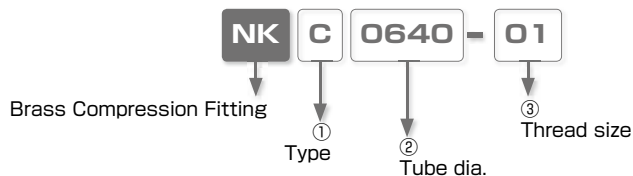




## Compression Fitting of All Brass Brass Compression Fitting Series

- *Special Metal Brass for Metallic Body. Improved Resistance to Water. Suitable for Automobile Industry and Molding Die Temperature Control.*
- *No Sleeve Required. No Worry about Forgetting or Losing Sleeve.*
- *Wide Variations of Products for Various Applications.*  
5 types of Shape: C, CF, MF, L and E  
Applicable tube size:  $\varnothing 4\sim 16\text{mm}$  (10 sizes)

### Model Designation (Example)



#### ① Type

| Code      | Type                     | Code     | Type  | Code     | Type      | Code      | Type            |
|-----------|--------------------------|----------|-------|----------|-----------|-----------|-----------------|
| <b>C</b>  | Straight                 | <b>L</b> | Elbow | <b>E</b> | Union Tee | <b>CF</b> | Female Straight |
| <b>MF</b> | Bulkhead Female Straight |          |       |          |           |           |                 |

#### ② Tube dia.

| Code                  | 0425 | 0640 | 0850 | 0860 | 1065 | 1075 | 1280 | 1290 | 1611 | 1613 |
|-----------------------|------|------|------|------|------|------|------|------|------|------|
| Tube O.D. (mm)        | ø4   | ø6   | ø8   |      | ø10  |      | ø12  |      | ø16  |      |
| Tube I.D. (mm)        | ø2.5 | ø4   | ø5   | ø6   | ø6.5 | ø7.5 | ø8   | ø9   | ø11  | ø13  |
| Identification groove | ×    | ×    | ○    | ×    | ○    | ×    | ○    | ×    | ○    | ×    |

※ See the shape of identification groove from construction on next page.

#### ③ Thread size

| Thread size | Taper pipe thread |       |       |       |
|-------------|-------------------|-------|-------|-------|
| Code        | 01                | 02    | 03    | 04    |
| R           | R1/8              | R1/4  | R3/8  | R1/2  |
| Rc          | Rc1/8             | Rc1/4 | Rc3/8 | Rc1/2 |

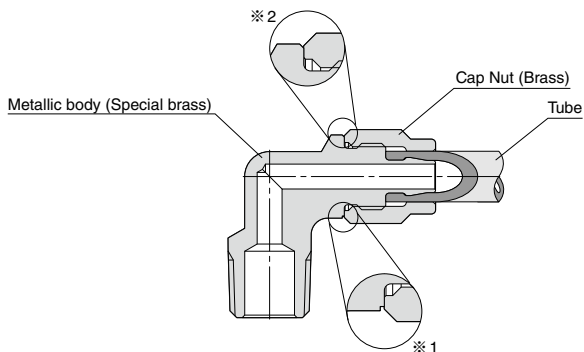
## Specifications

|                         |  |
|-------------------------|--|
| Fluid medium            | Air / Water / Others (※)                                 |
| Max. operating pressure | Follow the max. operation pressure of tube specification |
| Max. vacuum             | -100kPa  |
| Operating temp. range   | Depend on the range of tube specification (No freezing)  |

#### ⚠ Warning

- ※ 1. Be sure to contact us in case of using other fluid medium except air and water. The specification above may not be applied, depending on the operating conditions.
- ※ 2. Surge pressure must be controlled lower than max. operating pressure when using water as a fluid medium.
- ※ 3. Operating temp. range follows the specification of the tube. The operation in a high temperature environment may cause damage to the products when they receive an excessive load.

## Construction (Elbow: NKL)



※ 1. Shape with Identification groove. Available tube I.D. :  $\varnothing 5$ ,  $\varnothing 6.5$ ,  $\varnothing 8$ ,  $\varnothing 11$ mm

※ 2. Shape without Identification groove. Available tube I.D. :  $\varnothing 2.5$ ,  $\varnothing 4$ ,  $\varnothing 6$ ,  $\varnothing 7.5$ ,  $\varnothing 9$ ,  $\varnothing 13$ mm

## △ Detailed Safety Instructions

Before using PISCO products, be sure to read "Safety Instructions" and "Safety Instruction Manual" on page 23 to 27 and "Common Safety Instructions for Fittings" on page 33 to 35.

### Warning

1. When using chemicals or mixed gases as a fluid medium, be sure to contact us first. Depending on conditions, it may cause damage to the products, the escape of tubes and a fluid leakage.

### Caution

1. Taper thread is not coated with Sealock. When coating the thread with seal tape or sealant, do not coat 1.5 to 2 screw ridges from the tip of the thread.



## Brass Compression Fitting Series

FITTING

### Standard Size List

#### Connection: Thread ⇔ Tube

| Type          | Page  | Thread size | Tube O.D. x I.D. (mm) |       |       |       |          |          |        |        |         |
|---------------|-------|-------------|-----------------------|-------|-------|-------|----------|----------|--------|--------|---------|
|               |       |             | 4 × 2.5               | 6 × 4 | 8 × 5 | 8 × 6 | 10 × 6.5 | 10 × 7.5 | 12 × 8 | 12 × 9 | 16 × 13 |
| NKCI Straight | P.239 | R1/8        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R1/4        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R3/8        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R1/2        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
| NKLI Elbow    | P.240 | R1/8        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R1/4        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R3/8        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |
|               |       | R1/2        | ●                     | ●     | ●     | ●     | ●        | ●        | ●      | ●      | ●       |

| Type                          | Page  | Thread size | Tube size |       |       |       |          |          |        |        |
|-------------------------------|-------|-------------|-----------|-------|-------|-------|----------|----------|--------|--------|
|                               |       |             | 4 × 2.5   | 6 × 4 | 8 × 5 | 8 × 6 | 10 × 6.5 | 10 × 7.5 | 12 × 8 | 12 × 9 |
| NKCF Female Straight          | P.242 | Rc1/8       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc1/4       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc3/8       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc1/2       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
| NKMF Bulkhead Female Straight | P.243 | Rc1/8       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc1/4       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc3/8       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |
|                               |       | Rc1/2       | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |

#### Connection: Tube ⇔ Tube (Equal dia.)

| Type           | Page  | Tube size |       |       |       |          |          |        |        |
|----------------|-------|-----------|-------|-------|-------|----------|----------|--------|--------|
|                |       | 4 × 2.5   | 6 × 4 | 8 × 5 | 8 × 6 | 10 × 6.5 | 10 × 7.5 | 12 × 8 | 12 × 9 |
| NKKE Union Tee | P.241 | ●         | ●     | ●     | ●     | ●        | ●        | ●      | ●      |

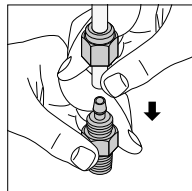
## How to insert and disconnect

### 1. How to insert and disconnect tubes

#### ① Tube insertion

Pass the tube through the nut and insert the barb into the tube up to the barb end. Use a spanner to tighten the nut until the screw end.

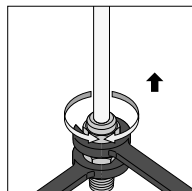
※ Hold tube in tightening the nut to avoid tube twisting.



#### ② Tube disconnection

Loosen the nut with a spanner first and pull the tube out.

Before tube disconnection, make sure to stop fluids such as air, water, etc.



### 2. How to tighten thread

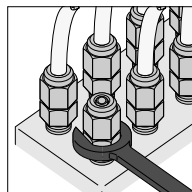
#### ① Tightening thread

Use a spanner to tighten a hexagonal-column or square part of the fitting.

Since there is no Sealock coating on taper pipe thread, use seal tape or sealant if necessary.

Refer to the following table..

| Thread size | Recommended tightening torque |
|-------------|-------------------------------|
| R1/8        | 4 ~ 5N·m                      |
| R1/4        | 5 ~ 6N·m                      |
| R3/8        | 13 ~ 15N·m                    |
| R1/2        | 16 ~ 18N·m                    |

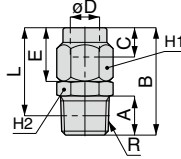


## Applicable Tube and Related Products

Tube Fitting Brass Series.....P.212

Speed Controller Brass.....P.430

Throttle (Needle) Valve Brass.....P.474



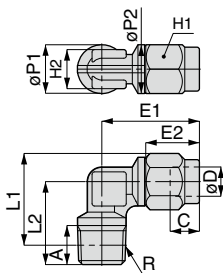
Unit : mm

| Model code | Tube O.D. x I.D.<br>$\phi D$ | R    | A  | B    | L    | E    | C   | Hex.<br>H1 | Hex.<br>H2 | Effective area<br>(mm <sup>2</sup> ) | Weight<br>(g) | CAD<br>file name |
|------------|------------------------------|------|----|------|------|------|-----|------------|------------|--------------------------------------|---------------|------------------|
| NKC0425-01 | 4 × 2.5                      | R1/8 | 8  | 21.5 | 17.5 | 10.5 | 5.5 | 8          | 10         | 1                                    | 8.1           | NKC0425-01       |
| NKC0425-02 |                              | R1/4 | 11 | 25.5 | 19.5 |      |     |            | 14         |                                      | NKC0425-02    |                  |
| NKC0640-01 | 6 × 4                        | R1/8 | 8  | 22   | 18   | 11   | 6   | 10         | 10         | 5.5                                  | 9.7           | NKC0640-01       |
| NKC0640-02 |                              | R1/4 | 11 | 26   | 20   |      |     |            | 14         |                                      | NKC0640-02    |                  |
| NKC0640-03 |                              | R3/8 | 12 | 28   | 21.7 |      |     |            | 17         |                                      | NKC0640-03    |                  |
| NKC0850-01 | 8 × 5                        | R1/8 | 8  | 24   | 20   | 12   | 7   | 12         | 12         | 10                                   | 14            | NKC0850-01       |
| NKC0850-02 |                              | R1/4 | 11 | 27   | 21   |      |     |            | 14         |                                      | NKC0850-02    |                  |
| NKC0850-03 |                              | R3/8 | 12 | 29   | 22.7 |      |     |            | 17         |                                      | NKC0850-03    |                  |
| NKC0860-01 | 8 × 6                        | R1/8 | 8  | 24   | 20   | 12   | 7   | 12         | 12         | 15                                   | 14            | NKC0860-01       |
| NKC0860-02 |                              | R1/4 | 11 | 27   | 21   |      |     |            | 14         |                                      | NKC0860-02    |                  |
| NKC0860-03 |                              | R3/8 | 12 | 29   | 22.7 |      |     |            | 17         |                                      | NKC0860-03    |                  |
| NKC1065-02 | 10 × 6.5                     | R1/4 | 11 | 29.8 | 23.8 | 14.8 | 9   | 16         | 16         | 15                                   | 29            | NKC1065-02       |
| NKC1065-03 |                              | R3/8 | 12 | 31.8 | 25.5 |      |     |            | 17         |                                      | NKC1065-03    |                  |
| NKC1065-04 |                              | R1/2 | 15 | 35.8 | 27.6 |      |     |            | 21         |                                      | NKC1065-04    |                  |
| NKC1075-02 | 10 × 7.5                     | R1/4 | 11 | 29.8 | 23.8 | 14.8 | 9   | 16         | 16         | 21                                   | 29            | NKC1075-02       |
| NKC1075-03 |                              | R3/8 | 12 | 31.8 | 25.5 |      |     |            | 17         |                                      | NKC1075-03    |                  |
| NKC1075-04 |                              | R1/2 | 15 | 35.8 | 27.6 |      |     |            | 21         |                                      | NKC1075-04    |                  |
| NKC1280-02 | 12 × 8                       | R1/4 | 11 | 30.4 | 24.4 | 15.4 | 9   | 17         | 17         | 26                                   | 30            | NKC1280-02       |
| NKC1280-03 |                              | R3/8 | 12 | 32.4 | 26.1 |      |     |            | 17         |                                      | NKC1280-03    |                  |
| NKC1280-04 |                              | R1/2 | 15 | 36.4 | 28.2 |      |     |            | 21         |                                      | NKC1280-04    |                  |
| NKC1290-02 | 12 × 9                       | R1/4 | 11 | 30.4 | 24.4 | 15.4 | 9   | 17         | 17         | 35                                   | 30            | NKC1290-02       |
| NKC1290-03 |                              | R3/8 | 12 | 32.4 | 26.1 |      |     |            | 17         |                                      | NKC1290-03    |                  |
| NKC1290-04 |                              | R1/2 | 15 | 36.4 | 28.2 |      |     |            | 21         |                                      | NKC1290-04    |                  |
| NKC1611-03 | 16 × 11                      | R3/8 | 12 | 35.2 | 28.9 | 16.2 | 9.5 | 23         | 23         | 50                                   | 68            | NKC1611-03       |
| NKC1611-04 |                              | R1/2 | 15 | 38.2 | 30   |      |     |            |            |                                      | 77            | NKC1611-04       |
| NKC1613-03 | 16 × 13                      | R3/8 | 12 | 35.2 | 28.9 | 16.2 | 9.5 | 23         | 23         | 70                                   | 67            | NKC1613-03       |
| NKC1613-04 |                              | R1/2 | 15 | 38.2 | 30   |      |     |            |            |                                      | 76            | NKC1613-04       |

※: "L" is a reference value for height dimension after tightening thread.

**NKL Elbow**

RoHS compliant

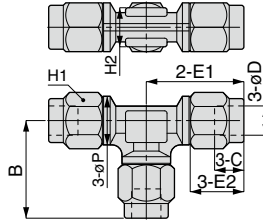


Unit : mm

| Model code | Tube O.D. x I.D.<br>ø D | R    | A  | L1   | L2   | E1   | E2   | C   | Hex.<br>H1 | Hex.<br>H2 | ø P1 | ø P2 | Effective area<br>(mm <sup>2</sup> ) | Weight<br>(g) | CAD<br>file name |
|------------|-------------------------|------|----|------|------|------|------|-----|------------|------------|------|------|--------------------------------------|---------------|------------------|
| NKL0425-01 | 4 × 2.5                 | R1/8 | 8  | 18   | 17   | 19.5 | 10.5 | 5.5 | 8          | 8          | 10   | 10   | 0.9                                  | 13            | NKL0425-01       |
| NKL0425-02 |                         | R1/4 | 11 | 19   | 20   | 21.5 |      |     |            |            | 14   |      |                                      | 17            | NKL0425-02       |
| NKL0640-01 | 6 × 4                   | R1/8 | 8  | 18.8 | 17   | 20   | 11   | 6   | 10         | 8          | 10   | 10   | 4                                    | 15            | NKL0640-01       |
| NKL0640-02 |                         | R1/4 | 11 | 19.8 | 20   | 22   |      |     |            |            | 14   |      |                                      | 19            | NKL0640-02       |
| NKL0640-03 |                         | R3/8 | 12 | 21.7 | 21.5 | 23.5 |      |     |            |            | 17   |      |                                      | 29            | NKL0640-03       |
| NKL0850-01 | 8 × 5                   | R1/8 | 8  | 22.5 | 19.5 | 23   | 12   | 7   | 12         | 10         | 14   | 14   | 8.5                                  | 24            | NKL0850-01       |
| NKL0850-02 |                         | R1/4 | 11 |      | 21.5 | 24.5 |      |     |            |            | 17   |      |                                      | 31            | NKL0850-02       |
| NKL0850-03 |                         | R3/8 | 12 |      | 22.1 | 24.5 |      |     |            |            | 17   |      |                                      | 31            | NKL0850-03       |
| NKL0860-01 | 8 × 6                   | R1/8 | 8  | 22.5 | 19.5 | 23   | 12   | 7   | 12         | 10         | 14   | 14   | 12                                   | 23            | NKL0860-01       |
| NKL0860-02 |                         | R1/4 | 11 |      | 21.5 | 24.5 |      |     |            |            | 17   |      |                                      | 30            | NKL0860-02       |
| NKL0860-03 |                         | R3/8 | 12 |      | 22.1 | 24.5 |      |     |            |            | 17   |      |                                      | 30            | NKL0860-03       |
| NKL1065-02 | 10 × 6.5                | R1/4 | 11 | 27.2 | 24   | 28   | 14.8 | 9   | 16         | 14         | 17   | 17   | 14                                   | 47            | NKL1065-02       |
| NKL1065-03 |                         | R3/8 | 12 | 26.9 | 27.5 | 29.5 |      |     |            |            | 21   |      |                                      | 66            | NKL1065-03       |
| NKL1065-04 |                         | R1/2 | 15 | 28.6 | 27.5 | 29.5 |      |     |            |            | 21   |      |                                      | 66            | NKL1065-04       |
| NKL1075-02 | 10 × 7.5                | R1/4 | 11 | 27.2 | 24   | 28   | 14.8 | 9   | 16         | 14         | 17   | 17   | 20                                   | 47            | NKL1075-02       |
| NKL1075-03 |                         | R3/8 | 12 | 26.9 | 27.5 | 29.5 |      |     |            |            | 21   |      |                                      | 66            | NKL1075-03       |
| NKL1075-04 |                         | R1/2 | 15 | 28.6 | 27.5 | 29.5 |      |     |            |            | 21   |      |                                      | 66            | NKL1075-04       |
| NKL1280-02 | 12 × 8                  | R1/4 | 11 | 27.8 | 24   | 28.5 | 15.4 | 9   | 17         | 14         | 17   | 17   | 24                                   | 48            | NKL1280-02       |
| NKL1280-03 |                         | R3/8 | 12 | 27.5 | 27.5 | 30   |      |     |            |            | 21   |      |                                      | 67            | NKL1280-03       |
| NKL1280-04 |                         | R1/2 | 15 | 29.2 | 27.5 | 30   |      |     |            |            | 21   |      |                                      | 67            | NKL1280-04       |
| NKL1290-02 | 12 × 9                  | R1/4 | 11 | 27.8 | 24   | 28.5 | 15.4 | 9   | 17         | 14         | 17   | 17   | 29                                   | 46            | NKL1290-02       |
| NKL1290-03 |                         | R3/8 | 12 | 27.5 | 27.5 | 30   |      |     |            |            | 21   |      |                                      | 65            | NKL1290-03       |
| NKL1290-04 |                         | R1/2 | 15 | 29.2 | 27.5 | 30   |      |     |            |            | 21   |      |                                      | 65            | NKL1290-04       |
| NKL1611-03 | 16 × 11                 | R3/8 | 12 | 34.9 | 28   | 31.5 | 16.2 | 9.5 | 23         | 17         | 23   | 23   | 45                                   | 92            | NKL1611-03       |
| NKL1611-04 |                         | R1/2 | 15 | 35.1 | 30   | 31.5 |      |     |            |            | 101  |      |                                      | NKL1611-04    |                  |
| NKL1613-03 | 16 × 13                 | R3/8 | 12 | 34.9 | 28   | 31.5 | 16.2 | 9.5 | 23         | 17         | 23   | 23   | 59                                   | 86            | NKL1613-03       |
| NKL1613-04 |                         | R1/2 | 15 | 35.1 | 30   | 31.5 |      |     |            |            | 97   |      |                                      | NKL1613-04    |                  |

※ . "L" is a reference value for height dimension after tightening thread.

FITTING  
 CONTROLLER  
 VALVE  
 TUBE  
 MAKE-TO-ORDER PRODUCTS  
 240  
 Inhibitor & Pass Series  
 The Temperature Control  
 Minimal Series  
 Stop Fitting Series  
 Rotary Series  
 Twist-Proof Fitting  
 Block and Connector  
 Coupling  
 Color Cap



Unit : mm

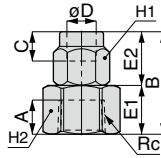
| Model code | Tube O.D. x I.D.<br>ø D | B    | E1   | E2   | C   | Hex.<br>H1 | Hex.<br>H2 | ø P | Effective area<br>(mm <sup>2</sup> ) | Weight<br>(g) | CAD<br>file name |
|------------|-------------------------|------|------|------|-----|------------|------------|-----|--------------------------------------|---------------|------------------|
| NKE0425    | 4 × 2.5                 | 19.5 | 19.5 | 10.5 | 5.5 | 8          | 8          | 10  | 0.8                                  | 21            | NKE0425          |
| NKE0640    | 6 × 4                   | 20   | 20   | 11   | 6   | 10         | 8          | 10  | 4                                    | 26            | NKE0640          |
| NKE0850    | 8 × 5                   | 23   | 23   | 12   | 7   | 12         | 10         | 14  | 8                                    | 44            | NKE0850          |
| NKE0860    | 8 × 6                   | 23   | 23   | 12   | 7   | 12         | 10         | 14  | 12.5                                 | 41            | NKE0860          |
| NKE1065    | 10 × 6.5                | 28   | 28   | 14.8 | 9   | 16         | 14         | 17  | 12.5                                 | 94            | NKE1065          |
| NKE1075    | 10 × 7.5                | 28   | 28   | 14.8 | 9   | 16         | 14         | 17  | 18                                   | 90            | NKE1075          |
| NKE1280    | 12 × 8                  | 28.5 | 28.5 | 15.4 | 9   | 17         | 14         | 17  | 22                                   | 95            | NKE1280          |
| NKE1290    | 12 × 9                  | 28.5 | 28.5 | 15.4 | 9   | 17         | 14         | 17  | 28                                   | 90            | NKE1290          |



# NKCF Female Straight



RoHS compliant



Unit : mm

| Model code  | Tube O.D. x I.D.<br>ø D | Rc    | A    | B    | E1 | E2   | C   | Hex.<br>H1 | Hex.<br>H2 | Effective area<br>(mm <sup>2</sup> ) | zq/Weight<br>(g) | CAD<br>file name |
|-------------|-------------------------|-------|------|------|----|------|-----|------------|------------|--------------------------------------|------------------|------------------|
| NKCF0425-01 | 4 × 2.5                 | Rc1/8 | 7    | 20.5 | 10 | 10.5 | 5.5 | 8          | 14         | 1                                    | 14               | NKCF0425-01      |
| NKCF0425-02 |                         | Rc1/4 | 9.5  | 23.5 | 13 |      |     |            | 17         |                                      | 21               | NKCF0425-02      |
| NKCF0640-01 | 6 × 4                   | Rc1/8 | 7    | 21   | 10 | 11   | 6   | 10         | 14         | 5.5                                  | 16               | NKCF0640-01      |
| NKCF0640-02 |                         | Rc1/4 | 9.5  | 24   | 13 |      |     |            | 17         |                                      | 22               | NKCF0640-02      |
| NKCF0640-03 |                         | Rc3/8 | 10.5 | 26   | 15 |      |     |            | 21         |                                      | 34               | NKCF0640-03      |
| NKCF0850-01 | 8 × 5                   | Rc1/8 | 7    | 22   | 10 | 12   | 7   | 12         | 14         | 10                                   | 18               | NKCF0850-01      |
| NKCF0850-02 |                         | Rc1/4 | 9.5  | 25   | 13 |      |     |            | 17         |                                      | 24               | NKCF0850-02      |
| NKCF0850-03 |                         | Rc3/8 | 10.5 | 27   | 15 |      |     |            | 21         |                                      | 36               | NKCF0850-03      |
| NKCF0860-01 | 8 × 6                   | Rc1/8 | 7    | 22   | 10 | 12   | 7   | 12         | 14         | 15                                   | 18               | NKCF0860-01      |
| NKCF0860-02 |                         | Rc1/4 | 9.5  | 25   | 13 |      |     |            | 17         |                                      | 24               | NKCF0860-02      |
| NKCF0860-03 |                         | Rc3/8 | 10.5 | 27   | 15 |      |     |            | 21         |                                      | 36               | NKCF0860-03      |
| NKCF1065-02 | 10 × 6.5                | Rc1/4 | 9.5  | 27.8 | 13 | 14.8 | 9   | 16         | 17         | 15                                   | 34               | NKCF1065-02      |
| NKCF1065-03 |                         | Rc3/8 | 10.5 | 29.8 | 15 |      |     |            | 21         |                                      | 46               | NKCF1065-03      |
| NKCF1065-04 |                         | Rc1/2 | 13   | 32.8 | 18 |      |     |            | 27         |                                      | 75               | NKCF1065-04      |
| NKCF1075-02 | 10 × 7.5                | Rc1/4 | 9.5  | 27.8 | 13 | 14.8 | 9   | 16         | 17         | 21                                   | 34               | NKCF1075-02      |
| NKCF1075-03 |                         | Rc3/8 | 10.5 | 29.8 | 15 |      |     |            | 21         |                                      | 46               | NKCF1075-03      |
| NKCF1075-04 |                         | Rc1/2 | 13   | 32.8 | 18 |      |     |            | 27         |                                      | 75               | NKCF1075-04      |
| NKCF1280-02 | 12 × 8                  | Rc1/4 | 9.5  | 28.4 | 13 | 15.4 | 9   | 17         | 17         | 26                                   | 35               | NKCF1280-02      |
| NKCF1280-03 |                         | Rc3/8 | 10.5 | 30.4 | 15 |      |     |            | 21         |                                      | 47               | NKCF1280-03      |
| NKCF1280-04 |                         | Rc1/2 | 13   | 33.4 | 18 |      |     |            | 27         |                                      | 77               | NKCF1280-04      |
| NKCF1290-02 | 12 × 9                  | Rc1/4 | 9.5  | 28.4 | 13 | 15.4 | 9   | 17         | 17         | 35                                   | 35               | NKCF1290-02      |
| NKCF1290-03 |                         | Rc3/8 | 10.5 | 30.4 | 15 |      |     |            | 21         |                                      | 44               | NKCF1290-03      |
| NKCF1290-04 |                         | Rc1/2 | 13   | 33.4 | 18 |      |     |            | 27         |                                      | 76               | NKCF1290-04      |

FITTING  
CONTROLLER  
VALVE  
TUBE

MAKE-TO-ORDER  
PRODUCTS

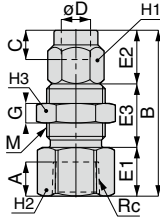
Anti-siphon  
& Press Series  
Oil Temperature  
Control  
Minimal  
Series  
Stop Fitting  
Series  
Rotary  
Series  
Twist-Proof  
Fitting  
Block and  
Connector  
Coupling

Color  
Cap

### NKMF Bulkhead Female Straight



RoHS compliant



Unit : mm

| Model code  | Tube O.D. x I.D.<br>ø D | Rc    | A    | M       | B    | E1 | E2   | E3   | G | C   | Hex.<br>H1 | Hex.<br>H2 | Hex.<br>H3 | Elastic area<br>(mm <sup>2</sup> ) | Weight<br>(g) | CAD<br>file name |
|-------------|-------------------------|-------|------|---------|------|----|------|------|---|-----|------------|------------|------------|------------------------------------|---------------|------------------|
| NKMF0425-01 | 4 × 2.5                 | Rc1/8 | 7    | M10 x 1 | 32.5 | 10 | 10.5 | 12   | 3 | 5.5 | 8          | 14         | 12         | 1                                  | 20            | NKMF0425-01      |
| NKMF0425-02 |                         | Rc1/4 | 9.5  |         | 35.5 | 13 |      |      |   |     |            | 17         |            |                                    |               | NKMF0425-02      |
| NKMF0640-01 | 6 × 4                   | Rc1/8 | 7    | M12 x 1 | 34   | 10 | 11   | 13   | 4 | 6   | 10         | 14         | 14         | 5.5                                | 25            | NKMF0640-01      |
| NKMF0640-02 |                         | Rc1/4 | 9.5  |         | 37   | 13 |      |      |   |     |            | 17         |            |                                    |               | NKMF0640-02      |
| NKMF0640-03 |                         | Rc3/8 | 10.5 |         | 39   | 15 |      |      |   |     |            | 21         |            |                                    |               | NKMF0640-03      |
| NKMF0850-01 | 8 × 5                   | Rc1/8 | 7    | M14 x 1 | 35   | 10 | 12   | 13   | 4 | 7   | 12         | 17         | 17         | 10                                 | 40            | NKMF0850-01      |
| NKMF0850-02 |                         | Rc1/4 | 9.5  |         | 38   | 13 |      |      |   |     |            | 21         |            |                                    |               | NKMF0850-02      |
| NKMF0850-03 |                         | Rc3/8 | 10.5 |         | 40   | 15 |      |      |   |     |            | 21         |            |                                    |               | NKMF0850-03      |
| NKMF0860-01 | 8 × 6                   | Rc1/8 | 7    | M14 x 1 | 35   | 10 | 12   | 13   | 4 | 7   | 12         | 17         | 17         | 15                                 | 39            | NKMF0860-01      |
| NKMF0860-02 |                         | Rc1/4 | 9.5  |         | 38   | 13 |      |      |   |     |            | 21         |            |                                    |               | NKMF0860-02      |
| NKMF0860-03 |                         | Rc3/8 | 10.5 |         | 40   | 15 |      |      |   |     |            | 21         |            |                                    |               | NKMF0860-03      |
| NKMF1065-02 | 10 × 6.5                | Rc1/4 | 9.5  | M18 x 1 | 40.8 | 13 | 14.8 | 13   | 4 | 9   | 16         | 21         | 22         | 15                                 | 74            | NKMF1065-02      |
| NKMF1065-03 |                         | Rc3/8 | 10.5 |         | 42.8 | 15 |      |      |   |     |            | 27         |            |                                    |               | NKMF1065-03      |
| NKMF1065-04 |                         | Rc1/2 | 13   |         | 45.8 | 18 |      |      |   |     |            | 27         |            |                                    |               | NKMF1065-04      |
| NKMF1075-02 | 10 × 7.5                | Rc1/4 | 9.5  | M18 x 1 | 40.8 | 13 | 14.8 | 13   | 4 | 9   | 16         | 21         | 22         | 21                                 | 74            | NKMF1075-02      |
| NKMF1075-03 |                         | Rc3/8 | 10.5 |         | 42.8 | 15 |      |      |   |     |            | 27         |            |                                    |               | NKMF1075-03      |
| NKMF1075-04 |                         | Rc1/2 | 13   |         | 45.8 | 18 |      |      |   |     |            | 27         |            |                                    |               | NKMF1075-04      |
| NKMF1280-02 | 12 × 8                  | Rc1/4 | 9.5  | M18 x 1 | 41   | 13 | 15.4 | 12.6 | 4 | 9   | 17         | 21         | 22         | 26                                 | 73            | NKMF1280-02      |
| NKMF1280-03 |                         | Rc3/8 | 10.5 |         | 43   | 15 |      |      |   |     |            | 27         |            |                                    |               | NKMF1280-03      |
| NKMF1280-04 |                         | Rc1/2 | 13   |         | 46   | 18 |      |      |   |     |            | 27         |            |                                    |               | NKMF1280-04      |
| NKMF1290-02 | 12 × 9                  | Rc1/4 | 9.5  | M18 x 1 | 41   | 13 | 15.4 | 12.6 | 4 | 9   | 17         | 21         | 22         | 35                                 | 73            | NKMF1290-02      |
| NKMF1290-03 |                         | Rc3/8 | 10.5 |         | 43   | 15 |      |      |   |     |            | 27         |            |                                    |               | NKMF1290-03      |
| NKMF1290-04 |                         | Rc1/2 | 13   |         | 46   | 18 |      |      |   |     |            | 27         |            |                                    |               | NKMF1290-04      |

243

Standard Series

Mini Series

Stainless Series

Chemical Series

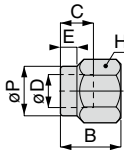
PP Series

EG Series

Anti-sep  
& Brass Series

### NKN Cap Nut

RoHS compliant



Unit : mm

| Model code | Tube O.D.<br>ø D | B    | ø P | E   | C   | Hex.<br>H | Weight<br>(g) |
|------------|------------------|------|-----|-----|-----|-----------|---------------|
| NKN4       | 4                | 10.5 | 7   | 3   | 5.5 | 8         | 2.6           |
| NKN6       | 6                | 11   | 9   | 3   | 6   | 10        | 3.7           |
| NKN8       | 8                | 12   | 11  | 3.5 | 7   | 12        | 5.1           |
| NKN10      | 10               | 14.8 | 15  | 4.5 | 9   | 16        | 12            |
| NKN12      | 12               | 15.4 | 16  | 4.5 | 9   | 17        | 12            |
| NKN16      | 16               | 16.2 | 21  | 4.5 | 9.5 | 23        | 22            |



3D CAD data is available at PISCO website.



CAD data is available at PISCO website.



# SAFETY Instructions

This safety instructions aim to prevent personal injury and damage to properties by requiring proper use of PISCO products.

Be certain to follow ISO 4414 and JIS B 8370

ISO 4414 : Pneumatic fluid power...Recommendations for the application of equipment to transmission and control systems.

JIS B 8370 : General rules and safety requirements for systems and their components.

This safety instructions is classified into "Danger", "Warning" and "Caution" depending on the degree of danger or damages caused by improper use of PISCO products.



**Danger**

Hazardous conditions. It can cause death or serious personal injury.



**Warning**

Hazardous conditions depending on usages. Improper use of PISCO products can cause death or serious personal injury.



**Caution**

Hazardous conditions depending on usages. Improper use of PISCO products can cause personal injury or damages to properties.



## Warning

### 1. Selection of pneumatic products

- ① A user who is a pneumatic system designer or has sufficient experience and technical expertise should select PISCO products.
- ② Due to wide variety of operating conditions and applications for PISCO products, carry out the analysis and evaluation on PISCO products. The pneumatic system designer is solely responsible for assuring that the user's requirements are met and that the application presents no health or safety hazards. All designers are required to fully understand the specifications of PISCO products and constitute all systems based on the latest catalog or information, considering any malfunctions.

### 2. Handle the pneumatic equipment with enough knowledge and experience

- ① Improper use of compressed air is dangerous. Assembly, operation and maintenance of machines using pneumatic equipment should be conducted by a person with enough knowledge and experience.

### 3. Do not operate machine / equipment or remove pneumatic equipment until safety is confirmed.

- ① Make sure that preventive measures against falling work-pieces or sudden movements of machine are completed before inspection or maintenance of these machine.
- ② Make sure the above preventive measures are completed. A compressed air supply and the power supply to the machine must be off, and also the compressed air in the systems must be exhausted.
- ③ Restart the machines with care after ensuring to take all preventive measures against sudden movements.

## Disclaimer

1. PISCO does not take any responsibility for any incidental or indirect loss, such as production line stop, interruption of business, loss of benefits, personal injury, etc., caused by any failure on use or application of PISCO products.
2. PISCO does not take any responsibility for any loss caused by natural disasters, fires not related to PISCO products, acts by third parties, and intentional or accidental damages of PISCO products due to incorrect usage.
3. PISCO does not take any responsibility for any loss caused by improper usage of PISCO products such as exceeding the specification limit or not following the usage the published instructions and catalog allow.
4. PISCO does not take any responsibility for any loss caused by remodeling of PISCO products, or by combinational use with non-PISCO products and other software systems.
5. The damages caused by the defect of Pisco products shall be covered but limited to the full amount of the PISCO products paid by the customer.



# SAFETY INSTRUCTION MANUAL

PISCO products are designed and manufactured for use in general industrial machines. Be sure to read and follow the instructions below.

## Danger

1. Do not use PISCO products for the following applications.
  - ① Equipment used for maintaining / handling human life and body.
  - ② Equipment used for moving / transporting human.
  - ③ Equipment specifically used for safety purposes.

## Warning

1. Do not use PISCO products under the following conditions.
  - ① Beyond the specifications or conditions stated in the catalog, or the instructions.
  - ② Under the direct sunlight or outdoors.
  - ③ Excessive vibrations and impacts.
  - ④ Exposure / adhere to corrosive gas, inflammable gas, chemicals, seawater, water and vapor. \*  
\* Some products can be used under the condition above(④), refer to the details of specification and condition of each product.
2. Do not disassemble or modify PISCO products, which affect the performance, function, and basic structure of the product.
3. Turn off the power supply, stop the air supply to PISCO products, and make sure there is no residual air pressure in the pipes before maintenance and inspection.
4. Do not touch the release-ring of push-in fitting when there is a working pressure. The lock may be released by the physical contact, and tube may fly out or slip out.
5. Frequent switchover of compressed air may generate heat, and there is a risk of causing burn injury.
6. Avoid any load on PISCO products, such as a tensile strength, twisting and bending. Otherwise, there is a risk of causing damage to the products.
7. As for applications where threads or tubes swing / rotate, use Rotary Joints, High Rotary Joints or Multi-Circuit Rotary Block only. The other PISCO products can be damaged in these applications.
8. Use only Die Temperature Control Fitting Series, Tube Fitting Stainless SUS316 Series, Tube Fitting Stainless SUS316 Compression Fitting Series or Tube Fitting Brass Series under the condition of over 60°C (140° F) water or thermal oil. Other PISCO products can be damaged by heat and hydrolysis under the condition above.
9. As for the condition required to dissipate static electricity or provide an antistatic performance, use EG series fitting and antistatic products only, and do not use other PISCO products. There is a risk that static electricity can cause system defects or failures.
10. Use only Fittings with a characteristic of spatter-proof such as Anti-spatter or Brass series in a place where flame and weld spatter is produced. There is a risk of causing fire by sparks.
11. Turn off the power supply to PISCO products, and make sure there is no residual air pressure in the pipes and equipment before maintenance. Follow the instructions below in order to ensure safety.
  - ① Make sure the safety of all systems related to PISCO products before maintenance.
  - ② Restart of operation after maintenance shall be proceeded with care after ensuring safety of the system by preventive measures against unexpected movements of machines and devices where pneumatic equipment is used.
  - ③ Keep enough space for maintenance when designing a circuit.
12. Take safety measures such as providing a protection cover if there is a risk of causing damages or fires on machine / facilities by a fluid leakage.

### ⚠ Caution

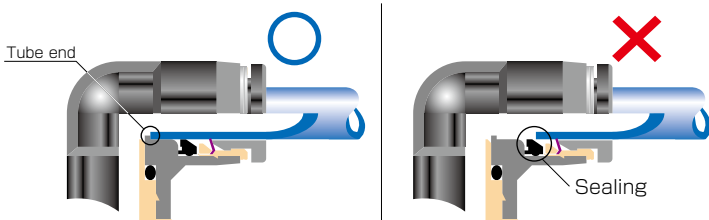
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without using an Insert Ring.
3. The product incorporating NBR as seal rubber material has a risk of malfunction caused by ozone crack. Ozone exists in high concentrations in static elimination air, clean-room, and near the high-voltage motors, etc. As a countermeasure, material change from NBR to HNBR or FKM is necessary. Consult with PISCO for more information.
4. Special option "Oil-free" products may cause a very small amount of a fluid leakage. When a fluid medium is liquid or the products are required to be used in harsh environments, contact us for further information.
5. In case of using non-PISCO brand tubes, make sure the tolerance of the outer tube diameter is within the limits of Table 1.

● Table 1. Tube O.D. Tolerance

| mm size | Nylon tube | Polyurethane tube | inch size | Nylon tube | Polyurethane tube |
|---------|------------|-------------------|-----------|------------|-------------------|
| ø1.8mm  | —          | ± 0.05mm          | ø1/8      | ± 0.1mm    | ± 0.15mm          |
| ø3mm    | —          | ± 0.15mm          | ø5/32     | ± 0.1mm    | ± 0.15mm          |
| ø4mm    | ± 0.1mm    | ± 0.15mm          | ø3/16     | ± 0.1mm    | ± 0.15mm          |
| ø6mm    | ± 0.1mm    | ± 0.15mm          | ø1/4      | ± 0.1mm    | ± 0.15mm          |
| ø8mm    | ± 0.1mm    | ± 0.15mm          | ø5/16     | ± 0.1mm    | ± 0.15mm          |
| ø10mm   | ± 0.1mm    | ± 0.15mm          | ø3/8      | ± 0.1mm    | ± 0.15mm          |
| ø12mm   | ± 0.1mm    | ± 0.15mm          | ø1/2      | ± 0.1mm    | ± 0.15mm          |
| ø16mm   | ± 0.1mm    | ± 0.15mm          | ø5/8      | ± 0.1mm    | ± 0.15mm          |

### 6. Instructions for Tube Insertion

- ① Make sure that the cut end surface of the tube is at right angle without a scratch on the surface and deformations.
- ② When inserting a tube, the tube needs to be inserted fully into the push-in fitting until the tubing edge touches the tube end of the fitting as shown in the figure below. Otherwise, there is a risk of leakage.



Tube is not fully inserted up to tube end.

- ③ After inserting the tube, make sure it is inserted properly and not to be disconnected by pulling it moderately.
- ※ When inserting tubes, Lock-claws may be hardly visible in the hole, observed from the front face of the release-ring. But it does not mean the tube will surely escape. Major causes of the tube escape are the followings;
- ① Shear drop of the lock-claws edge
  - ② The problem of tube diameter (usually small)
- Therefore, follow the above instructions from ① to ③, even lock-claws is hardly visible.

7. Instructions for Tube Disconnection

- ① Make sure there is no air pressure inside of the tube, before disconnecting it.
- ② Push the release-ring of the push-in fitting evenly and deeply enough to pull out the tube toward oneself. By insufficient pushing of the release-ring, the tube may not be pulled out or damaged by scratch, and tube shavings may remain inside of the fitting, which may cause the leakage later.

8. Instructions for Installing a fitting

- ① When installing a fitting, use proper tools to tighten a hexagonal-column or an inner hexagonal socket. When inserting a hex key into the inner hexagonal socket of the fitting, be careful so that the tool does not touch lock-claws. The deformation of lock-claws may result in a poor performance of systems or an escape of the tube.
- ② Refer to Table 2 which shows the recommended tightening torque. Do not exceed these limits to tighten a thread. Excessive tightening may break the thread part or deform the gasket and cause a fluid leakage. Tightening thread with tightening torque lower than these limits may cause a loosened thread or a fluid leakage.
- ③ Adjust the tube direction while tightening thread within these limits, since some PISCO products are not rotatable after the installation.

● Table 2: Recommended tightening torque / Sealock color / Gasket materials

| Thread type                | Thread size | Tightening torque | Sealock color | Gasket materials |
|----------------------------|-------------|-------------------|---------------|------------------|
| Metric thread              | M3 × 0.5    | 0.7N·m            | —             | SUS304<br>NBR    |
|                            | M5 × 0.8    | 1.0 ~ 1.5N·m      |               |                  |
|                            | M6 × 1      | 2 ~ 2.7N·m        |               |                  |
|                            | M3 × 0.5    | 0.7N·m            |               | POM              |
|                            | M5 × 0.8    | 1 ~ 1.5N·m        |               |                  |
|                            | M6 × 0.75   | 0.8 ~ 1N·m        |               |                  |
| Taper pipe thread          | M8 × 0.75   | 1 ~ 2N·m          | White         | —                |
|                            | R1/8        | 4.5 ~ 6.5N·m      |               |                  |
|                            | R1/4        | 7 ~ 9N·m          |               |                  |
|                            | R3/8        | 12.5 ~ 14.5N·m    |               |                  |
| Unified thread             | R1/2        | 20 ~ 22N·m        | —             | SUS304, NBR      |
|                            | No.10-32UNF | 1.0 ~ 1.5N·m      |               |                  |
| National pipe thread taper | 1/16-27NPT  | 4.5 ~ 6.5N·m      | White         | —                |
|                            | 1/8-27NPT   | 4.5 ~ 6.5N·m      |               |                  |
|                            | 1/4-18NPT   | 7 ~ 9N·m          |               |                  |
|                            | 3/8-18NPT   | 12.5 ~ 14.5N·m    |               |                  |
|                            | 1/2-14NPT   | 20 ~ 22N·m        |               |                  |

※ These values may differ for some products. Refer to each specification as well.

9. Instructions for removing a fitting

- ① When removing a fitting, use proper tools to loosen a hexagonal-column or an inner hex bolt.
- ② Remove the sealant stuck on the mating equipment. The remained sealant may get into the peripheral equipment and cause malfunctions.

10. Arrange piping avoiding any load on fittings and tubes such as twist, tensile, moment load, shaking and physical impact. These may cause damages to fittings, tube deformations, bursting and the escape of tubes.

## Common Safety Instructions for Fittings

Before selecting or using PISCO products, read the following instructions. Read the detailed instructions for individual series as well as the instructions below.

### Warning

1. Do not use fittings with fluid medium other than air or water. (Water can be used with some series.) Contact us for using other kind of fluid medium except air and water.
2. Do not use fittings except Anti-splatter, Brass and Brass Compression Fitting series in a place where the flame and weld splatter is produced. There is a risk of causing fire by sparks.
3. As for applications where threads or tubes swing / rotate, use Rotary Joints, High Rotary Joints or Multi-Circuit Rotary Block only. The other PISCO products can be damaged in these applications.
4. Use only Die Temperature Control Fitting Series, Tube Fitting Stainless SUS316 Series, Tube Fitting Stainless SUS316 Compression Fitting Series or Tube Fitting Brass Series under the condition of over 60°C (140° F) water or thermal oil. Other PISCO products can be damaged by heat and hydrolysis under the condition above.
5. As for the condition required to dissipate static electricity or provide an antistatic performance, use EG Series fitting and antistatic products only, and do not use other PISCO products. There is a risk that static electricity can cause system defects or failures.
6. Avoid any load on PISCO products, such as a tensile strength, twisting and bending. Otherwise, there is a risk of causing damage to the products.



## ⚠ Caution

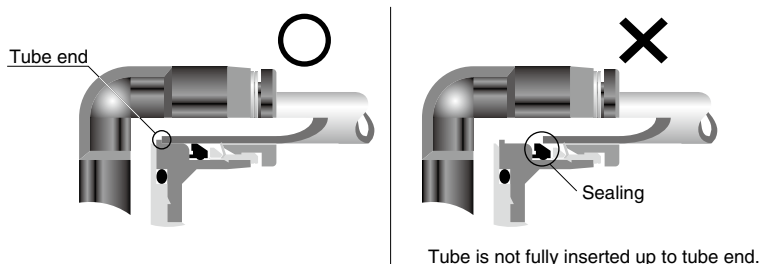
1. In case of using non-PISCO brand tubes, make sure the tolerance of the outer tube diameter is within the following limits of Table 1.

● Table 1. Tube O.D. Tolerance

| mm size | Nylon tube | Urethane tube | inch size | Nylon tube | Urethane tube |
|---------|------------|---------------|-----------|------------|---------------|
| ø1.8mm  | —          | ± 0.05mm      | ø1/8      | ± 0.1mm    | ± 0.15mm      |
| ø3mm    | —          | ± 0.15mm      | ø5/32     | ± 0.1mm    | ± 0.15mm      |
| ø4mm    | ± 0.1mm    | ± 0.15mm      | ø3/16     | ± 0.1mm    | ± 0.15mm      |
| ø6mm    | ± 0.1mm    | ± 0.15mm      | ø1/4      | ± 0.1mm    | ± 0.15mm      |
| ø8mm    | ± 0.1mm    | ± 0.15mm      | ø5/16     | ± 0.1mm    | ± 0.15mm      |
| ø10mm   | ± 0.1mm    | ± 0.15mm      | ø3/8      | ± 0.1mm    | ± 0.15mm      |
| ø12mm   | ± 0.1mm    | ± 0.15mm      | ø1/2      | ± 0.1mm    | ± 0.15mm      |
| ø16mm   | ± 0.1mm    | ± 0.15mm      | ø5/8      | ± 0.1mm    | ± 0.15mm      |

## 2. Instructions for Tube Insertion

- ① Make sure that the cut end surface of the tube is at right angle without a scratch on the tube surface and deformations.
- ② When inserting a tube, the tube needs to be inserted fully into the push-in fitting until the tubing edge touches the tube end of the fitting as shown in the figure below. Otherwise, there is a risk of leakage.



- ③ After inserting the tube, make sure it is inserted properly and not to be disconnected by pulling it moderately.

## 3. Instructions for Tube Disconnection

- ① Make sure there is no air pressure inside of the tube, before disconnecting it.
- ② Push the release-ring of the push-in fitting evenly and deeply enough to pull out the tube toward oneself. By insufficient pushing of the release-ring, the tube may not be pulled out or damaged by scratch, and tube shavings may remain inside of the fitting, which may cause the leakage later.

#### 4. Instructions for Installing a fitting

- ① When installing a fitting, use proper tools to tighten a hexagonal-column or an inner hexagonal socket. When inserting a hex key into the inner hexagonal socket of the fitting, be careful so that the tool does not touch lock-claws. The deformation of lock-claws may result in a poor performance of systems or an escape of the tube.
- ② Refer to Table 2 which shows the recommended tightening torque. Do not exceed these limits to tighten a thread. Excessive tightening may break the thread part or deform the gasket and cause a fluid leakage. Tightening thread with tightening torque lower than these limits may cause a loosened thread or a fluid leakage.
- ③ Adjust the tube direction while tightening thread within these limits, since some PISCO products are not rotatable the installation.

● Table 2: Recommended tightening torque / Sealock color / Gasket materials

| Thread type                | Thread size | Tightening torque | Sealock color | Gasket materials |
|----------------------------|-------------|-------------------|---------------|------------------|
| Metric thread              | M3 × 0.5    | 0.7N·m            | —             | SUS304<br>NBR    |
|                            | M5 × 0.8    | 1.0 ~ 1.5N·m      |               |                  |
|                            | M6 × 1      | 2 ~ 2.7N·m        |               |                  |
|                            | M3 × 0.5    | 0.5 ~ 0.6N·m      |               | POM              |
|                            | M5 × 0.8    | 1 ~ 1.5N·m        |               |                  |
|                            | M6 × 0.75   | 0.8 ~ 1N·m        |               |                  |
|                            | M8 × 0.75   | 1 ~ 2N·m          |               |                  |
| Taper pipe thread          | R1/8        | 7 ~ 9N·m          | White         | —                |
|                            | R1/4        | 12 ~ 14N·m        |               |                  |
|                            | R3/8        | 22 ~ 24N·m        |               |                  |
|                            | R1/2        | 28 ~ 30N·m        |               |                  |
| Unified thread             | No.10-32UNF | 1.0 ~ 1.5N·m      | —             | SUS304, NBR      |
| National pipe thread taper | 1/16-28NPT  | 7 ~ 9N·m          | White         | —                |
|                            | 1/8-27NPT   | 7 ~ 9N·m          |               |                  |
|                            | 1/4-18NPT   | 12 ~ 14N·m        |               |                  |
|                            | 3/8-18NPT   | 22 ~ 24N·m        |               |                  |
|                            | 1/2-14NPT   | 28 ~ 30N·m        |               |                  |

※. These values may differ for some products. Refer to each specification as well

#### 5. Instructions for removing a fitting

- ① When removing a fitting, use proper tools to loosen a hexagonal-column or an inner hexagonal socket.
- ② Remove the sealant stuck on the mating equipment. The remained sealant may get into the peripheral equipment and cause malfunctions.

6. Arrange piping avoiding any load on fittings and tubes such as twist, tensile, moment load, shaking and physical impact. These may cause damages to fittings, tube deformations, bursting and the escape of tubes.