

# Integral Fitting Type (Hyper Fittings) Series *LVD*

## How to Order

LVD **1 0** - S **03**   -

### Body class

Symbol	Body class	Orifice dia.
1	1	ø2
2	2	ø4
3	3	ø8
4	4	ø10
5	5	ø16

### Valve type

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

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

### Option

Nil	None
1	With flow rate adjustment
2	With by-pass
3	With flow rate adjustment & by-pass

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

### Material

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

### Applicable tubing size

Symbol	Connecting tubing outside diameter	Body class				
		1	2	3	4	5
<b>Metric sizes</b>						
03	ø3	○				
04	ø4	○	●			
06	ø6		○			
08	ø8			●		
10	ø10			○	●	
12	ø12				○	●
19	ø19					○
<b>Inch sizes</b>						
03	1/8	○	●			
05	3/16		●			
07	1/4		○	●		
11	3/8			○	●	
13	1/2				○	●
19	3/4					○

○ Basic size ● With reducer

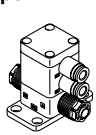
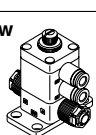
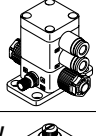
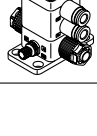
### Pilot port thread type

Symbol	Body class	Thread type
Nil	1	ø4 one-touch fitting
	2, 3, 4, 5	ø6 one-touch fitting
2	1, 2, 3, 4, 5	M5 x 0.8

### Port B (OUT) different dia. size

Symbol	Application
Nil	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.

### Variations

Type	Symbol	Valve type	Model				
			Orifice diameter				
			LVD10	LVD20	LVD30	LVD40	LVD50
Basic type	 PA PB PA B A B A B A N.C. N.O. Double acting	N.C.	ø2	ø4	ø8	ø10	ø16
			4	4, 6	6, 8, 10	10, 12	12, 19
With flow rate adjustment	 PA PA B A B A N.C. Double acting	N.C.	ø3, 1/8	1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4
			ø3, 1/8	1/8, 3/16, 1/4	1/4, 3/8	3/8, 1/2	1/2, 3/4
With by-pass	 PA PA B A B A N.C. Double acting	N.C.	—	○	○	○	○
			—	○	○	○	○
With flow rate adjustment & by-pass	 PA PA B A B A N.C. Double acting	N.C.	—	○	○	○	○
			—	○	○	○	○

VC

VDW

VQ

VX2

VX

VX3

VXA

VN

LVC

LVA

L VH

LVD

L VQ

LQ

L VN

T/ TIL

PA

PAX

PB



## Standard Specifications

Model		LVD10	LVD20	LVD30	LVD40	LVD50
Tubing O.D.	Metric	3, 4	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		ø2	ø4	ø8	ø10	ø16
Flow characteristics	$Av \times 10^{-6} \text{m}^2$	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		
Back pressure (MPa)		0.3 or less		0.2 or less		
Valve leakage (cm <sup>3</sup> /min)		0 (with water pressure)				
Pilot air pressure (MPa)		0.3 to 0.5				
Pilot port size	One-touch fitting	ø4 x ø3 tubing		ø6 x ø4 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


## 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 can not be selected for the body size 1.

● With reducer

Body class	Tubing O.D.												
	Metric sizes						Inch sizes						
	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 17-5-53 for information on changing tubing sizes.

## Specific Product Precautions

Be sure to read before handling. Refer to page 17-6-3 for Safety Instructions and 17-5-59 to 17-5-61 for High Purity Chemical Valve Precautions.

### Piping

## Caution

### 1. Connect tubing with special tools.

Refer to pages 17-5-53 through 17-5-55 regarding tubing connection and special tools.

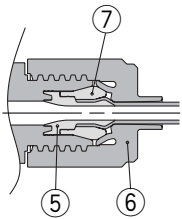
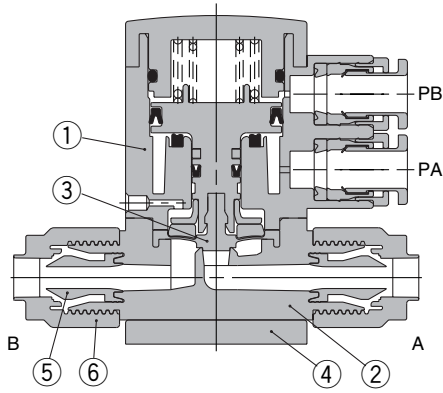
### 2. Tighten the nut to the end surface of the body. As a guide, refer to the proper tightening torques shown below.

#### Tightening torque for piping

Body class	Torque (Nm)
2	0.3 to 0.4
3	0.8 to 1.0
4	1.0 to 1.2
5	2.5 to 3.0

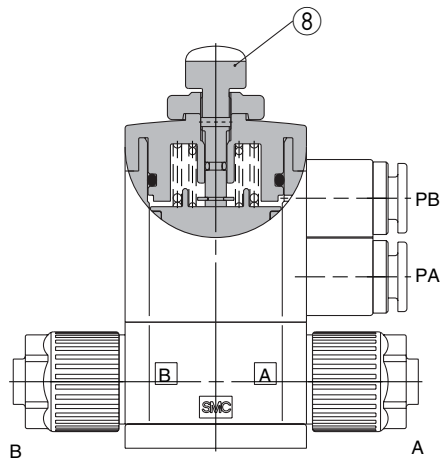
## Construction

Standard type  
N.C. type

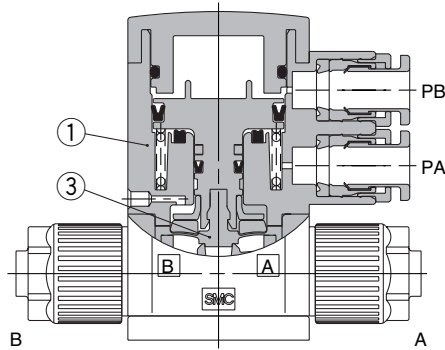


With reducer

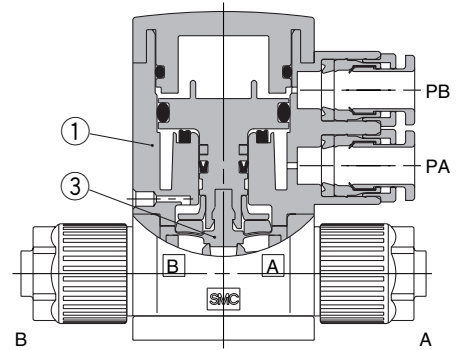
With flow rate adjustment



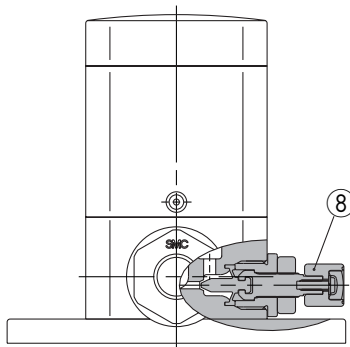
N.O. type



Double acting type



With by-pass



VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

LVH

**LVD**

LVQ

LQ

LVN

TI/  
TIL

PA

PAX

PB

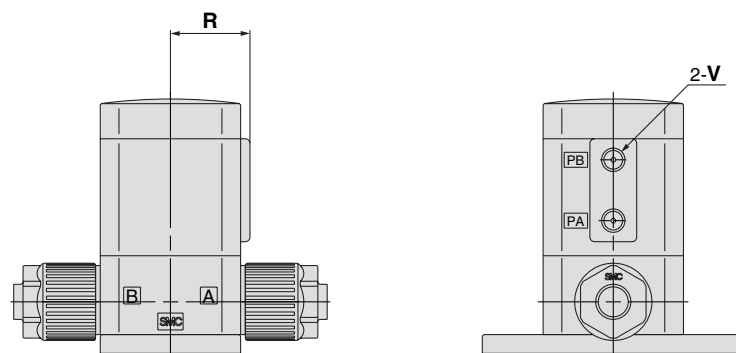
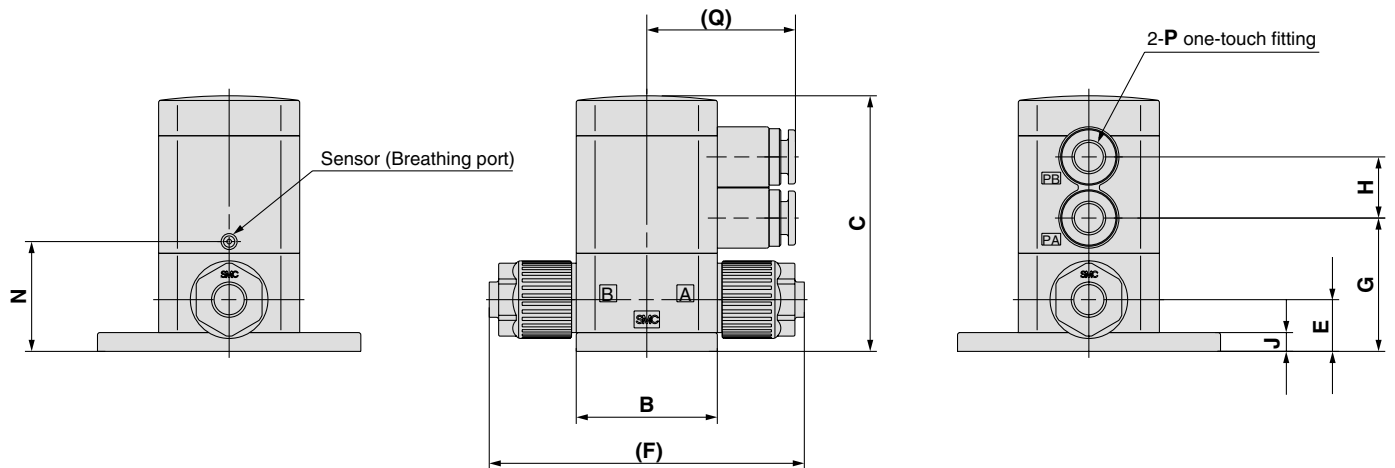
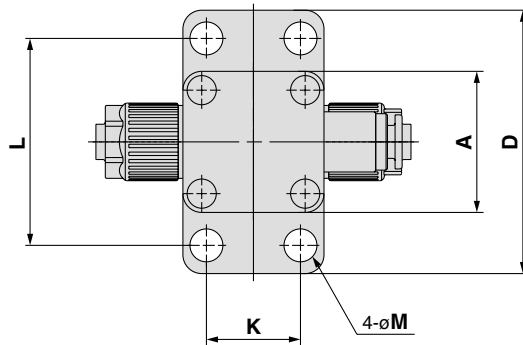
### Parts list

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

# Series LVD

## Dimensions

### Basic type



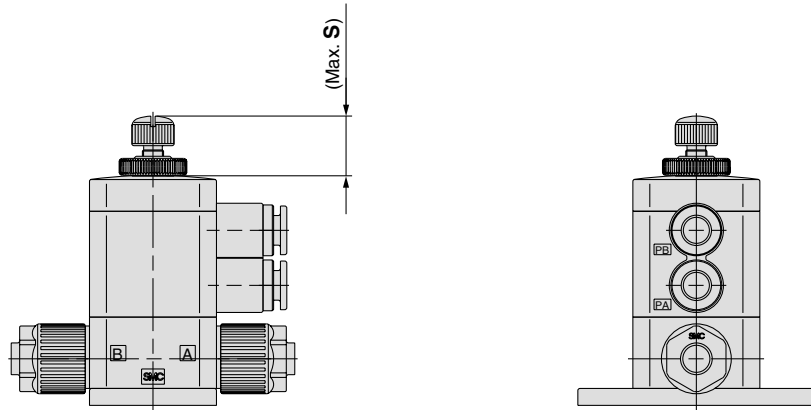
Pilot port threaded type

### Dimensions

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	ø4 (5/32")	28	22.5	M5 x 0.8
LVD2□-S□	30	30	54.4	56	11	67	28.5	13	4	20	44	7	23	ø6	31.5	17	M5 x 0.8
LVD3□-S□	35	35	79.5	62	17.5	83	45.5	14.5	6	22	50	7	37	ø6	36	21	M5 x 0.8
LVD4□-S□	35	35	82	62	20	93	48	14.5	6	22	50	7	39	ø6	36	21	M5 x 0.8
LVD5□-S□	45	45	105.5	76	25	114	65	17.5	8	32	64	7	52	ø6	38.5	25	M5 x 0.8

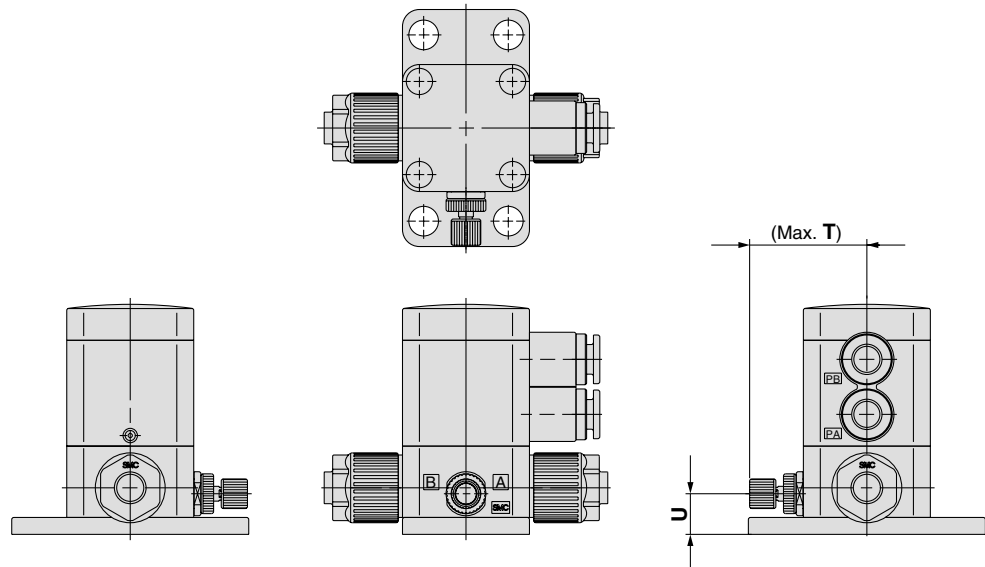
## With flow rate adjustment

Dimensions (mm)	
Model	S
LVD1□-S□	14
LVD2□-S□	11.5
LVD3□-S□	26
LVD4□-S□	26
LVD5□-S□	29.5



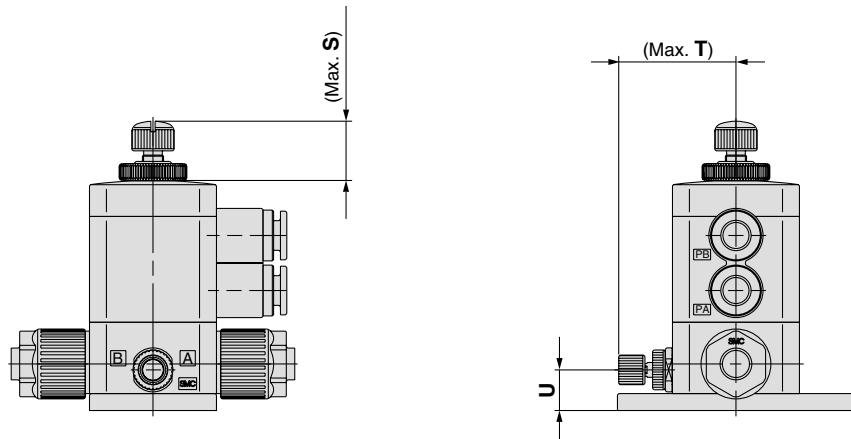
## With by-pass

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 & by-pass

Dimensions (mm)			
Model	S	T	U
LVD2□-S□	11.5	28	9.6
LVD3□-S□	26	34	17.5
LVD4□-S□	26	35	20
LVD5□-S□	29.5	57	25



- VC□
- VDW
- VQ
- VX2
- VX□
- VX3
- VXA
- VN□
- LVC
- LVA
- LVH
- LVD**
- LVQ
- LQ
- LVN
- TI/  
TIL
- PA
- PAX
- PB

# Series LVD

## 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 sizes						Inch sizes						
	3	4	6	8	10	12	19	1/8	3/16	1/4	3/8	1/2	3/4
1	○	○	—	—	—	—	—	○	—	—	—	—	—
2	—	●	○	—	—	—	—	●	●	○	—	—	—
3	—	—	●	●	○	—	—	—	—	●	○	—	—
4	—	—	—	—	●	○	—	—	—	—	●	○	—
5	—	—	—	—	—	●	○	—	—	—	—	●	○

#### Part composition

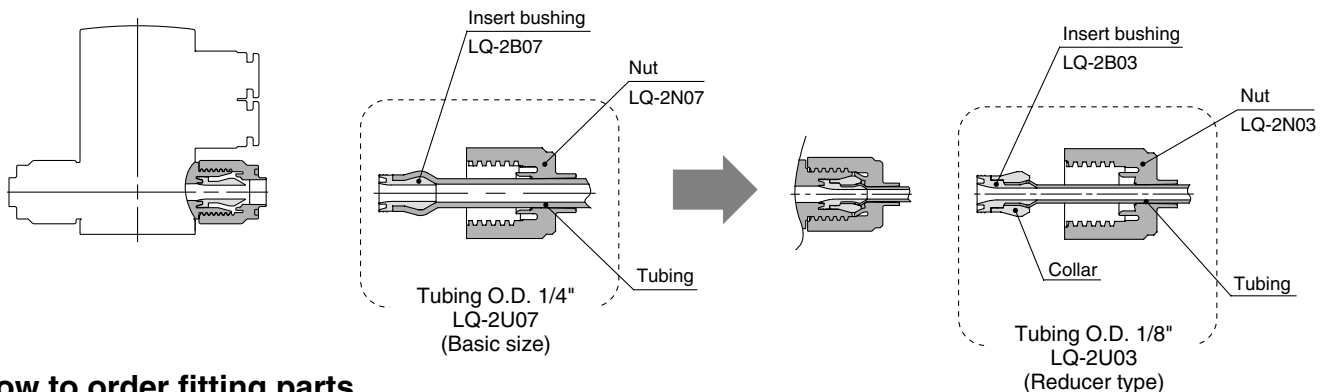
	Component parts		
	Nut	Insert	Collar (Insert assembly)
○ Basic size	Yes	Yes	No
● Reducer type	Yes	Yes	Yes

#### Changing the tubing size

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 1/8" O.D. tubing (LQ-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

**LQ1-1U03**

\* Type U is recommended when changing tubing sizes.

Body class	
Symbol	Body class
1	1
2	2
3	3
4	4
5	5

#### Type of part

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

#### Tubing size

Symbol	Tubing O.D.	Body class
03	1/8", ø3	1
04	ø4	
03	1/8"	2
04	ø4	
05	3/16"	
06	ø6	
07	1/4"	
06	ø6	3
08	ø8	
10	ø10	
07	1/4"	
11	3/8"	
10	ø10	4
12	ø12	
11	3/8"	
13	1/2"	
12	ø12	5
13	1/2"	
19	3/4", ø19	

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

L VH

LVD

LVQ

LQ

LVN

TI/  
TIL

PA

PAX

PB

## Special Tools

### How to order fitting jigs

LQ-G J [ ] - [ ] - [ ]

#### Insert pin material

Nil	Resin
S	Stainless steel (J/K type only)

#### Insert pin/Holder type

Nil	Metric size
N	Inch size



Note 1) Compatible pins and holders are included with all sizes. (with the parts case)

#### Type

Symbol	Body class	Diagram	
J, K	1, 2		
		J type	K type
L, M	1, 2, 3, 4, 5, 6		
		L type	M type (for short piping)

#### Option (L/M type only)

Symbol	Option	Diagram
Nil	None	
B	With bracket	

#### Option

	Description	Part No.
Bracket assembly		LQ-GBL

Table 1 Tubing size symbols

Type	Body class	Tubing O.D.															
		Metric sizes								Inch sizes							
		ø3	ø4	ø6	ø8	ø10	ø12	ø19	ø25	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"	1"	
J	1	03	04	—	—	—	—	—	—	03	—	—	—	—	—	—	
	2	—	04	06	—	—	—	—	—	03	05	07	—	—	—	—	
L	1	03	04	—	—	—	—	—	—	03	—	—	—	—	—	—	
	2	—	04	06	—	—	—	—	—	03	05	07	—	—	—	—	
	3	—	—	06	08	10	—	—	—	—	—	07	11	—	—	—	
	4	—	—	—	—	10	12	—	—	—	—	—	11	13	—	—	
	5	—	—	—	—	—	12	19	—	—	—	—	—	—	13	19	—
6	—	—	—	—	—	—	19	25	—	—	—	—	—	—	—	19	25

#### Replacement parts

Description	Diagram	Part No.								
Insert pin holder assembly (with the parts case)		LQ-GP J [ ] - [ ] Type Insert pin material (J/K type only) <table border="1"> <tr><td>Nil</td><td>Resin</td></tr> <tr><td>S</td><td>Stainless steel</td></tr> </table> Insert pin/Holder type <table border="1"> <tr><td>Nil</td><td>Metric size</td></tr> <tr><td>N</td><td>Inch size</td></tr> </table>	Nil	Resin	S	Stainless steel	Nil	Metric size	N	Inch size
Nil	Resin									
S	Stainless steel									
Nil	Metric size									
N	Inch size									
Insert pin (Single)		LQ-GP [2] J [ ] - [07] Body class (Refer to Table 1) Type Insert pin material (J/K type only) <table border="1"> <tr><td>Nil</td><td>Resin</td></tr> <tr><td>S</td><td>Stainless steel</td></tr> </table> Tubing size symbol (Refer to Table 1)	Nil	Resin	S	Stainless steel				
Nil	Resin									
S	Stainless steel									
Holder (Single)		LQ-GH J [ ] - [07] Tubing size symbol (Refer to Table 1) Type								

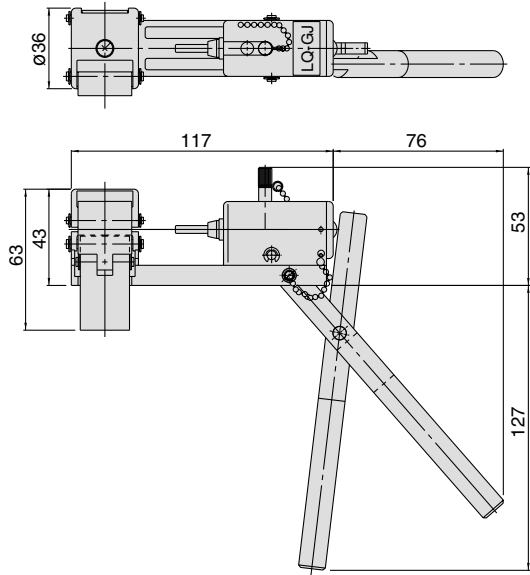


Note1) Replacement part type J shows the parts for LQ-GJ and LQ-GK. Replacement part type L shows the parts for LQ-GL and LQ-GM.

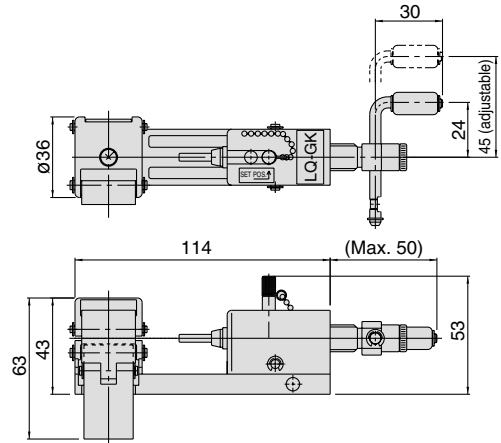
## Special Tools

## Dimensions

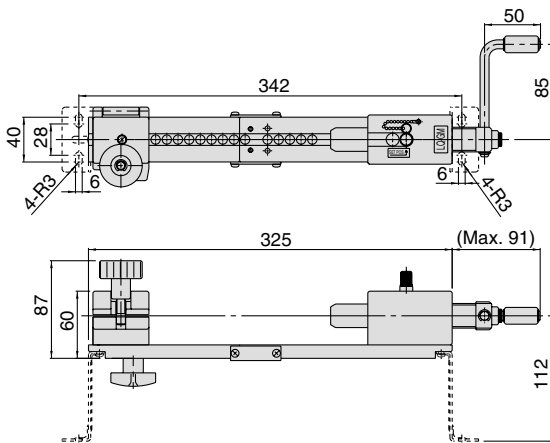
### LQ-GJ



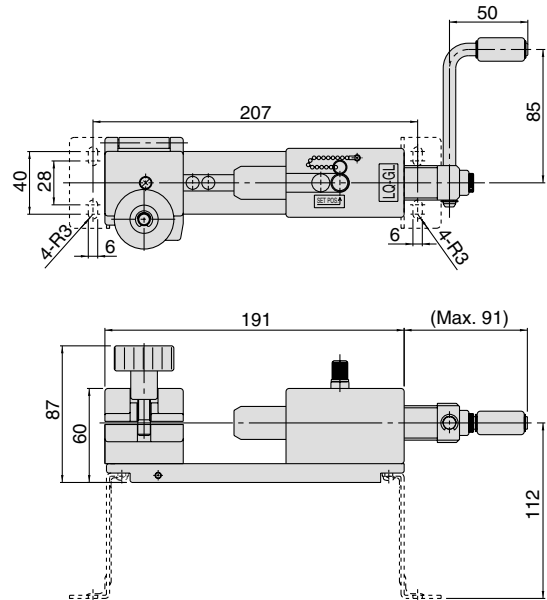
### LQ-GK



### LQ-GM



### LQ-GL



VC

VDW

VQ

VX2

VX

VX3

VXA

VN

LVC

LVA

L VH

**LVD**

LVQ

LQ

LVN

TI/  
TIL

PA

PAX

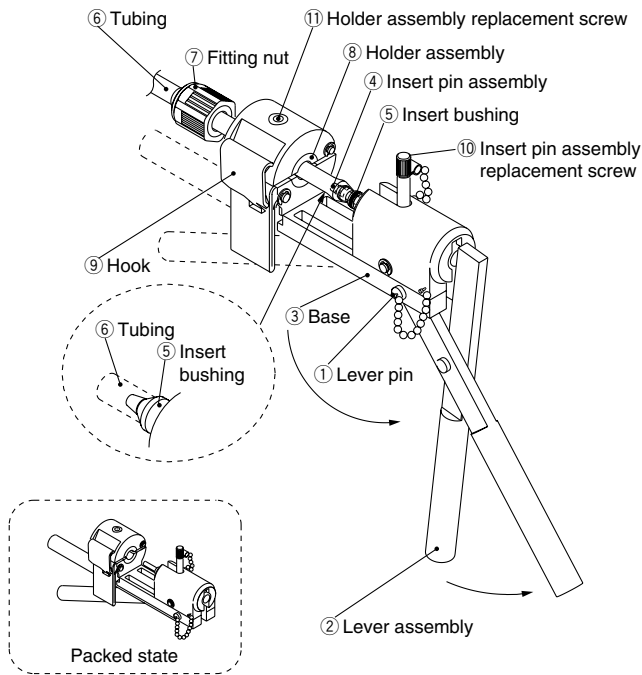
PB



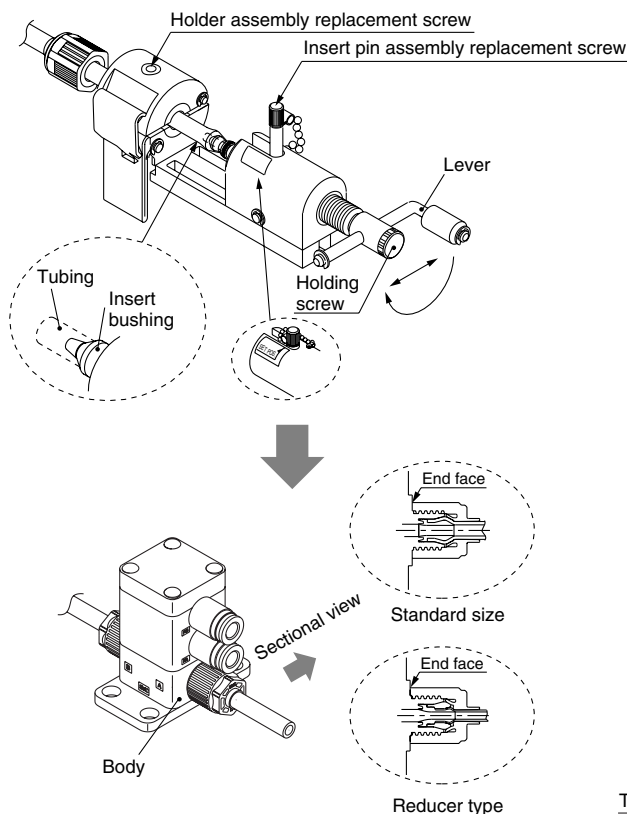
## Fitting Assembly Procedure

Assemble fittings following the procedure shown below.

### J type



### K type



### J type fitting assembly procedure

- 1 Pull out the lever pin ①. Rotate the lever assembly ② to align the holes on the lever assembly ② and the base ③. Insert the lever pin ① into the holes to fix the lever assembly ②.
  - 2 Place the insert bushing ⑤ on the insert pin assembly ④.
  - 3 Cut the end of the tubing ⑥ at a right angle and pass it through the fitting nut ⑦. After placing the tubing ⑥ in the holder assembly ⑧, push it onto the insert bushing ⑤ until it stops and clamp it with the hook ⑨.
- ⚠ Caution**
- When the tubing ⑥ is curved, straighten it out before using it.
  - The tubing ⑥ may slip if there is oil or dust, etc., on the holder assembly ⑧. Remove the contamination using alcohol or another suitable cleaner.
- 4 Press the insert bushing ⑤ into the tubing ⑥ by turning the lever assembly ②.
  - 5 To replace the insert pin assembly ④ and holder assembly ⑧, use the insert pin assembly replacement screw ⑩ and the holder assembly replacement screws ⑪, respectively.

### K type fitting assembly procedure

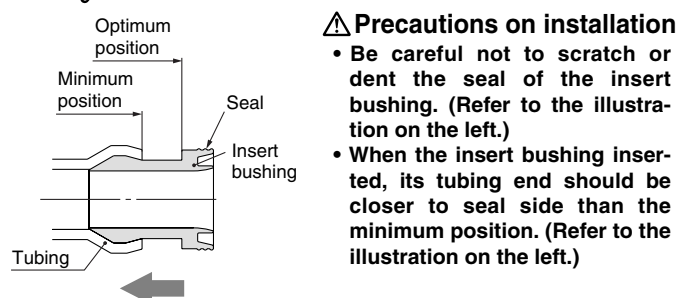
- For procedure to set and press fit the insert pin assembly, refer to L, M type fitting assembly procedures.
- For procedure to set the tubing, refer to J type procedure.

- 1 } Refer to J type assembly procedure.
- 5 }
- 6 Tighten the fitting nut ⑦ until it reaches the prescribed position on the body (end face). As a guide, refer to the proper tightening torques shown below.

#### Nut tightening torque for piping

Body class	Torque (Nm)	
	LQ1	LQ2
2	0.3 to 0.4	1.5 to 2.0

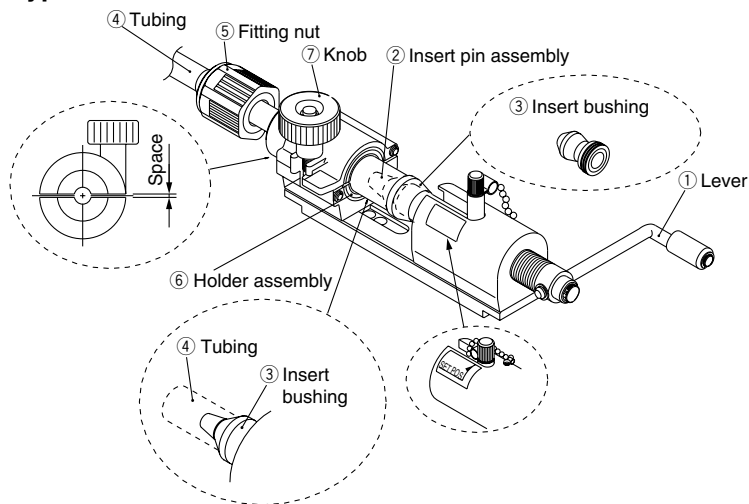
Note 1) In case of body class 1, the nut should be tightened manually.



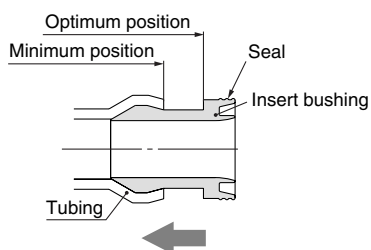
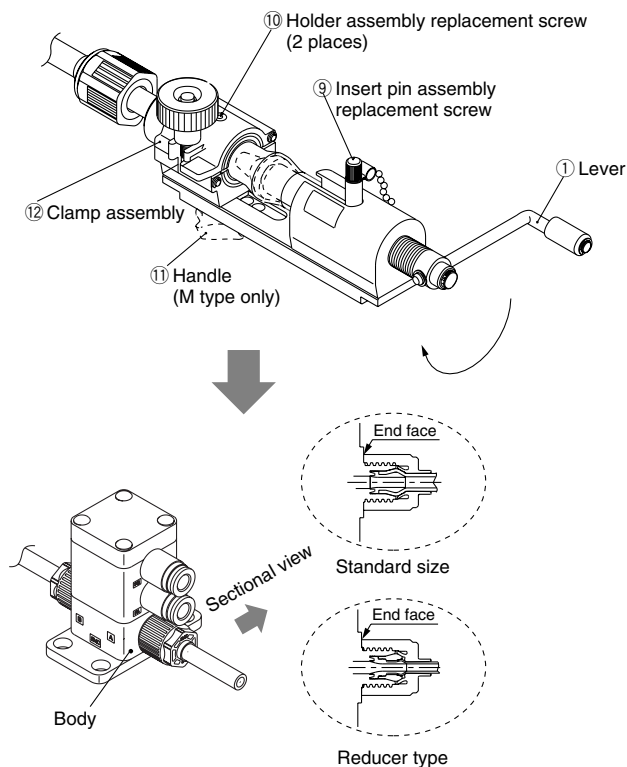
## Fitting Assembly Procedure

Assemble fittings following the procedure shown below.

### L type



### M type



### L/M type fitting assembly procedure

- 1 Turn the **lever** ① and move to SET POS.
- 2 Place the **insert bushing** ③ on the **insert pin assembly** ②.
- 3 Cut the end of the **tubing** ④ at a right angle and pass it through the **fitting nut** ⑤. After placing the **tubing** ④ in the **holder assembly** ⑥, push it onto the **insert bushing** ③ until it stops and clamp it with the **knob** ⑦. As a guide when tightening the **tubing** ④ with the **knob** ⑦, maintain a uniform gap on both sides of the holder.
- ⚠ Caution**
  - When the **tubing** ④ is curved, straighten it out before using it.
  - The **tubing** ④ may slip if there is oil or dust, etc. on the **holder assembly** ⑥. Remove the contamination using alcohol or another suitable cleaner.
- 4 Press the **insert bushing** ③ into the **tubing** ④ by turning the **lever** ①. (Pressing in can be accomplished with 2 or 3 turns of the **lever** ①.)
- 5 To replace the **insert pin assembly** ② and **holder assembly** ⑥, use the **insert pin assembly replacement screw** ⑨ and the **holder assembly replacement screws** ⑩, respectively.
- 6 In case of M type for short piping, remove the **handle** ⑪, slide the **clamp assembly** ⑫ to attain the specified length, then secure it again with the **handle** ⑪.
- 7 Tighten the **fitting nut** ⑤ to the prescribed position on the body (end face). As a guide, refer to the proper tightening torques shown below.

#### Nut tightening torque for piping

Body class	Torque (Nm)	
	LQ1	LQ2
2	0.3 to 0.4	1.5 to 2.0
3	0.8 to 1.0	3.0 to 3.5
4	1.0 to 1.2	7.5 to 9
5	2.5 to 3.0	11 to 13
6	5.5 to 6.0	—

Note 1) In case of body class 1, the nut should be tightened manually.

#### ⚠ Precautions on installation

- Be careful not to scratch or dent the seal of the insert bushing. (Refer to the illustration on the left.)
- When the insert bushing inserted, its tubing end should be closer to seal side than the minimum position. (Refer to the illustration on the left.)

VC□

VDW

VQ

VX2

VX□

VX3

VXA

VN□

LVC

LVA

LVH

LVD

LVQ

LQ

LVN

TI/  
TIL

PA

PAX

PB