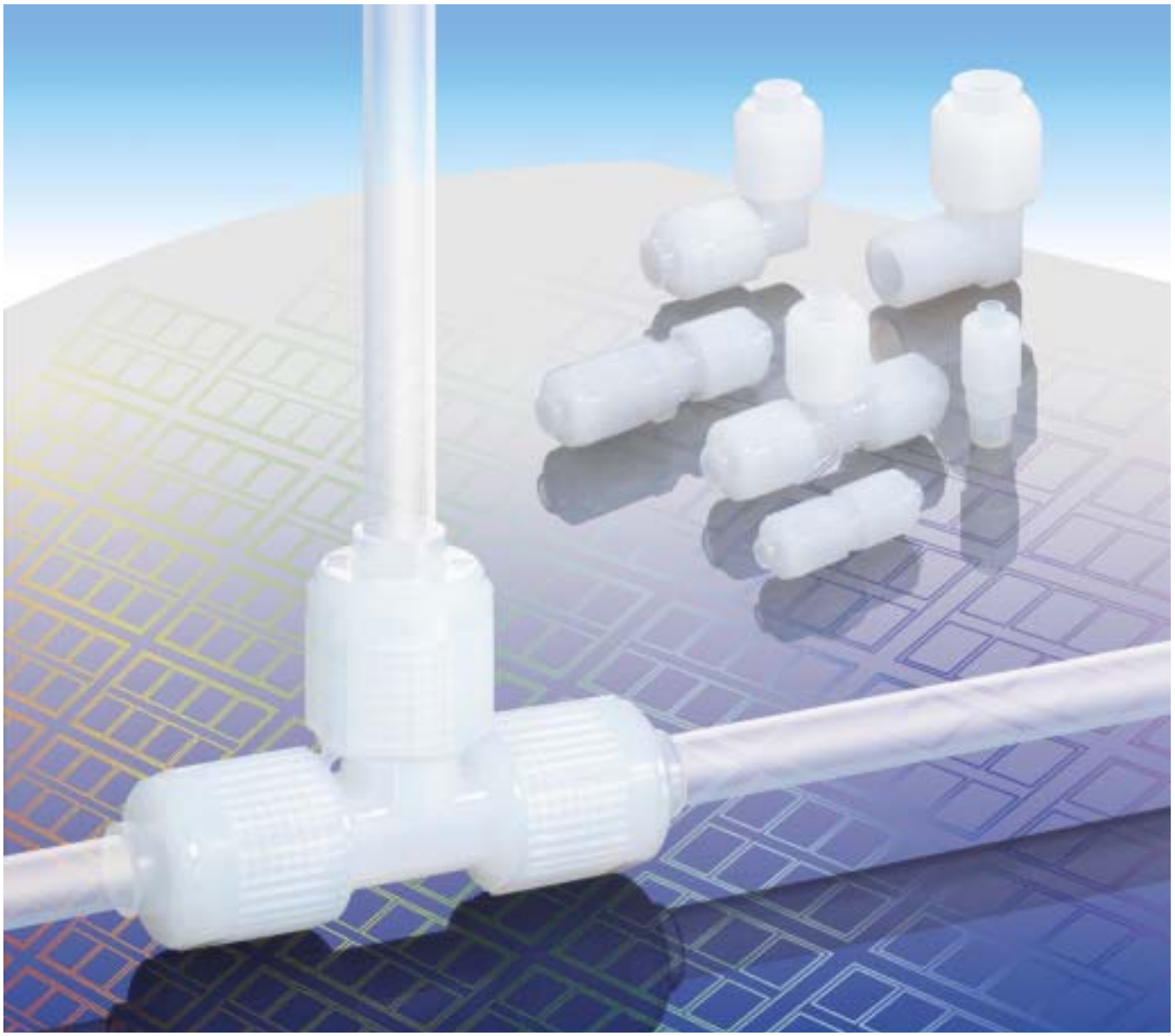
CAT.ES70-17 B

SMC

High Purity Fluoropolymer Fittings & Tubing

Fittings Series LQ

Tubing Series TL/TIL



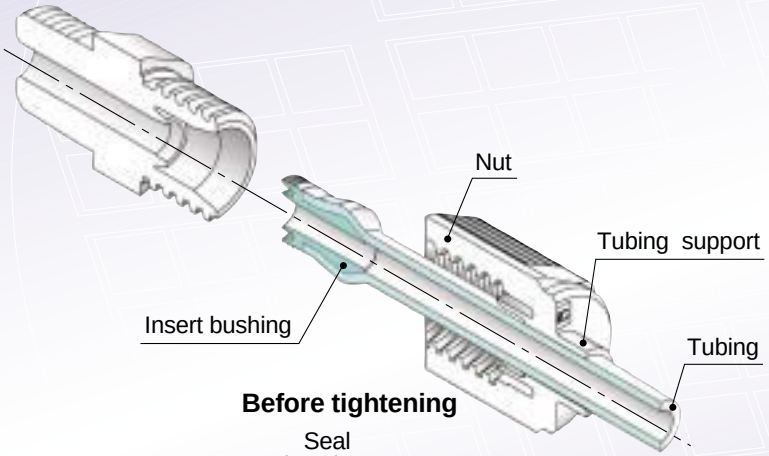
U.S. Pat. 5,996,636

SMC high purity series responding to the latest demands in process control

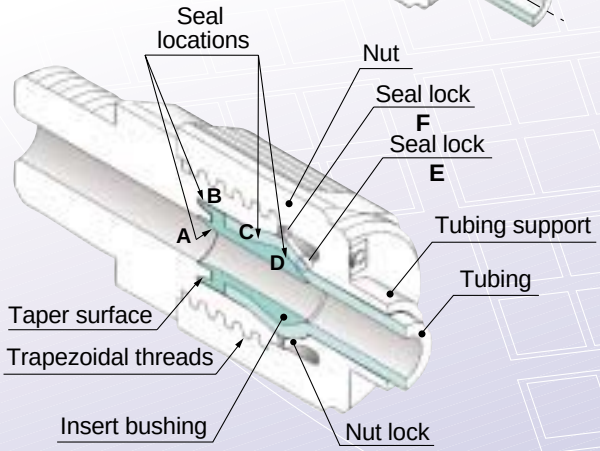
High Purity Fluoropolymer Fittings & Tubing

Fittings
Series LQ

Tubing
Series TL/TIL



Before tightening



After tightening

Quadruple seal construction
Our new patented high-performance quadruple seal construction, as well as our precision insertion tooling, provides maximum leak protection in your process circuitry.

High conductivity and swept flow path
Our quadruple seal construction allows minimal dead space for impurities and contaminants.

Excellent heat resistance
The use of a nut with locking mechanism and trapezoidal screw threads maximize seal performance even when subjected to heat cycles, maintaining integrity up to 200°C.

Compression nut design resists side loading
Tube support resists crimping and deformation of tubing.

Tube diameters can be changed quickly and easily
If chemistries or flow requirements are changed during process, our face seal design allows for quick change of tubing, and/or tube diameters, using the same fitting body.

Easy tightening of nuts
Tightening to the end surface makes a positioning gauge unnecessary for easy work operations.

- **Clean specifications**
  From parts cleaning to assembly and packaging, all processes are controlled for cleanliness, and the use of NEW PFA virtually eliminates particle generation and TOC (total organic carbon) allowing confident use for the most demanding applications.
- **Outstanding corrosion resistance**
  Compatible with chemicals such as acids, bases and ultrapure water.
- **Numerous variations**
- **Compatible with maximum fluid temperatures up to 200°C**

High levels of purity are increasingly required in the handling of fluids for advanced processing applications of semiconductors, pharmaceuticals, medicine, instrumentation, cleaning and food processing. SMC high purity series products incorporate many new and unique innovations that minimize both particulate and chemical contamination to levels compatible with the most demanding requirements. Cleaning, assembly and packaging are performed in a clean room to ensure the ultimate in product integrity.

Variations

Series	Class	Port size					Tube O.D.											
							Metric size						Inch size					
		None	1/4"	3/8"	1/2"	3/4"	ø4	ø6	ø8	ø10	ø12	ø19	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"
Male connector **LQH**	2	—	○	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	—	—	○	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	—	—	—	○	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	—	—	—	—	○	—	—	—	—	●	○	—	—	—	—	●	○
Male elbow **LQL**	2	—	○	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	—	—	○	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	—	—	—	○	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	—	—	—	—	○	—	—	—	—	●	○	—	—	—	—	●	○
Union elbow **LQE**	2	○	—	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	○	—	—	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	○	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	○	—	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○
Union tee **LQT**	2	○	—	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	○	—	—	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	○	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	○	—	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○
Panel mount union **LQP**	2	○	—	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	○	—	—	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	○	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	○	—	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○
Union **LQU**	2	○	—	—	—	—	●	○	—	—	—	—	●	●	○	—	—	—
	3	○	—	—	—	—	—	●	●	○	—	—	—	—	●	○	—	—
	4	○	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○	—
	5	○	—	—	—	—	—	—	—	—	●	○	—	—	—	—	●	○

○ Standard size ● With insert bushing and nut reducer

New High Purity PFA

Series		Tube O.D.	
TL	Material: High Purity PFA	Metric size	ø4
			ø6
			ø8
			ø10
			ø12
			ø19
TIL		Inch size	1/8"
			3/16"
			1/4"
			3/8"
			1/2"
			3/4"
			1"

Insertion tool

Type		Class
LQ-GA		2
LQ-GB		3 4 5

High Purity Fluoropolymer Fittings

Series LQ

How to Order

Port size

Symbol	Class	Port size
2	2	1/4"
3	3	3/8"
4	4	1/2"
5	5	3/4"

Thread type

Symbol	Type
Nil	Rc
N	NPT

Model

H	Male connector
L	Male elbow

Threaded connection LQ H 2 2 □ – 06 – □

Tubing connection LQ E 2 0 06 □ – □

Model

E	Union elbow
T	Union tee
P	Panel mount union
U	Union

Class

Symbol	Class
2	2
3	3
4	4
5	5

Port size

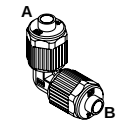
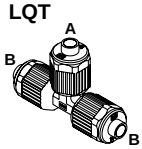
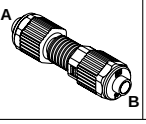
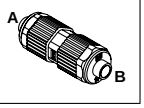
Symbol	Port size
0	No port connection

Packaging

Nil	Clean packaging Class 100
1	Standard packaging Class 10,000

Tubing size on B side if different than A side

Symbol	Application
Nil	Same tubing size
Tubing size symbol	Refer to the applicable tubing size table at the left below. Different diameter tubing can be selected within the same body class where marked with a "●" symbol.

Union elbow **LQE**	Union tee **LQT**	Panel mount union **LQP**	Union **LQU**
			

Applicable tubing size (A side)

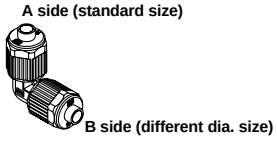
	Symbol	Connection tubing size	Class 2	3	4	5
Metric sizes	04	ø4 x ø3	●			
	06	ø6 x ø4	○	●		
	08	ø8 x ø6		●		
	10	ø10 x ø8		○	●	
	12	ø12 x ø10			○	●
	19	ø19 x ø16				○
Inch sizes	03	1/8" x 0.086"	●			
	05	3/16" x 0.127"	●			
	07	1/4" x 5/32"	○	●		
	11	3/8" x 1/4"		○	●	
	13	1/2" x 3/8"			○	●
	19	3/4" x 5/8"				○

○ Standard size ● With insert bushing and nut reducer

Different diameter tubing order example

Different diameter tubing (with plug-in reducer) can be selected within the same body class.

(Example) Union elbow
Body class 3
Standard size (A): ø10 x ø8
Different dia. tubing (B): ø8 x ø6
Order as shown below.



LQE (class 3)

LQ E 3 0 – 10 08 – □

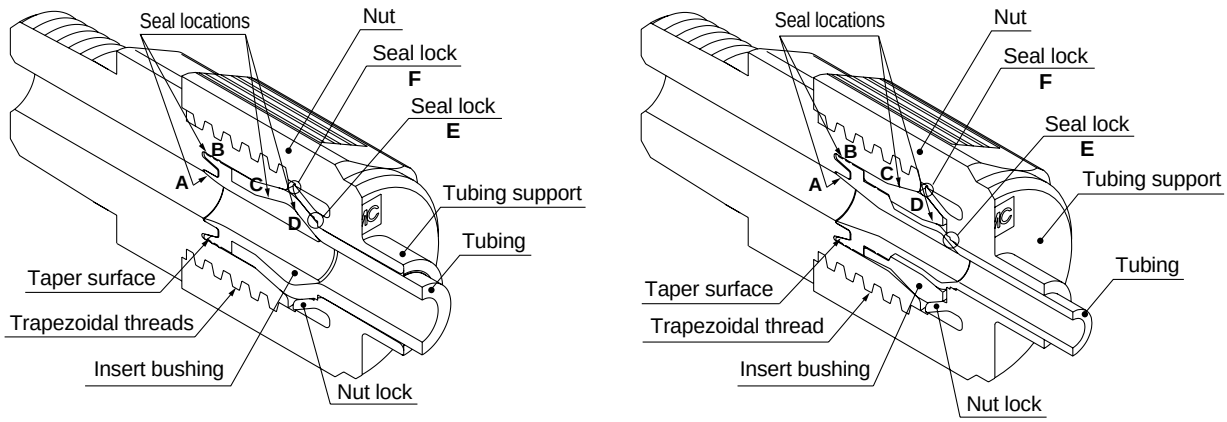
- **E** – Union elbow
- **3** – Class
- **10** – Applicable tubing size (A side)
- **08** – Different dia. tubing (B side)

Note 1) Order unit quantities are shown below.

Class			
2	3	4	5
4 pcs.			2 pcs.

SMC

Construction



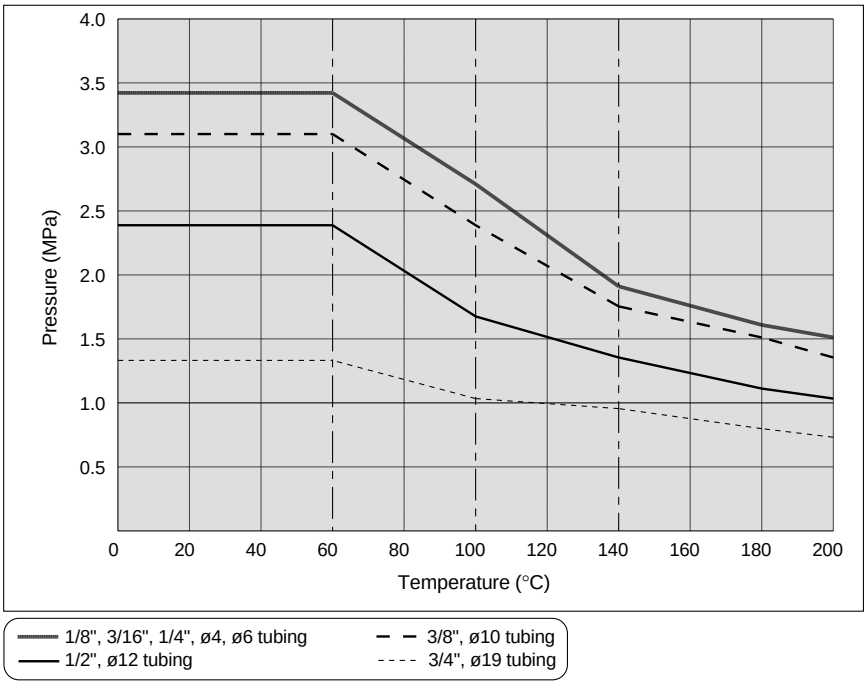
Reducer type configuration

Material: High purity PFA
Applicable tubing material: High purity PFA

Specifications

Model	LQ□20	LQ□30	LQ□40	LQ□50
Maximum operating pressure (at 20°C)	1.0MPa			
Proof pressure	Refer to the withstand pressure and heat resistance performance curves.			
Operating temperature	0 to 200°C			

Burst Pressure and Heat Resistance Performance



Dimensions

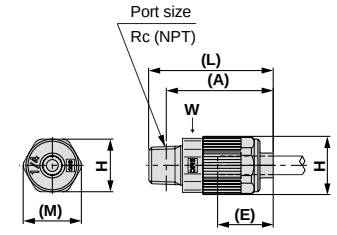
Male Connector: LQH

Metric sizes

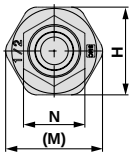
Model	Applicable tubing O.D.	Connection threads Rc, NPT	A	E	H	L	M	N	W
LQH22□-04	ø4	1/4	36.5	19	18	42.5	19.9	—	16
LQH22□-06	ø6								
LQH33□-06	ø6	3/8	42	22	24	48.5	26.2	—	24
LQH33□-08	ø8		42.5			49			
LQH33□-10	ø10								
LQH44□-10	ø10	1/2	50	28	30	58	33.1	21	30
LQH44□-12	ø12		51			59			
LQH55□-12	ø12	3/4	57.5	32	36	67	40	26	36
LQH55□-19	ø19		58.5			68			

Inch sizes

Model	Applicable tubing O.D.	Connection threads Rc, NPT	A	E	H	L	M	N	W
LQH22□-03	1/8"	1/4	36.5	19	18	42.5	19.9	—	16
LQH22□-05	3/16"								
LQH22□-07	1/4"								
LQH33□-07	1/4"	3/8	42	22	24	48.5	26.2	—	24
LQH33□-11	3/8"		42.5			49			
LQH44□-11	3/8"	1/2	50	28	30	58	33.1	21	30
LQH44□-13	1/2"		51			59			
LQH55□-13	1/2"	3/4	57.5	32	36	67	40	26	36
LQH55□-19	3/4"		58.5			68			



Class 2 and 3



Class 4 and 5

Note 1) "A" dimensions are reference dimensions for Rc (NPT) threads after installation.

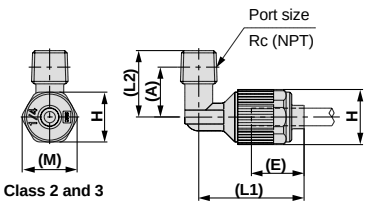
Male elbow: LQL

Metric sizes

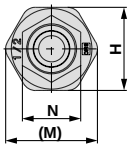
Model	Applicable tubing O.D.	Connection threads Rc, NPT	A	E	H	L1	L2	M	N
LQL22□-04	ø4	1/4	18	19	18	38	24	19.9	—
LQL22□-06	ø6								
LQL33□-06	ø6	3/8	21.5	22	24	42.5	28	26.2	—
LQL33□-08	ø8					43			
LQL33□-10	ø10								
LQL44□-10	ø10	1/2	27	28	30	51	35	33.1	21
LQL44□-12	ø12					52			
LQL55□-12	ø12	3/4	33.5	32	36	58	43	40	26
LQL55□-19	ø19					59			

Inch sizes

Model	Applicable tubing O.D.	Connection threads Rc, NPT	A	E	H	L1	L2	M	N
LQL22□-03	1/8"	1/4	18	19	18	38	24	19.9	—
LQL22□-05	3/16"								
LQL22□-07	1/4"								
LQL33□-07	1/4"	3/8	21.5	22	24	42.5	28	26.2	—
LQL33□-11	3/8"					43			
LQL44□-11	3/8"	1/2	27	28	30	51	35	33.1	21
LQL44□-13	1/2"					52			
LQL55□-13	1/2"	3/4	33.5	32	36	58	43	40	26
LQL55□-19	3/4"					59			



Class 2 and 3



Class 4 and 5

Note 1) "A" dimensions are reference dimensions for Rc (NPT) threads after installation.

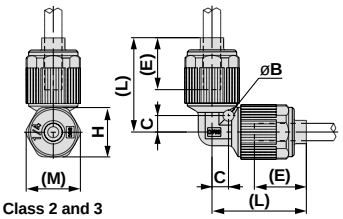
Union elbow: LQE

Metric sizes

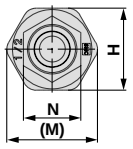
Model	Applicable tubing O.D.	B	C	E	H	L	M	N
LQE20-04	ø4	ø4	6	19	18	34.5	19.9	—
LQE20-06	ø6							
LQE30-06	ø6	ø5	9	22	24	42.5	26.2	—
LQE30-08	ø8					43		
LQE30-10	ø10							
LQE40-10	ø10	ø6	11	28	30	51	33.1	21
LQE40-12	ø12					52		
LQE50-12	ø12	ø7	14	32	36	58.5	40	26
LQE50-19	ø19					59.5		

Inch sizes

Model	Applicable tubing O.D.	B	C	E	H	L	M	N
LQE20-03	1/8"	ø4	6	19	18	34.5	19.9	—
LQE20-05	3/16"							
LQE20-07	1/4"							
LQE30-07	1/4"	ø5	9	22	24	42.5	26.2	—
LQE30-11	3/8"					43		
LQE40-11	3/8"	ø6	11	28	30	51	33.1	21
LQE40-13	1/2"					52		
LQE50-13	1/2"	ø7	14	32	36	58.5	40	26
LQE50-19	3/4"					59.5		



Class 2 and 3



Class 4 and 5

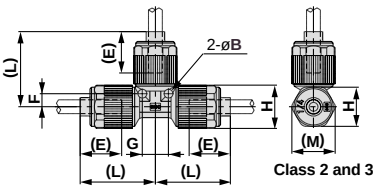
Union tee: LQT

Metric sizes

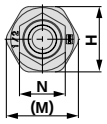
Model	Applicable tubing O.D.	B	E	F	G	H	L	M	N
LQT20-04	ø4	ø4	19	6	12	18	34.5	19.9	—
LQT20-06	ø6								
LQT30-06	ø6	ø5	22	9	18	24	42.5	26.2	—
LQT30-08	ø8						43		
LQT30-10	ø10								
LQT40-10	ø10	ø6	28	11	22	30	51	33.1	21
LQT40-12	ø12						52		
LQT50-12	ø12	ø7	32	14	28	36	58.5	40	26
LQT50-19	ø19						59.5		

Inch sizes

Model	Applicable tubing O.D.	B	E	F	G	H	L	M	N
LQT20-03	1/8"	ø4	19	6	12	18	34.5	19.9	—
LQT20-05	3/16"								
LQT20-07	1/4"								
LQT30-07	1/4"	ø5	22	9	18	24	42.5	26.2	—
LQT30-11	3/8"						43		
LQT40-11	3/8"	ø6	28	11	22	30	51	33.1	21
LQT40-13	1/2"						52		
LQT50-13	1/2"	ø7	32	14	28	36	58.5	40	26
LQT50-19	3/4"						59.5		



Class 2 and 3



Class 4 and 5

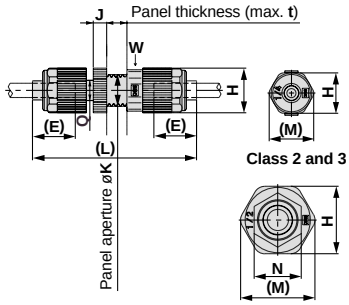
Panel mount union: LQP

Metric sizes

Model	Applicable tubing O.D.	E	H	J	K	L	M	N	Q	t	W
LQP20-04	ø4	19	18	6	ø14.5	73	19.9	—	9	7	16
LQP20-06	ø6										
LQP30-06	ø6	22	24	6	ø20.5	82	26.2	—	16	7	24
LQP30-08	ø8					83					
LQP30-10	ø10										
LQP40-10	ø10	28	30	9	ø24.5	93	33.1	21	18	7	30
LQP40-12	ø12					95					
LQP50-12	ø12	32	36	9	ø30.5	108	40	26	24	10	36
LQP50-19	ø19					110					

Inch sizes

Model	Applicable tubing O.D.	E	H	J	K	L	M	N	Q	t	W
LQP20-03	1/8"	19	18	6	ø14.5	73	19.9	—	9	7	16
LQP20-05	3/16"										
LQP20-07	1/4"										
LQP30-07	1/4"	22	24	6	ø20.5	82	26.2	—	16	7	24
LQP30-11	3/8"					83					
LQP40-11	3/8"	28	30	9	ø24.5	93	33.1	21	18	7	30
LQP40-13	1/2"					95					
LQP50-13	1/2"	32	36	9	ø30.5	108	40	26	24	10	36
LQP50-19	3/4"					110					



Class 2 and 3

Class 4 and 5

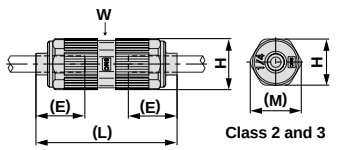
Union : LQU

Metric sizes

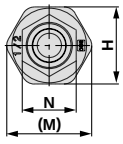
Model	Applicable tubing O.D.	E	H	L	M	N	W
LQU20-04	ø4	19	18	55	19.9	—	16
LQU20-06	ø6						
LQU30-06	ø6	22	24	64	26.2	—	24
LQU30-08	ø8			65			
LQU30-10	ø10						
LQU40-10	ø10	28	30	75	33.1	21	30
LQU40-12	ø12			77			
LQU50-12	ø12	32	36	86	40	26	36
LQU50-19	ø19			88			

Inch sizes

Model	Applicable tubing O.D.	E	H	L	M	N	W
LQU20-03	1/8"	19	18	55	19.9	—	16
LQU20-05	3/16"						
LQU20-07	1/4"						
LQU30-07	1/4"	22	24	64	26.2	—	24
LQU30-11	3/8"			65			
LQU40-11	3/8"	28	30	75	33.1	21	30
LQU40-13	1/2"			77			
LQU50-13	1/2"	32	36	86	40	26	36
LQU50-19	3/4"			88			



Class 2 and 3



Class 4 and 5

Options

Panel mounting nut

LQN P 2 – □

Class

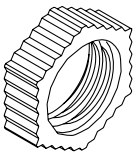
Symbol	Class
2	2
3	3
4	4
5	5

Note1) Order unit quantities are shown below.

Class			
2	3	4	5
4 pcs.			2 pcs.

Packaging

Nil	Clean packaging Class 100
1	Standard packaging Class 10,000



Used to secure a panel with a panel mount union.

Nut insert bushing

LQ – 2 U 03 – □

* The U type is recommended when changing tubing sizes.

Class

Symbol	Class
2	2
3	3
4	4
5	5

Type of parts

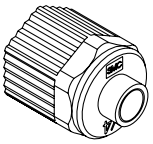
Symbol	Parts
U	Insert bushing + Nut
B	Insert bushing Note 1)
N	Nut

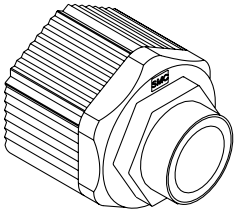
Note 1) Order unit quantities are shown below.

	Class			
	2	3	4	5
Insert bushing + Nut	4 pcs.			2 pcs.
Insert bushing	8 pcs.			1 pc.
Nut	4 pcs.			2 pcs.

Packaging

Nil	Clean packaging Class 100
1	Standard packaging Class 10,000





Applicable tubing size

	Symbol	Connection tubing size	Class 2	3	4	5
Metric sizes	04	ø4 x ø3	●			
	06	ø6 x ø4	○	●		
	08	ø8 x ø6		●		
	10	ø10 x ø8		○	●	
	12	ø12 x ø10			○	●
	19	ø19 x ø16				○
Inch sizes	03	1/8" x 0.086"	●			
	05	3/16" x 0.127"	●			
	07	1/4" x 5/32"	○	●		
	11	3/8" x 1/4"		○	●	
	13	1/2" x 3/8"			○	●
	19	3/4" x 5/8"				○

○ Standard size ● With insert bushing and nut reducer

Blanking plug

LQ – 2 P 07 – □

Class

Symbol	Class
2	2
3	3
4	4
5	5

Note 1) Order unit quantities are shown below.

Class			
2	3	4	5
4 pcs.			2 pcs

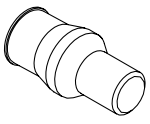
Packaging

Nil	Clean packaging Class 100
1	Standard packaging Class 10,000

Applicable tubing size

	Symbol	Connection tubing size	Class 2	3	4	5
Metric sizes	04	ø4 x ø3	●			
	06	ø6 x ø4	○	●		
	08	ø8 x ø6		●		
	10	ø10 x ø8		○	●	
	12	ø12 x ø10			○	●
	19	ø19 x ø16				○
Inch sizes	03	1/8" x 0.086"	●			
	05	3/16" x 0.127"	●			
	07	1/4" x 5/32"	○	●		
	11	3/8" x 1/4"		○	●	
	13	1/2" x 3/8"			○	●
	19	3/4" x 5/8"				○

○ Standard size ● With insert bushing and nut reducer



Used to block fittings which are not being used.

Series LQ
Insertion Tool

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 outside diameter											
	Metric sizes						Inch sizes					
	ø4	ø6	ø8	ø10	ø12	ø19	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"
2	●	○	—	—	—	—	●	●	○	—	—	—
3	—	●	●	○	—	—	—	—	●	○	—	—
4	—	—	—	●	○	—	—	—	—	●	○	—
5	—	—	—	—	●	○	—	—	—	—	●	○

Parts composition

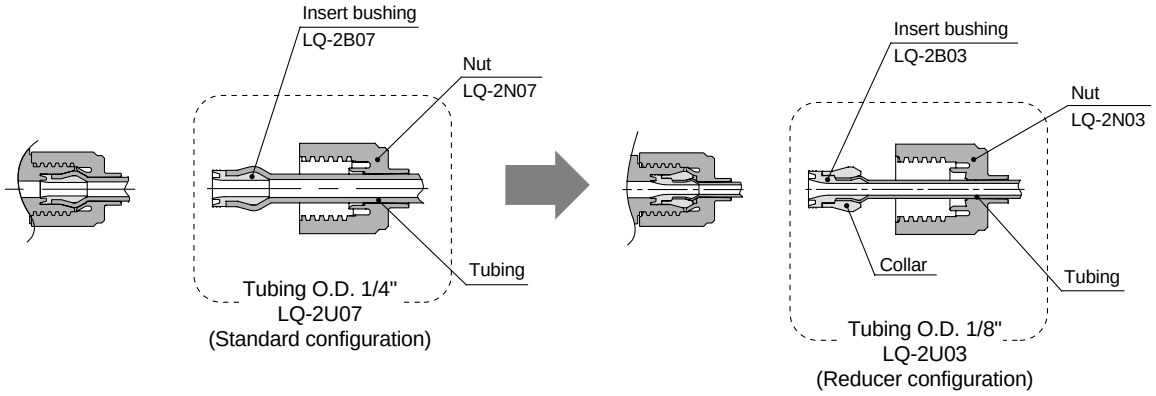
	Component parts		
	Nut	Insert	Collar (insert assembly)
○ Standard size	Yes	Yes	No
● Reducer type	Yes	Yes	Yes

Changing the tubing size

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

Procure 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.



Series LQ
Insertion Tool

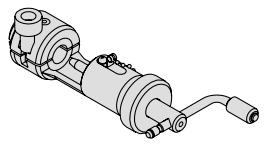
Special Tools

How to order insertion tool

LQ − G A − □ − □

- **Fitting jig**
- **Type**
- **Insert pin/Holder type**
- **Option**

Symbol	Body class
A	2
B	3, 4, 5



Insert pin/Holder type	
Nil	Metric size
N	Inch size

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

Symbol	Option
Nil	None
B	With brackets

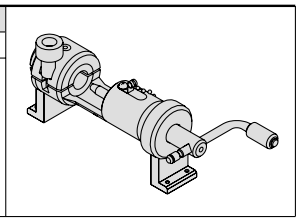
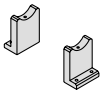


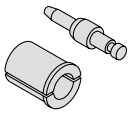
Table 1 Tubing size symbols

Type	Body class	Tubing outside diameter											
		Metric sizes						Inch sizes					
		ø4	ø6	ø8	ø10	ø12	ø19	1/8"	3/16"	1/4"	3/8"	1/2"	3/4"
A	2	04	06	—	—	—	—	03	05	07	—	—	—
B	3	—	06	08	10	—	—	—	—	07	11	—	—
	4	—	—	—	10	12	—	—	—	—	11	13	—
	5	—	—	—	—	12	19	—	—	—	—	13	19

Options

Description		Part no.	Body class
Bracket assembly		**LQ-GBA**	2
		LQ-GBB	3, 4, 5

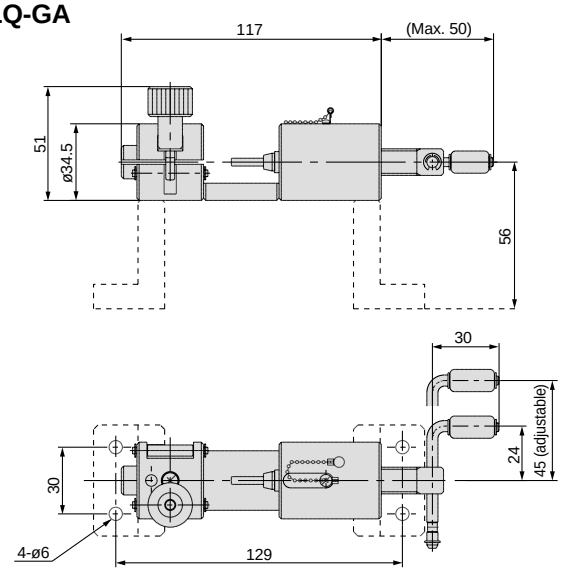
Replacement parts

Description		Part no.
Insert pin holder assembly (in parts case)		**LQ-GP A -** □ Type (refer to table 1) Insert pin/Holder type **Nil** Metric size **N** Inch size
Insert pin (single)		**LQ-GP 2 A - 07** Body class (refer to table 1) Type (refer to table 1) Tubing size symbol (refer to table 1)
Holder (single)		**LQ-GH A - 07** Type (refer to table 1) Tubing size symbol (refer to table 1)

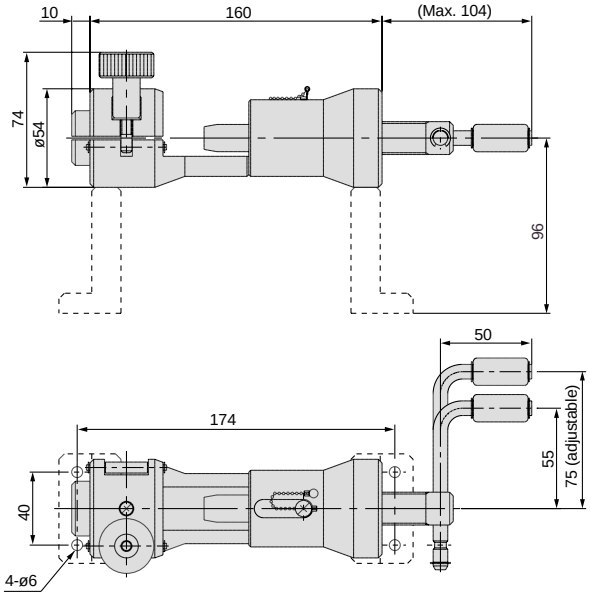
Note 1) Refer to Table 1 for jig type and body class combinations.

Dimensions

LQ-GA

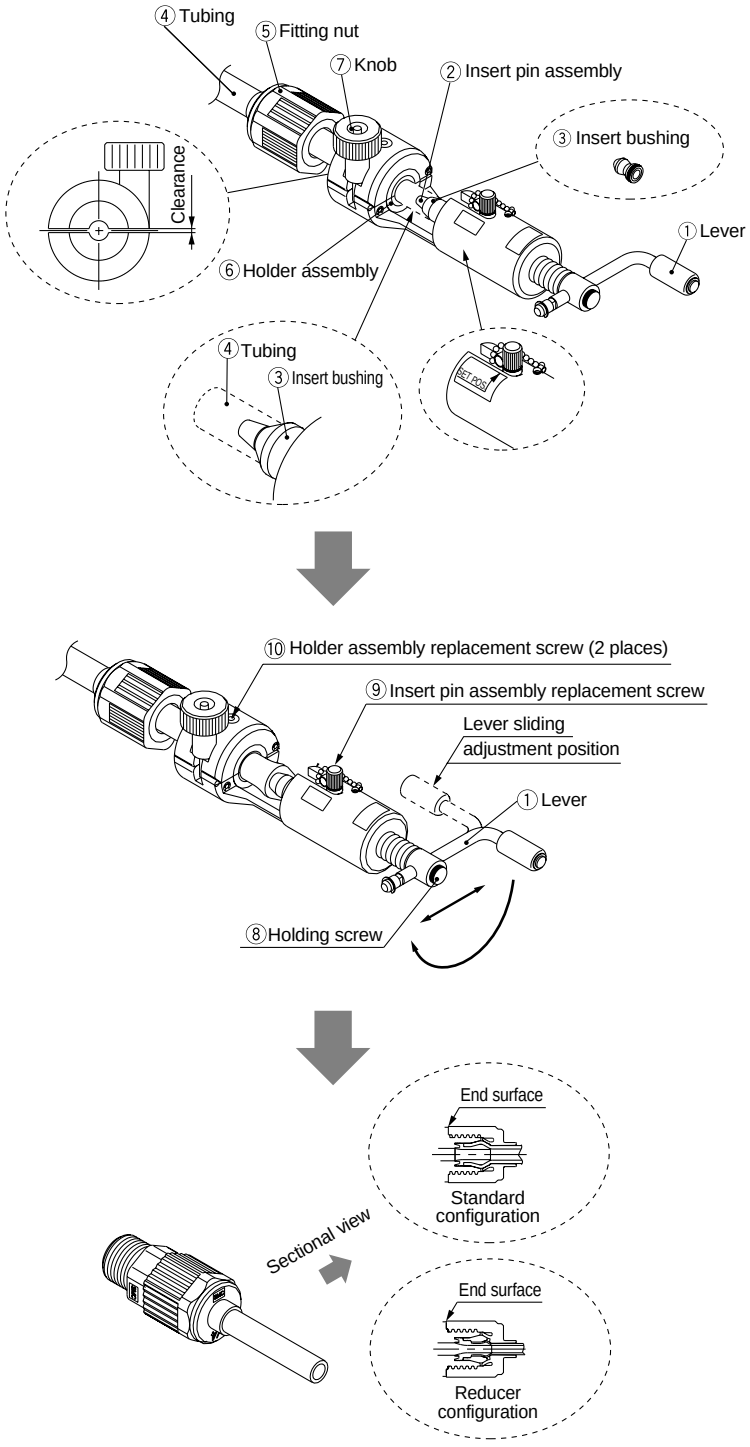


LQ-GB



Fitting Assembly Procedure

Assemble fittings following the procedure shown below.



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. When tightening the **tube** ④ with the **knob** ⑦, maintain uniform clearance 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** by turning the **lever** ①. (Pressing in can be accomplished with 2 or 3 turns of the **lever** ①.) Note that the **lever** ① can be adjusted in two steps depending on the size of the fitting. To make an adjustment, loosen the **holding screw** ⑧, turn the **lever** ① 180 degrees, and then slide the lever.
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. Tighten the **fitting nut** ⑤ 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 (N·m)
2	1.5 to 2.0
3	3.0 to 3.5
4	7.5 to 9.0
5	11.0 to 13.0

High Purity Fluoropolymer Tubing
Series TL/TIL

Series

Material: High purity PFA

		Metric sizes (Series TL)						Inch sizes (Series TIL)						
		TL0403	TL0604	TL0806	TL1008	TL1210	TL1916	TIL01	TIL05	TIL07	TIL11	TIL13	TIL19	TIL25
O.D. x I.D. (mm)		ø4 x ø3	ø6 x ø4	ø8 x ø6	ø10 x ø8	ø12 x ø10	ø19 x ø16	ø3.18 x ø2.18	ø4.75 x ø3.15	ø6.35 x ø3.95	ø9.53 x ø6.33	ø12.7 x ø9.50	ø19.05 x ø15.85	ø25.4 x ø22.2
O.D. (mm)	Standard size	4	6	8	10	12	19	3.18	4.75	6.35	9.53	12.7	19.05	25.4
	Tolerance	±0.1				+0.2 –0.1		±0.1				+0.2 –0.1		
Thickness (mm)	Standard size	0.5	1				1.5	0.5	0.8	1.2	1.6			
	Tolerance	±0.05	±0.1				±0.15	±0.05	±0.08	±0.12	±0.15			
Colour		Translucent (colour of material)												

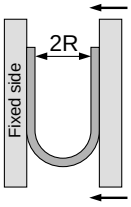
Nominal size (inch)						
1/8"	3/16"	1/4"	3/8"	1/2"	3/4"	1"

Specifications

Max. operating pressure (at 20°C) Note 1)	1.0MPa		0.9MPa	0.7MPa	0.6MPa	1.0MPa							
Burst pressure (at 20°C)	4.9MPa	6.9MPa	4.7MPa	3.6MPa	2.9MPa	2.6MPa	6.4MPa	6.7MPa	7.9MPa	6.7MPa	4.6MPa	2.8MPa	2.0MPa
Min. bending radius (mm) Note 2)	20		40	65	110	160	12	20		30	60	160	270
Max. operating temperature	260°C (fixed)												
Material	High purity PFA												

Note 1) • The maximum operating pressure is the value at 20°C. For other temperatures, calculate from the burst pressure drop coefficient. Furthermore, an abnormal temperature increase due to adiabatic compression can cause tubing to burst. To operate at a temperature other than 20°C, the operating pressure must be no more than the value calculated using the equation below:
(max. operating pressure) = 1/4 x (burst pressure drop coefficient) x (burst pressure at 20°C)
• When using a fluid in liquid form, the surge pressure must be no more than the maximum operating pressure. A surge pressure higher than the maximum operating pressure can cause breakage of the fitting or bursting of the tube.

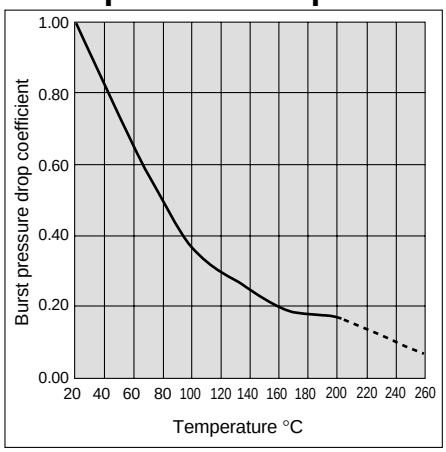
Note 2) The minimum bending radius is measured using the method shown in the figure at the right.



At a temperature of 20°C bend the tubing into a U shape. Then with one side fixed, gradually close the other side and measure 2R at the point where the tubing folds or flattens, etc.

"For Dynamic Acidic Extractable s data please contact your SMC representative."

Burst pressure drop curve



How to Order

Metric sizes

TL0604 — **20**

- **Tubing Model**
- **Bundle length**

Symbol	Length
10	10m
20	20m

Refer to the series chart.

Inch sizes

TIL05 — **33**

- **Tubing Model**
- **Bundle length**

Symbol	Length
16	50'
33	100'

Refer to the series chart.

Series LQ, TL/TIL
Safety Instructions

These safety instructions are intended to prevent a hazardous situation and/or equipment damage. These instructions indicate the level of potential hazard by labels of **"Caution", "Warning" or "Danger"**. To ensure safety, be sure to observe ISO 4414 Note 1) , JIS B 8370 Note 2) and other safety practices.

⚠ Caution : Operator error could result in injury or equipment damage.

⚠ Warning : Operator error could result in serious injury or loss of life.

⚠ Danger : In extreme conditions, there is a possible result of serious injury or loss of life.

Note 1) ISO 4414: Pneumatic fluid power --Recommendations for the application of equipment to transmission and control systems

Note 2) JIS B 8370: General Rules for Pneumatic Equipment

⚠ Warning

1. **The compatibility of equipment is the responsibility of the person who designs the system or decides its specifications.**
   Since the products specified here are used in various operating conditions, their compatibility for the specific system must be based on specifications or after analysis and/or tests to meet your specific requirements.
2. **Only trained personnel should operate machinery and equipment.**
   Assembly, handling or repair of machinery and equipment should be performed by trained and experienced operators.
3. **Do not service machinery/equipment or attempt to remove components until safety is confirmed.**
4. **To promote safe operation, be sure to observe company standards and legal regulations, etc.**
   Refer to ISO4414, JIS B 8370 (General Rules for Pneumatic Equipment), labor health and safety laws and other safety regulations.

Series LQ, TL/TIL
High Purity Fluoropolymer Fittings & Tubing Precautions 1
Be sure to read before handling.

Precautions on Design and Selection

⚠ Warning

1. Confirm the specifications.

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

2. Fluid

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 catalog.

5. Countermeasures for static electricity

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

Mounting

⚠ Warning

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

2. Instruction 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. Connect tubing with special tools.

Refer to page 6 regarding tubing connection and special tools.

2. Tighten the nut until it touches the end surface of the body, and then tighten it an addition 1/8 turn. As a guide, refer to the proper tightening torques shown below.

Nut tightening torque for piping

Body class	Torque (N·m)
2	1.5 to 2.0
3	3.0 to 3.5
4	7.5 to 9
5	11 to 13

Series LQ, TL/TIL
High Purity Fluoropolymer Fittings & Tubing Precautions 2
Be sure to read before handling.

Operating Environment

⚠ Warning

1. Do not use in locations having an explosive atmosphere.

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

3. In locations near heat sources, block off radiated heat.

Maintenance

⚠ Warning

1. Perform maintenance in accordance with the procedures in the instruction manual.

Improper handling can cause damage.

2. When removing or reinstalling fittings, remove any remaining chemicals and carefully replace them with pure water or air, etc., before beginning work activities.

3. Tightening of taper threads for piping

Because the taper threads are made of resin, minute leakage may gradually occur due to stress relaxation. Perform periodic inspections, and if leakage is detected correct the problem by additional tightening. If additional tightening becomes ineffective, replace the fitting with a new product.

4. Check the following during regular maintenance, and replace components as necessary.

a) Scratches, gouges, abrasion, corrosion

b) Twisting, flattening or distortion of tubing

c) Hardening, deterioration or softening of tubing

5. Do not repair or patch the replaced tubing or fittings for reuse.

Operating Precautions

⚠ Warning

1. Operate within the range of the maximum operating pressure.

⚠ Caution

1. After a long period of non-use, perform inspections before beginning operation.

2. Use sufficient care in the handling of series LQ clean packaging types when their packaging is opened.

Precautions on Installation of Tubing

⚠ Caution

1. Cut the end of the tubing at a right angle and pass it through the fitting nut. After placing the tube in the holder, push it onto the insert bushing until it stops and clamp it with the knob.

As a guide when tightening the tube with the knob, maintain a uniform gap (approx. 2mm) on both sides of the holder.

- **When the tubing is curved, straighten it out before using it.**
- **The tubing may slip if there is oil or dust, etc., on the holder. Remove the contamination using alcohol or another suitable cleaner.**

Precautions on 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 sizes	ø4 x ø3	4.0	+0.20 –0.10	0.5	±0.06
	ø6 x ø4	6.0		1.0	±0.10
	ø8 x ø6	8.0			
	ø10 x ø8	10.0			
	ø12 x ø10	12.0			
	ø19 x ø16	19.0	+0.30 –0.10	1.5	±0.15
Inch sizes	1/8" x 0.086"	3.18	+0.20 –0.10	0.5	±0.10
	3/16" x 0.127"	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	+0.30 –0.10		
	3/4" x 5/8"	19.0			