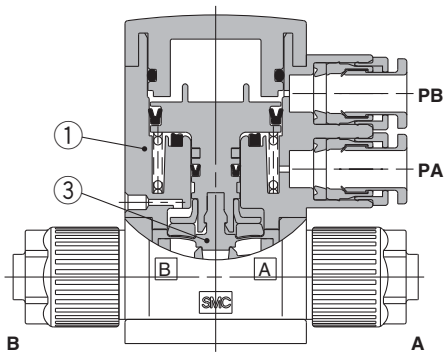
Construction

Basic type

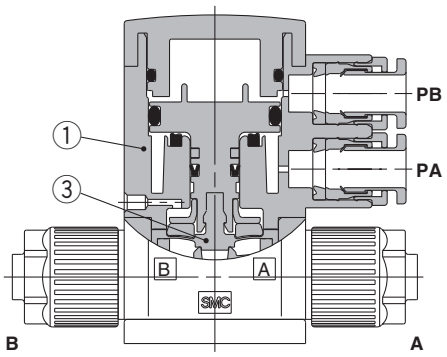
N.C.

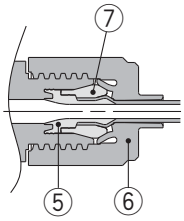


N.O.



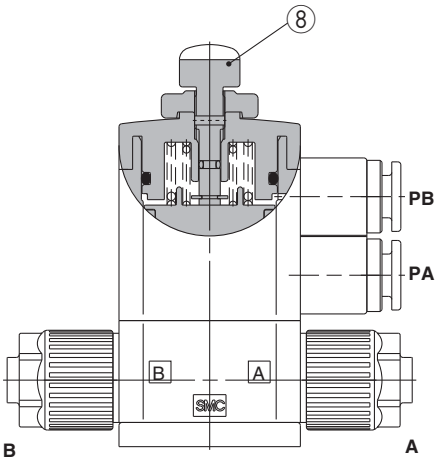
Double acting



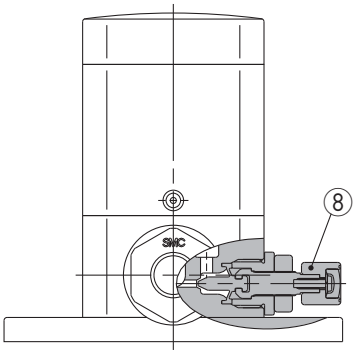


With reducer

With flow rate adjustment



With bypass

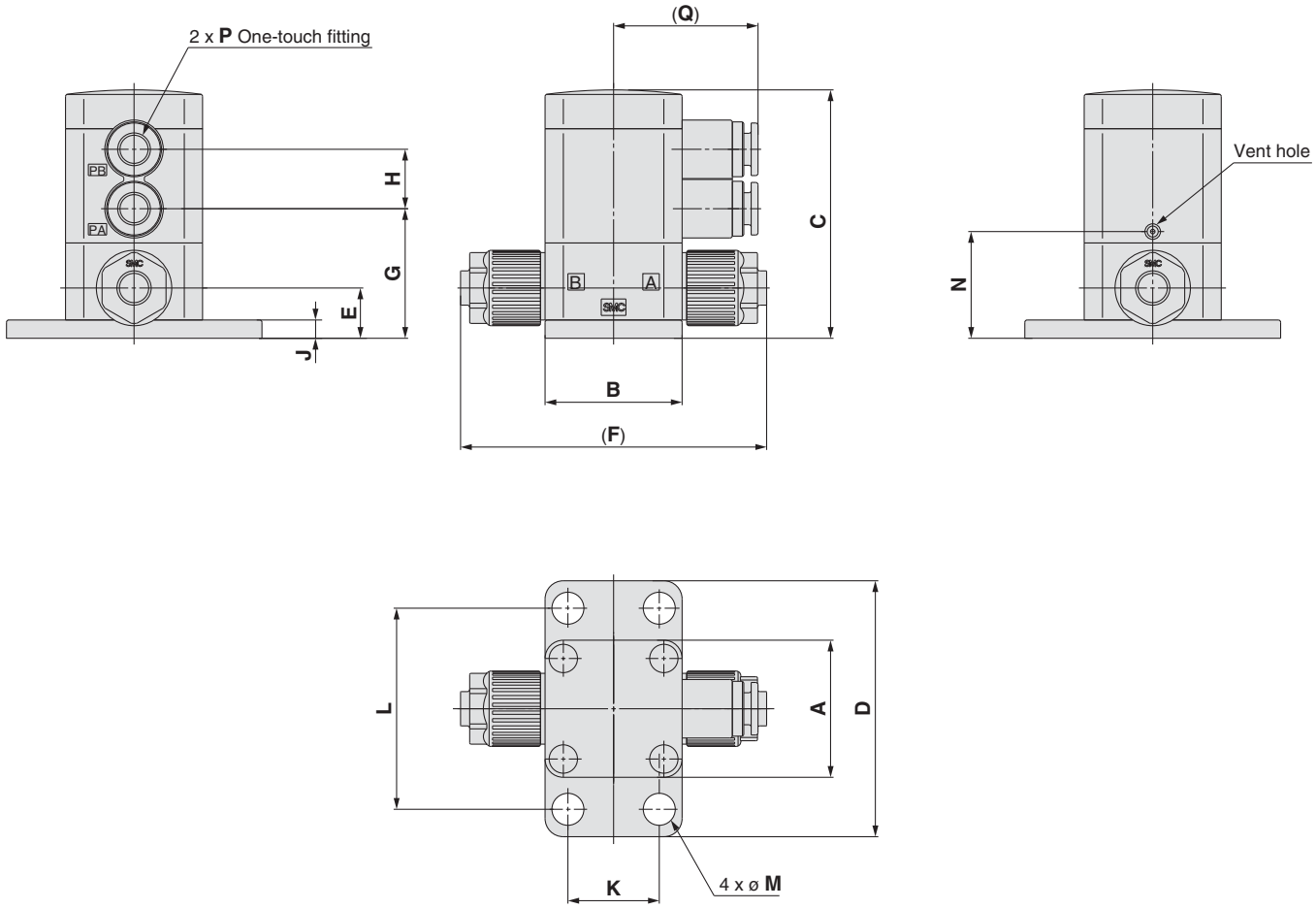


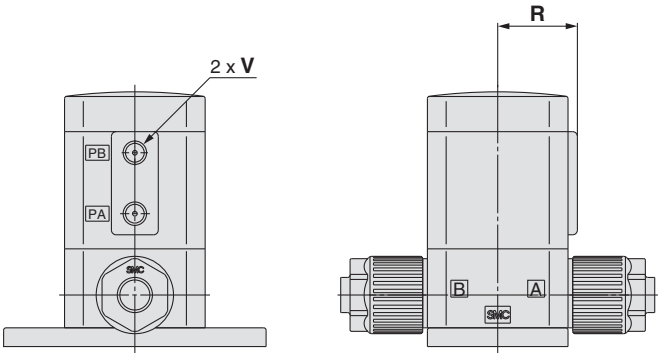
Component Parts

No.	Description	Material
1	**Actuator section**	PPS
2	**Body**	PFA
3	**Diaphragm**	PTFE
4	**End plate**	PPS
5	**Insert bushing**	PFA
6	**Nut**	PFA
7	**Collar**	PFA
8	**Flow rate adjuster section**	PPS

Dimensions

Basic type





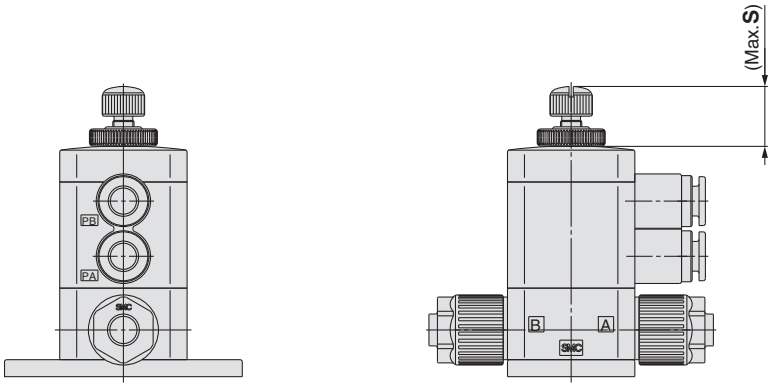
Pilot port threaded type

Dimensions

[mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	V
LVD1□-S□	20	20	45	39	9.5	46	23	11.5	4.5	11	30	5	21	Ø 4 (5/32")	28	22.5	M5 x 0.8
LVD2□-S□	30	30	54.5	56	11	67	28.5	13	4	20	44	7	23.5	Ø 6	31.5	17.5	M5 x 0.8
LVD3□-S□	35	35	79.5	62	17.5	83	42.4	17.5	6	22	50	7	36.8	Ø 6	36	21	M5 x 0.8
LVD4□-S□	35	35	82	62	20	93	44.9	17.5	6	22	50	7	39.3	Ø 6	36	21	M5 x 0.8
LVD5□-S□	45	45	105.7	76	25	114	65.2	17.5	8	32	64	7	52.2	Ø 6	38.5	25	M5 x 0.8

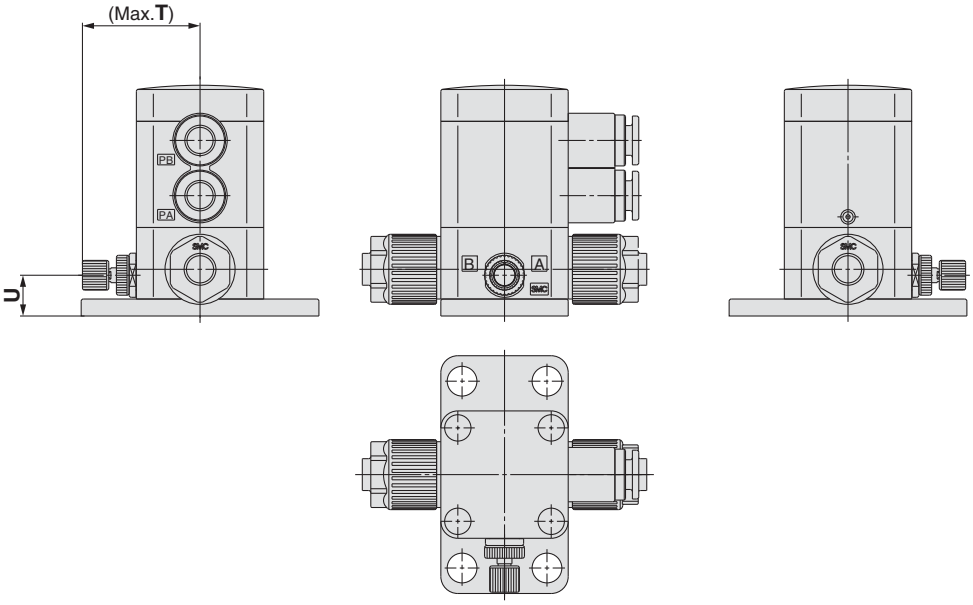
With flow rate adjustment



Dimensions [mm]

Model	S
LVD1□-S□	14
LVD2□-S□	12.5
LVD3□-S□	26
LVD4□-S□	26
LVD5□-S□	29.5

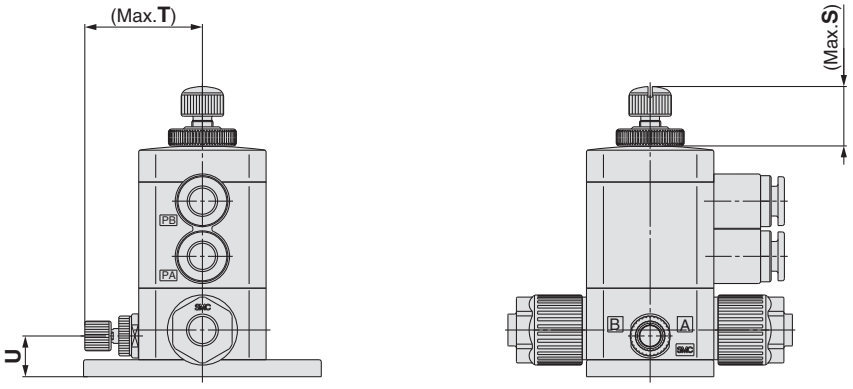
With bypass



Dimensions [mm]

Model	T	U
LVD2□-S□	28	9.6
LVD3□-S□	34	17.5
LVD4□-S□	35	20
LVD5□-S□	57	25

With flow rate adjustment & bypass



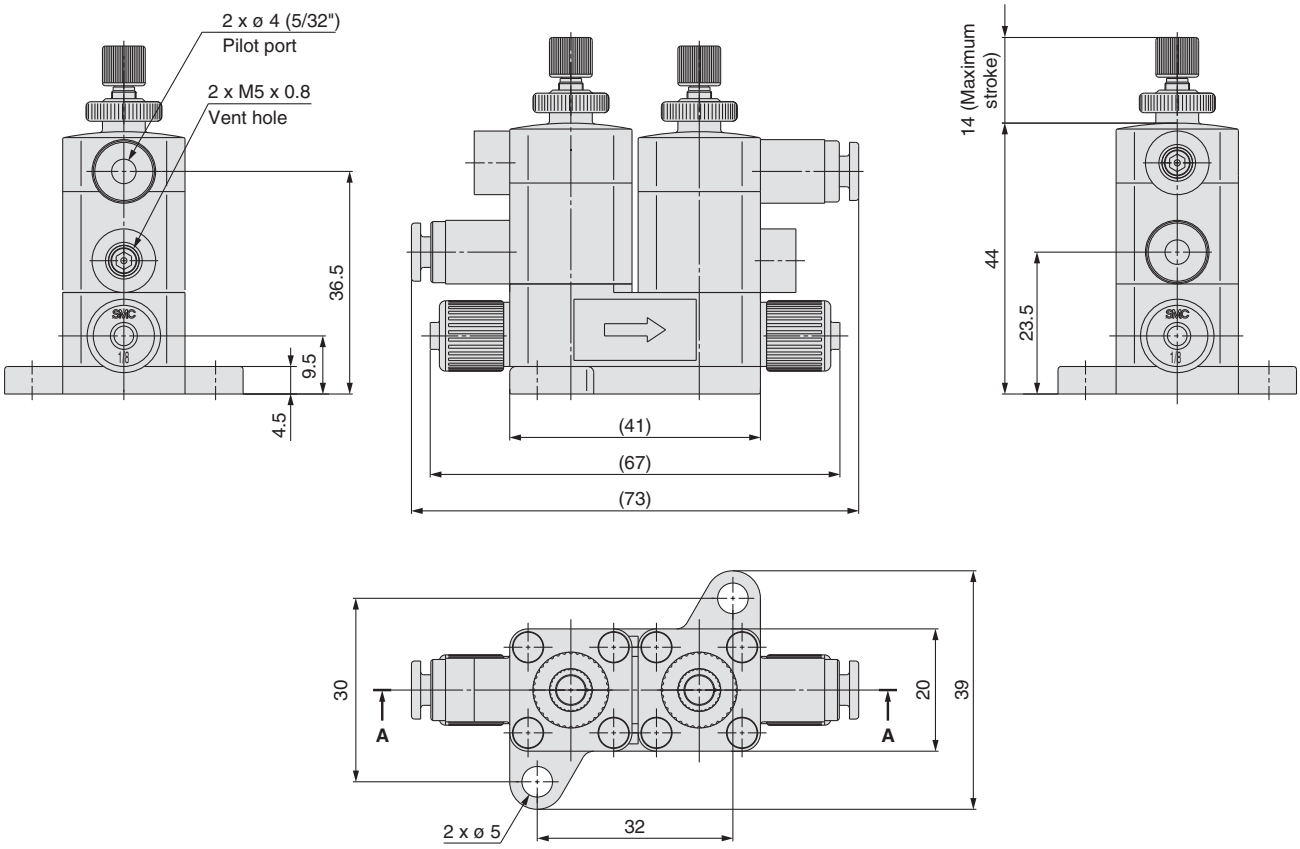
Dimensions [mm]

Model	S	T	U
LVD2□-S□	12.5	28	9.6
LVD3□-S□	26	34	17.5
LVD4□-S□	26	35	20
LVD5□-S□	29.5	57	25

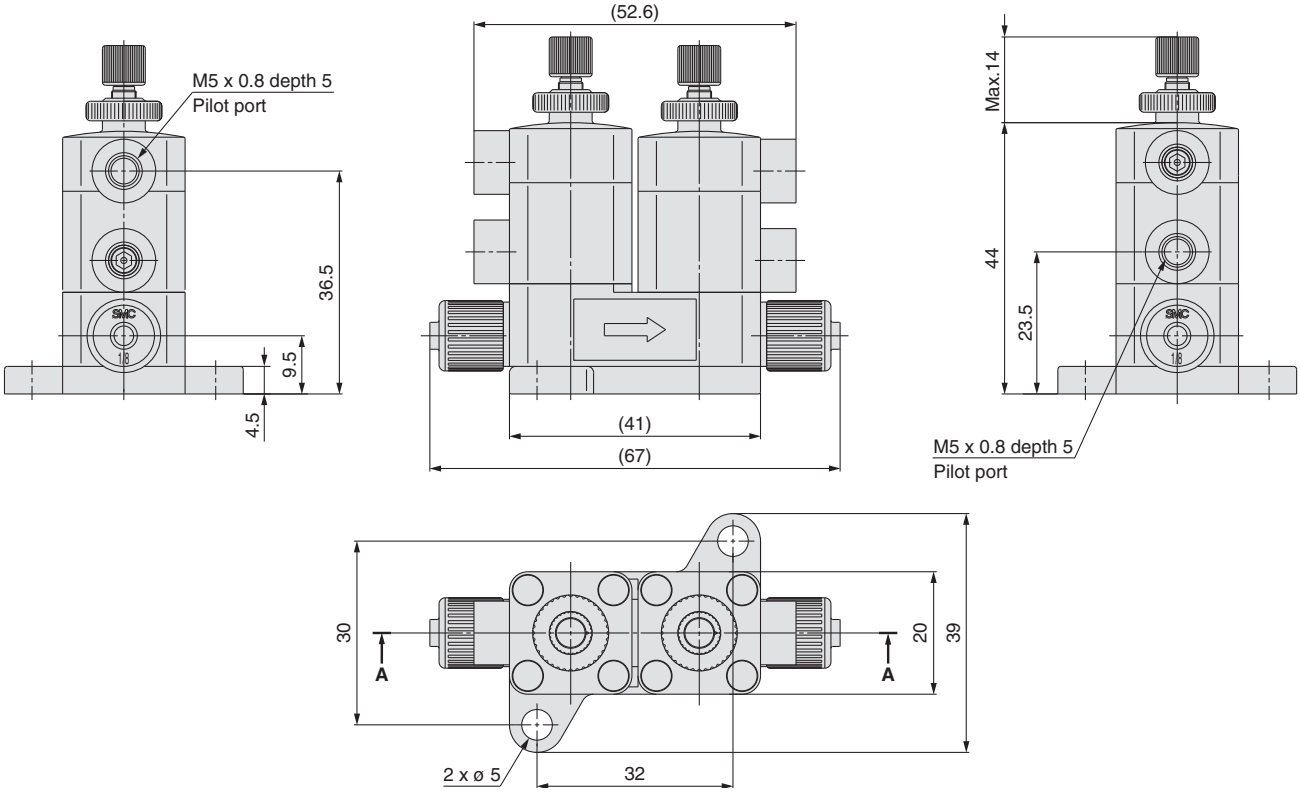
Dimensions

Suck back valve unit:

Pilot port with One-touch fittings



Pilot port threaded type



Air Operated
Tube Extensions
Series LVD-T

RoHS

How to Order

LVD 2 0 – T 06 □ □ – □ □

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16

Valve type

0	N.C.
1	N.O.
2	Double acting

Note) Refer to "Variations" in the table below for valve type combinations.

Tubing O.D.

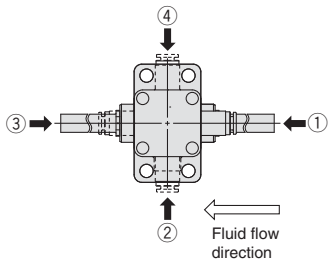
Symbol	Tubing O.D.	Body class 2	3	4	5
Metric size					
06	Ø 6	○			
10	Ø 10		○		
12	Ø 12			○	
19	Ø 19				○
Inch size					
07	1/4"	○			
11	3/8"		○		
13	1/2"			○	
19	3/4"				○

Pilot port type

Symbol	Type
—	Ø 6 One-touch fitting
2	M5 x 0.8

Pilot port position

Symbol	Position
—	①
P2	②
P3	③
P4	④



Material

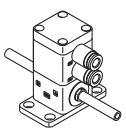
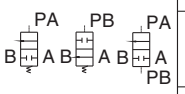
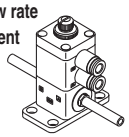
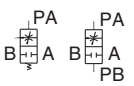
Symbol	Body	Actuator section / End plate	Diaphragm	Note
—	PFA	PPS	PTFE	—
N	PFA	PPS	PTFE	Ammonium hydroxide compatible

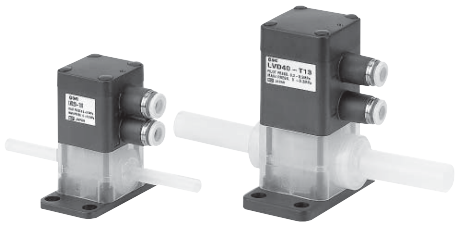
Option

—	None
1	With flow rate adjustment

Note) Refer to "Variations" in the table below for option combinations.

Variations

Type	Symbol (Valve type)		Model: LVD20-T	LVD30-T	LVD40-T	LVD50-T
		Orifice diameter	Ø 4	Ø 8	Ø 10	Ø 16
		Tubing O.D. Metric	6	10	12	19
		Tubing O.D. Inch	1/4	3/8	1/2	3/4
Basic 	 N.C. N.O. Double acting	N.C.	○	○	○	○
		N.O.	○	○	○	○
		Double acting	○	○	○	○
With flow rate adjustment 	 N.C. Double acting	N.C.	○	○	○	○
		Double acting	○	○	○	○



⚠ Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

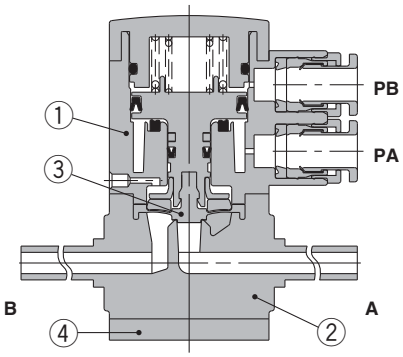
Standard Specifications

Model		LVD20	LVD30	LVD40	LVD50
Tubing O.D.	Metric	6	10	12	19
	Inch	1/4	3/8	1/2	3/4
Orifice diameter		Ø 4	Ø 8	Ø 10	Ø 16
Flow-rate characteristics	Av x 10^{-6} m^2	8.4	31.2	45.6	120
	Cv	0.35	1.3	1.9	5
Withstand pressure [MPa]		1			
Operating pressure [MPa]	A→B flow	0 to 0.5	0 to 0.3		
	B→A flow	0 to 0.2	0 to 0.1		
Back pressure [MPa]		0.3 or less	0.2 or less		
Valve leakage [cm^3/min]		0 (With water pressure)			
Pilot air pressure [MPa]		0.3 to 0.5			
Pilot port size	One-touch fitting	Ø 6 x Ø 4 tube			
	Threaded	M5 x 0.8			
Fluid temperature [°C]		0 to 100			
Ambient temperature [°C]		0 to 60			
Weight [kg]		0.09	0.15	0.17	0.36

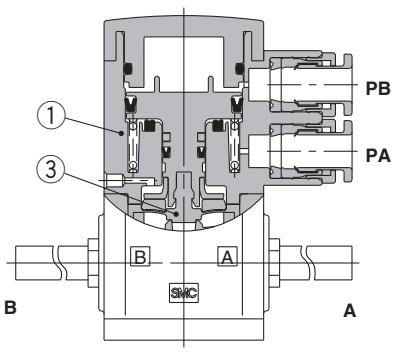
Construction

Basic type

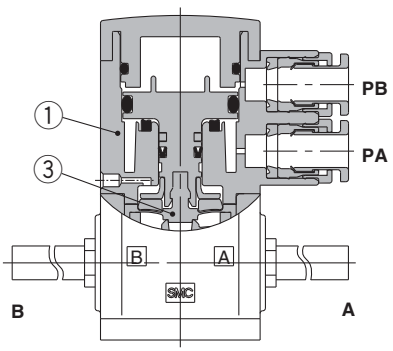
N.C.



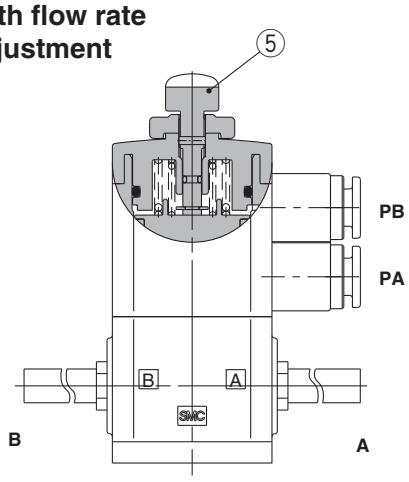
N.O.



Double acting



With flow rate adjustment

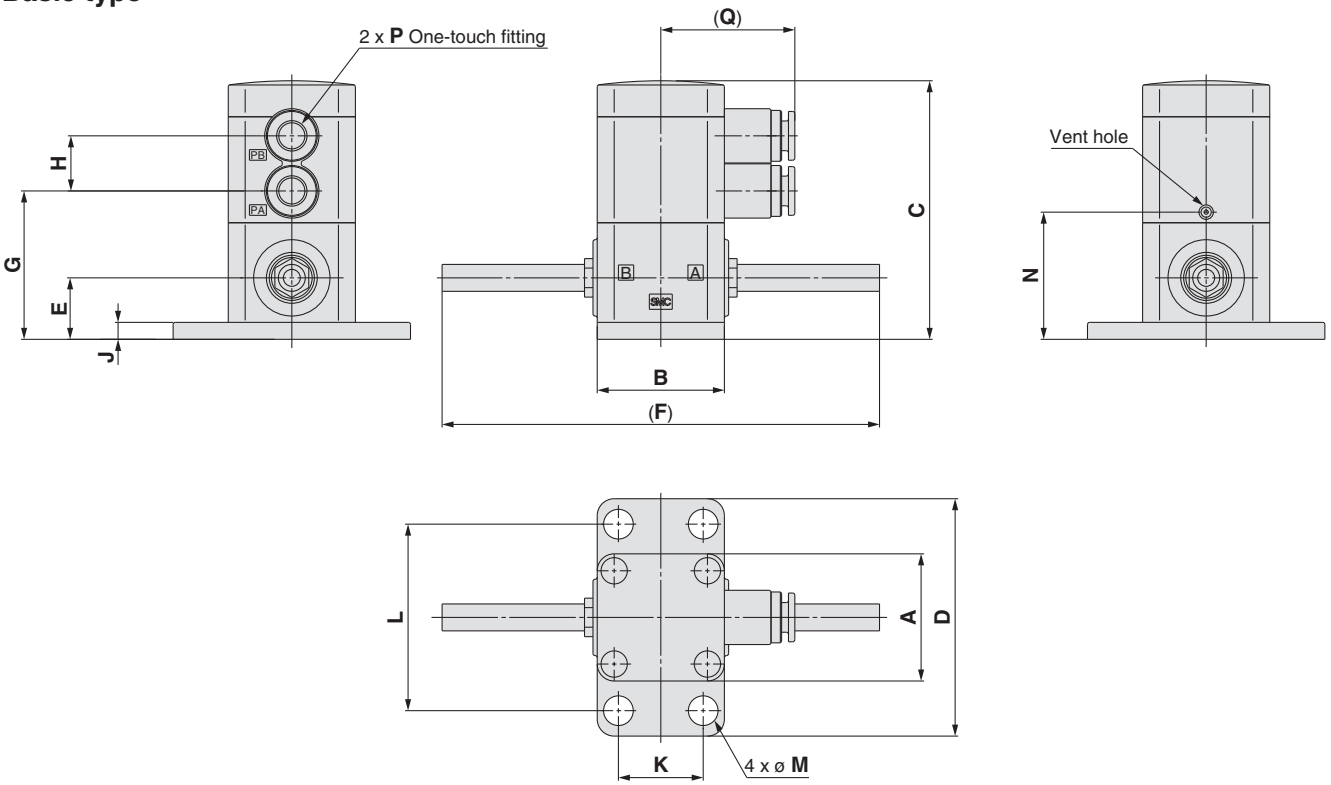


Component Parts

No.	Description	Material
1	Actuator section	PPS
2	Body	PFA
3	Diaphragm	PTFE
4	End plate	PPS
5	Flow rate adjuster section	PPS

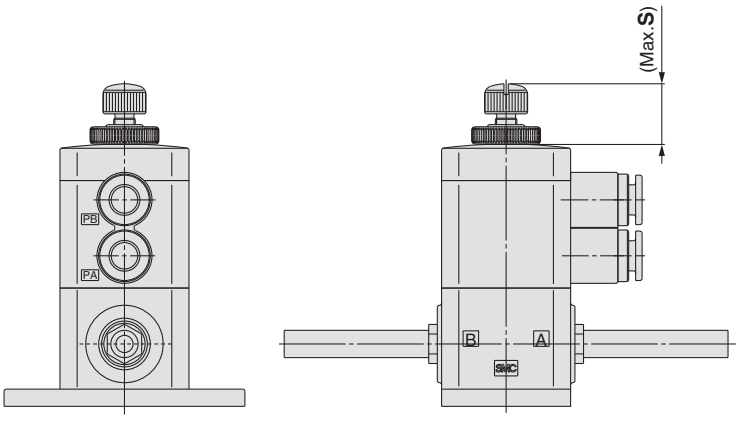
Dimensions

Basic type



Pilot port threaded type

With flow rate adjustment



Dimensions [mm]

Model	S
LVD2□-T□	12.5
LVD3□-T□	26
LVD4□-T□	26
LVD5□-T□	29.5

Dimensions [mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	T	U
LVD2□-T□	30	30	61	56	14.5	103	35	13	4	20	44	7	30	Ø 6	31.5	17.5	M5 x 0.8
LVD3□-T□	35	35	79.5	62	17.5	136	42.4	17.5	6	22	50	7	36.8	Ø 6	36	21	M5 x 0.8
LVD4□-T□	35	35	82	62	20	137	44.9	17.5	6	22	50	7	39.3	Ø 6	36	21	M5 x 0.8
LVD5□-T□	45	45	105.7	76	25	169.5	65	17.5	8	32	64	7	52.2	Ø 6	38.5	25	M5 x 0.8

Air Operated
Insert Bushing, Integral Fittings
Series LVD-F/FN

RoHS

How to Order Valves

LVD 2 0 – V 07 [ ] [ ] [ ] – FN [ ]

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Valve type

0	N.C.
1	N.O.
2	Double acting

Fitting type

Symbol	Model
V	LQ1

Applicable tubing size

Symbol	Connecting tubing size	Body class 2	3	4	5	6
Metric size						
03	3 x 2	●				
04	4 x 3	●				
06	6 x 4	○	●			
08	8 x 6		●			
10	10 x 8		○	●		
12	12 x 10			○	●	
19	19 x 16				○	●
25	25 x 22					○
Inch size						
03	1/8" x 0.086"	●				
05	3/16" x 1/8"	●				
07	1/4" x 5/32"	○	●			
11	3/8" x 1/4"		○	●		
13	1/2" x 3/8"			○	●	
19	3/4" x 5/8"				○	●
25	1" x 7/8"					○

○Basic size ●With reducer

Port B (OUT) different diameter size

Symbol	Application
—	Ports A & B same size
Refer to the applicable tubing table shown above.	Different diameter tubings can be selected within the same body class.

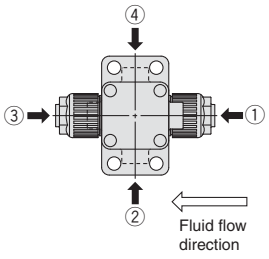
Pilot port thread type

—	Rc 1/8
N	NPT 1/8

Pilot port position

Symbol	Position
—	①
P2	②
P3	③
P4	④

Note) P2 and P4 are not available for the LVD6□.



Material

Symbol	Body	Actuator section / End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

Option

—	None
1	With flow rate adjustment
2	With bypass
3	With flow rate adjustment & bypass
4	With indicator
5	High back pressure (0.5 MPa) tolerant
6	High back pressure with flow rate adjustment
7	High back pressure with bypass
8	High back pressure with flow rate adjustment & bypass
9	High back pressure with indicator
24	With bypass & indicator

Note 1) With flow rate adjustment: Only available with N.C. valve and double acting valve, With indicator: Only available with N.C. valve, With bypass: Only available with N.C. valve and double acting valve.

Note 2) "With bypass" type is not available for the LVD2□ and LVD6□.

Standard Specifications

Model			LVD20	LVD30	LVD40	LVD50	LVD60
Tubing O.D.		Metric	3, 4, 6	6, 8, 10	10, 12	12, 19	19, 25
		Inch	1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4	3/4, 1
Orifice diameter			Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	Av x 10^{-6}m²		8.4	31.2	45.6	120	192
	Cv		0.35	1.3	1.9	5	8
Withstand pressure [MPa]			1				
Operating pressure [MPa]	Standard	A→B flow	0 to 0.5	0 to 0.3			0 to 0.4
		B→A flow	0 to 0.2	0 to 0.1			
	High back pressure	A→B flow	0 to 0.5				
		B→A flow	0 to 0.4				
Back pressure [MPa]	Standard	N.C./N.O.	0.3 or less	0.2 or less			0.2 or less
		Double acting					0.3 or less
	High back pressure	N.C./N.O./ Double acting	0.5 or less				
Valve leakage [cm³/min]			0 (With water pressure)				
Pilot air pressure [MPa]			0.3 to 0.5 (High back pressure: 0.5 to 0.8)				
Pilot port size			Rc 1/8, NPT 1/8				
Fluid temperature [°C]			0 to 100				
Ambient temperature [°C]			0 to 60				

Different Diameter Tubing Applicable with Reducer

Different diameter tubing can be selected (within a body class) by using a nut and insert bushing (reducer).

● With reducer

Body class	Tubing O.D.														
	Metric size								Inch size						
	3	4	6	8	10	12	19	25	1/8	3/16	1/4	3/8	1/2	3/4	1
2	●	●	○	—	—	—	—	—	●	●	○	—	—	—	—
3	—	—	●	●	○	—	—	—	—	—	●	○	—	—	—
4	—	—	—	—	●	○	—	—	—	—	—	●	○	—	—
5	—	—	—	—	—	●	○	—	—	—	—	—	●	○	—
6	—	—	—	—	—	—	●	○	—	—	—	—	—	●	○

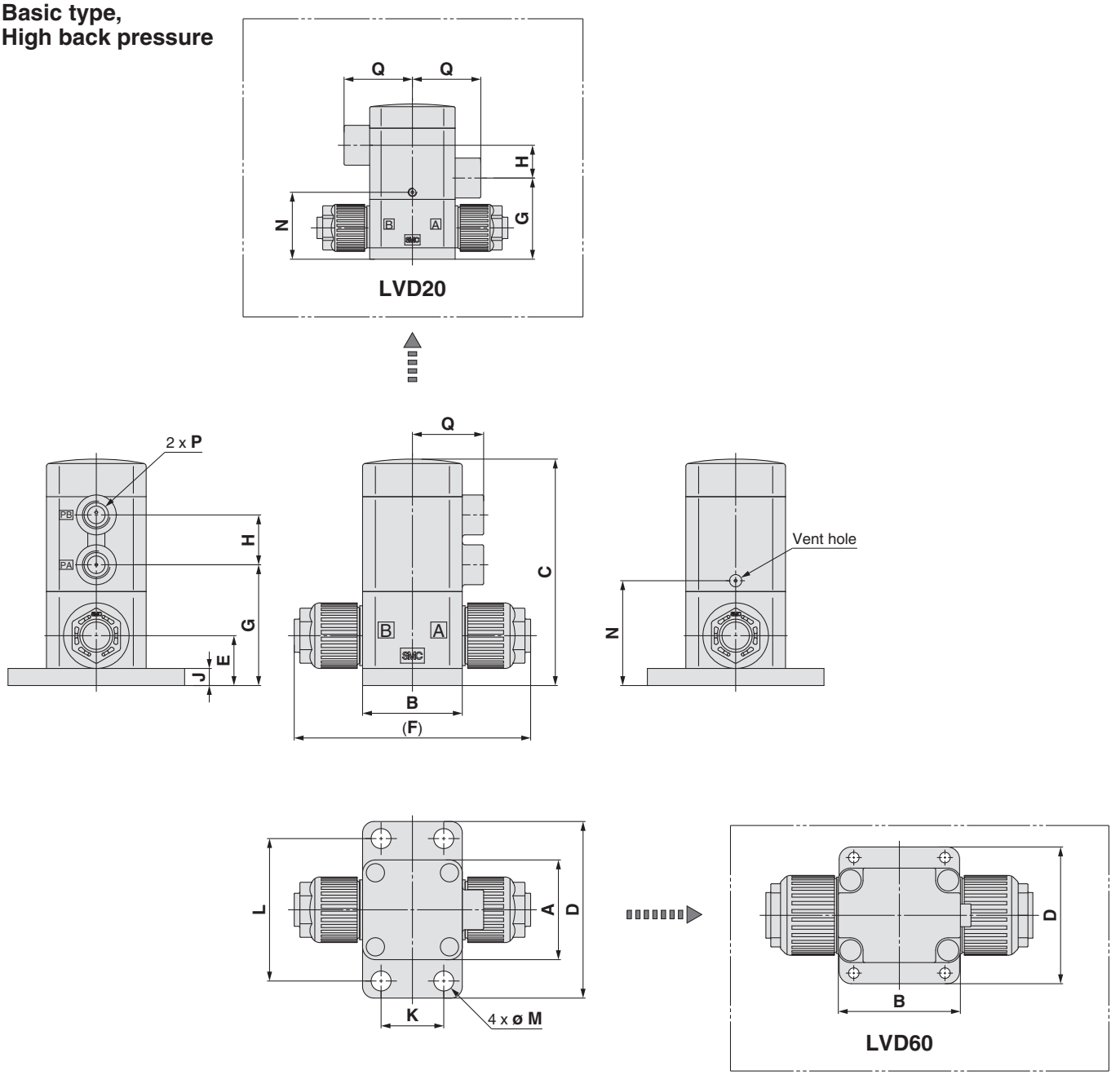
Note) Refer to page 29 for information on changing tubing sizes.

⚠Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

Dimensions

Basic type,
High back pressure

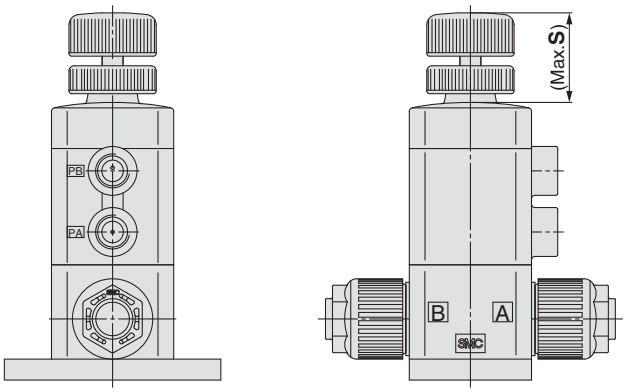


Dimensions [mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
LVD2□-V□-F□	30	30	54.5	56	11	67	28.5	11.5	4	20	44	7	23.5	Rc 1/8 NPT 1/8	24
LVD3□-V□-F□	35	35	79.5	62	17.5	83	42.4	17.5	6	22	50	7	36.8	Rc 1/8 NPT 1/8	25
LVD4□-V□-F□	35	35	82	62	20	93	44.9	17.5	6	22	50	7	39.3	Rc 1/8 NPT 1/8	25
LVD5□-V□-F□	45	45	105.7	76	25	114	65.2	17.5	8	32	64	7	52.2	Rc 1/8 NPT 1/8	27.5
LVD6□-V□-F□	58	74	137.8	84	32	164	76.8	27.5	8	56	71	6.5	70.8	Rc 1/8 NPT 1/8	44

Dimensions

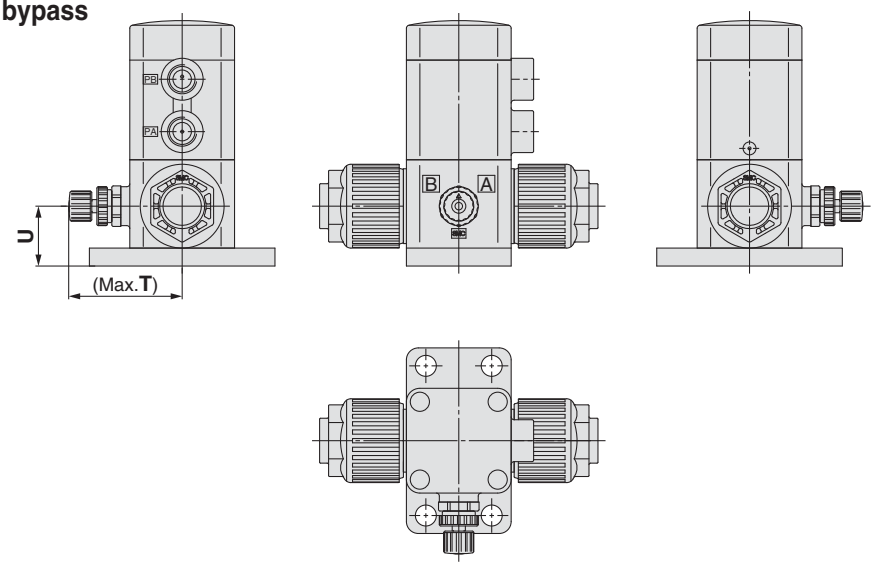
With flow rate adjustment, High back pressure with flow rate adjustment



Dimensions [mm]

Model	S
LVD2□-V□-F1	18.5
LVD3□-V□-F1	28.5
LVD4□-V□-F1	28.5
LVD5□-V□-F1	30.1
LVD6□-V□-F1	38

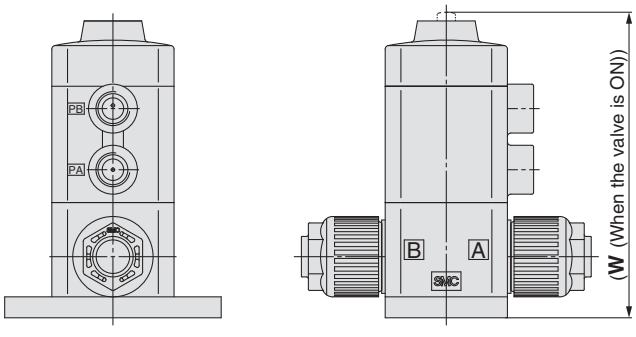
With bypass, High back pressure with bypass



Dimensions [mm]

Model	T	U
LVD3□-V□-F2	36.9	17.5
LVD4□-V□-F2	37.9	20
LVD5□-V□-F2	60.6	25

With indicator, High back pressure with indicator



Dimensions [mm]

Model	W
LVD20-V□-F4	56.4
LVD30-V□-F4	87.3
LVD40-V□-F4	89.8
LVD50-V□-F4	114.6
LVD60-V□-F4	149.4

Air Operated
Flare, Integral Fittings
Series LVD-F/FN

RoHS

How to Order Valves

LVD 2 0 – Z 07 [ ] [ ] – FN [ ]

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Valve type

0	N.C.
1	N.O.
2	Double acting

Fitting type

Symbol	Model
Z	LQ3

Applicable tubing size

Symbol	Connecting tubing size	Body class 2	3	4	5	6
Metric size						
06	6 x 4	○				
08	8 x 6		○			
10	10 x 8		○			
12	12 x 10			○		
19	19 x 16				○	
25	25 x 22					○
Inch size						
07	1/4" x 5/32"	○				
11	3/8" x 1/4"		○			
13	1/2" x 3/8"			○		
19	3/4" x 5/8"				○	
25	1" x 7/8"					○

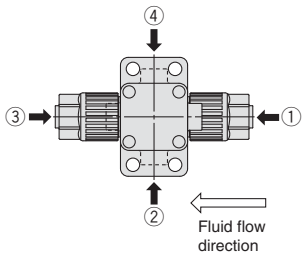
Pilot port thread type

—	Rc 1/8
N	NPT 1/8

Pilot port position

Symbol	Position
—	①
P2	②
P3	③
P4	④

Note) P2 and P4 are not available for the LVD6□.



Option

—	None
1	With flow rate adjustment
4	With indicator
5	High back pressure (0.5 MPa) tolerant
6	High back pressure with flow rate adjustment
9	High back pressure with indicator

Note) With flow rate adjustment: Only available with N.C. valve and double acting valve
With indicator: Only available with N.C. valve

Material

Symbol	Body	Actuator section / End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

Standard Specifications

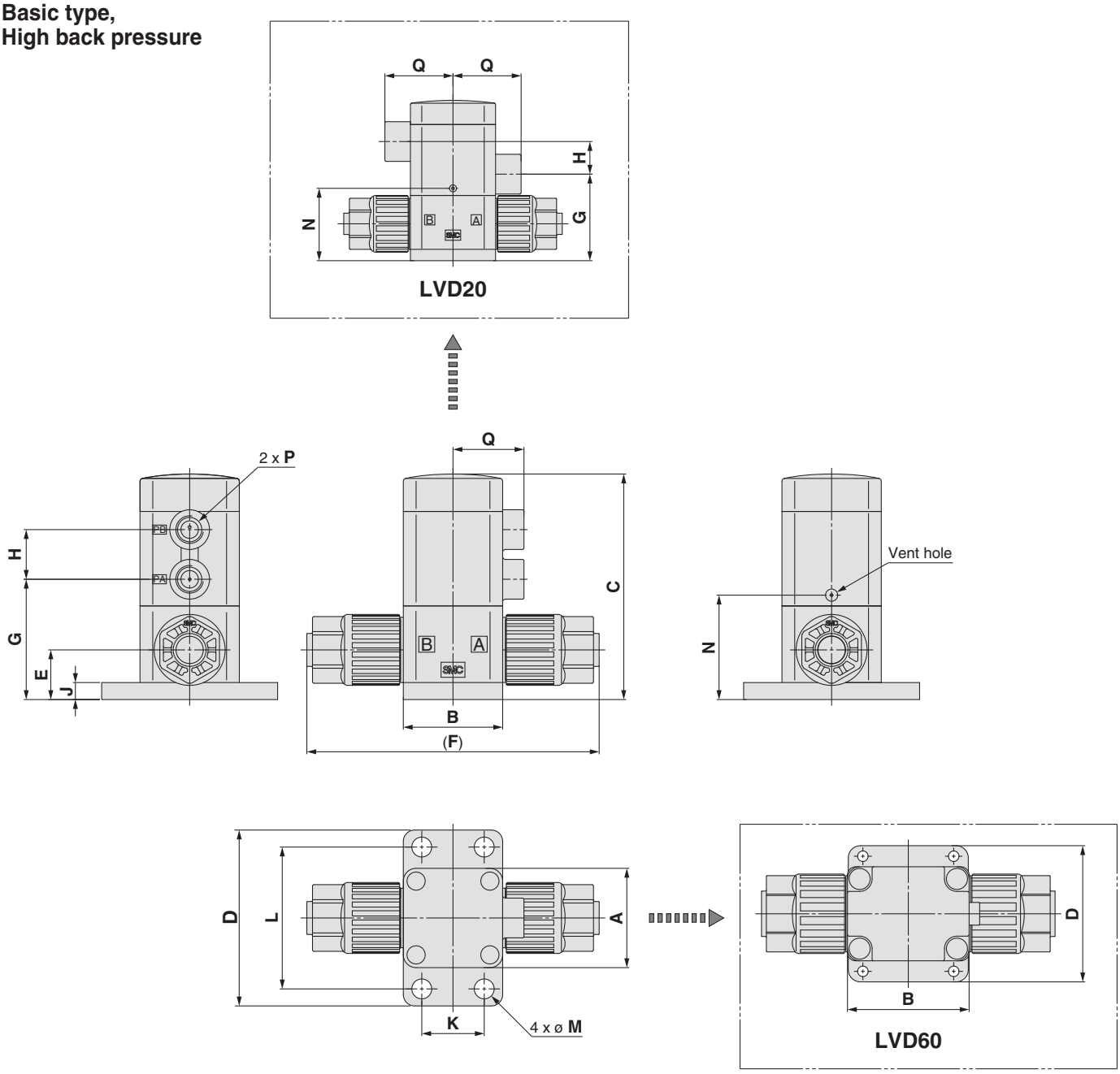
Model			LVD20	LVD30	LVD40	LVD50	LVD60
Tubing O.D.		Metric	6	8, 10	12	19	25
		Inch	1/4	3/8	1/2	3/4	1
Orifice diameter			Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	Av x 10^{-6} m²		8.4	31.2	45.6	120	192
	Cv		0.35	1.3	1.9	5	8
Withstand pressure [MPa]			1				
Operating pressure [MPa]	Standard	A→B flow	0 to 0.5	0 to 0.3			0 to 0.4
		B→A flow	0 to 0.2	0 to 0.1			
	High back pressure	A→B flow	0 to 0.5				
		B→A flow	0 to 0.4				
Back pressure [MPa]	Standard	N.C./N.O.	0.3 or less	0.2 or less			0.2 or less
		Double acting					0.3 or less
	High back pressure	N.C./N.O./ Double acting	0.5 or less				
Valve leakage [cm³/min]			0 (With water pressure)				
Pilot air pressure [MPa]			0.3 to 0.5 (High back pressure: 0.5 to 0.8)				
Pilot port size			Rc 1/8, NPT 1/8				
Fluid temperature [°C]			0 to 100				
Ambient temperature [°C]			0 to 60				

⚠Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

Dimensions

**Basic type,
High back pressure**

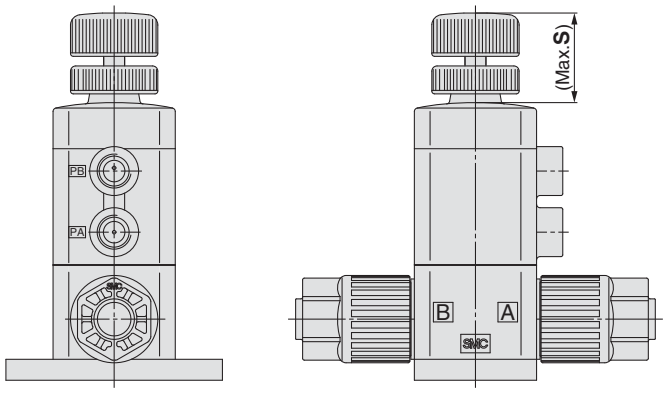


Dimensions [mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
LVD2□-Z□-F□	30	30	56.5	56	13	77	30.5	11.5	4	20	44	7	25.5	Rc 1/8 NPT 1/8	24
LVD3□-Z□-F□	35	35	79.5	62	17.5	103	42.4	17.5	6	22	50	7	36.8	Rc 1/8 NPT 1/8	25
LVD4□-Z□-F□	35	35	82	62	20	112	44.9	17.5	6	22	50	7	39.3	Rc 1/8 NPT 1/8	25
LVD5□-Z□-F□	45	45	105.7	76	25	134	65.2	17.5	8	32	64	7	52.2	Rc 1/8 NPT 1/8	27.5
LVD6□-Z□-F□	58	74	137.8	84	32	181	76.8	27.5	8	56	71	6.5	70.8	Rc 1/8 NPT 1/8	44

Dimensions

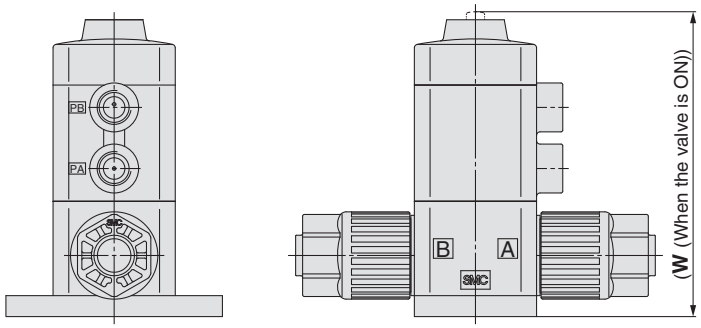
With flow rate adjustment, High back pressure with flow rate adjustment



Dimensions [mm]

Model	S
LVD2□-Z□-F1	18.5
LVD3□-Z□-F1	28.5
LVD4□-Z□-F1	28.5
LVD5□-Z□-F1	30.1
LVD6□-Z□-F1	38

With indicator, High back pressure with indicator



Dimensions [mm]

Model	W
LVD20-Z□-F4	58.4
LVD30-Z□-F4	87.3
LVD40-Z□-F4	89.8
LVD50-Z□-F4	114.6
LVD60-Z□-F4	149.4

Air Operated
Tube Extensions
Series LVD-T-F/FN

RoHS

How to Order Valves

LVD 2 0 – T 07 [ ] [ ] – FN [ ]

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Valve type

0	N.C.
1	N.O.
2	Double acting

Fitting type

Symbol	Type
T	Tube extensions

Tubing O.D.

Symbol	Tubing O.D.	Body class 2	3	4	5	6
Metric size						
06	Ø 6	○				
10	Ø 10		○			
12	Ø 12			○		
19	Ø 19				○	
25	Ø 25					○
Inch size						
07	1/4	○				
11	3/8		○			
13	1/2			○		
19	3/4				○	
25	1					○

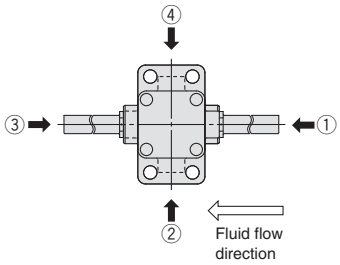
Pilot port thread type

—	Rc1/8
N	NPT1/8

Pilot port position

Symbol	Position
—	①
P2	②
P3	③
P4	④

Note) P2 and P4 are not available for the LVD6□.



Option

—	None
1	With flow rate adjustment
4	With indicator
5	High back pressure (0.5 MPa) tolerant
6	High back pressure with flow rate adjustment
9	High back pressure with indicator

Note) With flow rate adjustment: Only available with N.C. valve and double acting valve
With indicator: Only available with N.C. valve

Material

Symbol	Body	Actuator section / End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

⚠Precautions

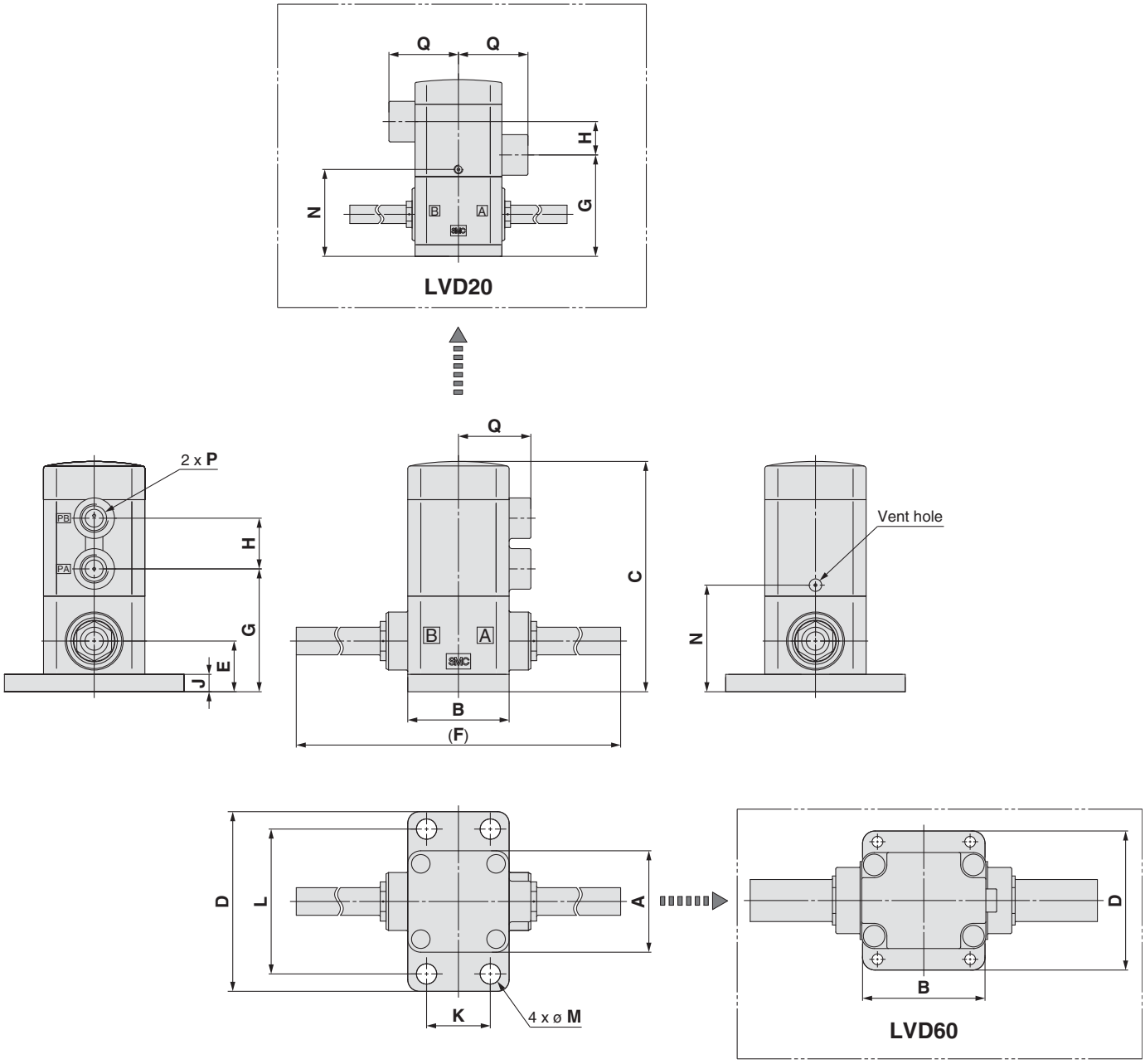
Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

Standard Specifications

Model			LVD20	LVD30	LVD40	LVD50	LVD60
Tubing O.D.		Metric	6	10	12	19	25
		Inch	1/4	3/8	1/2	3/4	1
Orifice diameter			Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	Av x 10^{-6}m²		8.4	31.2	45.6	120	192
	Cv		0.35	1.3	1.9	5	8
Withstand pressure [MPa]			1				
Operating pressure [MPa]	Standard	A→B flow	0 to 0.5	0 to 0.3			0 to 0.4
		B→A flow	0 to 0.2	0 to 0.1			
	High back pressure	A→B flow	0 to 0.5				
		B→A flow	0 to 0.4				
Back pressure [MPa]	Standard	N.C./N.O.	0.3 or less	0.2 or less			0.2 or less
		Double acting					0.3 or less
	High back press.	N.C./N.O./Double acting	0.5 or less				
Valve leakage [cm³/min]			0 (With water pressure)				
Pilot air pressure [MPa]			0.3 to 0.5 (High back pressure: 0.5 to 0.8)				
Pilot port size			Rc 1/8, NPT 1/8				
Fluid temperature [°C]			0 to 100				
Ambient temperature [°C]			0 to 60				

Dimensions

Basic type, High back pressure

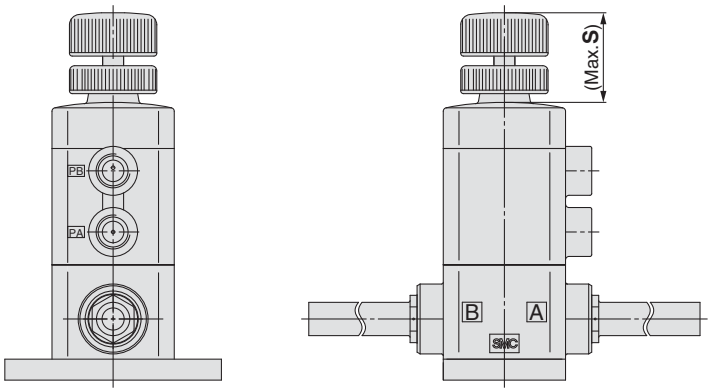


Dimensions [mm]

Model	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q
LVD2□-T□-F□	30	30	61	56	14.5	103	35	11.5	4	20	44	7	30	Rc 1/8 NPT 1/8	24
LVD3□-T□-F□	35	35	79.5	62	17.5	136	42.4	17.5	6	22	50	7	36.8	Rc 1/8 NPT 1/8	25
LVD4□-T□-F□	35	35	82	62	20	137	44.9	17.5	6	22	50	7	39.3	Rc 1/8 NPT 1/8	25
LVD5□-T□-F□	45	45	105.7	76	25	169.5	65.2	17.5	8	32	64	7	52.2	Rc 1/8 NPT 1/8	27.5
LVD6□-T□-F□	58	74	137.8	84	32	210	76.8	27.5	8	56	71	6.5	70.8	Rc 1/8 NPT 1/8	44

Dimensions

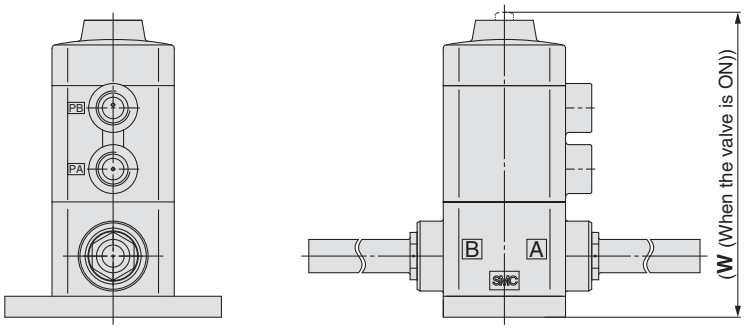
With flow rate adjustment, High back pressure with flow rate adjustment



Dimensions [mm]

Model	S
LVD2□-T□-F1	18.5
LVD3□-T□-F1	28.5
LVD4□-T□-F1	28.5
LVD5□-T□-F1	30.1
LVD6□-T□-F1	38

With indicator, High back pressure with indicator



Dimensions [mm]

Model	W
LVD20-T□-F4	62.9
LVD30-T□-F4	87.3
LVD40-T□-F4	89.8
LVD50-T□-F4	114.6
LVD60-T□-F4	149.4

Manually Operated
Insert Bushing, Integral Fittings
Series LVDH-F/FN RoHS

How to Order Valves

LVDH 2 0 – V 07 [ ] – FN

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Fitting type

Symbol	Model
V	LQ1

Material

Symbol	Body	Actuator section / End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

Applicable tubing size

Symbol	Connecting tubing size	Body class 2	3	4	5	6
Metric size						
03	3 x 2	●				
04	4 x 3	●				
06	6 x 4	○	●			
08	8 x 6		●			
10	10 x 8		○	●		
12	12 x 10			○	●	
19	19 x 16				○	●
25	25 x 22					○
Inch size						
03	1/8" x 0.086"	●				
05	3/16" x 1/8"	●				
07	1/4" x 5/32"	○	●			
11	3/8" x 1/4"		○	●		
13	1/2" x 3/8"			○	●	
19	3/4" x 5/8"				○	●
25	1" x 7/8"					○

○ Basic size ● With reducer

Port B (OUT) different diameter size

Symbol	Application
—	Ports A & B same size
Refer to the applicable tubing table to the left.	Different diameter tubings can be selected within the same body class.

Standard Specifications

Model		LVDH20	LVDH30	LVDH40	LVDH50	LVDH60
Tubing O.D.	**Metric**	3, 4, 6	6, 8, 10	10, 12	12, 19	19, 25
	Inch	1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4	3/4, 1
Orifice diameter		Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	**Av x 10^{-6} m²**	8.4	31.2	45.6	120	192
	Cv	0.35	1.3	1.9	5	8
Withstand pressure [MPa]		1				
Operating pressure [MPa]	**A→B flow**	0 to 0.5				
Valve leakage [cm³/min]		0 (With water pressure)				
Fluid temperature [°C]		0 to 100				
Ambient temperature [°C]		0 to 60				

Different Diameter Tubing Applicable with Reducer

Different diameter tubing can be selected (within a body class) by using a nut and insert bushing (reducer).

● With reducer

Body class	Tubing O.D.														
	Metric size								Inch size						
	3	4	6	8	10	12	19	25	1/8	3/16	1/4	3/8	1/2	3/4	1
2	●	●	○	—	—	—	—	—	●	●	○	—	—	—	—
3	—	—	●	●	○	—	—	—	—	—	●	○	—	—	—
4	—	—	—	—	●	○	—	—	—	—	—	●	○	—	—
5	—	—	—	—	—	●	○	—	—	—	—	—	●	○	—
6	—	—	—	—	—	—	●	○	—	—	—	—	—	●	○

Note) Refer to page 29 for information on changing tubing sizes.

⚠Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

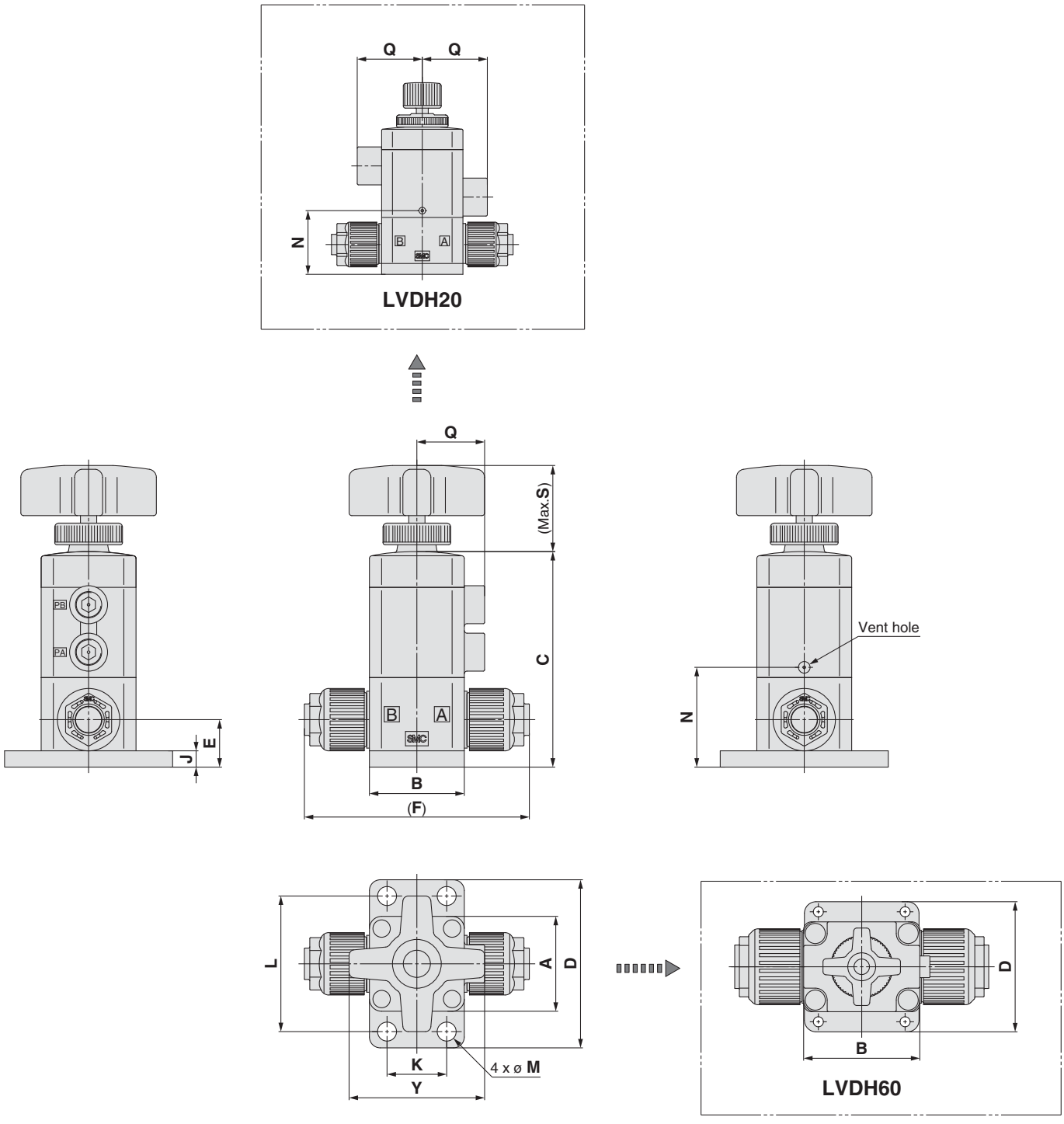
Handle Operation

In order to prevent valve breakage due to excessive handle operation, the number of handle rotations is shown in the table below as a guide for handle operation when opening or closing the valve.

Number of Handle Rotations (from fully open to fully closed)

Body class	Number of rotations
2	6 to 7
3	3 to 4
4	
5	5 to 6
6	

Dimensions



Dimensions [mm]

Model	A	B	C	D	E	F	J	K	L	M	N	Q	S	Y
LVDH20-V□-F□	30	30	54.5	56	11	67	4	20	44	7	23.5	24	18.5	—
LVDH30-V□-F□	35	35	79.5	62	17.5	83	6	22	50	7	36.8	25	34.6	50
LVDH40-V□-F□	35	35	82	62	20	93	6	22	50	7	39.3	25	34.6	50
LVDH50-V□-F□	45	45	105.7	76	25	114	8	32	64	7	52.2	27.5	36.2	50
LVDH60-V□-F□	58	74	137.8	84	32	164	8	56	71	6.5	70.8	44	39	50

Manually Operated
Flare, Integral Fittings
Series LVDH-F/FN RoHS

How to Order Valves

LVDH 2 0 – Z 07 – FN

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Material

Symbol	Body	Actuator section End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

Fitting type

Symbol	Model
Z	LQ3

Applicable tubing size

Symbol	Connecting tubing size	Body class 2	3	4	5	6
Metric size						
06	6 x 4	○				
08	8 x 6		○			
10	10 x 8		○			
12	12 x 10			○		
19	19 x 16				○	
25	25 x 22					○
Inch size						
07	1/4" x 5/32"	○				
11	3/8" x 1/4"		○			
13	1/2" x 3/8"			○		
19	3/4" x 5/8"				○	
25	1" x 7/8"					○

Standard Specifications

Model		LVDH20	LVDH30	LVDH40	LVDH50	LVDH60
Tubing O.D.	**Metric**	6	8, 10	12	19	25
	Inch	1/4	3/8	1/2	3/4	1
Orifice diameter		Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	**Av x 10^{-6} m²**	8.4	31.2	45.6	120	192
	Cv	0.35	1.3	1.9	5	8
Withstand pressure [MPa]		1				
Operating pressure [MPa]	**A→B flow**	0 to 0.5				
Valve leakage [cm³/min]		0 (With water pressure)				
Fluid temperature [°C]		0 to 100				
Ambient temperature [°C]		0 to 60				

⚠Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

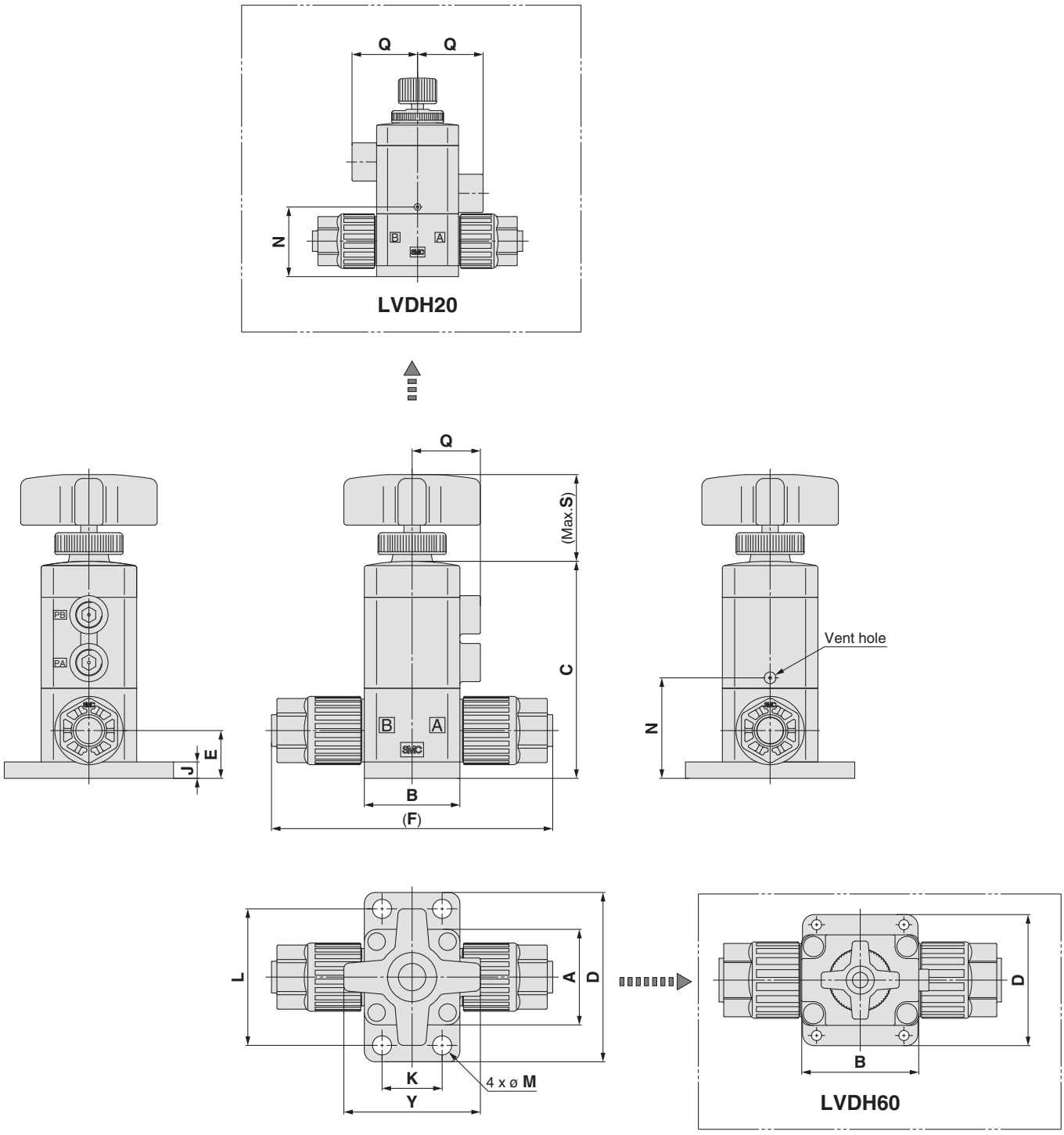
Handle Operation

In order to prevent valve breakage due to excessive handle operation, the number of handle rotations is shown in the table below as a guide for handle operation when opening or closing the valve.

Number of Handle Rotations (from fully open to fully closed)

Body class	Number of rotations
2	6 to 7
3	3 to 4
4	
5	5 to 6
6	

Dimensions



Dimensions [mm]

Model	A	B	C	D	E	F	J	K	L	M	N	Q	S	Y
LVDH20-Z□-F□	30	30	56.5	56	13	77	4	20	44	7	25.5	24	18.5	—
LVDH30-Z□-F□	35	35	79.5	62	17.5	103	6	22	50	7	36.8	25	34.6	50
LVDH40-Z□-F□	35	35	82	62	20	112	6	22	50	7	39.3	25	34.6	50
LVDH50-Z□-F□	45	45	105.7	76	25	134	8	32	64	7	52.2	27.5	36.2	50
LVDH60-Z□-F□	58	74	137.8	84	32	181	8	56	71	6.5	70.8	44	39	50

Manually Operated Tube Extensions

Series LVDH-T-F/FN RoHS

How to Order Valves

LVDH 2 0 – T 07 – FN

Body class

Symbol	Body class	Orifice dia.
2	2	Ø 4
3	3	Ø 8
4	4	Ø 10
5	5	Ø 16
6	6	Ø 22

Material

Symbol	Body	Actuator section / End plate	Diaphragm	Seal	Buffer
F	PFA	PVDF	PTFE	FKM	
FN	PFA	PVDF	PTFE	EPDM	

Fitting type

Symbol	Type
T	Tube extensions

Tubing O.D.

Symbol	Tubing O.D.	Body class 2	3	4	5	6
Metric size						
06	Ø 6	○				
10	Ø 10		○			
12	Ø 12			○		
19	Ø 19				○	
25	Ø 25					○
Inch size						
07	1/4	○				
11	3/8		○			
13	1/2			○		
19	3/4				○	
25	1					○

Standard Specifications

Model		LVDH20	LVDH30	LVDH40	LVDH50	LVDH60
Tubing O.D.	**Metric**	6	10	12	19	25
	Inch	1/4	3/8	1/2	3/4	1
Orifice diameter		Ø 4	Ø 8	Ø 10	Ø 16	Ø 22
Flow-rate characteristics	**Av x 10^{-6} m²**	8.4	31.2	45.6	120	192
	Cv	0.35	1.3	1.9	5	8
Withstand pressure [MPa]		1				
Operating pressure [MPa]	**A→B flow**	0 to 0.5				
Valve leakage [cm³/min]		0 (With water pressure)				
Fluid temperature [°C]		0 to 100				
Ambient temperature [°C]		0 to 60				

⚠Precautions

Be sure to read this before handling. Refer to the back cover for Safety Instructions, and pages 31 and 32 for Compact Type High Purity Air Operated Chemical Liquid Valve Precautions.

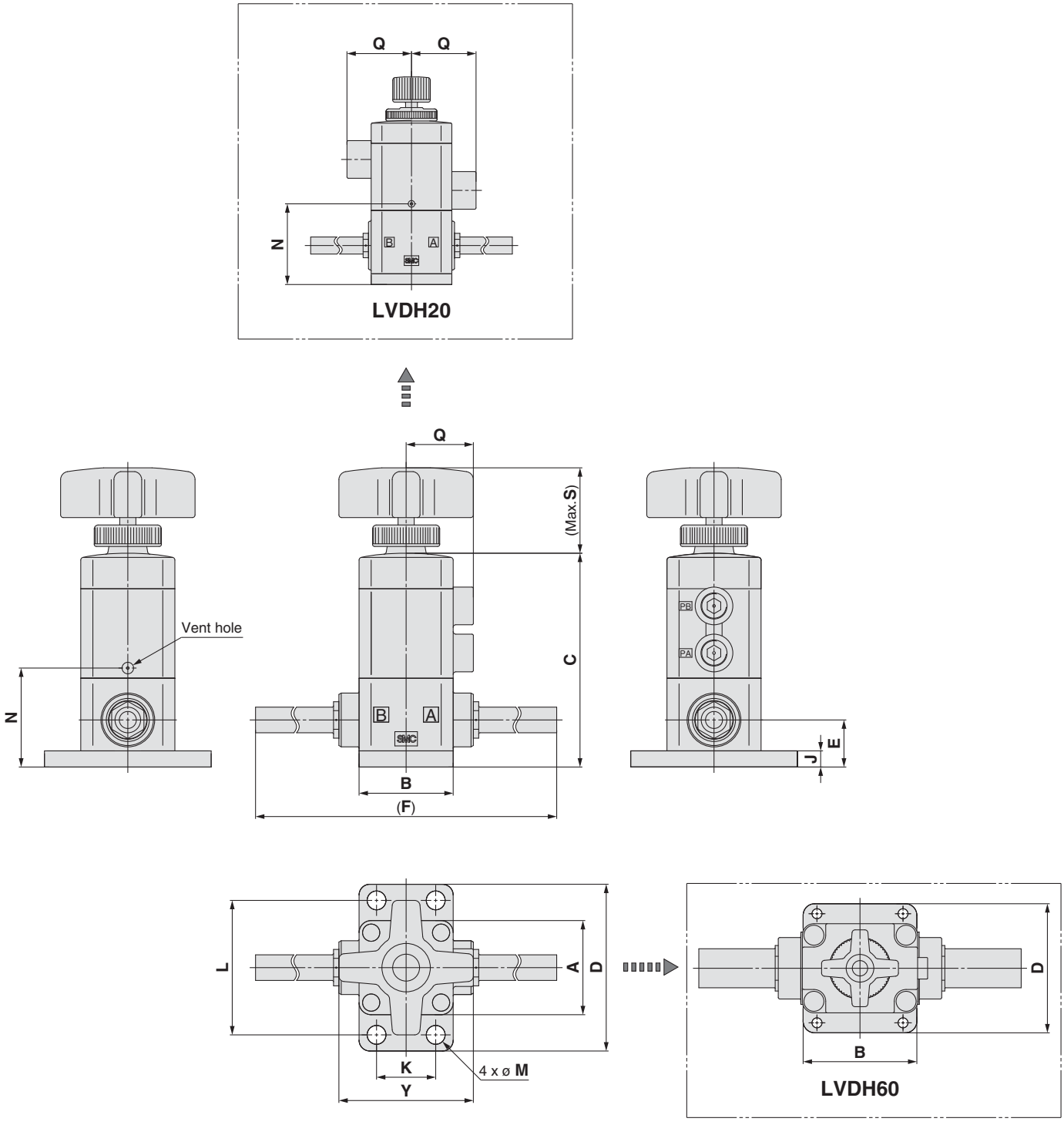
Handle Operation

In order to prevent valve breakage due to excessive handle operation, the number of handle rotations is shown in the table below as a guide for handle operation when opening or closing the valve.

Number of Handle Rotations (from fully open to fully closed)

Body class	Number of rotations
2	6 to 7
3	3 to 4
4	
5	5 to 6
6	

Dimensions



Dimensions [mm]

Model	A	B	C	D	E	F	J	K	L	M	N	Q	S	Y
LVDH20-T□-F□	30	30	61	56	14.5	103	4	20	44	7	30	24	18.5	—
LVDH30-T□-F□	35	35	79.5	62	17.5	136	6	22	50	7	36.8	25	34.6	50
LVDH40-T□-F□	35	35	82	62	20	137	6	22	50	7	39.3	25	34.6	50
LVDH50-T□-F□	45	45	105.7	76	25	169.5	8	32	64	7	52.2	27.5	36.2	50
LVDH60-T□-F□	58	74	137.8	84	32	210	8	56	71	6.5	70.8	44	39	50

Fittings and Special Tools

Fittings

Changing Tubing Sizes

The tubing size can be changed within the same body class (body size) by replacing the nut and insert bushing.

Body class	Tubing O.D.														
	Metric size								Inch size						
	3	4	6	8	10	12	19	25	1/8	3/16	1/4	3/8	1/2	3/4	1
1	○	○	—	—	—	—	—	—	○	—	—	—	—	—	—
2	●	●	○	—	—	—	—	—	●	●	○	—	—	—	—
3	—	—	●	●	○	—	—	—	—	—	●	○	—	—	—
4	—	—	—	—	●	○	—	—	—	—	—	●	○	—	—
5	—	—	—	—	—	●	○	—	—	—	—	—	●	○	—
6	—	—	—	—	—	—	●	○	—	—	—	—	—	●	○

Part Composition

	Component parts		
	Nut	Insert	Collar (Insert assembly)
○ Basic size	Yes	Yes	No
● Reducer type	Yes	Yes	Yes

⚠ Caution

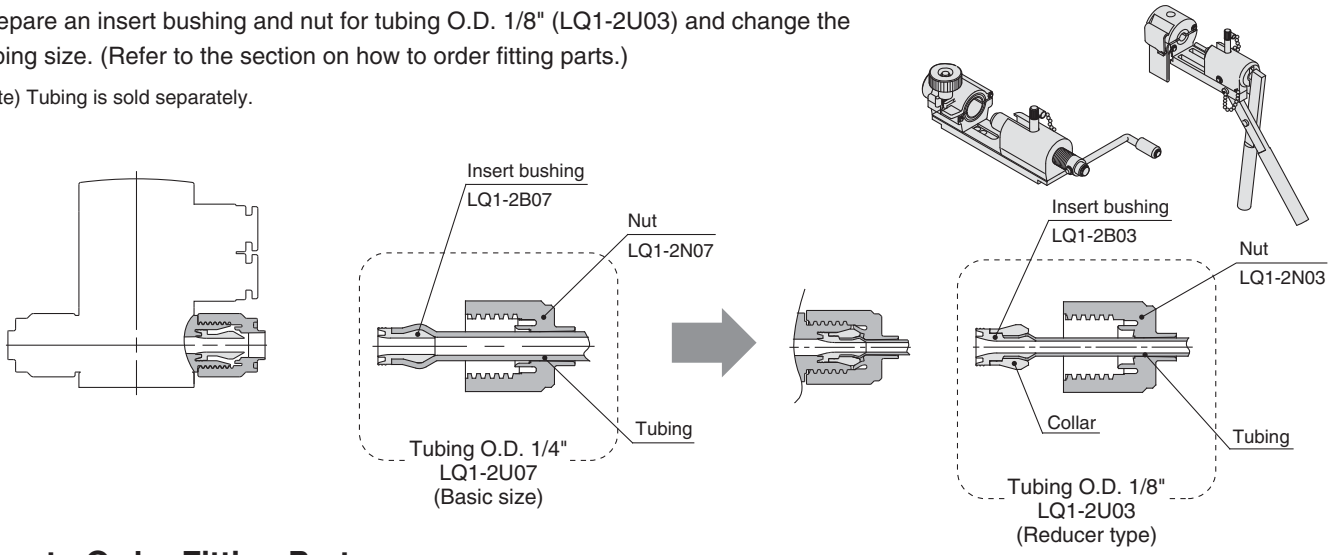
1. Connect tubing with special tools.
Refer to the pamphlet "High-Purity Fluoropolymer Fittings Hyper Fitting/Series LQ1, 2 Work Procedure Instructions" (M-E05-1) for connecting tubing and special tools. (Downloadable from our website.)

Changing tubing sizes

Example) Changing the tubing from an outside diameter of 1/4" to 1/8" in body class 2.

Prepare an insert bushing and nut for tubing O.D. 1/8" (LQ1-2U03) and change the tubing size. (Refer to the section on how to order fitting parts.)

Note) Tubing is sold separately.



How to Order Fitting Parts

LQ1 — 1 U 03

∗ Type U is recommended when changing tubing sizes.

Type of part

Symbol	Type of part
U	Nut & Insert bushing
B	Insert bushing
N	Nut

Body class fittings

Symbol	Body class (fittings)
1	1
2	2
3	3
4	4
5	5
6	6

Tubing size Note)

Symbol	Tubing size	Body class (fittings)
03	1/8" x 0.086", 3 x 2	1
04	4 x 3	
03	1/8" x 0.086"	2
04	4 x 3	
05	3/16" x 1/8"	
06	6 x 4	
07	1/4" x 5/32"	
06	6 x 4	3
08	8 x 6	
10	10 x 8	
07	1/4" x 5/32"	
11	3/8" x 1/4"	
10	10 x 8	4
12	12 x 10	
11	3/8" x 1/4"	
13	1/2" x 3/8"	
12	12 x 10	5
13	1/2" x 3/8"	
19	3/4" x 5/8", 19 x 16	
19	3/4" x 5/8", 19 x 16	6
25	1" x 7/8", 25 x 22	

Note) Refer to page 32 for details on the applicable tubing sizes.

Series LVD
Applicable Fluids

High Purity Air Operated Chemical Liquid Valve Material and Fluid Compatibility Check List

Chemical		Compatibility
Acetone		○ Note 1) 2)
Ammonium hydroxide		○ Note 2)
Isobutyl alcohol		○ Note 1) 2)
Isopropyl alcohol		○ Note 1) 2)
Hydrochloric acid		○
Ozone (dry)		○
Hydrogen peroxide	Concentration 5 % or less, Temperature 50 °C or less	○
Ethyl acetate		○ Note 1) 2)
Butyl acetate		○ Note 1) 2)
Nitric acid (except fuming nitric acid)	Concentration 10 % or less	○ Note 2)
DI water (deionised water)		○
Sodium hydroxide (caustic soda)	Concentration 50 % or less	○
Nitrogen gas		○
Ultrapure water		○
Toluene		○ Note 1) 2)
Hydrofluoric acid		×
Sulfuric acid (except fuming sulfuric acid)		○ Note 2)
Phosphoric acid	Concentration 80 % or less	○

Table symbols
○ : Can be used.
○ : Can be used under certain conditions.
× : Cannot be used.

The material and fluid compatibility check list provides reference values as a guide only.
Note 1) Since static electricity may be generated, implement suitable countermeasures.
Note 2) Use caution as permeation may occur. The permeated fluid may effect the parts of other materials.

• Compatibility is indicated for fluid temperatures of 100 °C or less.
• The material and fluid compatibility check list provides reference values as a guide only, therefore we do not guarantee the application to our product.
• The data above is based on the information presented by the material manufacturers.
• SMC is not responsible for its accuracy and any damage happened because of this data.

Compact Type High Purity Air Operated Chemical Liquid Valve Precautions 1

Be sure to read this before handling.

Design / Selection

⚠ Warning

1. Check the specifications.

Give careful consideration to operating conditions such as the application, fluid and environment, and use within the operating ranges specified in this catalogue.

2. Fluids

Operate after confirming the compatibility of the product's component materials with fluids, using the check list on page 30. Please contact SMC regarding fluids other than those in the check list. Operate within the indicated fluid temperature range.

3. Maintenance space

Ensure the necessary space for maintenance and inspections.

4. Fluid pressure range

Keep the supplied fluid pressure within the operating pressure range shown in the catalogue.

5. Ambient environment

Operate within the ambient operating temperature range. After confirming the compatibility of the product's component materials with the ambient environment, operate so that fluid does not adhere to the product's exterior surfaces.

6. Liquid seals

When circulating fluid:

Provide a relief valve in the system so that fluid does not get into the liquid seal circuit.

7. Countermeasures for static electricity

Since static electricity may be generated depending on the fluid being used, implement suitable countermeasures.

Mounting

⚠ Warning

1. If air leakage increases or equipment does not operate properly, stop operation.

After mounting, perform suitable function and leak tests to confirm that the mounting is correct.

2. Operation Manual

Mount and operate the product after reading the manual carefully and understanding its contents. Also, keep the manual where it can be referred to as necessary.

Piping

⚠ Caution

1. Preparation before piping

Before piping is connected, it should be thoroughly blown out with air (flushing) or washed to remove chips, cutting oil and other debris from inside the pipe.

Install piping so that it does not apply pulling, pressing, bending or other forces on the valve body.

Piping

⚠ Caution

2. Use the tightening torques shown below for the threaded pilot port.

Tightening Torque for Operating Port

Operating port	Torque [N·m]
M5	1/6 turn with a tightening tool after first tightening by hand
Rc, NPT 1/8	0.8 to 1.0

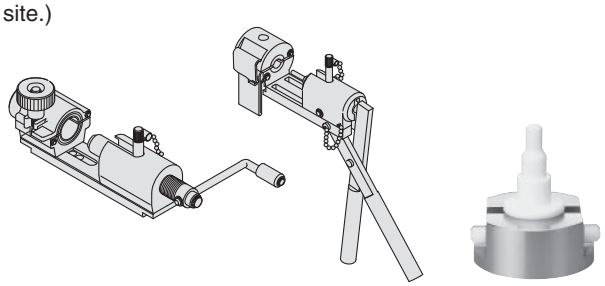
3. Use pilot ports and sensor (breathing) ports as indicated below.

	PA port	PB port	Sensor (breathing) port
N.C.	Pressure	Breathing	Breathing
N.O.	Breathing	Pressure	Breathing
Double acting	Pressure	Pressure	Breathing

In the case of N.C. and N.O. types, the port which does not receive operating pressure is released to atmosphere. When intake and exhaust directly from the valve is not desired due to problems with the ambient environment or scattering of dust, etc., install piping and perform intake and exhaust at a location which does not present a problem.

4. Connect tubing with special tools.

Refer to the pamphlet “High-Purity Fluoropolymer Fittings Hyper Fitting/Series LQ1, 2 Work Procedure Instructions” (M-E05-1) or “High Purity Fluoropolymer Fittings Hyper Fitting/Flare Type Series LQ3 Fitting Procedure” (M-06-4) for connecting tubing and special tools. (Downloadable from our web site.)



5. Tighten the nut to the end surface of the body. As a guide, refer to the proper tightening torque shown below.

Tightening Torque for Piping

Body class	Torque [N·m]	
	LQ1	**LQ3**
2	0.3 to 0.4	1.6 to 1.8
3	0.8 to 1.0	3.2 to 3.5
4	1.0 to 1.2	5.0 to 5.3
5	2.5 to 3.0	10.0 to 10.5
6	5.5 to 6.0	22.5 to 23.0

Operating Air Supply

⚠ Warning

1. Use clean air.

Do not use compressed air which includes chemicals, synthetic oils containing organic solvents, salt, or corrosive gases, etc., as this may cause damage or malfunction.

Compact Type High Purity Air Operated Chemical Liquid Valve Precautions 2

Be sure to read this before handling.

Installation and Removal of Tubing for Pilot Port Section

⚠ Caution

1. Installation of tubing

1) Using tube cutters TK-1, 2 or 3, take a tube having no flaws on its periphery and cut it off at a right angle. Do not use pinchers, nippers or scissors, etc. The tubing might be cut diagonally or flattened, making installation impossible causing problems such as disconnection and leakage.

2) Hold the tube and push it in slowly, inserting it securely all the way into the fitting.

3) After inserting the tubing, pull on it tightly to confirm that it will not come out. If it is not installed securely all the way into the fitting, problems such as leakage or disconnection of the tubing can occur.

4) Grease is not used due to the KP series oil-free specification. For this reason, greater insertion force is required when tubing is installed. In particular, polyurethane tubing may fold when inserted due to its softness. Hold the end of the tubing, and insert it all the way in slowly and securely. Refer to dimension "M" in the dimension drawings for guidance on the insertion depth of tubing.

2. Removal of tubing

1) Push in the release button sufficiently, pressing the collar evenly around its circumference.

2) Pull out the tubing while holding down the release button so that it does not pop out. If the release button is not pressed down sufficiently, there will be increased bite on the tubing and it will become more difficult to pull it out.

3) When the removed tubing is to be used again, first cut off the section of the tubing which has been chewed.
Using the chewed portion of the tube as it is can cause problems such as leakage or difficulty in removing the tubing.

Precautions on Use of Other Tubing Brands

⚠ Caution

1. When using tubing brands other than SMC, confirm that the tubing outside diameter tolerances satisfy the following specifications.

1) Polyolefin tubing: Within ±0.1 mm

2) Polyurethane tubing: Within +0.15 mm, Within −0.2 mm

3) Nylon tubing: Within ±0.1 mm

4) Soft nylon tubing: Within ±0.1 mm

Do not use tubing if the outside diameter tolerance is not satisfied. It may not be possible to connect the tubing, or leakage or disconnection may occur after connection.
Polyolefin tubing is recommended for use with clean room fittings. Note that while other types of tubing will satisfy performance standards for leakage and tubing pull-out strength, etc., the degree of cleanliness will deteriorate.

Operating Environment

⚠ Warning

1. Do not use in a location having an explosive atmosphere.

2. Do not operate in locations where vibration or impact occurs.

Operating Environment

⚠ Warning

3. Do not use in locations where radiated heat will be received from nearby heat sources.

Maintenance

⚠ Warning

1. Maintenance should be performed in accordance with the procedures in the Operation Manual.

Incorrect handling can cause damage or malfunction of machinery and equipment, etc.

2. Before removing equipment or compressed air supply/exhaust devices, shut off the air and power supplies, and exhaust compressed air from the system.
Further, when restarting equipment after remounting or replacement, first confirm safety and then check the equipment for normal operation.

3. Perform work after removing residual chemicals and carefully replacing them with DI water or air, etc.

4. Do not disassemble the product. Products which have been disassembled cannot be guaranteed.

If disassembly is necessary, please contact SMC.

5. In order to obtain optimum performance from valves, perform periodic inspections to confirm that there are no leaks from valves or fittings, etc.

⚠ Caution

1. Removal of drainage

Flush drainage from filters regularly.

Use of Tubing

⚠ Caution

1. Refer to the applicable tubing sizes shown below for tubing to be used.

Applicable Tubing Sizes

	Connection tubing size	O.D. [mm]		Internal thickness [mm]	
		Standard size	Tolerance	Standard size	Tolerance
Metric size	Ø 3 x Ø 2	3.0	+0.2 −0.1	0.5	±0.06
	Ø 4 x Ø 3	4.0			
	Ø 6 x Ø 4	6.0		1.0	±0.1
	Ø 8 x Ø 6	8.0			
	Ø 10 x Ø 8	10.0			
	Ø 12 x Ø 10	12.0			
	Ø 19 x Ø 16	19.0	+0.3 −0.1	1.5	±0.15
	Ø 25 x Ø 22	25.0			
Inch size	1/8" x 0.086"	3.18	+0.2 −0.1	0.5	±0.1
	3/16" x 1/8"	4.75		0.8	
	1/4" x 5/32"	6.35		1.2	±0.12
	3/8" x 1/4"	9.53		1.6	±0.15
	1/2" x 3/8"	12.7			
	3/4" x 5/8"	19.0	+0.3 −0.1		
	1" x 7/8"	25.4			

⚠ Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of **"Caution," "Warning"** or **"Danger."** They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)*1), and other safety regulations.

⚠ Caution: **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

⚠ Warning: **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

⚠ Danger : **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.
ISO 4413: Hydraulic fluid power – General rules relating to systems.
IEC 60204-1: Safety of machinery – Electrical equipment of machines. (Part 1: General requirements)
ISO 10218-1: Manipulating industrial robots - Safety.
etc.

⚠ Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalogue information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

2. Only personnel with appropriate training should operate machinery and equipment.
The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalogue.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

⚠ Caution

1. The product is provided for use in manufacturing industries.
The product herein described is basically provided for peaceful use in manufacturing industries.
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following "Limited warranty and Disclaimer" and "Compliance Requirements".
Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, wichever is first.*2)
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalogue for the particular products.

*2) **Vacuum pads are excluded from this 1 year warranty.**
A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

⚠ Caution

SMC products are not intended for use as instruments for legal metrology.
Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

⚠ Safety Instructions | Be sure to read "Handling Precautions for SMC Products" (M-E03-3) before using.

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