SMC PSE575 Pressure Sensor for General Fluids User Manual

Contents

1 Pressure Sensor for General Fluids PSE575
1.1 Safety Instructions
1.2 Limited warranty and Disclaimer/Compliance Requirements
1.3 Operator
1.4 Safety Instructions
1.5 Names of Parts of Product and Handling Precautions
1.6 Mounting and Installation
1.7 Troubleshooting
1.8 Specification
2 Documents / Resources
3 Related Posts

Pressure Sensor for General Fluids PSE575

MODEL / Series / Product Number
PSE575/576/577

Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage.
These instructions indicate the level of potential hazard with the labels of “Caution”, “Warning” or “Danger”.
They are all important notes for safety and must be followed in addition to International Standards

(ISO/IEC)*1), and other safety regulations*2).

*1) ISO 4414: Pneumatic fluid power — General rules relating to systems.
ISO 4413: Hydraulic fluid power — General rules relating to systems.
IEC 60204-1: Safety of machinery — Electrical equipment of machines .(Part 1: General requirements)
ISO 10218: Manipulating industrial robots -Safety. etc.

*2) High Pressure Gas Safety Law

Caution indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
Warning indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Danger indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Warning

1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.
   Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results.
   The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product.
   This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.
2. Only personnel with appropriate training should operate machinery and equipment.
   The product specified here may become unsafe if handled incorrectly.
   The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.
3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.
   1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
   2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
   3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.
4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.
   1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
   2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
   3. An application which could have negative effects on people, property, or animals requiring special safety

analysis.

4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

Caution

1. The product is provided for use in manufacturing industries.
   The product herein described is basically provided for peaceful use in manufacturing industries.
   If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.
   If anything is unclear, contact your nearest sales branch.

Limited warranty and Disclaimer/Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”. Read and accept them before using the product.

Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered,whichever is first.2)
   Also, the product may have specified durability, running distance or replacement parts.
   Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.
   This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.
   2) Vacuum pads are excluded from this 1 year warranty.
   A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.
   Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulation of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

Caution

SMC products are not intended for use as instruments for legal metrology.

Products that SMC manufactures or sells are not measurement instruments that are qualified by pattern approval tests relating to the measurement laws of each country.
Therefore, SMC products cannot be used for business or certification ordained by the measurement laws of each country.

Operator

- This operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- Read and understand this operation manual carefully before assembling, operating or providing maintenance to the product.

Safety Instructions

Warning

- Do not disassemble, modify (including changing the printed circuit board) or repair.
  An injury or failure can result.
- Do not operate the product outside of the specifications.
  Do not use for flammable or harmful fluids.
  Fire, malfunction, or damage to the product can result.
  Verify the specifications before use.
- Do not operate in an atmosphere containing flammable or explosive gases.
  Fire or an explosion can result.
  This product is not designed to be explosion proof.
- Do not use the product in a place where static electricity is a problem.
  Otherwise it can cause failure or malfunction of the system.
- If using the product in an interlocking circuit:
  Provide a double interlocking system, for example a mechanical system
  Check the product regularly for proper operation
  Otherwise malfunction can result, causing an accident.
- The following instructions must be followed during maintenance:
  Turn off the power supply
  Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance
  Otherwise an injury can result.

Caution

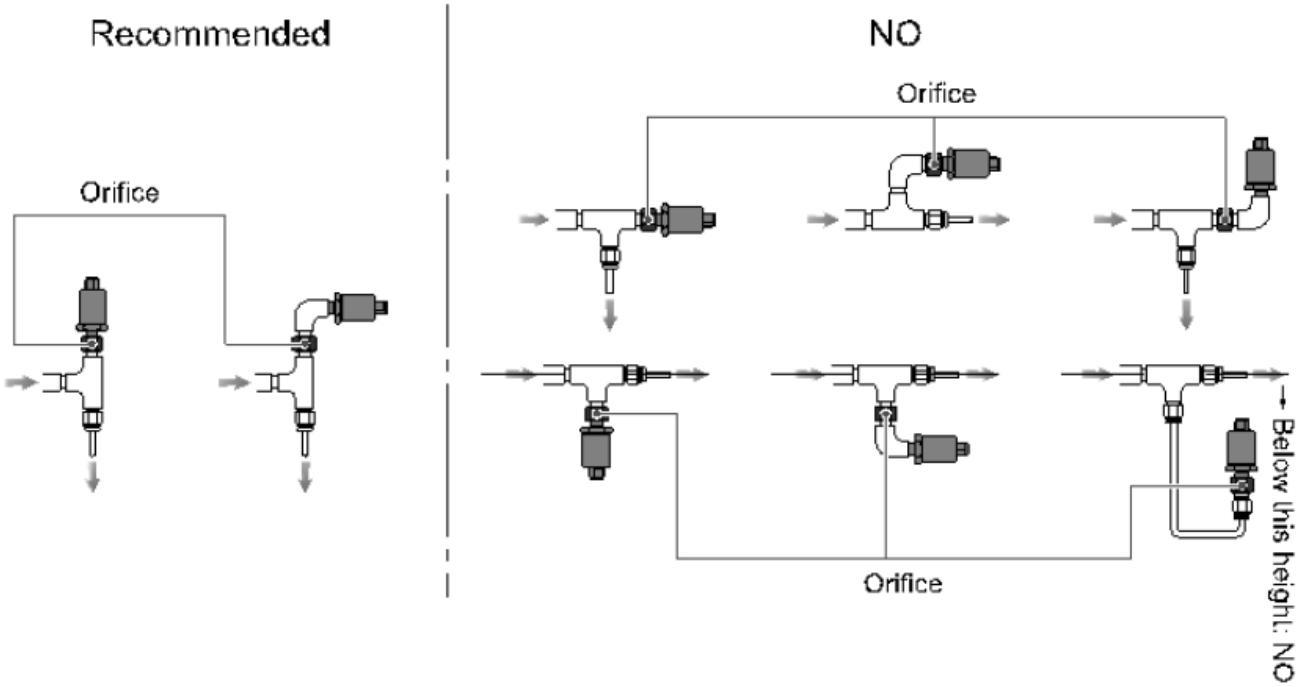
- After maintenance is complete, perform appropriate functional inspections and leak tests.
  Stop operation if the equipment does not function properly or there is a leakage of fluid.
  When leakage occurs from parts other than the piping, the product might be faulty.
  Disconnect the power supply and stop the fluid supply.
  Do not apply fluid under leaking conditions.

Safety cannot be assured in the case of unexpected malfunction.

- Use within the specified operating pressure.
  Otherwise it can cause damage to the Pressure Sensor or inability to measure correctly.
  If fluid is supplied at a pressure exceeding the proof pressure, the ceramic diaphragm will be damaged. A significantly damaged diaphragm will result in external leakage. In addition, the power supply is short circuited depending on the applied fluid. Please use a power supply which includes short circuit protection.

NOTE

- Follow the instructions given below when designing, selecting and handling the product.
- The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.
  Product specifications
  Use the specified voltage.
  Otherwise failure or malfunction can result.
  Applicable fluid is a fluid that does not corrode C3604 + electroless nickel plated, AI203 (aluminum oxide) and FKM.
- Do not use a fluid containing chemicals, synthetic oils including organic solvent, salt and corrosive gases.
  Otherwise, damage to the product and malfunction can result.
  Check the details of the specifications before using.
  Reserve a space for maintenance.
- **Allow sufficient space for maintenance when designing the system.**
  A ceramic diaphragm type pressure sensor is used in this product. The ceramic diaphragm can be damaged by overpressure from hydraulic shock, which can be generated when condensate in the fluid collides with the sensor during pressure fluctuation. This is also known as “water hammer”.
  To mitigate hydraulic shock, it is recommended to insert an orifice between the fluid and the sensor. A gas pocket also needs to be between the orifice and the sensor to cushion the shock pulse. The sensor would then need to be located above the orifice with the orifice mounted vertically so that no fluid gets between the orifice and sensor.
- Some recommended and NOT recommended examples are shown in the following figure. Part numbersZS-31-X175 or X188 are applicable orifices (called throttles in product literature).



PSE57 [7] - [02] - [ ] [ ]

Sensor range

Symbol	Content
5	Positive pressure (0 to 2 MPa)
6	Positive pressure (0 to 5 MPa)
7	Positive pressure (0 to 10 MPa)

Port size

Symbol	Content
02	R1/4 (with M5 female thread)

Lead wire/Option

Symbol	Content
Nil	With lead wire and M12 connector (3 m) Straight
L	With lead wire and M12 connector (3 m) Right angle
N	None

Output spacification

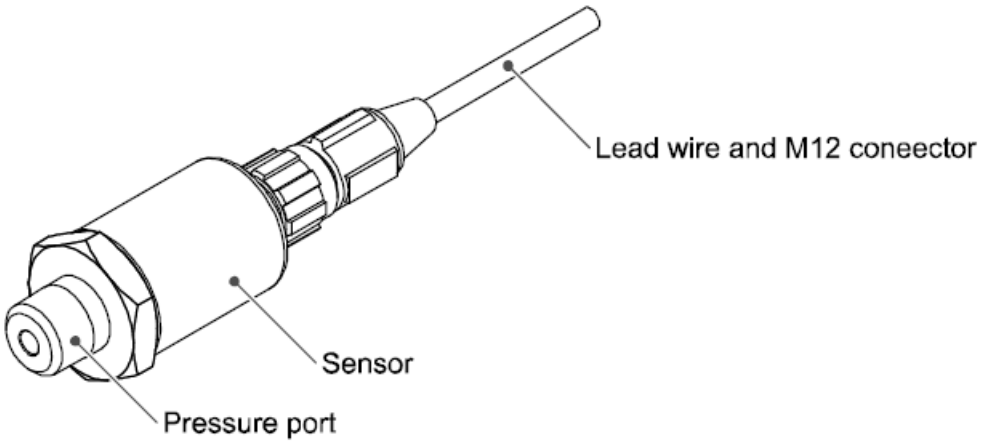
Symbol	Content
Nil	Voltage output type (1 to 5 V)
28	Current output type (4 to 20 mA)

○Option

Description	Part No.	Remarks
Lead wire and M12 connector (3 m) Straight	ZS-37-A	1 pc.
Lead wire and M12 connector (3 m) Right angle	ZS-37-B	1 pc.
Adapter with throttle Rc1/4	ZS-31-X175	1 pc.

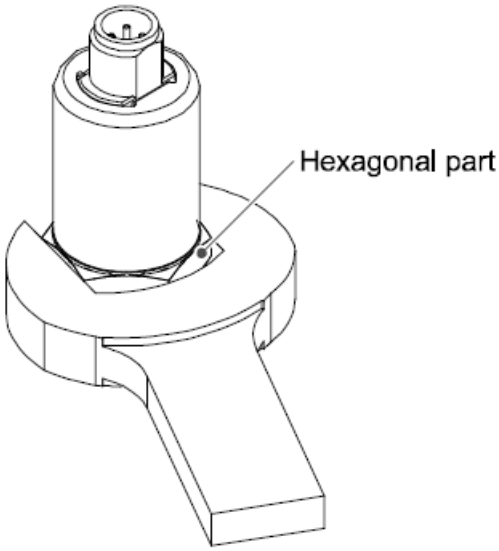
Names of Parts of Product and Handling Precautions

○Names of parts of product



Only fluids which are non-corrosive to C3604 + electroless nickel plated, AI203 (aluminum oxide) and FKM should be used.

○Handling precautions



•When piping, apply a spanner to the piping section of the sensor.

Nominal size screws	Appropriate tightening torque (Nm)
R1/4	8 to 12

Mounting and Installation

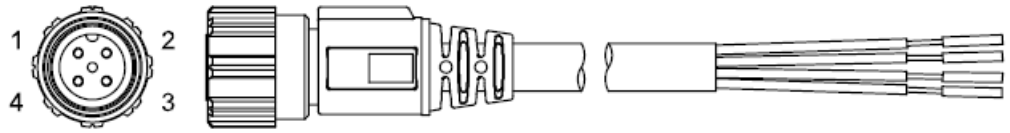
Wiring

Connector pin numbers

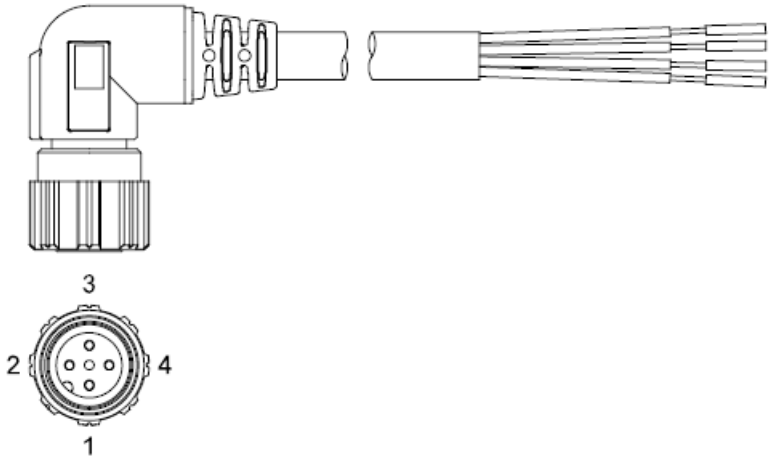
When the lead wire and connector (ZS-37-A or ZS-37-B) designated for the PSE570 is used, the wire colours will apply as shown in the diagram.

Connector pin numbers (on the lead wire)

•ZS-37-A



•ZS-37-B



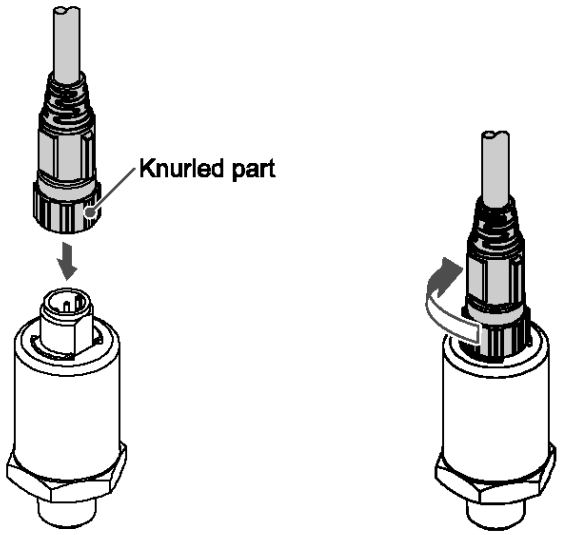
Pin No.	Content	Colour
1	DC(+)	Brown
2	N.C. *	White
3	DC(-)	Blue
4	Analogue output	Black

*: The unconnected terminals are used in SMC, so please do not connect them.

○How to connect the body and the lead wire and connector

•Align the lead wire connector with the connector key groove, and insert vertically.

•Connection is complete when the knurled part is fully tightened. Check that the connection is not loose.



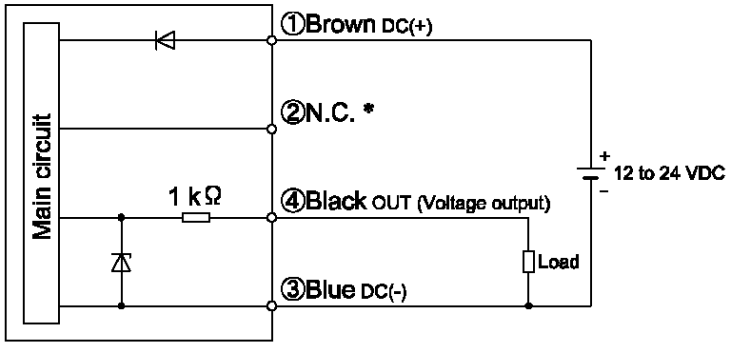
○Internal circuit and wiring example

•Output specification

PSE57□-02

Voltage output: 1 to 5 V

Output impedance: Approx. 1 kΩ



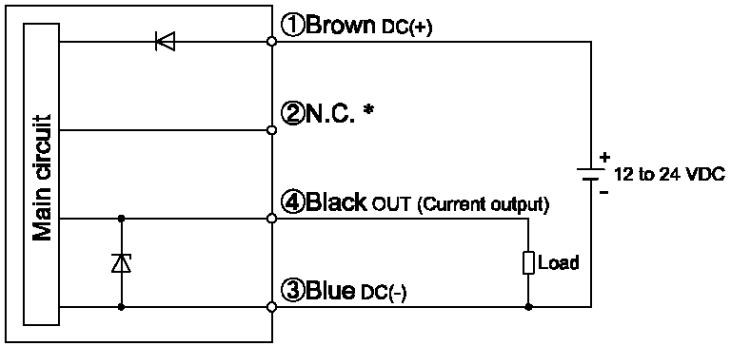
PSE57□-02-28

Current output: 4 to 20 mA

Allowable load impedance:

500 Ω or less (at 24 VDC)

100 Ω or less (at 12 VDC)



*: The unconnected terminals are used in SMC, so please do not connect them.

Troubleshooting

○Cross-reference for troubleshooting

Problem	Possible cause	Investigation method	Countermeasure
Analogue output is not provided. (Specified accuracy is not satisfied.)	Incorrect wiring	Check if the analogue output line is connected with a load.	Correct the wiring.
	Non-compliance with the load spec.	(1) Check if the proper load is connected. (2) Check if input impedance of input equipment (such as the A/D) is proper.	Connect a proper load.
	Insufficient warm-up	Check if the product satisfies the specified accuracy in 20 minutes after supplying power.	After energizing, indication and output can drift. For detecting fine pressure, warm up the product for 20 to 30 minutes.
	Product failure		Replace the product.
Noisy.	Air and liquid leakage	Check if air liquid are leaking from the piping.	Rework the piping. If excessive tightening torque over the specified range is applied, a mounting screw, mounting bracket, and product may be broken.
	Product failure		Replace the product.

Specification

■Specifications

Model		PSE575	PSE576	PSE577
Pressure spec.	Rated pressure range	0 to 2 MPa	0 to 5 MPa	0 to 10 MPa
	Withstand pressure	5 MPa	12.5 MPa	30 MPa
Temperature characteristics		±5%F.S. (at 25 °C)		

Model		PSE57□-02	PSE57□-02-28
Fluid	Applicable	Gas or liquid that will not attack or corrode the materials of parts in contact with fluid	
Electrical spec.	Power supply voltage	12 to 24 VDC±10% with 10% voltage ripple or less	
	Current consumption	10 mA or less	
	Protection	Protected against inverse connection	
Analogue output	Output type	Analogue output: 1 to 5 V Output impedance: Approx. 1 kΩ	Analogue output: 4 to 20 mA Maximum load impedance: 500 Ω or less (at 24 VDC) 100 Ω or less (at 12 VDC)
Analogue output Accuracy (Ambient temperature at 25 °C)		±2.5%F.S.	
Linearity		±0.5%F.S.	
Repeatability		±0.5%F.S. (at 25 °C)	
Environ mental	Enclosure	IP65	
	Withstand voltage	500 VAC, 1 minute, Between lead block and case	
	Insulation resistance	100 MΩ or more (at 500 VDC) Between lead block and case	
	Operating temperature range	Operation: -10 to 60 °C, Storage: -20 to 70 °C (No condensation or freezing)	
	Operating humidity range	Operation, Storage: 35 to 85%RH (No condensation)	
Standard		CE marked (EMC directive, RoHS directive)	
Lead wire and M12 connector		3 m	

○Piping specifications

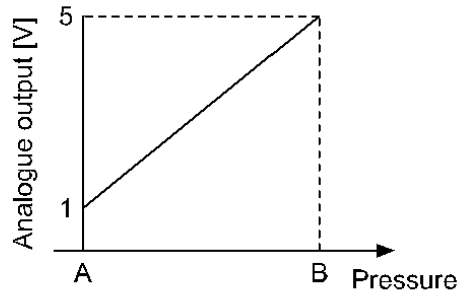
Model		02
Port size		R1/4, M5 x 0.8
Materials of parts in contact with fluid		Piping port: C3604 + electroless nickel plated Pressure sensor: Al_2o_3 (aluminum oxide) Sensor seal: FKM
Weight	Without lead wire and M12 connector	103 g
	With lead wire and M12 connector	191 g

○Cable specifications

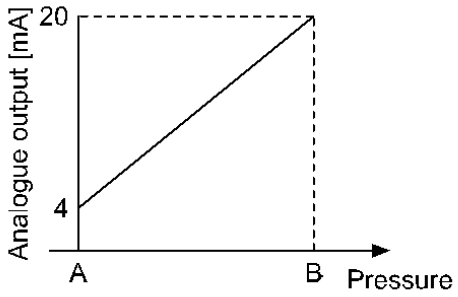
Conductor	Nominal cross section area	AWG23
	Outside diameter	0.72 mm
Insulator	Material	Cross linked vinyl chloride
	Outside diameter	1.14 mm
	Colours	Brown, Blue, Black, White
Sheath	Material	Oil resistant vinyl chloride
Finished outside diameter		ϕ4

○Analogue output

1 to 5 VDC

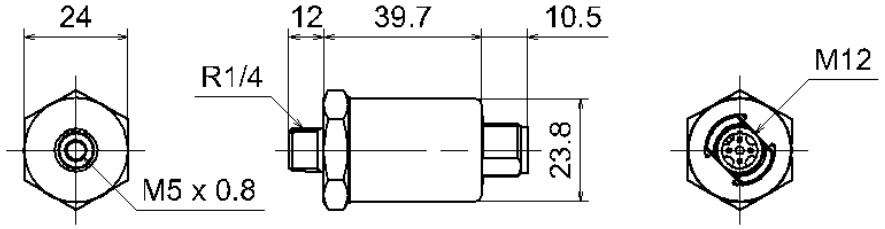


4 to 20 mA



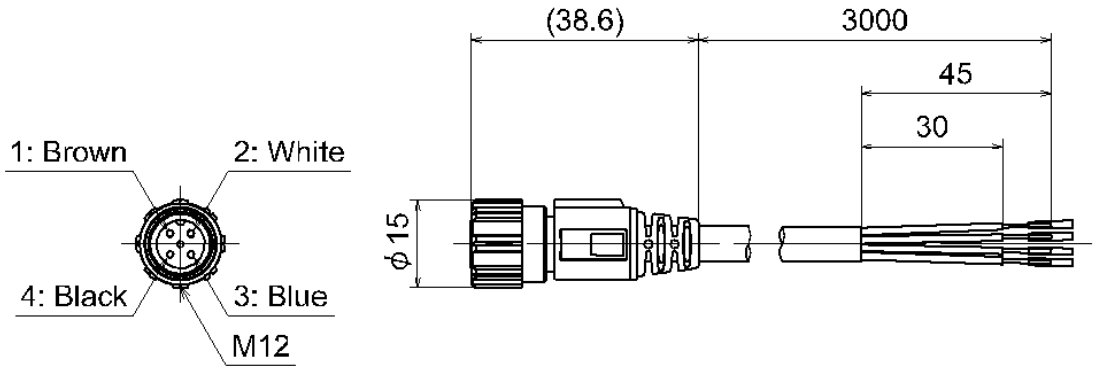
Model	Rated pressure range	A	B
PSE575	0 to 2 MPa	0	2 MPa
PSE576	0 to 5 MPa	0	5 MPa
PSE577	0 to 10 MPa	0	10 MPa

■Dimensions

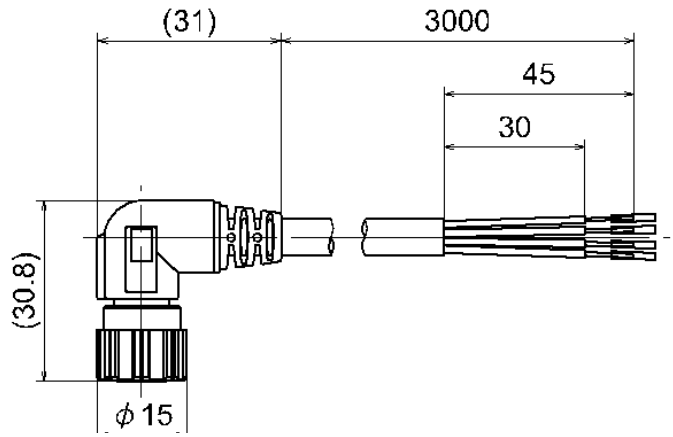


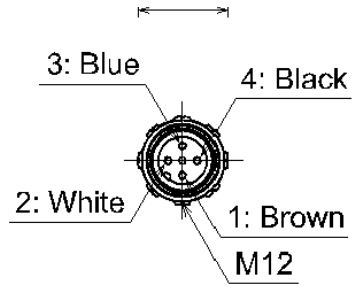
•Lead wire and M12 connector

ZS-37-A

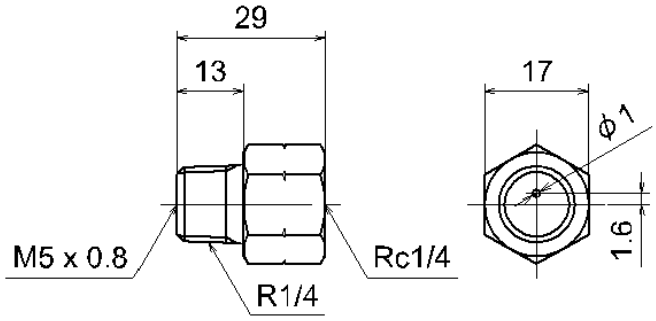


ZS-37-B





•Adapter with throttle
ZS-31-X175



Revision history
A: Contents revised in several places.
B: Contents revised in several places. [July 2018]
C: Contents revised in several places. [October 2020]

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No.PS※※-OMT0006-C

Documents / Resources

	SMC PSE575 Pressure Sensor for General Fluids [pdf] User Manual PSE575, 576, 577, PSE575 Pressure Sensor for General Fluids, Pressure Sensor for General Fluids