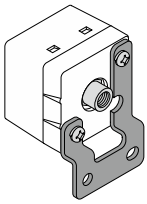



## Pressure sensor and Vacuum switch with digital display

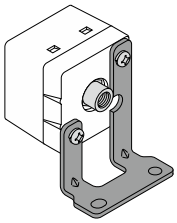
# Large Digital Pressure Sensor 30-series

- *Visibility improvement by 11mm of font height in LED display.*
- *Negative, positive and compound pressure can be handled by one unit.*
- *Switch output has 8 combinations from separate mode and wind comparator mode.*
- *Excellent cost performance.*
- *Variety of accessories to cope with various attachments.*

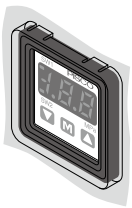




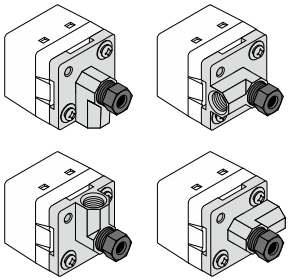
Wall bracket



Upright bracket



Panel holder



Usage example of Port bracket

## Model Designation (Example)

VUS - 30

① Sensor ② Display type

### ① Sensor

| Code | SEU | VUS |
|---|---|---|
| Sensor | Positive pressure (compound type) | Negative pressure (compound type) |

### ② Display type

| Code | 30 |
|---|---|
| Display | Large digital display |

## Model Designation of accessories (Example)

ACPG - 011

Display Accessories ① Accessory type

### ① Accessory type

| Code | 011 | 012 | 003 | 004 | 007 | 005 |
|---|---|---|---|---|---|---|
| Accessory type | Wall bracket | Upright bracket | Panel holder set | Holder cover set | Holder stopper set | Port bracket |
| including | M3x4 screw (2pcs) | M3x4 screw (2pcs) | Panel holder cover, Panel holder and Panel stopper | Panel holder cover and Panel holder | Panel holder and Panel stopper | Blind plug, O-ring and M3x10 screw (2pcs) |

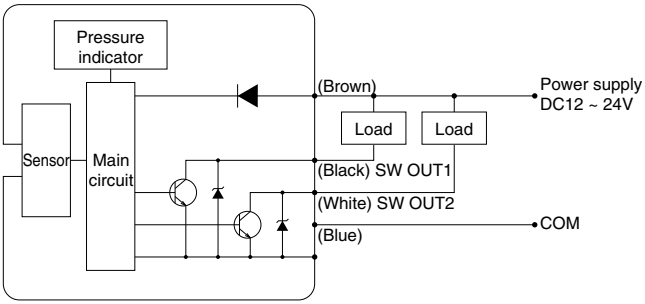
## Specifications

| Model code. | | VUS-30 | SEU-30 |
|---|---|---|---|
| Rated voltage | | DC12-24V ± Ripple (P-P) Max. 10% | |
| Current consumption | | 40mA or less | |
| Operating pressure range | | -100 ~ 100kPa | -0.1 ~ 1.0MPa |
| Pressure resistance | | 500kPa | 2MPa |
| Storage temperature range | | Atmospheric pressure / Humidity: 60% RH or less | |
| Operating temp. range | | -10 ~ 50°C (No freezing) | |
| Operating humidity range | | 35 ~ 85%RH (No dew condensation) | |
| Protective structure | | Equivalent to IEC / IP40 | |
| Pressure Display | Display frequency | 4 times / sec. | |
| | Response time | Variable by digital filter (About 5, 25 and 250m·sec) | |
| | Display accuracy | ±1%F.S. | |
| | Temperature characteristic | ±3%F.S. (0~50℃ (Standard: 25℃ )) | |
| | Monitoring system | Over rated pressure | Blinking display (Rated pressure: 110% or more) |
| | | Out of pressure detection range | Lower than negative pressure display: Blinking "-L-" / Higher than positive pressure display: Blinking "-H-" |
| | | Output overload detection | Applying overload current: Blinking "E1" |
| | Zero point adjusting function | | Zero point adjustment by panel control |
| | | Adjusting error | More than ± 0.06Pr of residual pressure remains in a pressure port during Zero point adjustment: Blinking "E2". Release it by panel control. |
| | Sensor Resolution | 1 digit | |
| | Display element | Two 1/2-digit, Height of Red LED display: 11mm | |
| | Rated display range | Refer to "Pressure Range" table (Unit is selectable from the list by panel control). | |
| Switch Output | No. of pressure setting | 2 switch outputs (SW1, SW2) | |
| | Output type | NPN open collector | |
| | Switch capacity | Max. DC30V 100mA | |
| | Residual voltage | Max. 1.2V (load current: 100mA) | |
| | Pressure adjusting method | by panel control | |
| | Pressure setting range | -110 ~ 110digits (Decimal point follows the rated display range) | |
| | Operation indicator | LED(SW1, SW2: RED) / Blinking (Output: ON) | |
| | Accuracy of responase | ±0.3F.S. | |
| | Operating accuracy | ±0.5F.S. (0 ~ 50°C, Reference temperature: 25℃ ) | |
| | Response time | Variable by digital filter (About 5, 25 and 250m·sec) | |
| | Hysteresis adjustment | 0 ~ 30digits (Adjustable by panel control) | |
| | Overload protection | 2 switch outputs (SW1, SW2) OFF (overload current: about over 200mA or more) | |

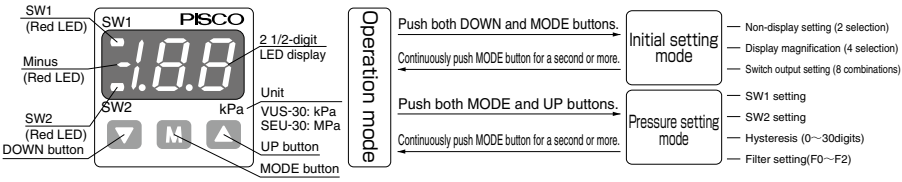
| Display magnification (unit) | Pressure Range (Rated display range) VUS-30 |
|---|---|
| ×1 (kPa) | -100 ~ 100 |
| ×1 (MPa) | – |
| ×0.75 (cmHg) | -75 ~ 75 |
| ×0.01 (bar) | -1.00 ~ 1.00 |
| ×0.145 (psi) | -14.5 ~ 14.5 |

| Display magnification (unit) | Pressure Range (Rated display range) SEU-30 |
|---|---|
| ×1 (kPa) | – |
| ×1 (MPa) | -0.10 ~ 1.00 |
| ×0.75 (cmHg) | – |
| ×10 (bar) | -1.0 ~ 10.0 |
| ×145 (psi) | -14 ~ 145 |

## Circuit diagram

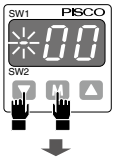



## Parts Names of Large Digital Pressure Sensor Parts and Operation Method




## Initial Setting Mode

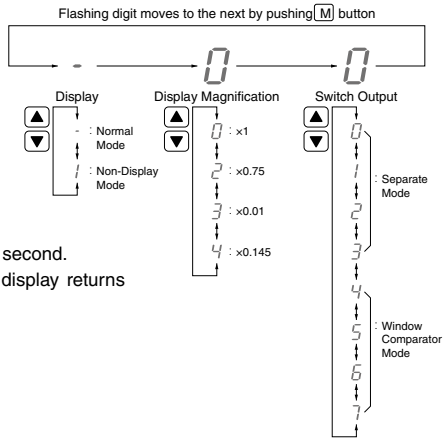
### Starting Initial Setting Mode



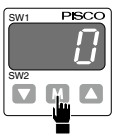
Push both ▼ DOWN and M MODE buttons in Operation Mode.
The third digit starts flashing to indicate Initial Setting Mode.
(VUS-30: "-00" or SEU-30: "-10" is displayed at the first use)

### Setting Initial Conditions

The flashing LED shifts to another digit by pushing M MODE button and the value of the flashing LED changes by ▼ DOWN or ▲ UP button.




### Exiting Initial Setting Mode



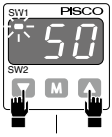
Press and hold M MODE button for a second.
Initial settings are completed and the display returns to operation mode.

## Pressure Setting Mode

### Starting Pressure Setting Mode

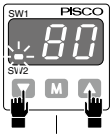

Push both M MODE and ▲UP buttons simultaneously in Operation Mode.
Once Pressure Setting Mode starts, SW1 starts flashing and Setting Value 1 will be displayed.
(VUS-30: "50" and SEU-30: " .50" are displayed at the first use)

### Setting Pressure Values



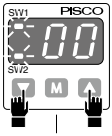

Push MODE button.

[Setting Value 1 (P1)]
SW1 LED starts flashing.
Setting Value 1 (P1) is adjustable by pushing ▼DOWN or ▲UP button.
(VUS-30: "50" or SEU-30: " .50" is displayed at the first use)
Note1) Setting values are available within operating pressure range.
Note2) Setting values in wind comparator mode are the range of "P1 ≦ P2-2H" .



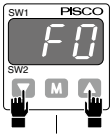

Push MODE button.

[Setting Value 2 (P2)]
SW2 LED starts flashing.
Setting Value 2 (P2) is adjustable by pushing ▼DOWN or ▲UP button.
(VUS-30: "50" or SEU-30: " .50" is displayed at the first use)
Note1) Setting values are available within operating pressure range.
Note2) Setting values in wind comparator mode are the range of "P1 ≦ P2-2H" .




Push MODE button.

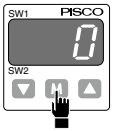
[Hysteresis (H) Setting]
SW1 and SW2 start flashing.
Hysteresis (H) is adjustable by pushing ▼DOWN or ▲UP button.
(VUS-30: "00" or SEU-30: " .00" is displayed at the first use)
Note1) Setting values are available within 30-digits. (example: kPa → selectable values 1~30)
Note2) Setting values in wind comparator mode are the range of "P1 ≦ P2-2H" .




Push MODE button.

[Digital Filter Setting]
Digital Filter is adjustable by pushing ▼DOWN or ▲UP button.
*F0* : No filter
*F1* : 25ms filter
*F2* : 250ms filter
( "F0" is displayed at the first use)

### Close Pressure Setting Mode




Press and hold M MODE for a second.
Pressure settings are completed and the display returns to Operation Mode.

## Functions

### Non-Display Mode

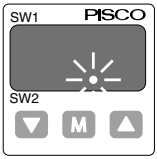
When any button is not touched for about 10 seconds, the system automatically select non-display mode and LED indication function will sleep. Pushing any button while sleeping, LED indication will come back.

Note1) During Non-Display Mode, decimal point flashes as drawing below.

Note2) Switch output and switch output indicator are active during Non-Display Mode.

Note3) No error message will appear during Non-Display Mode.

※. Refer to "Initial Setting Mode (P.841)" for Non-Display Mode.




### Display Magnification

Display Magnification is selectable from the right table.

※. Refer to "Initial Setting Mode (P.841)" for Display magnification.

| Code | Pressure range | | | |
|---|---|---|---|---|
| | VUS-30 | | SEU-30 | |
| | Display magnification | Display range | Display magnification | Display range |
| 0 | ×1 | -100 ~ 100 | | |
| 1 | | | ×1 | -0.10 ~ 1.00 |
| 2 | ×0.75 | -75 ~ 75 | | |
| 3 | ×0.01 | -1.00 ~ 1.00 | ×10 | -1.0 ~ 10.0 |
| 4 | ×0.145 | -14.5 ~ 14.5 | ×145 | -14 ~ 145 |

### Switch Output

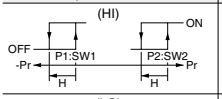
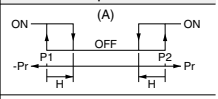
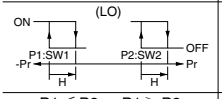
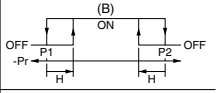
Switch output is selectable from the table below.

Note1) SW1 & Setting Value1 and SW2 & Setting Value2 work individually in Separate Mode.

Note2) SW1 and SW2 operate at their common lower limit (Setting Value 1) and their upper limit (Setting Value 2) in Wind Comparator Mode.

※. Refer to "Initial Setting Mode (P.841)" for Switch Output.

| Output | | SW1 | | | | SW2 | | | |
|---|---|---|---|---|---|---|---|---|---|
| Mode | | Separate | | Wind Comparator | | Separate | | Wind Comparator | |
| Operation | | HI | LO | A | B | HI | LO | A | B |
| Code | 0 | ○ | | | | ○ | | | |
| | 1 | ○ | | | | | ○ | | |
| | 2 | | ○ | | | ○ | | | |
| | 3 | | ○ | | | | ○ | | |
| | 4 | | | ○ | | | | ○ | |
| | 5 | | | ○ | | | | | ○ |
| | 6 | | | | ○ | | | ○ | |
| | 7 | | | | ○ | | | | ○ |
| | | Setting Value 1 | | Lower limit : Setting Value 1<br>Upper limit : Setting Value 2 | | Setting Value 2 | | Lower limit : Setting Value 1<br>Upper limit : Setting Value 2 | |
| | | Note1 | | Note2 | | Note1 | | Note2 | |

| Separate Mode | Wind Comparator Mode |
|---|---|
|  |  |
|  |  |
| P1 ≦ P2 or P1 ≧ P2 | P1 ≦ P2-2H |



P1: Setting Value 1 / P2: Setting Value 2

H: Hysteresis

### Digital Filter

There are two selections (25ms or 250ms) of Digital Filter.

Use the digital filter function when the pressure fluctuates.

Note1) Selected digital filter (25ms or 250ms) is reflected on pressure indication and switch output.

※. Refer to "Pressure Setting Mode (P.842)" for the digital filter setting.

## Zero Point Adjustment and Error Message

### Starting Zero point adjustment


Release the applied pressure in pressure port to have the atmospheric pressure condition. (i.e., No pressure is applied.)
Push both ▼ and ▲ buttons simultaneously in Operation Mode.
Once Zero Point Adjustment starts, 0A starts flashing.

### Exiting Zero Point Adjustment


Release ▼ and ▲ buttons during 0A flashing.
Zero point adjustment is completed after a second and the display returns to Operation Mode.


Error message E2 is displayed when any pressure is supplied to the sensor during the zero adjustment. Escape E2 by pressing M button for more than a second.
Release the pressure in the pressure port and operate Zero Point Adjustment again.

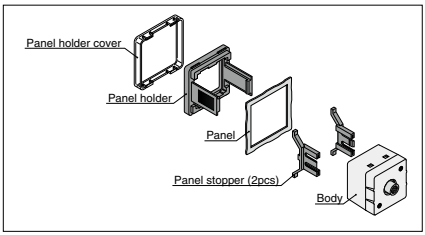
### Countermeasure for Error

| Error message | Error contents | Countermeasure |
|---|---|---|
| E1 | An overload electric current is supplied. (SW1 or SW2 detecting the overload current starts flashing) | Turn off the power and check the overload condition. |
| E2 | Pressure is supplied to the sensor during the zero adjustment. | Release " E2 " by pressing M MODE key. Release the pressure in the pressure port and start Zero Point Adjustment again. |
| 111 | Vacuum pressure is exceeding 110% or more of the rated pressure range. (In case of 111kPa by VUS-30)) | Check the pressure supply. |
| -H- | Pressure supply is higher than the range of pressure display. | Check the pressure supply. |
| -L- | Pressure supply is lower than the range of pressure display. | Check the pressure supply. |

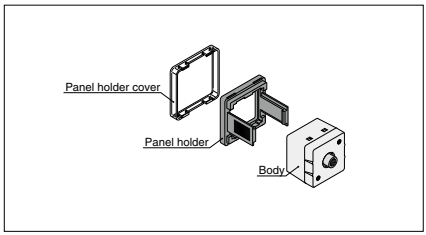
※. Error message is not displayed during Non-Display Mode.

## Assembling Method of Accessories

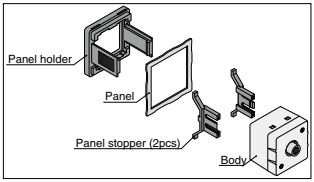
1. Assembling Method of Panel Holder Set (ACPG-003)



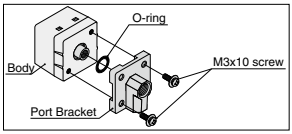

2. Assembling Method of Holder Cover Set (ACPG-004)




3. Assembling Method of Holder Stopper Set (ACPG-007)




4. Assembling Method of Port Bracket (ACPG-005)




## Applicable Tube and Related Products

### Tube Fitting
### (1. Piping products catalog P.38)

■ Push-In Fitting for General Piping. Various Selection of Products.

### Tube Fitting Mini Series
### (1. Piping products catalog P.84)

■ Ultra Small Push-In Fitting for General Pneumatic Piping. 40% Miniaturize from Standard Type.

### Vacuum Generators ・・・・・ P.52

■ Vacuum Generator changes over from compressed air to vacuum air.

## ⚠ Detailed Safety Instructions

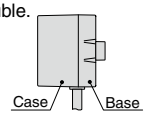
Before using PISCO products, be sure to read “Safety Instructions” and “Safety Instruction Manual” on page 35-39, “Common Safety Instructions for Pressure Sensors” on page 794.

### Warning

1. Avoid using the sensor under the condition of corrosive gas. Also do not use the gas as a fluid medium.
2. Avoid using this product in the flammable explosive gas, liquid or ambience. This product is not explosive-proof and may cause fire or explosion under these conditions.
3. Use the product within the described temperature range. Otherwise, there is a possibility of malfunction of the sensor by the heat.
4. Make sure to turn off the power before wiring. Check the wire colors, and do not short-circuit output terminals, power supply terminals and COM terminals when wiring. Short-circuits may cause a sensor trouble.

### Caution

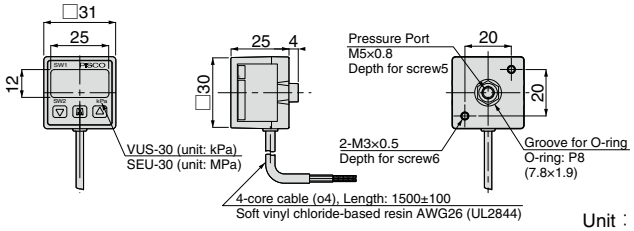
1. Supply a stable DC power to the product.
2. Add a surge absorption circuit to relays or solenoid valves, etc. which are to be connected with output terminal and source terminal. Avoid any use which involves over 80mA in current.
3. Ground the FG terminal when using a unit power source such as switching current.
4. Output terminals and other terminals should not be short-circuited.
5. Avoid strong external impacts and excessive force to the sensor body.
6. Wiring or ways by which noise or other disturbance is caused may cause a sensor trouble.
7. At the time of piping, hold the side back part of the sensor and attach PISCO fitting with M5 male thread. The tightening torque is 1.0 to 1.5 N-m. Do not apply force to front case part at the time of tightening. It may cause a damage to sensor.




8. Keep the product away from water/oil drops or dusts, since it is not drip/dust proof structure. Otherwise, there is a possibility of the sensor mulfunction.
9. For vacuum sensor, please avoid continuing application of pressure greater than 500kPa (72.5psi) during vacuum breaking. Continuous application of such pressure may possibly cause damage to the sensor.
10. Avoid an excessive tensile force and bending force on a lead wire. Otherwise, there is a possibility of wire breaking.
11. Do not use thinner or such solvent. Use neutral detergent for cleaning the body.
12. Do not press buttons on the sensor with a sharp tip tool. Otherwise, there is a possibility of damaging buttons.
13. Do not insert in wire etc. from pressure port. An internal diaphragm is damaged and normal operation is no longer obtained.

## SEU VUS Positive Pressure Sensor (Compound Type) Negative Pressure Sensor (Compound Type)

RoHS compliant



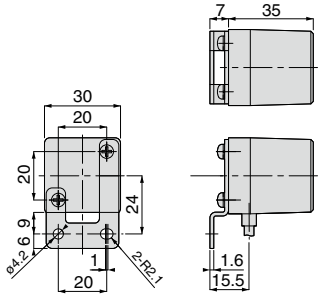

Unit : mm

| Lead Wire | Connection Terminal |
|---|---|
| Brown | Power (DC12 ~ 24V) |
| Blue | COMMON |
| Black | SW output 1 |
| White | SW output 2 |

| Model code | Weight (g) |
|---|---|
| VUS-30 | 65 |
| SEU-30 | 65 |

## ACPG Wall Bracket (Accessory)

RoHS compliant

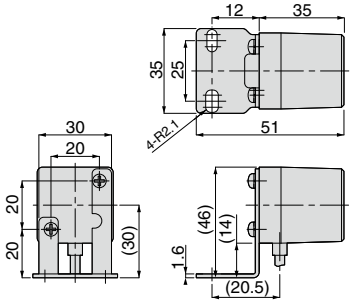



Unit : mm

| Model code | Weight (g) |
|---|---|
| ACPG-011 | 11 |

## ACPG Upright Bracket (Accessory)

RoHS compliant



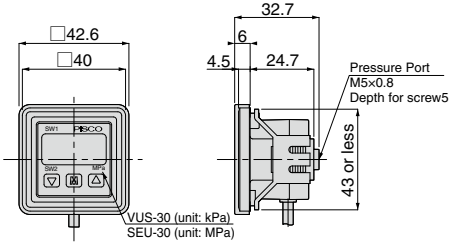

Unit : mm

| Model code | Weight (g) |
|---|---|
| ACPG-012 | 13 |

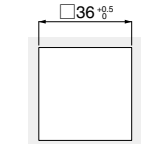
## ACPG Panel Holder Set (Accessory)

Unit：mm

| Model code | Weight (g) |
|---|---|
| ACPG-003 | 11 |




●Panel cut dimension

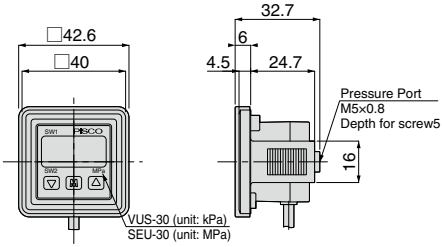



Panel thickness：1～3.6mm

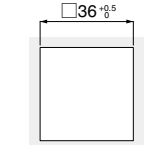
## ACPG Holder Cover Set (Accessory)

Unit：mm

| Model code | Weight (g) |
|---|---|
| ACPG-004 | 9.5 |




●Panel cut dimension

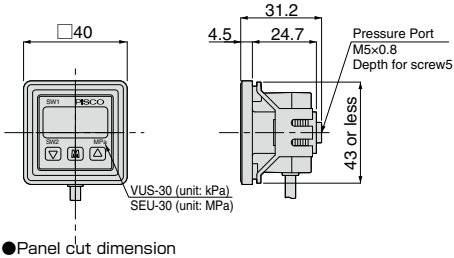



Panel thickness：1～3.6mm

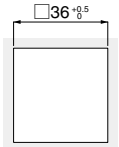
## ACPG Holder Stopper Set (Accessory)

Unit：mm

| Model code | Weight (g) |
|---|---|
| ACPG-007 | 10 |




●Panel cut dimension



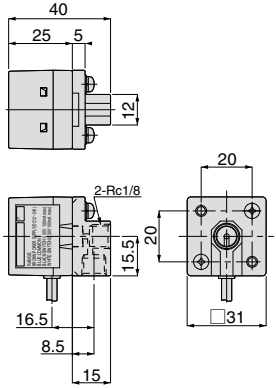

Panel thickness：1～3.6mm

## ACPG Port Bracket (Accessory)

RoHS compliant

Unit：mm

| Model code | Weight (g) |
|---|---|
| ACPG-005 | 40 |



# ⚠ 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…Recomendations 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.

※. This safety instructions are subject to change without notice.

## 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℃ (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

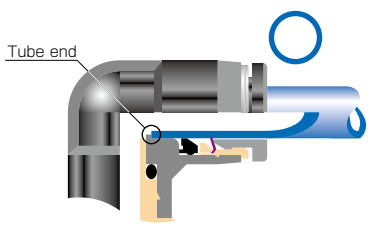
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without 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.

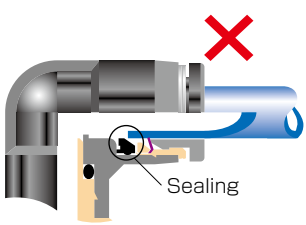
●Table 1. Tube O.D. Tolerance

| mm size | Nylon tube | Polyurethane tube |
|---|---|---|
| ø1.8mm | — | ±0.05mm |
| ø3mm | — | ±0.15mm |
| ø4mm | ±0.1mm | ±0.15mm |
| ø6mm | ±0.1mm | ±0.15mm |
| ø8mm | ±0.1mm | ±0.15mm |
| ø10mm | ±0.1mm | ±0.15mm |
| ø12mm | ±0.1mm | ±0.15mm |
| ø16mm | ±0.1mm | ±0.15mm |

| inch size | Nylon tube | Polyurethane tube |
|---|---|---|
| ø1/8 | ±0.1mm | ±0.15mm |
| ø5/32 | ±0.1mm | ±0.15mm |
| ø3/16 | ±0.1mm | ±0.15mm |
| ø1/4 | ±0.1mm | ±0.15mm |
| ø5/16 | ±0.1mm | ±0.15mm |
| ø3/8 | ±0.1mm | ±0.15mm |
| ø1/2 | ±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;
   ①Shear drop of the lock-claws edge
   ②The 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 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 | | |
| | M8 × 0.75 | 1 ~ 2N·m | | |
| Taper pipe thread | R1/8 | 4.5 ~ 6.5N·m | White | — |
| | R1/4 | 7 ~ 9N·m | | |
| | R3/8 | 12.5 ~ 14.5N·m | | |
| | R1/2 | 20 ~ 22N·m | | |
| Unified thread | No.10-32UNF | 1.0 ~ 1.5N·m | — | SUS304、NBR |
| 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 Pressure Sensors

Before selecting or using PISCO products, read the following information. Regarding the instructions of each series, please follow each Detailed Safety Instructions.

## ⚠ Warning

1. Avoid an excessive tensile strength, twisting force, bending, dropping and strong impact on pressure sensors. Otherwise, there is a possibility of damaging the products.
2. Supply clean air to the operating pressure source. There is a possibility of malfunction of sensors by sludge or dusts.

## ⚠ Caution

1. Refer to "Common Safety Instructions for Fittings" for handling Fittings.
2. Instructions for Installation
   ①. Use a proper tool to tighten hexagonal-columns of body.
   ②. Refer to the following recommended tightening torque to tighten thread. Do not exceed these limits to tighten a thread. Excessive tightening may break the thread part or deform the gasket to cause a fluid leakage. Tightening thread with tightening torque less than these limits may cause a loosened thread or fluid leakage.

● Table: Recommended tightening torque (Hexagonal-column)

| Thread type | Thread size | Tightening torque |
|---|---|---|
| Metric thread | M5×0.8 | 1.5 ~ 1.9N·m |
| Taper pipe thread | R1/8 | 7 ~ 9N·m |

3. Instructions for Removal
   ①. Use a proper tool to tighten hexagonal-columns of body.
   ②. Remove the sealant stuck on the mating equipment. The remained sealant may get into the peripheral equipment and cause malfunctions.