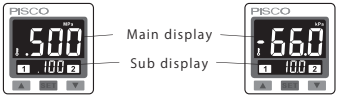
Large digital pressure sensor 31・32 - series

●Easily viewable LCD dual displays with 3-colors display.



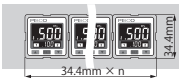
The main display uses 2-colors.
Main display: Pressure indication (Red・Green),
Sub display：Pressure setting value（Orange）

●Compact installation

■Opening dimensions for multiple installation

※Calculation：（A）=(34.4×n)-3.4　n：No. of pressure display

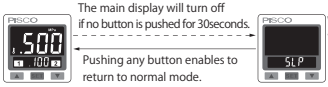
■Dimensions after installation



Body width：30㎜,
Body height：30㎜

●Power-save mode can reduce power consumption by 30%

■Normal mode　■Power saving mode



During power-save mode,
the main display will turn off
if no button is pushed for 30seconds.

●Excellent cost effectiveness.

Price down of -46.5% was achieved, compared to conventional large digital pressure sensor 30 series.
New large digital pressure sensor is affordable.

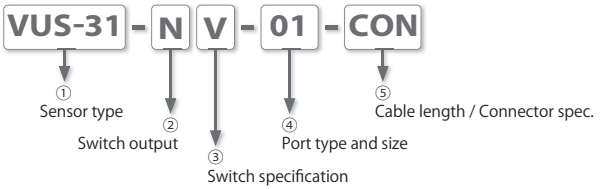
●Lock function

Wrong output by misoperation can be prevented.
Key icon is displayed in operating mode.

Hot *32 series has a copy function where settings can be copied to slave sensors.*
Saving time for setting.

Hot *32 series comes with connectorized wire which enables easier wiring and maintenance.*

Model designation



①. Sensor type

Code	VUS -31R	VUS -32R	VUS -31	VUS -32	SEU -31	SEU -32
Rated press. range	-100.0 ~ 100.0kPa (Compound press.)		-101.3 ~ 0.0kPa (Negative press.)		0.000 ~ 1.000MPa (Positive press.)	

②. Switch output

Code	N	P (※32 series only)
Type	NPN open collector	PNP open collector

③. Switch specification

Code	V	2
Spec.	31series : 1point SW output + Analog output (1-5V) 32series : 2 points SW output + Analog output (1-5V)	31series : 2 points SW output 32 series : 2 points SW output + copy function

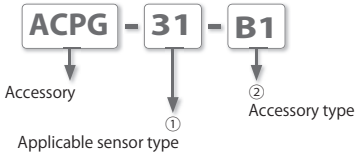
④. Port type and size

Code	01	N1U (※32 series only)	G1 (※32series only)
Type / size	O.D. : Taper pipe male thread R1/8, I.D. : Metric female thread M5x0.8	O.D. : National pipe taper male thread NPT1/8, I. D.: Unified female thread No.10-32UNF	O.D. : Parallel pipe male thread G1/8, I.D. : Metric female thread M5x0.8

⑤. Cable length / Connector spec.

Code	No code	CON (※31 series only)
Spec.	2m cable	M8, 4pin, with male connector

■ Model designation of display accessories

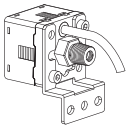
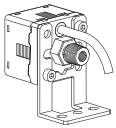
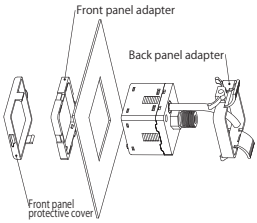


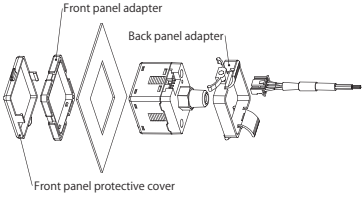
①. Applicable sensor type

Code	31 (※)	32
Sensor series	For 31 series	For 32 series

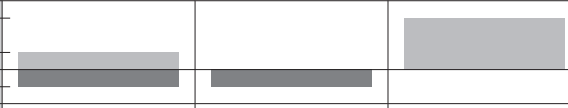
※ Wall bracket and Upright bracket are exclusively designed for each sensor type.
Panel adapters can be used for both sensor types in common. Please enter "31" in① in model designation when ordering panel adapters. Female connector is only for 31 series.

②. Accessory type

Code	B1	B2	P1	P2	C42
Type	Wall bracket	Upright bracket	Panel adapter set w/o front cover	Panel adapter set with front cover	Female connector
Including	M3×0.5 male screw (2pcs)	M3×0.5 male screw (2pcs)	Front panel adapter, Back panel adapter	Front panel protective cover, Front panel adapter, Back panel adapter	
31 series					

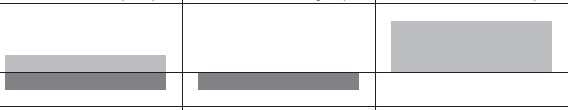
Code	B12	B13	P1	P2
Type	Wall bracket	Upright bracket	Panel adapter set w/o front cover	Panel adapter set with front cover
Including	M3×0.5 male screw (2pcs)	M3×0.5 male screw (2pcs)	Front panel adapter, Back panel adapter	Front panel protective cover, Front panel adapter, Back panel adapter
32 series				

31 series specifications

Sensor type		VUS-31R-N (Compound press.)	VUS-31-N (Negative press.)	SEU-31-N (Positive press.)
				
Rated pressure range		-100.0～100.0kPa	-101.3 ～0.0kPa	0.000 ～1.000MPa
Proof pressure		300kPa		1.5MPa
Fluid medium		Air, Non-corrosive / Non-flammable gas		
Power requirements		DC12V ～24V (Ripple ±10% or less)		
Current consumption		40mA or less (With no load)		
Switch output	Switch output	NPN open collector		
	Max. load current	125mA		
	Max. supply voltage	30VDC		
	Residual voltage	1.5V or less		
Repeatability		±0.2% F.S. ±1 digit or less		
Hysteresis	One point set mode	Adjustable (※)		
	Hysteresis mode			
	Window comparator mode			
Response time		2.5ms or less (Chattering-proof function：25ms, 100ms, 250ms, 500ms, 1000ms, 1500ms selections)		
Output short circuit protection		Yes		
Digital display		3 colors (Red, Green, Orange) indication (Sampling rate: 5times / 1sec.)		
Indicator accuracy		±2% F.S. ±1 digit or less (at Ta=25 ±3℃)		
Switch ON indicator		Orange 1 & 2 indicator		
Analog output (Voltage output)		Output voltage：1～5V ± 2.5% F.S. (within rated pressure range) Linearity：±1% F. S. or less, output impedance 1kΩ		
Environment	Protective structure	IP40		
	Ambient temp. range	Operation：0～50ºC, Storage：-10～60ºC (No dew condensation or freezing)		
	Ambient humidity range	Operation / Storage：35～85%RH (No dew condensation)		
	Withstand voltage	1000VAC in 1 min. (Between case and lead wire)		
	Insulation resistance	50MΩ or more (500VDC) (Between case and lead wire)		
	Vibration proof	Total amplitude 1.5mm or 100m/s², 10Hz ～150Hz ～10Hz for 1min. 、2 hours each direction X, Y, Z		
	Shock resistance	100m/s², 3 times each in direction X, Y, Z		
Temperature characteristics		±2% F.S. or less (at Ta=25ºC, at temp. range 0～ +50℃)		
Cable spec.		Oil-resistance cable (0.15mm²)		

※. Hysteresis value is adjustable within 1～8 digits for one point set mode and window comparator mode.

32 series specifications

Sensor type		VUS-32R-N (Compound press.)	VUS-32-N (Negative press.)	SEU-32-N (Positive press.)
1.0MPa 100kPa 0kPa -100kPa				
Rated pressure range		-100.0～100.0kPa	-101.3 ～0.0kPa	0.000 ～1.000MPa
Proof pressure		300kPa		1.5MPa
Fluid medium		Air, Non-corrosive / Non-flammable gas		
Power requirements		DC12V ～24V (Ripple ±10% or less)		
Current consumption		40mA or less (With no load)		
Switch output	Switch output	NPN open collector	PNP open collector	
	Max. load current	125mA		
	Max. supply voltage	30VDC	24VDC	
	Residual voltage	1.5V or less		
Repeatability		±0.2% F.S. ±1 digit or less		
Hysteresis	One point set mode	Adjustable (※)		
	Hysteresis mode			
	Window comparator mode			
Response time		2.5ms or less (Chattering-proof function : 25ms、100ms、250ms、500ms、1000ms、1500ms selection)		
Output short circuit protection		Yes		
Digital display		3 colors (Red, Green, Orange) indication (Sampling rate : 5times / 1sec.)		
Indicator accuracy		±2% F.S. ±1 digit or less (at Ta=25±3°C)		
Switch ON indicator		Orange 1 & 2 indicator		
Analog output (Voltage output)		Output voltage : 1～5V ±2.5% F.S. or less (within rated pressure range) Linearity : ±1% F.S. or less, output impedance 1kΩ		
Environment	Protective structure	IP40		
	Ambient temp. range	Operation : 0～50°C, Storage : -10～60°C (No dew condensation or freezing)		
	Ambient humidity range	Operation / Storage : 35～85%RH (No dew condensation)		
	Withstand voltage	1000VAC 1 min. (Between case and lead wire)		
	Insulation resistance	50MΩ or more (DC500V) (Between case and lead wire)		
	Vibration proof	Total amplitude 1.5mm or 100m/s^2、10Hz ～150Hz ～ 10Hz for 1min., 2 hours each direction X, Y, Z		
	Shock resistance	100m/s^2 , 3 times each in direction X, Y, Z		
Temperature characteristics		±2.5% F.S. or less (at Ta=25°C, at temp. range 0 ～ +50 °C)		
Cable spec.		Oil-resistance cable (0.15mm^2)		

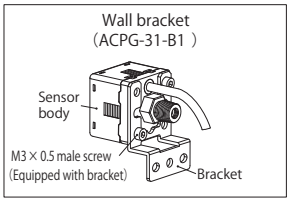
※. Hysteresis value is adjustable within 1~8 digits for one point set mode and window comparator mode.

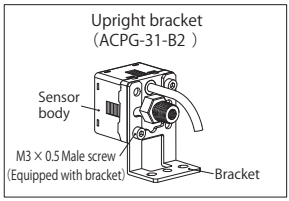
Functions

[How to attach accessories]

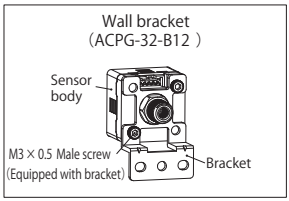
●How to attach bracket

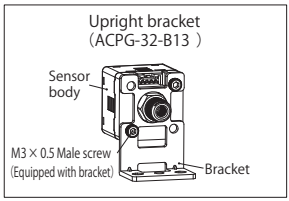
31 series





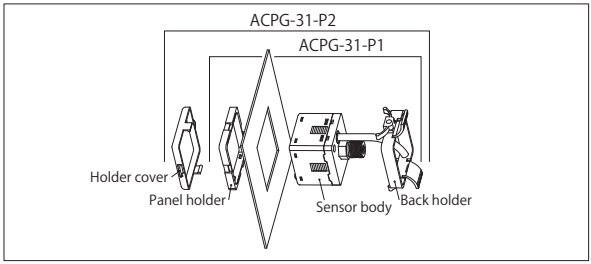
32 series



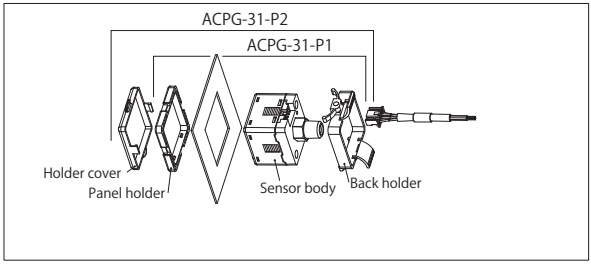


●How to attach holder cover

31 series

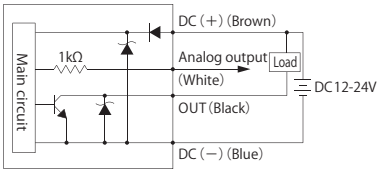


32 series

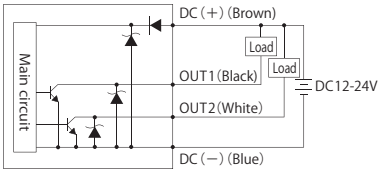


[Electrical diagram of 31 series]

● SW 1 point output + Analog output

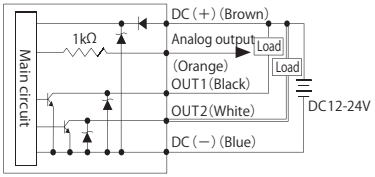


● SW 2 points output

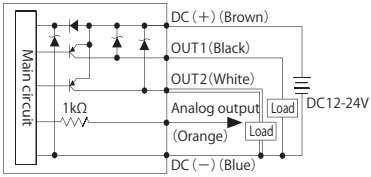


[Electrical diagram of 32 series]

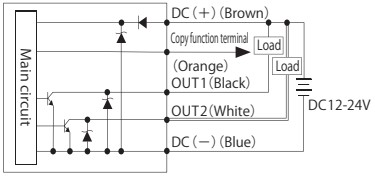
● 2NPN +Analog (Voltage) output (1-5V)



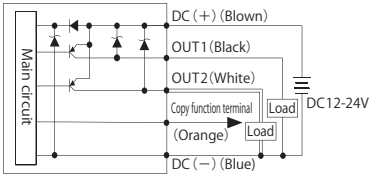
● 2PNP +Analog (Voltage) output (1-5V)



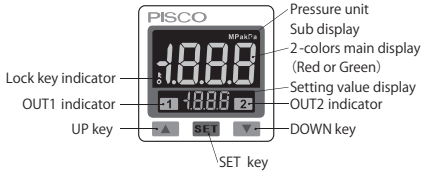
● 2NPN +Copy function



● 2PNP + Copy function



[Parts name]

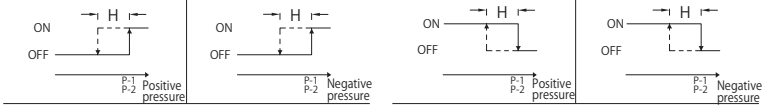


■Switch output

3 sensor modes can be selected.

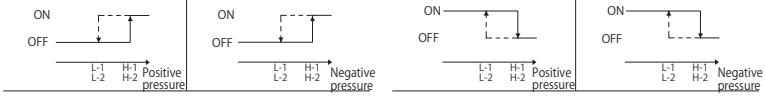
●One point setting mode

N. O. mode		N. C. mode	
Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32	Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32



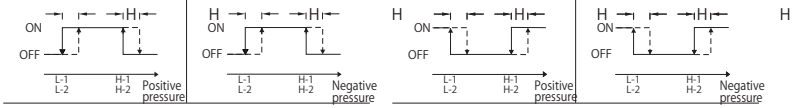
●Hysteresis mode

N. O. mode		N. C. mode	
Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32	Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32



●Window comparator mode

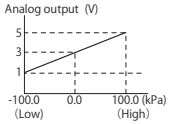
N. O. mode		N. C. mode	
Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32	Positive／Compound SEU-31 ／VUS-31R SEU-32 ／VUS-32R	Negative VUS-31 VUS-32



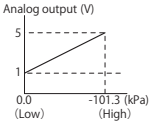
■Analog output

Analog output : 1～5V proportionally to the pressure.

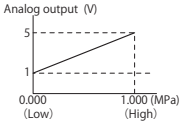
●Compound pressure



●Negative pressure



●Positive pressure



■Hysteresis setting

Hysteresis setting can prevent chattering which is caused by pressure pulsation.

■Response time

Response time setting for switch output is possible.
Response time setting can prevent false detection which is caused by sudden pressure change.

■Indication color change

Indication color for switch ON / OFF can be selected from Red or Green.
※Only for VUS-31(R)-N2-□-□, VUS-32(R)-N2-□, SEU-31-N2-□-□, and SEU-32-N2-□.

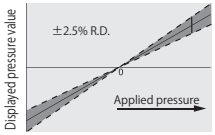
■Power-save mode

During Power-save mode, the main display will turn off if no button is pressed for 30 seconds.
Press any button to turn on the main display temporarily.

■Fine adjustment mode

Displayed value can be calibrated within ±2.5% with this function.
It can suppress the variations in the displayed values when using multiple sensors.

This function eliminates slight differences in the output values and allows uniformity in the displayed value.
Displayed value of the pressure sensor can be calibrated within ±2.5% R.D.



—Initial setting : Factory setting value
Display calibration range
R.D. (Real Detect)
※. Setting resolution : ± 0.1% R.D.

■Zero point setting

Pressure indication can be "0" forcibly by zero point setting.
Zero point setting is invalid when pressure which is ±3% or more of the atmospheric pressure is applied.

■Max. pressure / Min. pressure indication

Max. / Min. pressure after power on can be referred.
The memory will be deleted when turning it off.

■Key lock / unlock mode

Misoperation by pressing wrong button can be prevented by key lock mode.
A key icon is displayed on the main display during the key lock mode.

■Error code instructions

Error type		Error code	Error message	Troubleshooting
Overcurrent Error	out1	Er 1	Output 1 load current is more than 125mA.	Turn off the power and check the cause of overload current. Lower the load current below 125mA, and turn the power on again.
	out2	Er2	Output 2 load current is more than 125mA.	
Residual pressure error		Er3	During Zero point setting operation, the residual pressure is over ±3% F.S. of the atmospheric pressure.	Release the applied pressure (opened to the atmosphere) and try zero point setting again.
Applied pressure error		HHH	Applied pressure exceeds the upper limit of rating pressure.	Apply pressure within operating pressure range.
		LLL	Applied pressure is below the lower limit of rating pressure.	
System error		Er4	Internal system error	Turn off the power and turn it on again. If it is not back to normal yet, please contact us.
		Er5		
		Er6	Internal data error	
		Er7		
Copy error (For 32 series only)		Er8	Copy data error	Check the sensor model code and wiring. Turn off the power and turn it on again. If it is not back to normal yet, please contact us.

Note) Please see the instruction manuals for the setting method of each mode.

⚠ Detailed Safety Instructions

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

Cautions

1. Make sure to use this product within the rated pressure range specified in the specifications.
   Damage to the product or malfunction may be caused if the supply pressure exceeds Max. proof pressure.
2. Turn power off before connecting wiring.
3. Wrong wiring will damage the display and / or cause malfunction.
4. This product is not explosion-proof rated. Do not use in atmosphere containing flammable or explosive gasses.

Warnings

1. Wiring for pressure sensor should avoid power source line and high voltage line.
   If using in the same circuit, noise may cause malfunction.

■ Related products

Tube Fitting Standard Series

■Tube fitting for general pneumatic piping comes in a wide variety of models.

Tube Fitting Mini Series

■Small sized push-in fitting for general pneumatic piping realized 40% down sizing compared to Tube fitting standard series.

Vacuum Generator

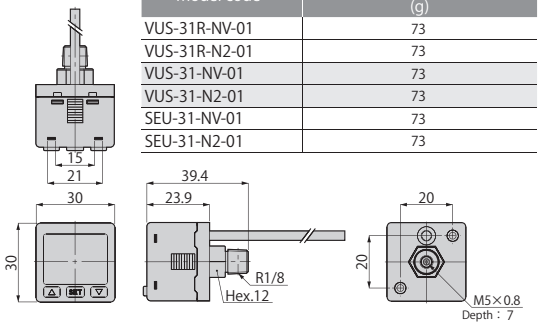
■Vacuum generator creates a vacuum by supplying compressed air, and can be used for work transportation by combining vacuum pad.

SEU 31 series Positive pressure type

VUS 31 series Negative pressure type・Compound pressure type

CAD 2D &3D

Unit：mm



Model code	Weight (g)
VUS-31R-NV-01	73
VUS-31R-N2-01	73
VUS-31-NV-01	73
VUS-31-N2-01	73
SEU-31-NV-01	73
SEU-31-N2-01	73

SEU 31 series Positive pressure type with M8, 4pins male connector

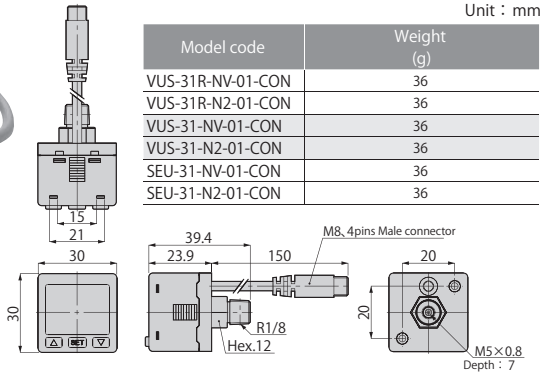
VUS 31 series Negative pressure type・Compound pressure type with M8, 4pins male connector

CAD 2D &3D

Unit：mm

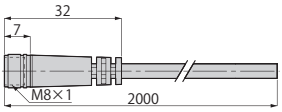
Pin layout

1: Brown（+）
2: White（OUT2/Analog output）
3: Blue（−）
4: Black（OUT1）



Model code	Weight (g)
VUS-31R-NV-01-CON	36
VUS-31R-N2-01-CON	36
VUS-31-NV-01-CON	36
VUS-31-N2-01-CON	36
SEU-31-NV-01-CON	36
SEU-31-N2-01-CON	36

ACPG 31 series M8, 4pins female connector (Accessory)



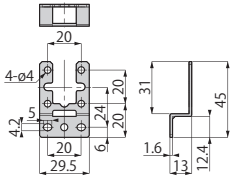
Unit：mm

Model code	Weight (g)
ACPG-31-C42	45

CAD CAD data is available at PISCO website.

ACPG 31 series Wall bracket (Accessory)

CAD 2D & 3D

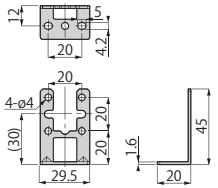


Unit：mm

Model code	Weight (g)
ACPG-31-B1	10

ACPG 31series Upright bracket (Accessory)

CAD 2D & 3D



Unit：mm

Model code	Weight (g)
ACPG-31-B2	12

SEU 32 series Positive pressure
VUS 32 series Negative pressure type・Compound pressure type

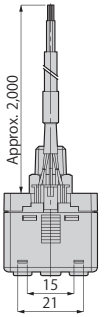
1055

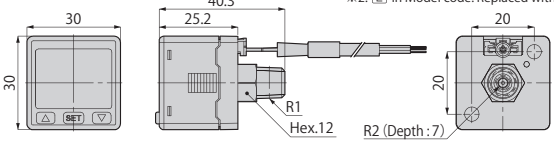
New

Unit：mm

Model code	R1	R2	Weight (g)
VUS-32R-[2]V-01	R1/8	M5×0.8	80(※1)
VUS-32R-[2]V-N1U	NPT1/8	No.10-32UNF	80(※1)
VUS-32R-[2]V-G1	G1/8	M5×0.8	80(※1)
VUS-32R-[2]2-01	R1/8	M5×0.8	80(※1)
VUS-32R-[2]2-N1U	NPT1/8	No.10-32UNF	80(※1)
VUS-32R-[2]2-G1	G1/8	M5×0.8	80(※1)
VUS-32-[2]V-01	R1/8	M5×0.8	80(※1)
VUS-32-[2]V-N1U	NPT1/8	No.10-32UNF	80(※1)
VUS-32-[2]V-G1	G1/8	M5×0.8	80(※1)
VUS-32-[2]2-01	R1/8	M5×0.8	80(※1)
VUS-32-[2]2-N1U	NPT1/8	No.10-32UNF	80(※1)
VUS-32-[2]2-G1	G1/8	M5×0.8	80(※1)
SEU-32-[2]V-01	R1/8	M5×0.8	80(※1)
SEU-32-[2]V-N1U	NPT1/8	No.10-32UNF	80(※1)
SEU-32-[2]V-G1	G1/8	M5×0.8	80(※1)
SEU-32-[2]2-01	R1/8	M5×0.8	80(※1)
SEU-32-[2]2-N1U	NPT1/8	No.10-32UNF	80(※1)
SEU-32-[2]2-G1	G1/8	M5×0.8	80(※1)

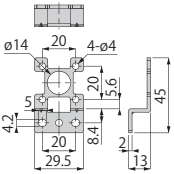
※1. The weight includes the cable (2m).
※2. [2] in Model code: Replaced with Switch output code in page 1045.





ACPG 32 series Wall bracket (Accessory)

New

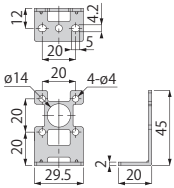


Unit : mm

Model code	Weight (g)
ACPG-32-B12	15

ACPG 32 series Upright bracket (Accessory)

New

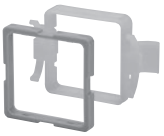


Unit : mm

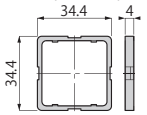
Model code	Weight (g)
ACPG-32-B13	18

ACPG 31・32 series Panel adapter set (Accessory)

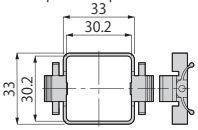
CAD 2D & 3D



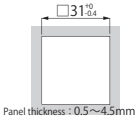
■Front panel adapter



■Back panel adapter



■Panel cut dimensions



Unit : mm

Model code	Weight (g)
ACPG-31-P1	4

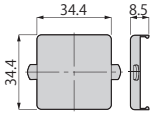
ACPG 31・32 series Panel adapter set with front cover (Accessory)

CAD 2D & 3D

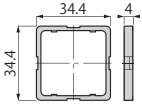
Unit : mm

Model code	Weight (g)
ACPG-31-P2	5

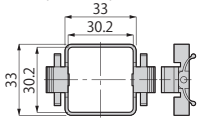
■Front panel protective cover



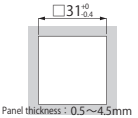
■Front panel adapter



■Back panel adapter



■Panel cut dimensions



CAD 2D & 3D 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…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

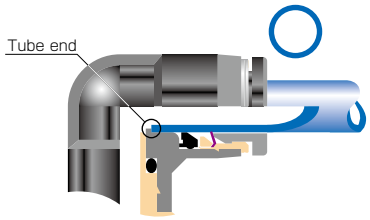
1. Remove dusts or drain before piping. They may get into the peripheral machine / facilities and cause malfunction.
2. When inserting an ultra-soft tube into push-in fitting, make sure to place an Insert Ring into the tube edge. There is a risk of causing the escape of tube and a fluid leakage without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

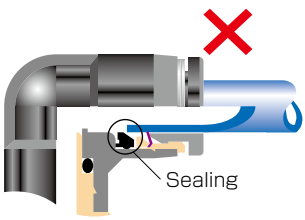
● Table 1. Tube O.D. Tolerance

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	0.5 ~ 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	1/16-27NPT	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.

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.