

Smart Pressure Transmitter

Model PTG60/70/71/72

User's Manual



Azbil Corporation

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Preface

Thank you very much for purchasing Azbil Corporation's Model PTG Smart Pressure Transmitter. Azbil Corporation's Model PTG Smart Pressure Transmitters are high performance, highly reliable general use pressure transmitters. The Model PTG offer improved performance and reliability with size, weight and cost advantages. Information regarding the Model PTG can be accessed using handheld SFC (Smart Field Communicator) at the valve or at a field junction box, or by using operators console.

This instruction manual describes how to use the Model PTG Smart Pressure Transmitter. We hope that you will fully use this manual to make the best use of the features of Model PTG Pressure Transmitter.

For safe operation of this product, please follow the following safety instructions. Azbil Corporation will not assume any liability for damages arising from failure to follow these safety instructions.

~Note *Good installation, correct operation, and post-installation maintenance are essential to safe use of your Model PTG Pressure Transmitter. The safety instructions are contained in this manual. Fully understand these instructions before installing, operating, and maintaining your PTG Smart Pressure Transmitter.*

Safety Standard

- The safety instructions presented in this Instruction Manual conform to ANSI (American National Standards Institute) Z535-4.
- In this manual, safety instructions are classified as either Warnings, Cautions, and Notes. The standard of classification is as follows:



WARNING

Failure to observe safety instructions in this category may result in personal injury or, even, death. Equivalent to definition “warning” in ANSI regulations.



CAUTION

Failure to observe safety instructions in this category could result in damage to or breakdown of equipment or facilities. Equivalent to definition “caution” in ANSI regulations.

~Note *Information that can be useful to the user. Equivalent to definition to “note” in ANSI regulations.*

Observe safe working practices

Note the following to ensure safety during installation and operation:

- Turn off the power switch before any wiring work.
- When opening the cover of the terminal box, pay due attention to the edges of the cover and the threads in the screws in the cabinet. If the PTG Smart Pressure Transmitter is an explosion model, NEVER open the terminal cover while the Transmitter is energized in operation.
- Do not stand on the installed Transmitter or use it as a step to prevent accidents.
- Do not touch the Transmitter unnecessarily while in operation. Surface may be very hot or very cold, depending on the process condition.

Explosion protected Models

FM Explosionproof / Dust-ignitionproof Apparatus (in accordance with NEC)



CAUTION

-
- Install the apparatus only in areas for which the apparatus has been approved.
 - Seal each conduit entering the apparatus enclosure within 18 inches (457 mm) from the enclosure.
 - Do not open the apparatus enclosure when an explosive atmosphere is present.
-

1. Class I, Division 1 locations

1.1 Wiring methods

- **Threaded rigid metal conduit, threaded steel intermediate metal conduit, or Type MI cable with termination fittings approved for the location**, can be employed
- **Threaded joints** must be made up with at least five threads fully engaged.

1.2 Sealing

- **Each conduit entering the apparatus enclosure is required to be sealed within 18 inches (457 mm) from the enclosure.**
- The sealing of each conduit can be provided with **a sealing fitting approved for class I locations.**
- **Sealing compound must be approved** and must not have a melting point of less than 93°C (200 °F).
- The minimum thickness of the sealing compound should not be less than the trade size of the conduit and, in no case, less than 5/8 inch (16 mm).
- Splices and taps cannot be made in the fittings.

2. Class I, Division 2 locations

2.1 Wiring methods

- **Threaded rigid metal conduit, threaded steel intermediate metal conduit, enclosed gasketed busways, or Type PLTC cable in accordance with the provisions of remote-control, signaling, and power-limited circuits (see NEC, Article 725), or Type ITC cable in cable trays, in raceways, supported by messenger wire, or directly buried where the cable is listed for this use; Type MI, MC, MV, or TC cable with approved termination fittings** can be employed.

2.2 Sealing

- Each conduit entering the apparatus enclosure is required to be sealed as shown in 1.2.

3. Class II, Division 1 locations

3.1 Wiring methods

- **Threaded rigid metal conduit, threaded steel intermediate metal conduit, or Type MI cable with termination fittings approved for the location**, can be employed.

3.2 Sealing

- Where a **raceway** provides communication between the apparatus enclosure and an enclosure that is not required to be dust-ignitionproof, suitable means must be provided to prevent the entrance of dust into the former enclosure through this raceway. One of the following means can be used: (1) a permanent and effective seal; (2) a horizontal raceway not less than 10 ft (3.05 m) long; or (3) a vertical raceway not less than 5 ft (1.52 m) long and extending downward from the dust-ignitionproof enclosure.
- **Seals are not required to be explosionproof.**

4. Class II, Division 2 locations

4.1 Wiring methods

- **Rigid metal conduit, intermediate metal conduit, electrical metallic tubing, dust-tight wireways, or Type MC or MI cable with approved termination fittings, or Type PLTC in cable trays, or Type ITC in cable trays, or Type MC or TC cable installed in ladder, ventilated trough, or ventilated channel cable trays in a single layer, with a space not less than the larger cable diameter between the two adjacent cables, can be employed.**

4.2 Sealing

- Sealing means must be provided as shown in 3.2.

5. Class III, Division 1 locations

5.1 Wiring methods

- **Rigid metal conduit, rigid non-metallic conduit, intermediate metal conduit, electrical metallic tubing, dust-tight wireways, or Type MC or MI cable with approved termination fittings, can be employed.**

5.2 Sealing

- Sealing means are not required.

6. Class III, Division 2 locations

6.1 Wiring methods

- Wiring methods must comply with 5.1.

6.2 Sealing

- Sealing means are not required.

NEPSI Flameproof and Dust Certifications

Smart Pressure Transmitter Model PTG, manufactured by Azbil Corporation, has been approved by National Supervision and Inspection Centre for Explosion Protection and Safety of Instrumentation (NEPSI) in accordance with the following standards:

GB3836.1 - 2010	Explosive atmospheres Part 1: Equipment - General requirements
GB3836.2 - 2010	Explosive atmospheres Part 2: Equipment protection by flameproof enclosures “d”
GB12476.1 - 2013	Electrical apparatus for use in the presence of combustible dust Part 1 : General requirements
GB12476.5 - 2013	Electrical apparatus for use in the presence of combustible dust Part 5 : Protection by enclosures “tD”

Transmitters are approved with Ex marking of Ex d IIC T4–T6 Gb, Ex tD A20 IP67 T85 °C to T135 °C. The certificate number is GYJ19.1389X.

1. SPECIAL CONDITIONS FOR SAFE USE

When the sign “X” is placed after the certificate number, it indicates that the product is subject to special conditions or instructions for safe use.

- 1.1 Special condition for safe use: The cover shall have at least 7 engaged threads.
- 1.2 Instructions for safe use: To maintain the degree of protection of at least IP67 in accordance with IEC60529, suitable cable glands, conduit sealing devices or blanking elements must be used and correctly installed.

2. CONDITIONS FOR SAFE USE

- 2.1 The external earthing terminal should be connected to the ground reliably at site.
- 2.2 The relation between temperature class, ambient temperature range, and the maximum process temperature are shown below:

Temperature Class	Ambient Temperature Range	Maximum Process Temperature
T4 / T135 °C	-25°C to +60°C	> 130°C
T5 / T100 °C	-25°C to +60°C	> 95°C
T6 / T85 °C	-25°C to +40°C	> 80°C

- 2.3 The cable entry holes have to be connected by means of suitable cable entry device with type of protection of Ex d IIC Gb. The cable entry device shall be approved by NEPSI in accordance with GB3836.1-2010, GB3836.2-2010, GB12476.1-2013, GB12476.5 - 2013, which are covered by a separate examination certificate. The threads of the cable entries shall be 1/2-14NPT. Unused entry holes shall be blocked by blanking elements. After installation of the cable entry, the whole apparatus shall reach IP67.
- 2.4 The warning, “Do not remove cover while circuits are alive” must be obeyed when the product is used in an explosive gas area.

- 2.5 Rated supply voltage: 12 to 30 Vd.c.
- 2.6 End users are forbidden to change the configuration to ensure the explosion protection performance of the product.
- 2.7 Regular cleanness shall be conducted to avoid the deposit of dust.
- 2.8 During installation, operation, and maintenance of the product users should comply with the relevant requirements of the product instruction manual, and the following standards:
 - GB3836.13-2013 : Explosive atmospheres — Part 13: Equipment repair, overhaul and reclamation
 - GB/T3836.15-2017 : Explosive atmospheres — Part 15: Electrical installations design, selection and erection
 - GB/T3836.16-2017 : Explosive atmospheres — Part 16: Electrical installations inspection and maintenance
 - GB50257-2014 : Code for construction and acceptance of electric equipment on fire and explosion hazard electrical equipment installation engineering
 - GB15577-2018 : Safety regulations for dust explosion prevention and protection

3. MANUFACTURER'S RESPONSIBILITY

- 3.1 The instruction manual should include all the items mentioned above.
- 3.2 The manufacturer must strictly produce according to the documents approved by NEPSI.

Precautions

General Precautions

1. Checking the Product

The Model PTG Smart Transmitter is a precision instrument. It has cleared various tests based on Azbil Corporation's rigorous quality control programs. Handle it with care to prevent accidents or damage.

Open the package, and check that the following items are included:

- 1) Main PTG Smart Pressure Transmitter
- 2) Blind conduit plug (standard accessory)
- 3) Gasket (if process connection used a male screw)
- 4) 2-inch pipe/wall mounting hardware set (optional)
- 5) Unit seal (for integral digital indicator type, optional)
- 6) Packing sets for wiring (For TIIS explosion proof type):

2. Checking the specifications

Specifications are printed to the nameplate of the PTG unit. Refer to the supplement, and make sure that the unit you have received matches to the model that you specified at the time of ordering. Then verify the followings:

Tag number (TAG NO.)

Type

Prom number (PROM No.)

3. Transportation

We recommend to transport the transmitter to the installation site in the packaged state in order to prevent damages from occurring during transportation.

4. Storage Environment

When storing your Transmitter unpacked, observe the following.

Store indoors, within specified storage temperature and humidity, in a location that is free from excessive shocks and vibrations. Store the unit original packing condition.

When storing your unit after use, follow these steps:

1. Firmly tighten the terminal box cover, and seal the conduit connection end with tape, to prevent the entry of moisture.
2. Seal the connection ends and bleed the hole in the pilot cover with tape, to prevent the entry of moisture and dirt.

3. Restore packing to original condition.
4. Store indoors, at ordinary temperature and humidity (about 25°C or 77°F, and 65% respectively), in a location that is free from excessive shocks and vibrations and not exposed to rain or water.

5. Installation Environment

In order to maintain the original performance and reliability for a long time, install the transmitter in the following environment:

(1) Ambient temperature

- (a) The temperature gradient and temperature changes in installation environment should be as small as possible.
- (b) If a transmitter is exposed to heat radiated from the process side, lower its ambient temperature as much as possible by installing it or by selecting a well-ventilated location for installation.
- (c) If a process fluid can freeze, prevent freezing by means of heat insulation.

(2) Environment

Pollution degree: 2

Avoid corrosive environment as much as possible.

Install in explosion proof and intrinsically safe conditions.

(3) Shock and vibration

Install the transmitter where shocks and vibrations will be as small as possible.

(4) Industrial Electromagnetic Environment

The transmitter intends to be used in an environment existing at locations characterized by a separate power network, in most cases supplied from a high- or medium-voltage transformer, dedicated for the supply of installations feeding manufacturing or similar plants with one or more of the following conditions:

- frequent switching of heavy inductive or capacitive loads;
- high currents and associated magnetic fields;
- presence of Industrial, Scientific and Medical (ISM) equipment (for example, welding machines)

6. Application of Pressure to Transmitter

- (1) Do not apply a pressure that exceeds the specified level.
- (2) Do not tighten or loosen bolts while pressure is being applied to the transmitter.

7. General precautions

- Do not use a transceiver within the area of 7 feet (2 meters) around the product, or around the connecting cables to the product. Doing so may result in malfunctioning of the product.
- Do not remove seals affixed to welds and the grounding cables until all pipes are installed.

Cautions to Disposal of Electrical and Electronic Equipment

Disposal of Electrical and Electronic Equipment (for Environmental Protection)

This is an industrial product subject to the WEEE Directive.

Do not dispose of electrical and electronic equipment in the same way as household waste.

Old products contain valuable raw materials and must be returned to an authorized collection point for correct disposal or recycling.



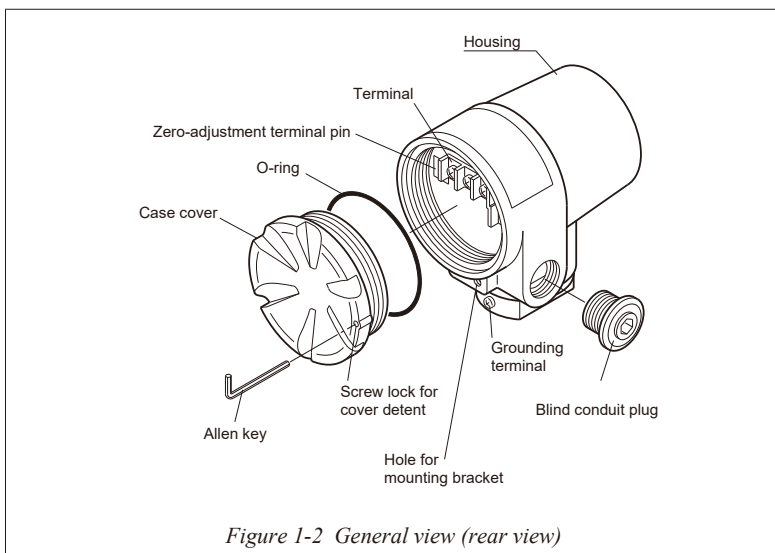
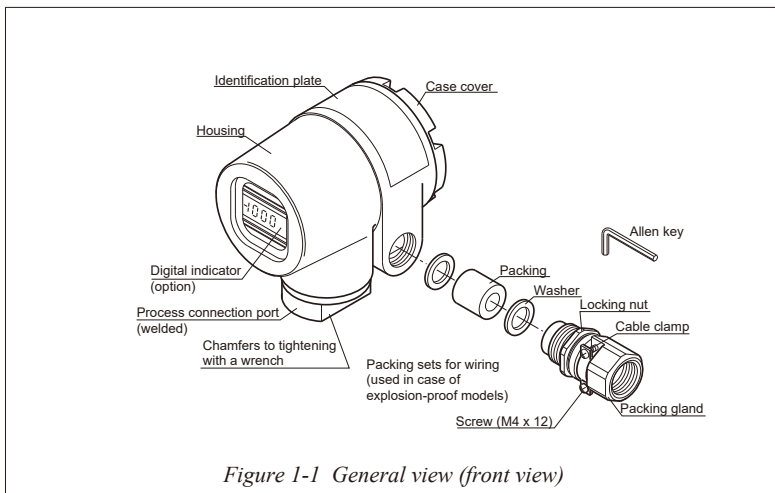
8. Contact

If you find any doubt about the specifications, contact an Azbil Corp. representative. When making an inquiry, provide unit's model number (MODEL) and product number (PROD.).

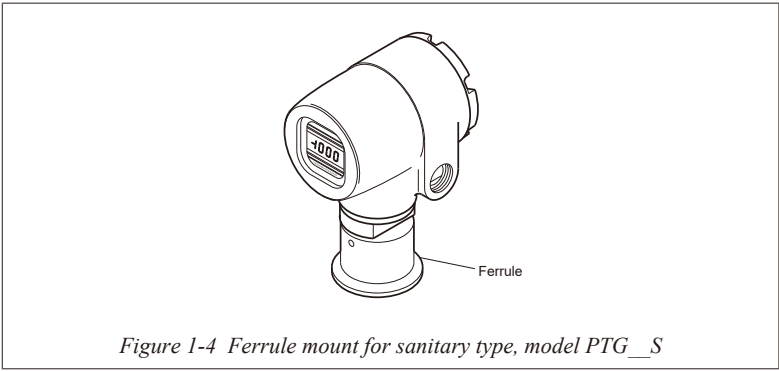
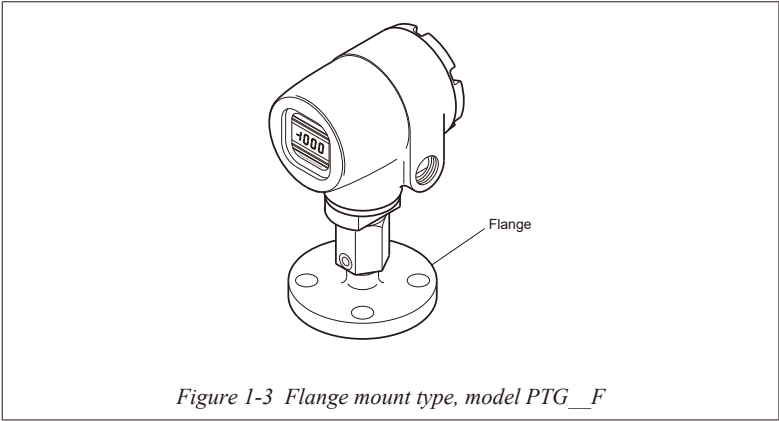
Chapter 1 : Descriptions of Parts

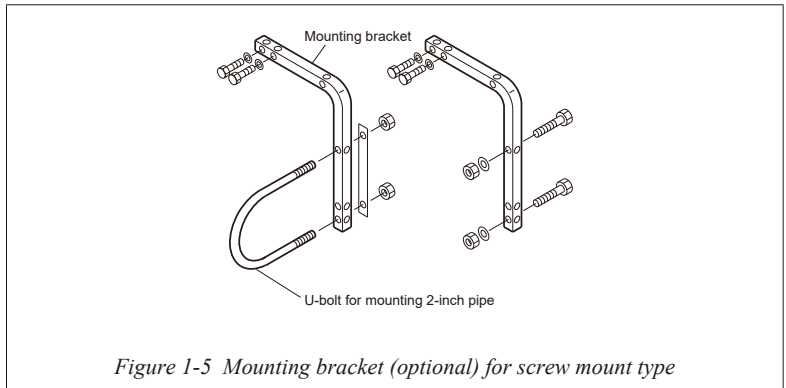
1-1 : Description of parts

Figure 1-1 and Figure 1-2 show expanded front and rear views of the PTG Pressure Transmitter.



The various types of mounting are given in Figure 1-3 and 1-4.





Chapter 2 : Installation

Introduction

This section describes various installation methods for different types of process interface.

2-1 : Air inlet

A Model PTG is a gauge pressure transmitter. The built-in semiconductor pressure sensor measures atmospheric pressure as the reference pressure.

Install this device in such a way that water will not enter the air inlet and powder or viscous materials will not be deposited on it.

If this device will be installed upside down at the bottom of the tank (with the process connection port facing upward), or if powder or viscous material may adhere to or accumulate on the device's exterior, insert the chloroprene rubber fitting (included with the product) into the air inlet.

If this device will be exposed to heavy splashing or if a great amount of powder or viscous material will adhere to or accumulate around it, it is also possible to insert a 3 mm diameter tube into this inlet to introduce air at a different position.

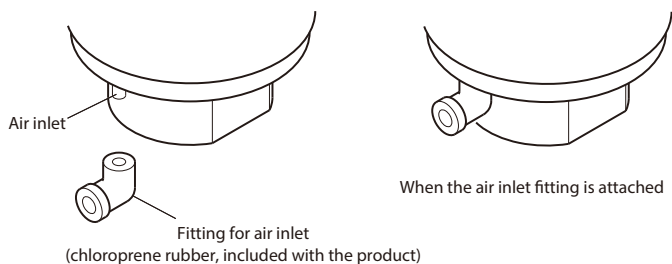


Figure 2-1 Air inlet and rubber fitting

For models with an internal air inlet (optional), the inlet is located in the cable wiring space so as not to be exposed to the outside.

2-2 : Installing screw-mount transmitters (model PTG__G, PTG__B, PTG__A)

Safety precautions



CAUTION

- After the PTG Transmitter is installed, do not use it as a foothold or any other improper purpose. Doing so may result in damage to equipment and/or physical injury.
- Hitting the glass portion of the indicator with a tool may break the glass and/or cause physical injury. Caution must be exercised if your PTG Transmitter is equipped with an optional digital indicator.
- Be careful when installing the transmitter if the process fluid temperature is high. The heat of the fluid and/or the heat radiated from the piping may raise the surface temperature of the Transmitter very high.

Installation precautions

- When installing the Transmitter, position and secure the gasket so that it does not protrude from where the Transmitter is connected to the process (where an adapter flange is coupled to a connecting pipe). If the gasket sticks out, liquid leakage or output error may result.
- Do not use the Transmitter under any other operating conditions than specified in the product specifications (i.e., rated pressure, connection standard, rated temperature, rated vibration and rated humidity). Using this product under incorrect operating conditions may cause damage to the product and leakage that could lead to a major accident.
- Wiring work in hazardous area should be performed carefully by following the work methods specified in the explosion-protection guidelines.
- Connect the Transmitter to a good ground. If it is not grounded or the ground is inadequate, output error will occur. Not grounding the transmitter is a violation of regulations. Be careful of your footing during installation. Always wear safety shoes.
- This product can be installed directly on the pipe (direct mounting), on a 2-inch pipe with the mounting brackets (optional part), or on a wall.
- Connecting pipe arrangement
- Piping conditions differ depending on the process.
 - Liquid: Establish a tap alongside the line and install the Transmitter next to or beneath the tap to allow gas to return to the inside of the process line.
 - Gas: Establish a tap on top of or alongside the line and install the Transmitter next to or above the tap to allow liquid to return to the inside of the process line.
 - Steam: Establish a tap alongside the process line and install the Transmitter beneath that tap to allow condensation to return through the connecting pipe.

Handling precautions

- For models PTG__G and PTG__A, Securely wrap sealing tape around the joint of the connecting pipe to prevent process leakage.
For model PTG7_B, seal the joint with a gasket.
- Using wrenches, securely tighten the wetted part and connecting pipe of the Transmitter. In so doing, use the wrenches to hold the parallel chambers at the wetted part. Do not tighten it by holding the housing of the product as this may cause damage to the Transmitter. Avoid holding the housing when tightening without a wrench.(See Figure 2-2.)
- Avoid installing the Transmitter with its front side facing down. Doing so invites water, dirt and other sediment to deposit at the wetted part, causing an inaccurate measurement.
- If the process temperature exceeds 110°C (230°F), take some measures, such as installing a siphon, to defuse the high temperature at the wetted part so it does not exceed 110°C (230°F).
- Install the Transmitter in a location where the liquid process does not freeze. Otherwise, take some measures to keep the process fluid from freezing.
- Install the Transmitter in a location where there is no excessive impact, vibration or pressure (such as water hammering).
- During filling the connecting pipe with process liquid, 10 MPa {1,450 PSI} or an equivalent pressure may be applied. Do not screw the Transmitter into a connecting pipe during filling, as it may lead to critical damage to the Transmitter. (See Figure 2-3.)

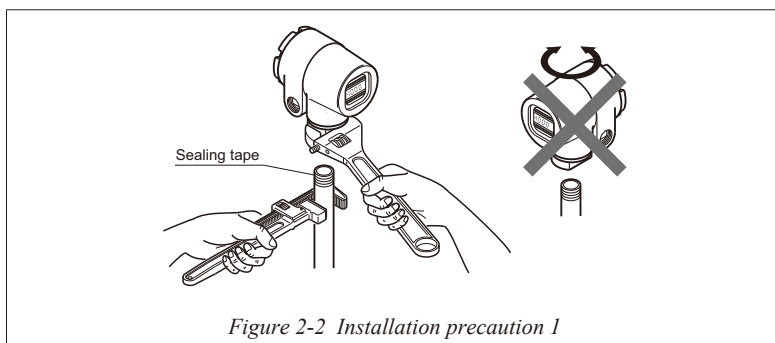
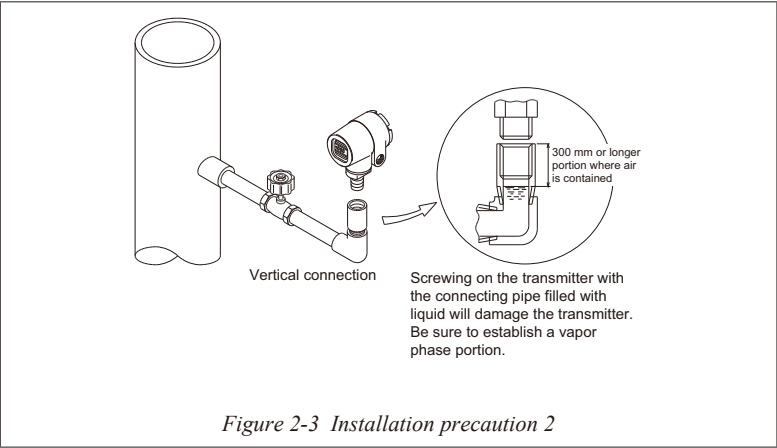


Figure 2-2 Installation precaution 1



Direct mounting onto the process line

Handling precautions

- When mounting the Transmitter directly onto the process line, full consideration must be given as to its weight, the temperature at the wetted part and to vibration.
- The method of connecting the Transmitter to the process line must be appropriate for each given process.
- Figure 2-4 shows an example of the direct-mount method.

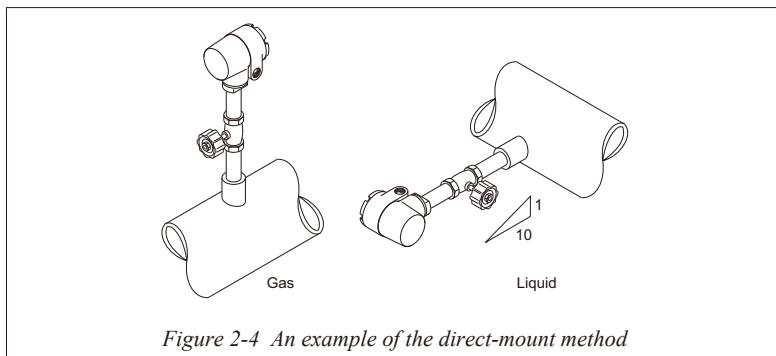


Figure 2-4 An example of the direct-mount method

Installing using an optional mounting bracket

Installation using the mounting bracket

An optional mounting bracket is available.

If a spare mounting bracket is necessary, please refer to “Chapter 10 : Spare Parts”.

If the mounting bracket is used, the transmitter can be installed on a 2-inch pipe or on a panel.

Figure 2-5 shows the recommended directions of the pressure outlet and the methods of connecting the impulse pipe. Figure 2-7 shows examples of installation using the mounting bracket.

Handling precautions

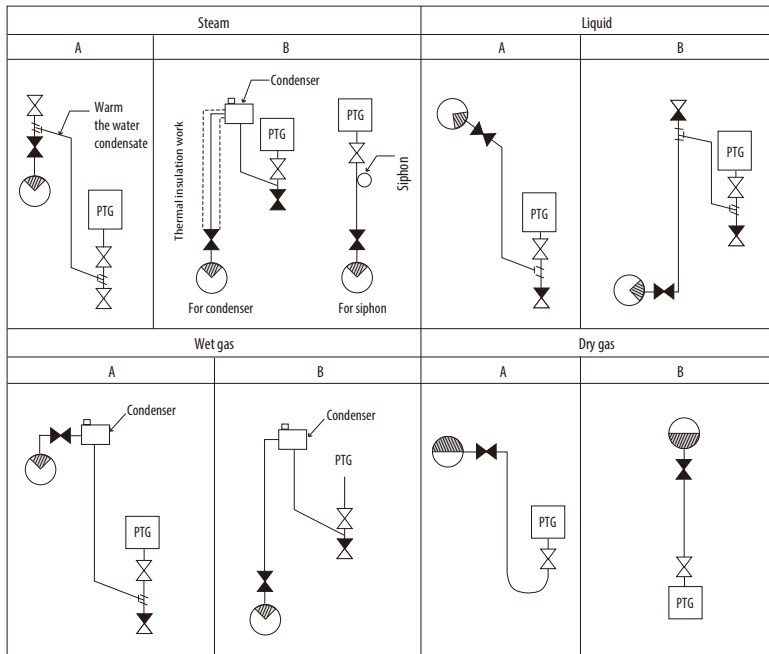
- When mounting this device on a 2-inch pipe or a panel using the mounting bracket, carefully consider the device’s mass, the temperature of the wetted part, and vibration.
- Use the appropriate method of connecting impulse pipes in accordance with the process.
- The pressure outlet should be in a place that is free from unnecessary dynamic pressure.

Also, install this device so that the impulse pipe between the pressure outlet and the instrumentation is not long and the head pressure difference is small.

- Appropriate tightening torque (for reference only)

For a M5 SUS304 bolt: 3 to 4 N·m

(The above value is for reference only. Tighten bolts with a torque that is appropriate for the material of the female thread and the installation location.)



Note:

A: The PTG is installed below the pressure outlet.

B: The PTG is installed above the pressure outlet.

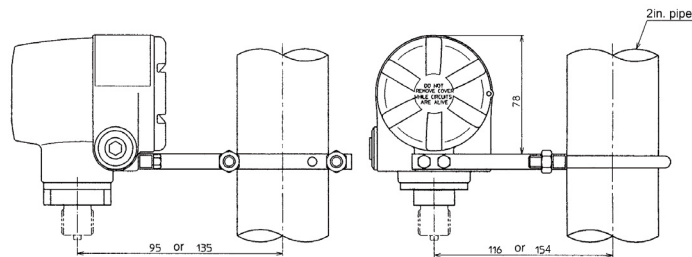
⌵ Main valve, ⌵ Gauge valve

⌵ Air release valve, ⌵ Drain valve

Black part of ⬤ The desirable direction of the pressure outlet

Figure 2-5 Pressure output direction and method of connecting impulse pipes

Installing the transmitter on a 2-inch pipe



Installing the transmitter on a panel

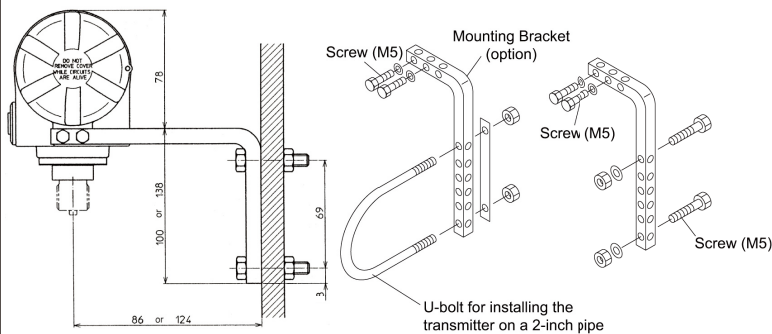


Figure 2-6 Installing the transmitter with the mounting brackets on a panel and 2-inch pipe

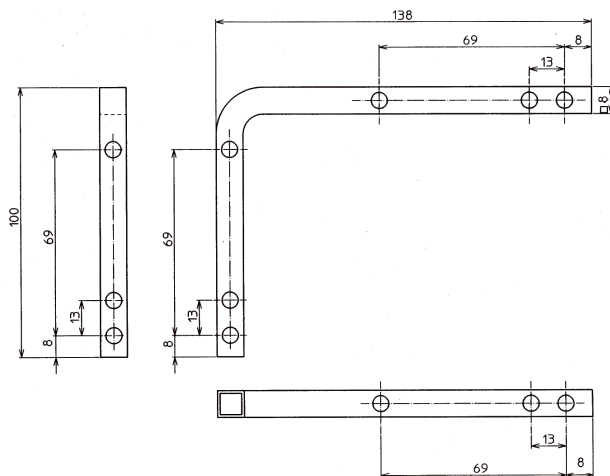


Figure 2-7 Dimensions of mounting bracket

2-3 : Installing flange-mount transmitters (model PTG__F)

Safety precautions



CAUTION

- After the Transmitter is installed, do not use it as a foothold or any other improper purpose. Doing so may damage the equipment and/or result in physical injury.
- Hitting the glass portion of the indicator with a tool may break the glass and result in physical injury. Caution must be exercised for products equipped with an digital indicator.
- Be careful when installing the Transmitter if the process fluid temperature is high. The heat of the fluid and/or the heat radiated from the piping may raise the surface temperature of the Transmitter very high.
- Fasten the flange with the specified torque to prevent the leakage from the flange connection.

Installation precautions

- When installing the Transmitter, position and secure the gasket so that it does not protrude from where the Transmitter is connected to the process (where an adapter flange is coupled to a connecting pipe). If the gasket sticks out, liquid leakage or output error may result.
- Do not use the Transmitter under any other operating conditions than specified in the product specifications (i.e., rated pressure, connection standard, rated temperature, rated vibration and rated humidity). Using this product under incorrect operating conditions may cause damage to the product and leakage that could lead to a major accident.
- Wiring work in hazardous area should be performed carefully by following the work methods specified in the explosion-protection guidelines.
- Properly ground the Transmitter. If it is not grounded or the ground is inadequate, output error will occur. Not grounding the transmitter is a violation of regulations. Be careful of your footing during installation. Always wear safety shoes.
- This product can be installed directly on the pipe (direct mounting), on a 2-inch pipe with the mounting brackets (optional part), or on a wall.
- If the flange diameter is 15A or 25A, use a gasket that meets the following conditions. $\text{Gasket inner dia.} + (\text{gasket outer dia.} - \text{gasket inner dia.}) \div 2 \geq 45 \text{ mm}$ (Ex.: The calculation result for a 15A spiral gasket (JIS 2404) is less than 45 mm. Do not use this gasket because it may damage the transmitter.)
- Minimum flange tightening torque (reference value): 64710 N

Handling precautions

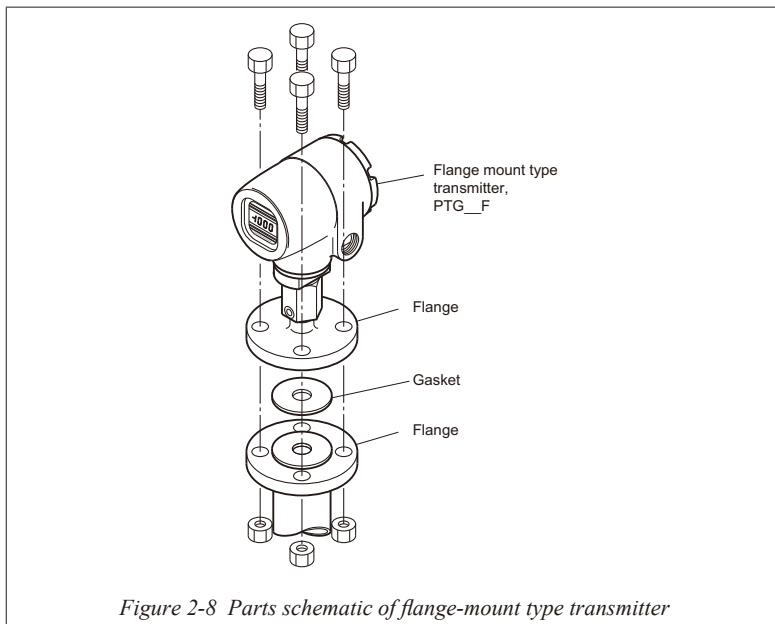
- Mounting procedure: Piping conditions differ depending on the process.
 - Liquid: Mount the nozzle on the pipe side and install the Transmitter sideways away from the nozzle or below the nozzle so that no deposit is produced and the gas generated returns to the process piping.
 - Gas: Mount the nozzle on top or to the side of the process pipe and install the Transmitter beside or above the nozzle so that the process returns to the process piping.
 - Steam: Mount the nozzle in the pipe side and install the Transmitter at the downside of the nozzle so that the condensed water collects in the conduit piping.
- Weld or bind with a sealing tape securely to the piping joint to prevent a process leakage from occurring.
- Avoid installing the Transmitter with its front side facing down. Doing so invites water, dirt and other sediment to deposit at the wetted part, causing an inaccurate measurement.
- If the process temperature exceeds 110°C (230°F), take some measures, such as installing a siphon, to defuse the high temperature at the wetted part so it does not exceed 110°C (230°F).
- Install the Transmitter in a location where liquid process does not freeze. Otherwise, take some measures to keep the process fluid from freezing.
- Install the Transmitter in a location where there is no excessive impact, vibration or pressure (such as water hammering).
- After installing the transmitter, adjust the zero point.
For details on the method of zero point adjustment, refer to chapter 4, “Calibration.”

Installing flange-mount transmitters

Precautions

- Mount the Transmitter considering its weight, the temperature at its wetted part and possible vibration.
- Connect the conduit to satisfy the given process requirements.

Figure 2-8 below shows an example of flange-mount type Transmitter.



2-4 : Installing ferrule-mount (sanitary type) transmitters (model PTG__S,PTG__K,PTG__T)

Safety precautions



CAUTION

- After the Transmitter is installed, do not use it as a foothold or any other improper purpose. Doing so may damage the equipment and/or result in physical injury.
- Hitting the glass portion of the indicator with a tool may break the glass and result in physical injury. Caution must be exercised for products equipped with a digital indicator.
- Be careful when installing the Transmitter if the process fluid temperature is high. The heat of the fluid and/or the heat radiated from the piping may raise the surface temperature of the Transmitter very high.

Installation precaution

- When installing the Transmitter, position and secure the gasket so that it does not protrude from where the Transmitter is connected to the process (where an adapter flange is coupled to a connecting pipe). If the gasket sticks out, liquid leakage or output error may result.
- Do not use the Transmitter under any other operating conditions than specified in the product specifications (i.e., rated pressure, connection standard, rated temperature, rated vibration and rated humidity). Using this product under incorrect operating conditions may cause damage to the product and leakage that could lead to a major accident.
- Wiring work in hazardous area should be performed carefully by following the work methods specified in the explosion-protection guidelines.
- Properly ground the Transmitter. If it is not grounded or the ground is inadequate, output error will occur. Not grounding the transmitter is a violation of regulations. Be careful of your footing during installation. Always wear safety shoes.
- Mounting procedure: Piping conditions differ depending on the process.

Liquid: Mount the nozzle in the pipe side and install the Transmitter sideways to or to the downside of the nozzle so that no deposit is produced and the gas generated returns to the process piping.

Gas: Mount the nozzle to the top or the side of the process pipe and install the Transmitter side by side with or to the upper side of the nozzle so that the process returns to the process piping.

Steam: Mount the nozzle on the pipe side and install the Transmitter at the downside of the nozzle so that the condensed water collects in the conduit piping.

Handling precautions

- Weld or bind with a sealing tape securely to the piping joint to prevent a process leakage from occurring.
- Avoid installing the Transmitter with its front side facing down. Doing so invites water, dirt and other sediment to deposit at the wetted part, causing an inaccurate measurement.
- If the process temperature exceeds 110°C (230°F), take some measures, such as installing a siphon, to defuse the high temperature at the wetted part so it does not exceed 150°C (302°F).
- Install the Transmitter in a location where liquid process does not freeze. Otherwise, take some measures to keep the process fluid from freezing.
- Install the Transmitter in a location where there is no excessive impact, vibration or pressure (such as water hammering).
- The use of standard models in the following installation locations may cause device failure. In these locations, please use the PTG__ with the optional feature of resistance to dynamic pressure or resistance to pulsation.
[Recommended locations for dynamic pressure resistant model]
 - (1) Where dynamic pressure is applied repeatedly to this device due to a batch process
 - (2) Where the sensor of this device is exposed to a water shower for cleaning a tank (Ex.: top of a conical tank)
 - (3) Other places where dynamic pressure is applied this device (Ex.: near pipe bends)[Recommended locations for pulsation resistant model]
 - (1) Where this device is exposed directly to process pulsation (Ex.: rotary pump outlet)
- After installing the transmitter, adjust the zero point.
For details on the zero point adjustment method, refer to chapter 4, “Calibration.”

Mounting of sanitary type transmitters

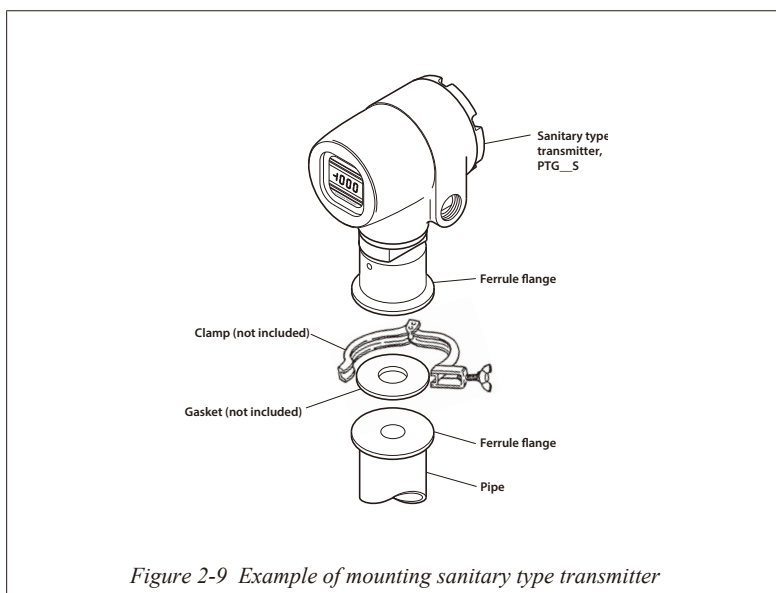
Mounting precautions

Mount the transmitter taking into consideration its weight as well as the temperature at its wet part and any possible vibration.

- Use the appropriate method of connecting impulse pipes in accordance with the process.
- The pressure outlet should be in a place that is free from unnecessary dynamic pressure.

Example of mounting

Figure 2-9 below shows an example of mounting a sanitary type transmitter.



Chapter 3 : Wiring

Wiring precautions



CAUTION

Performing wiring work with wet hands or with power applied may result in electrical shock. Perform wiring work with dry hands, always wear gloves and disconnect the power to the Transmitter before performing wiring work.

- Check the specifications before wiring. Incorrect wiring will cause damage to or malfunction of the product.
- Use a power supply which adheres to the specifications. Incorrect power supply will cause a damage to the product.
- The product is designed based on a two-wire wiring system. The power supply line also functions as a signal line. The wires are routed through the conduit hole on the side face of the Transmitter and are connected to the terminals. The conduit end is potted with sealing agent or capped with a sealing plug so the water cannot penetrate into the oscillator housing. The connecting wires to the terminals must be drawn in below the position where the connection port is located.
- Grounding wire

The transmitter has two grounding terminals: one at the terminal and the other on the outside face. Either terminal can be used. The grounding terminal must be connected to a class 3 ground (grounding resistance 100 Ω or less) or better.

For TIIS Explosion proof wiring

A model PTG conforming to the TIIS explosion-proof regulations is optionally available, and has a certified explosion-proof structure (Exdo IIC T4X).



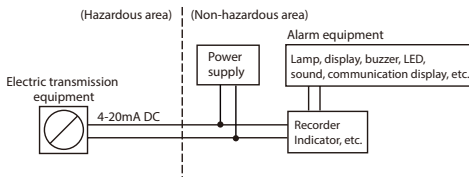
WARNING

-
- Be sure to perform wiring work with the power turned off. If the power is turned on, this may result in electrical shock.
 - Turning on the power in an explosion-protected area while the housing is open may result in explosion.
-
- Be sure to use the grounding cable and the set of pressure packings shipped with the transmitter. Using a cable or packing other than the ones shipped with the product will void the explosion-proof qualification of the transmitter.
 - After the wires are connected, be sure to close the cover and tighten the screw lock that holds the cover detent in place. One requirement for an explosion-proof structure is that the cover must be locked.
 - Installation and connection are to conform to the guidelines for industrial safety research and technology "Guide to Industrial Explosion-proof Electrical

Equipment for Users” (published by Industrial Safety Institute of the Ministry of Labor, Japan) or equivalent.

- This device has explosion-proof specifications. Configure your system so that an alarm is triggered in case of an output error (output of 3.8 mA or less, or 20.8 mA or more). The type of alarm system can be freely determined by your specifications.

Sample alarm system configuration

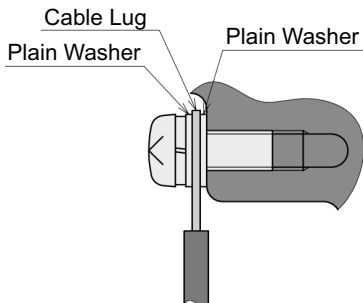


For FM and NEPSI Explosion-proof wiring

A model PTG Transmitters are conforming to Factory Mutual (FM) or NEPSI / GB explosion-proof regulations and are optionally available.

WIRING PRECAUTIONS

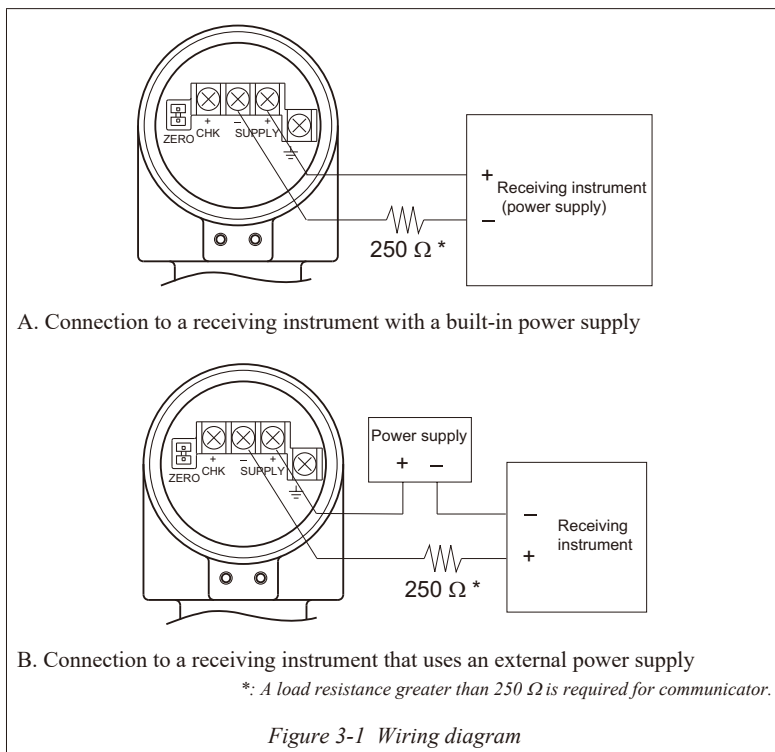
The connection of earthing or bonding conductor to the external grounding terminal must comply with the method shown below.



WARNING

- Be sure to turn off the power switch before performing the wiring work to avoid electrical shock to a personnel.
- Turning on the power in an explosion-protected area while the housing is open can induce an explosion.
- Be sure to use the grounding cable and the pressure packings.
- After the wiring is done, be sure to close the housing and tighten the screw lock securely. One important requirement for an explosion-proof structure is that the housing must be locked.

Wiring diagram

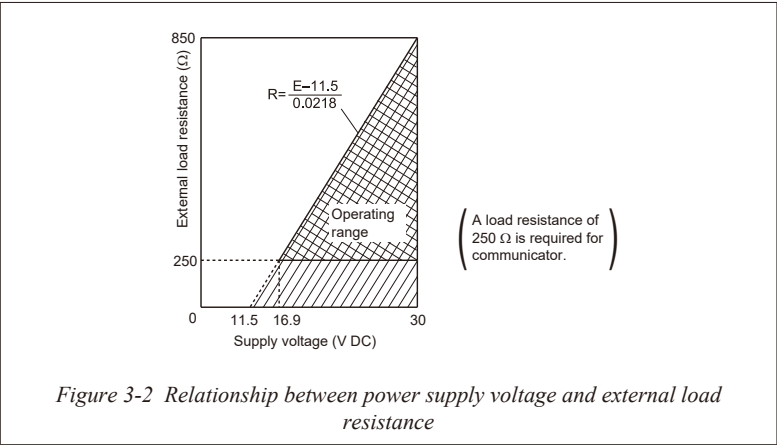


Power supply and external load resistance

External load resistance should be determined in relation to the voltage of the power supply so that both fall inside the diagonally-shaded area below.

External load resistance is the total resistance connected to the output terminals of the Transmitter, which includes the resistance in the cables forming the loop, the internal resistance in instruments connected between the Transmitter and the power supply, etc.

The abscissa axis shown in the figure is the voltage of the Transmitter’s power supply and the ordinate axis is the external load resistance.



Chapter 4 : Calibration

With the Model PTG Transmitter, no span interference will occur once its zero-point calibration is complete. That is, only one zero-point adjustment is needed for a complete calibration.

Note: Adjust the zero point in an area that does not require explosion-proofing.

Zero adjustment

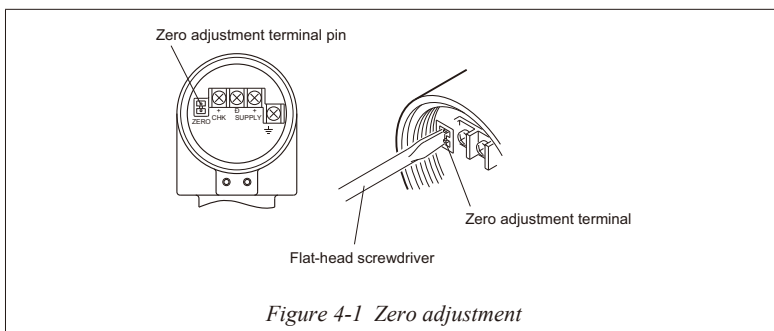
Caution: Zero adjustment must be performed in a non-hazardous area.

Calibration procedure

1. Connect the power supply to the Transmitter.
2. Apply the pressure corresponding to 0% output. In order to set this 0% output to 0 kPaG, release any gas or liquid from the wetted part and leave it open to atmospheric pressure.
3. This product has two zero adjustment terminal pins.
Using a flat-head screwdriver, allow the two terminal pins to contact each other simultaneously (for about one second). (For products equipped with a built-in digital indicator, when two terminal pins contact each other the word “ZERO” will appear on the indicator.)
4. The Step 3 above completes zero adjustment.

Test terminal

When checking the output from the Transmitter for maintenance purpose, connect an amperemeter to the “CHK +” terminal and to “-” of the Transmitter’s “SUPPLY” terminal.



Chapter 5 : Maintenance and troubleshooting

Maintenance precautions



WARNING

-
- If the Transmitter must be disconnected from the process for the maintenance purposes, careful attention must be paid to the possible residual process and pressure. Personal injury may result from the generation of gas or release of liquid process.
 - When draining the process from the Transmitter through a vent hole, check the direction of the gas or liquid being drained. This precaution is to protect you from possible scalding or inhaling harmful fume due to exposure to the process being drained.
 - Do not open the housing cover while in operation in explosion-proof area. Opening the cover may induce an explosion.
-
- This product is manufactured and shipped under Azbil Corporation's rigorous quality control system. Do not modify the product. Doing so will cause critical damage to the product.

Maintenance

Check the following on periodic basis:

- Has the housing, cover or grounding cable been damaged?
- Are the grounding cable, cover or housing-detent screws loose?
- Are the terminal screws loose?
- Is there any deterioration of the O-rings fitted to the set-screws holding the housing in position?
- Is there any leakage from the connection pipes?

Troubleshooting

If the product does not function properly, release the process gas or liquid from the product, leave it open to the atmosphere, and check the following items:

- Are there any loose or broken wires?
- Are the readings correct for power source voltage and load resistance?
- Is there any sediments or foreign objects at the wetted part?
- Is there dirt or debris present, clogging the connecting pipe? Is the gate valve fully open?

Over-range alarm display

When the input pressure from the process meets the following conditions, the digital indicator display (option) flashes a warning.

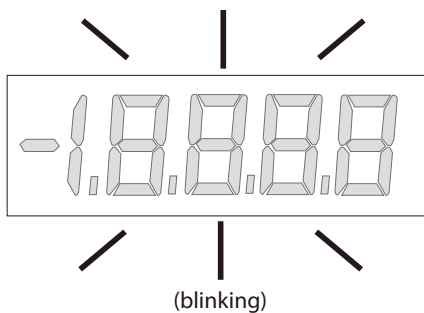
Over-range (upper limit)

$(\text{Span} \times 105\%) + \text{specified range lower limit} \leq \text{input pressure}$

Over-range (lower limit)

$(\text{Span} \times -1.25\%) + \text{specified range lower limit} \geq \text{input pressure}$

Example of over-range alarm display



Chapter 6 : Operation with Field Communication software (CFS100)

6-1 : Overview

Introduction

Field Communication Software Model CFS100 is a tool for communicating with Azbil Corporation's smart field devices (DSTJ and others) that enables configuration of device settings. It is a software product that operates on Windows PCs. Field Communication Software Model CFS100 communicates with Azbil Corporation's smart field devices using a USB interface connected to a Windows PC, which is then connected by communications cable to the USB port of a device.

Field Communication Software Model CFS100 supports Azbil Corporation's proprietary SFN/DE communication protocol as well as the HART communication protocol.

For information on the specifications common to all types of devices and information on how to install Field Communication Software Model CFS100, please refer to the main Field Communication Software Model CFS100 Operation Manual. *Before reading this manual, make sure to read the main Field Communication Software Model CFS100 Operation Manual thoroughly.*

Important Notes

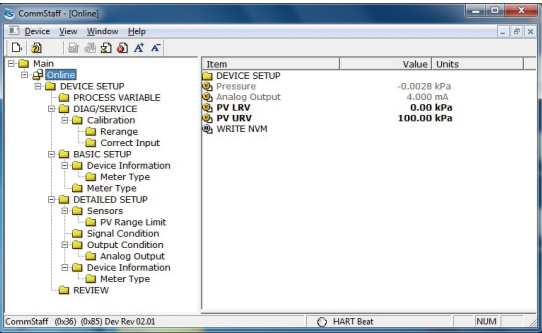
- * When changing connected devices
Field Communication Software Model CFS100 continues communicating with the device when displaying dynamic values, such as pressure, so that it can continuously update these values. If you remove the communications cable to change the device during this communication, an error will occur.
Exit Field Communication Software Model CFS100 before detaching the communications cable from the device, and then start Field Communication Software Model CFS100 again after connecting the communications cable to the new device.
- * The use of SFN communication changes the transmission signal, so be sure to switch the process control loop to manual mode beforehand.
- * For known troubleshooting issues, refer to section 7.4 of CM2-CFS100-2001, the common edition manual.

6-2 : Configuration

Menu List

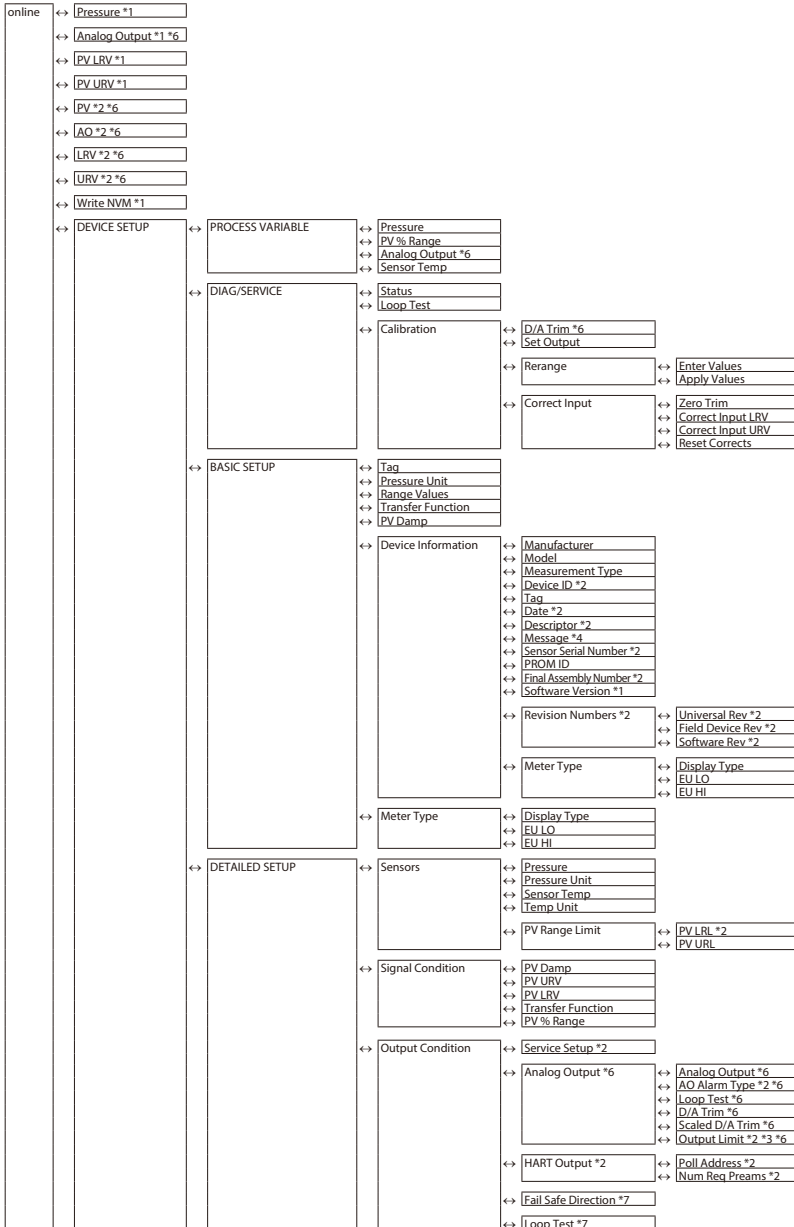
Right-clicking “Online” in the menu tree in the left pane of the Field Communication Software Model CFS100 application window displays a menu. Selecting Expand on the menu displays the expanded menu tree.

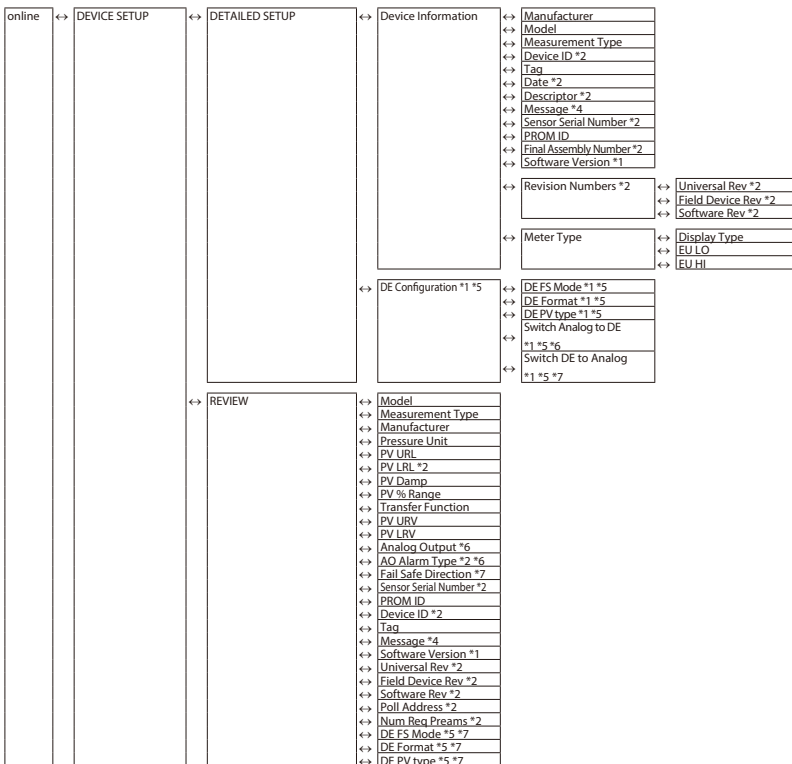
Parameters displayed in gray (Pressure and Analog Output in the following window) in the parameter display in the right pane are parameters that cannot be changed. Those displayed in black (PV LRV and PV URV in the window below) are parameters that can be changed.



The following gives details of the menus displayed in the menu tree.

Bold items are parameters that can be changed.





*1 Not displayed if HART communications is selected.

*2 Not displayed if SFN or DE communication is selected.

*3 Invalid menu in Field Communication Software Model CFS100.

*4 Not displayed if the transmitter version is one of the following: E.0, E.1

*5 Not displayed if the transmitter version is one of the following: E.0, E.1, E.2

*6 Not displayed if DE communication is selected.

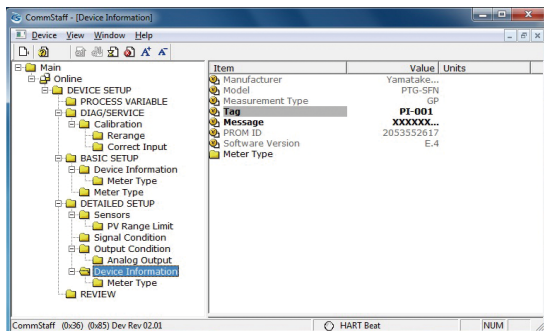
*7 Valid (displayed) if DE communication is selected.

Setting items and references

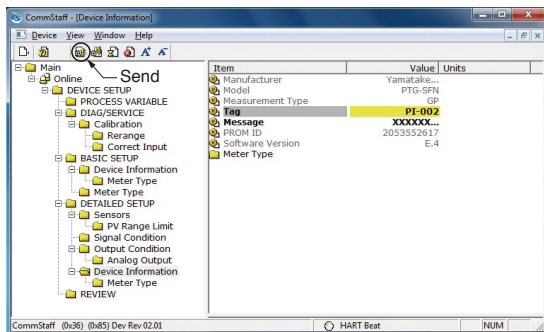
	Task	Parameter	Section of Manual
Preparation, Adjustment"	Tag No., set or check	Tag	2.2
	Measurement range, check or change	Basic Setup	2.5
	Damping time constant, check or set	Damping	2.6
	Units of pressure, check or change	Pressure Unit	2.4
	Zero adjustment, execute	Apply value	3.2
	Loop test, execute	Loop Test	3.1
	Indicator, set	Display	2.3
Maintenance	Calibrate	Correct Input	4.2

Tag Number Configuration

This section explains how to input or change the tag No. In the menu tree in the left pane, select DEVICE SETUP → DETAILED SETUP → Device Information → Tag.



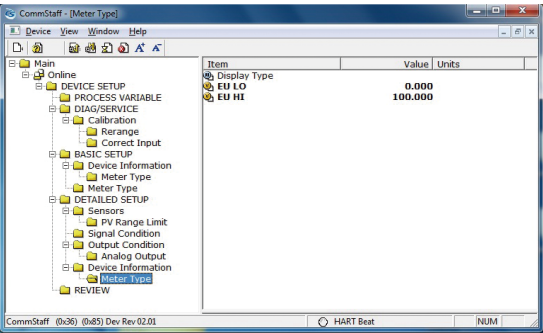
Double-clicking Tag displays the settings screen. On this screen, set the Tag and click the Set button. The tag is highlighted in yellow. Click the Send button to send the new Tag to the pressure transmitter.



Indicator Display Format

This section explains how to configure the indicator display format and the upper and lower limits for engineering units.

Select DEVICE SETUP → DETAILED SETUP → Device Information → Meter Type.



Display format

Mode	Description
E.UNIT (Linear)	Indicates that both the output and the displayed values are linear and equal to scale readings.
% (Linear)	Indicates that both the output and the displayed values are linear and in percent figures.

EULO/EUHI (upper and lower limits for engineering units)

This is enabled when Mode is set to E.Unit.

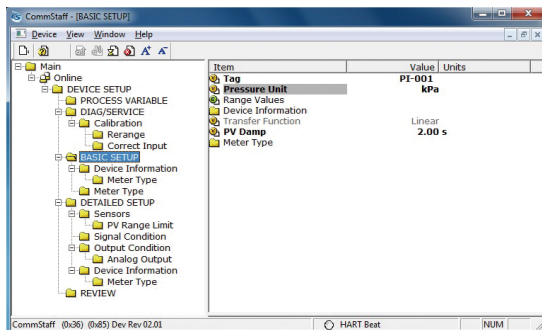
EULO and EUHI values are the upper and lower limits for engineering units (scale readings) displayed on the indicator. They are displayed in the range of -19999 to +19999.

- EULO : Value displayed when output is 0%.
- EUHI : Value displayed when output is 100%.

Selecting a Unit of Pressure

This function allows you to select the measurement units for pressure used by the pressure transmitter. Although the configured units for pressure can be changed, the changed settings are not saved by the pressure transmitter. At the next reconnection, measurements are displayed in the default units for pressure, that is, kPa or MPa, not in the changed units.

Select DEVICE SETUP → BASIC SETUP → Pressure Unit.



Units for pressure can be selected from the following.

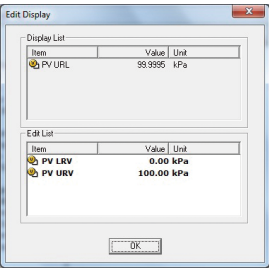
Note: If the PTG SFN is used in Japan, the selected units should be part of the standard international system (SI units).

inH2O	inHg	mmH2O	mmHg	psi
bar	mbar	g/Sqcm	kg/Sqcm	Pa
kPa	MPa			

Measurement Range Configuration

This section explains how to configure the measurement range of the pressure transmitter.

Select DEVICE SETUP → BASIC SETUP → Range Values.



LRV: Value at which 4 mA is output

URV: Value at which 20 mA is output

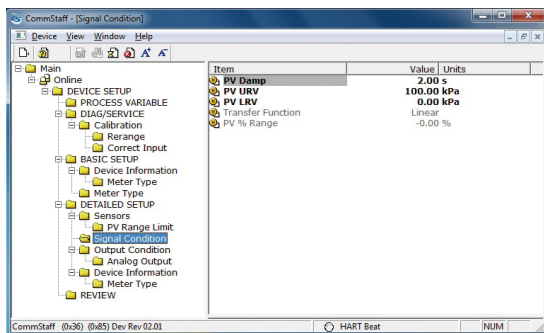
Double-clicking LRV or URV displays the settings screen. After configuring the measurement range, close the edit screen and click the Send button to send the measurement range value to the pressure transmitter. Values can be input to two decimal places.

Note: In SFC and CommPad, when the LRV is changed, the URV also changes by the same amount in order to keep SPAN unchanged. In Field Communication Software Model CFS100, when LRV is changed, URV does not change.

Damping Time Constant Configuration

This section explains how to configure the damping time constant.

Select DEVICE SETUP → DETAILED SETUP → Signal Condition → PV Damp.



If SFN communication is used, set a value in the range of 0 to 32 seconds.

The following values can be input. If a value other than the following is input, the closest value is automatically selected.

Unit: sec.

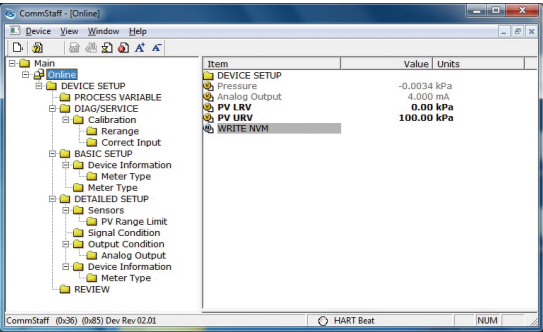
0.0
0.16
0.32
0.48
1.00
2.00
4.00
8.00
16.0
32.0

If HART communication is used, set a value in the range of 0 to 120 seconds.

NVM Save

The pressure transmitter saves configured data in nonvolatile memory 30 seconds after it is sent to the pressure transmitter. If the pressure transmitter power is turned off in less than 30 seconds, configuration data that has been sent will be lost, and the existing saved data will remain in the pressure transmitter. To avoid this, NVM Save can be used.

Select the “Online” menu at the top of the menu tree and execute WRITE NVM. This allows configuration data that has been sent to be saved in nonvolatile memory so that the pressure transmitter power can be turned off.



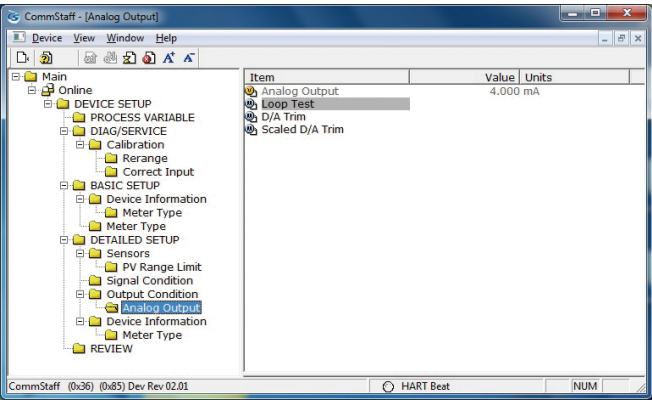
6-3 : Preparations and Starting Operation

This chapter explains how to prepare for pressure transmitter operation, and provides general instructions to follow when starting pressure transmitter operation.

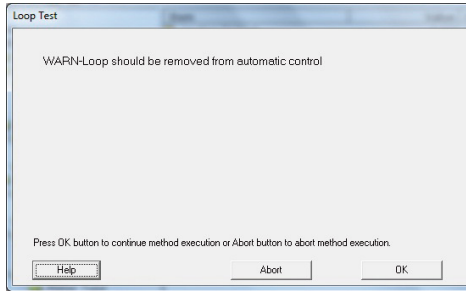
Confirmation of Output Signals (Loop Test)

By putting the pressure transmitter in constant current mode, you can keep current outputs constant in the range of 4 - 20 mA. This section explains how to configure the constant current mode and how to return to normal output mode. Select DEVICE SETUP → DETAILED SETUP → Output Condition → Analog Output → Loop Test.

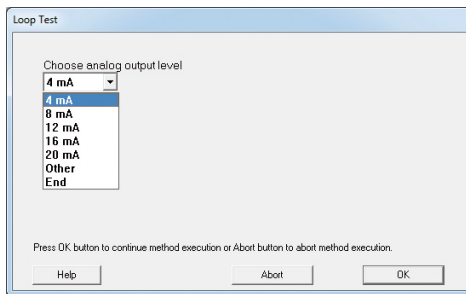
Caution: If this operation is performed while the pressure transmitter process is under automatic control, outputs may fluctuate, making pressure transmitter operation dangerous. Before performing this operation, make sure that you switch the process control loop to manual control.



Double-clicking Loop Test displays the following screen.



Click OK if there are no problems. The screen changes to the following.



- SFN communication

Select 4 mA and click OK. Output signals will be fixed at 4 mA (0%).

Select 8 mA and click OK. Output signals will be fixed at 8 mA (25%).

Select 12 mA and click OK. Output signals will be fixed at 12 mA (50%).

Select 16 mA and click OK. Output signals will be fixed at 16 mA (75%).

Select 20 mA and click OK. Output signals will be fixed at 20 mA (100%).

To input a different value, select Other and Click OK.

If you select End and click OK, a message is displayed notifying you that normal output mode will resume.

- HART communication

Select 4 mA and click OK. Output signals will be fixed at 4 mA (0%).

Select 20 mA and click OK. Output signals will be fixed at 20 mA (100%).

To input a different value, select Other and Click OK.

If you select End and click OK, a message is displayed notifying you that normal output mode will resume.

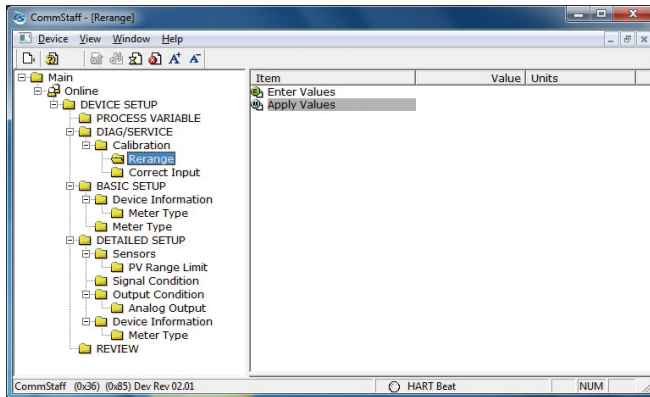
Range Configuration (Zero and Span Adjustments) according to Input Pressure

The range can be configured so that the current pressure input into the pressure transmitter becomes 4 mA (0%) or 20 mA (100%).

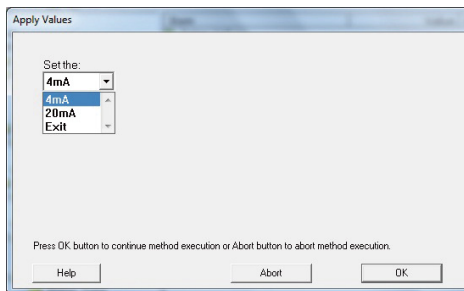
CAUTION: If this operation is performed while the pressure transmitter process is under automatic control, outputs may fluctuate, making pressure transmitter operation dangerous. Before performing this operation, make sure that you switch the process control loop to manual control.

The following describes how the range can be changed according to input pressure.

Select **DEVICE SETUP** → **DIAG/SERVICE** → **Calibration** → **Rerange** → **Apply Values**.



Double-click **Apply Values**, and a warning is displayed first and then the following screen.



- Select **4 mA** and click **OK**.
The range is reconfigured so that the current input pressure becomes the 4 mA output pressure (zero adjustment).
- Select **20 mA** and click **OK**.
The range is reconfigured so that the current input pressure becomes the 20 mA output pressure (span adjustment).
- Select **Exit** and click **OK**.
This completes the configuration process.

6-4 : Maintenance

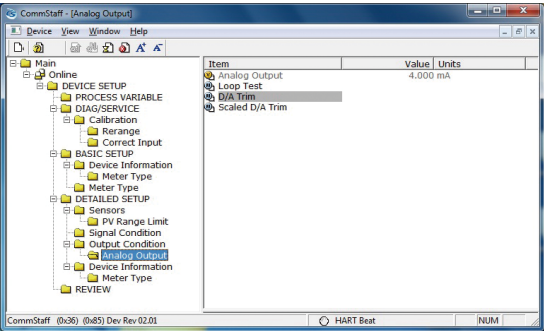
This chapter explains how to calibrate the analog signals of the pressure transmitter, how to calibrate the measurement range, and how to reset a calibrated value to the default value. It also explains how to check the pressure transmitter’s self-diagnostic messages.

Calibration of Analog Outputs

By connecting to an ammeter and comparing measured values, you can calibrate the 0% and 100% analog outputs.

Select DEVICE SETUP →DETAILED SETUP → Output Condition → Analog Output → D/A Trim.

CAUTION: If this operation is performed while the pressure transmitter process is under automatic control, outputs may fluctuate, making pressure transmitter operation dangerous. Before performing this operation, make sure that you switch the process control loop to manual control.



Step	Operation and indication
1	<p>Double-click D/A Trim.</p> <p>WARN - Loop should be removed from automatic control</p> <p>A warning that the loop should be switched from automatic control to manual mode is displayed. After switching to manual mode, click OK.</p> <p>“Connect reference meter” is displayed. Connect the loop to an ammeter (mA) or voltmeter. (It is recommended that an ammeter or voltmeter with an accuracy of 0.03% or better be used.)</p>
2	<p>The following messages are displayed in the order given.</p> <p>Setting fld dev output to 4mA (about to set pressure transmitter output to 4 mA)</p> <p>Click OK if there are no problems.</p> <p>Enter meter value (input the ammeter reading).</p> <p>Input the reading of the ammeter and click OK. This allows the adjustment command to be sent to the pressure transmitter.</p> <p>Fld dev output 4.000mA equal to reference meter? (is the pressure transmitter output equal to the reading on the connected ammeter?)</p> <p>If the pressure transmitter output is not equal to the reading of the ammeter, select No and click OK. This allows the adjustment process to continue.</p>
3	<p>Next do the 20 mA calibration.</p> <p>The following messages are displayed in the order given.</p> <p>Setting fld dev output to 20mA (about to set pressure transmitter output to 20 mA)</p> <p>Click OK if there are no problems.</p> <p>Enter meter value (input the ammeter reading)</p> <p>Input the reading of the ammeter and click OK. This allows the adjustment command to be sent to the pressure transmitter.</p> <p>Fld dev output 20.000mA equal to reference meter? (is the pressure transmitter output equal to a reading of the connected ammeter?)</p> <p>If the pressure transmitter output is not equal to the reading of the ammeter, select No and click OK. This allows the adjustment process to continue.</p> <p>Finally, a message is displayed notifying you that this will return operation to normal measurement mode and that the 20 mA calibration process is complete.</p>

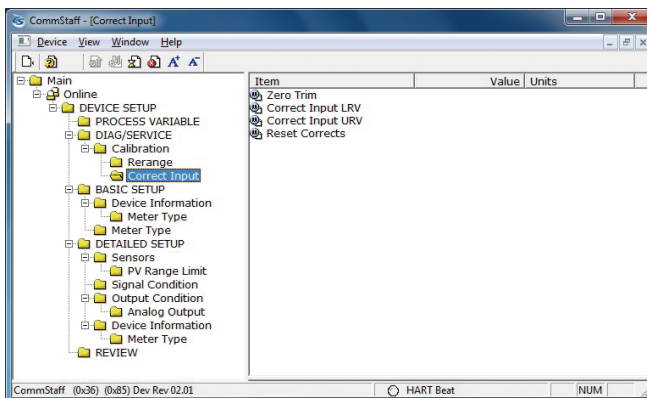
Measurement Range Calibration according to Actual Pressure

For the PTG series smart pressure transmitters, the measurement range must be calibrated at two points, namely the LRV (input value at 0% output) and URV (input value at 100% output).

This calibration is done when calibrating actual pressures using a standard pressure transmitter. For further details, refer to Chapter 6, “Remote Communication” in CM2-PTG300-2001.

CAUTION: If this operation is performed while the pressure transmitter process is under automatic control, outputs may fluctuate, making pressure transmitter operation dangerous. Before performing this operation, make sure that you switch the process control loop to manual control.

Select DEVICE SETUP → DIAG/SERVICE → Calibration → Correct Input.

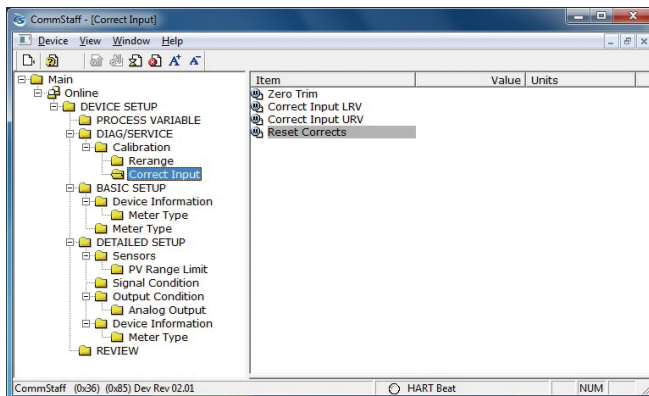


- To calibrate the LRV value, double-click Correct Input LRV. To calibrate the URV value, double-click Correct Input URV.
- A warning that the loop should be switched from automatic control to manual mode is displayed (WARN - Loop should be removed from automatic control). After switching to manual mode, click OK.
- “Apply LRV pressure” or “Apply URV pressure” is displayed. If the value of the standard pressure generator is equal to LRV (0%) or URV (100%), click OK.
- “Press OK when pressure is stable” is displayed. After confirming that input pressure has stabilized, click OK.
- The “Note - Loop may be returned to automatic control” message is displayed to notify you that you can now switch back to automatic control. Click OK.

Calibrated Value Reset

This operation is for resetting the calibrated zero-span value. Since the calibrated value is deleted, you must recalibrate following the steps described in 4.2.

Select DEVICE SETUP → DIAG/SERVICE → Calibration → Correct Input → Reset Corrects.

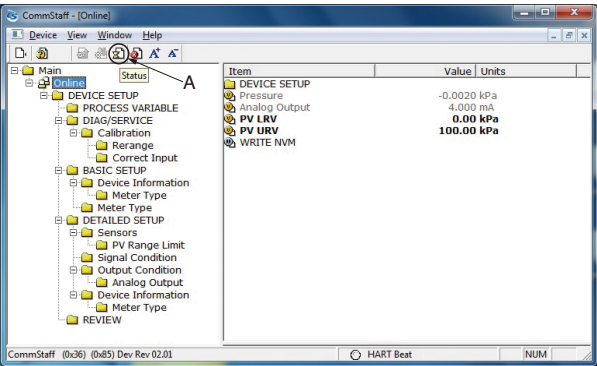


CAUTION: If this operation is performed while the pressure transmitter process is under automatic control, outputs may fluctuate, making pressure transmitter operation dangerous. Before performing this operation, make sure that you switch the process control loop to manual control.

- Double-click Reset Corrects. The “WARN - Loop should be removed from automatic control” message is displayed, warning that the loop should be switched from automatic control to manual mode. After switching to manual mode, click OK.
- The “About to Reset corrects” message is displayed to notify you that calibrated values will be reset. Click OK.
- After the calibrated values are reset, “Reset Corrects OK” is displayed. Click OK.
- The “Note - Loop may be returned to automatic control” message is displayed to notify you that you can now switch the loop back to automatic control. Click OK.

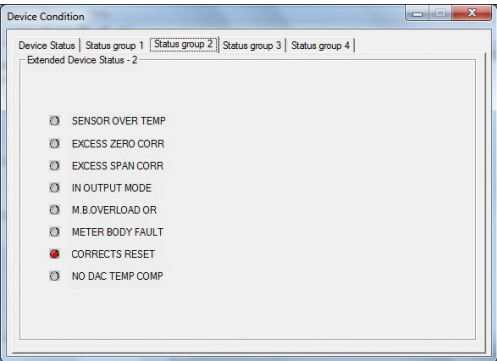
Checking Self-diagnostic Messages

You can check self-diagnostic messages by clicking the Status icon “A” in the below or “Device status” in the “Display” menu.



For example, the button to the left of CORRECTS RESET turns red after the calibrated values are reset.

For details on self-diagnostic messages, see the user's manual for the pressure transmitter.

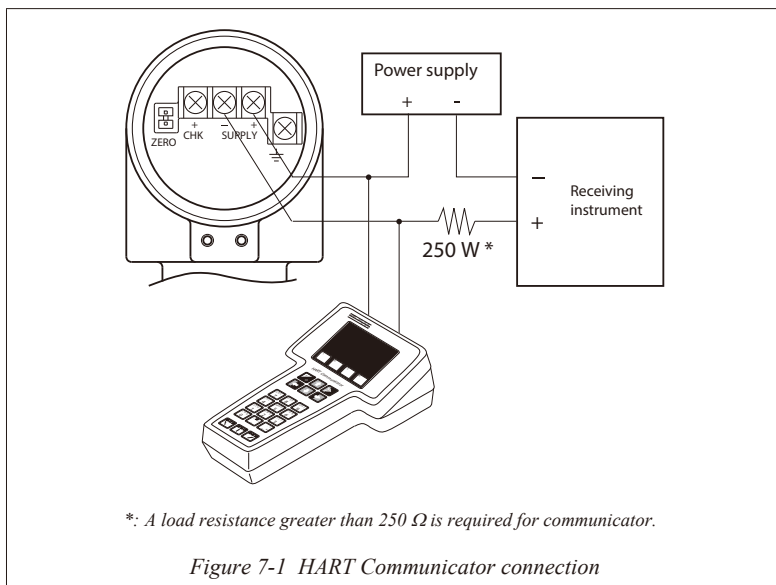


Chapter 7 : Operational Manual for HART Communication (For Model PTG72)

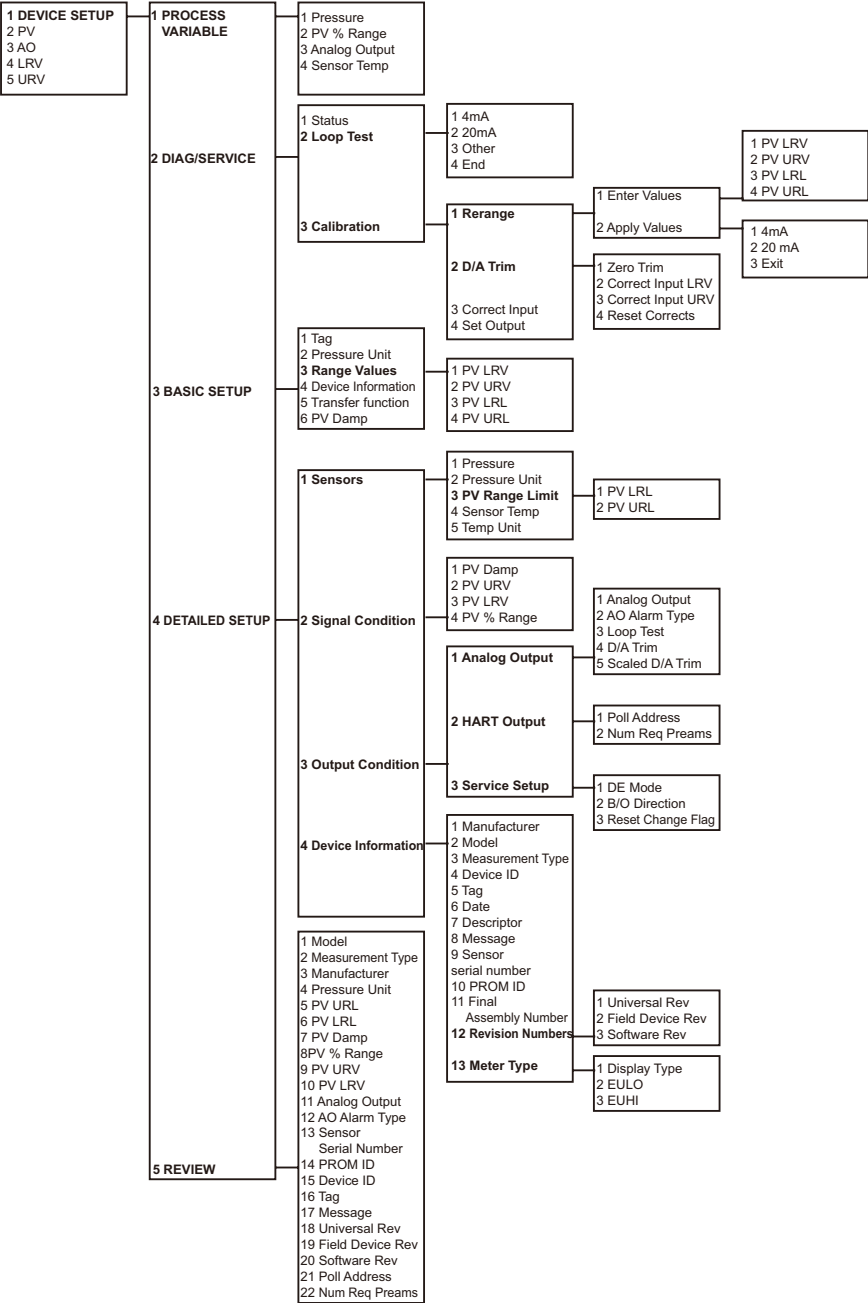
Instructions for connecting HART® Communicator to this transmitter.
Basic instructions for Key-pad operation.

7-1 : Connecting Communicator

You connect the communicator directly to signal terminals on the transmitter's terminal block or at any location in the 4 to 20mA loop. (Polarity of the communicator connection does not matter)



7-2 : HART Communicator Menu Summary



7-3 : Changing Tag No.

This shows how to change or enter tag number.

(Device setup) - (Detailed setup) - (Device information) - (Tag)

After entering a tag number with pressing ENTER, press SEND to download the change to the transmitter.

7-4 : Indicator Display Format

This shows how to configure display format and/or its ranges.

(Device setup) - (Detailed setup) - (Device information) -(Meter type)

PTG: TAG001

Meter Type

1 Display type

2 EULO

3 EUHI

SAVE

HOME

Display Type

Mode	Description
E.UNIT	Displaying PV with engineering unit (-19999EU ≤ PV ≤ +19999EU)
%	Displaying PV in % (-199.9% ≤ PV ≤ +199.9%)

EULO / EUHI

EULO and EUHI must be configured between -19999 and +19999 to indicate PV with an engineering unit.

EULO: The value to be indicated when the output is 0%

EUHI: The value to be indicated when the output is 100%

Displayed Value (EU) = PV (%) X (EUHI-EULO) + EULO

Over Range

The display will flash when the PV exceeds -1.25% or +105%.

7-5 : Selecting unit of Measurement

This function is to select a pressure unit of the transmitter.

(Device setup) - (Basic setup) - (Pressure Unit)

A pressure unit is able to be selected from the following;

inH ₂ O	inHg	mmH ₂ O	mmHg	psi	bar
mbar	g/Sqcm	kg/Sqcm	Pa	kPa	
MPa					

7-6 : Setting Range Values

This is to configure the measuring range of the transmitter.

(Device setup) - (Basic setup) - (Range values)

PTG: TAG001

Range Values

1→PV LRV 0.000 inH2O

2 PV URV 1.000 inH2O

3 PV LRL

4 PV URL

HELP

HOME

Select PV LRV or PV URV to key in the desired setting. The measuring range can be set from -105% to +105% of URL.

Press ENTER. This takes you back to “Range values” menu.

Press SEND to download change to transmitter.

PTG: TAG001

Range Values

1→PV LRV 0.000 inH2O

2 PV URV 5.000 inH2O

3 PV LRL

4 PV URL

HELP

SEND

HOME

If the number of digit you key in is more than four, the set range is not appeared on “Range Values” menu.

LRL and URL are to refer only.

7-7 : Adjusting Damping Time

You can adjust the damping time to reduce the output noise.

PTG: TAG001
PV damping
0.5 s
130

Value out of range
HELP DEL ESC ENTER

(Device setup) - (Detailed setup) - (Signal condition) - (PV damping)

When PV damping menu, key in appropriate damping time from 0.0 to 128.0, and the press ENTER. A display will prompt when you enter the value out of range that the value is out of range.



ATTENTION

The damping time set by HART Communicator might not be corresponding to that which is displayed on the SFC. Reconfigure the damping time with SFC when the transmitter is used in the DE enable mode. (ref. 5.2 DE Mode)

Chapter 8 : Start-up and Operation

This section identifies how to access typical data associated with the start-up and the operation of model PTG with HART communication option. It includes the procedure for running an analog output check



CAUTION

Failure to observe safety instructions in this category could result in damage to or breakdown of equipment or facilities. Equivalent to definition “caution” in ANSI regulations.

Be sure to switch the loop control mode of the process to Manual before performing this operation.

8-1 : Running Analog Output Check

You can put the transmitter into a constant-current source mode, which maintains the output that is set between 4mA (0%) and 20mA (100%).

This shows how to configure the transmitter in a constant-current source mode and to return to its original output.

(Device setup) - (Detailed setup) - (Output condition) - (Analog output) - (Loop test)

You will be prompted to put the loop into manual mode. After doing so, press ENTER.

Then, the following screen is appeared.

PTG: TAG001

Choose analog output level

- 1 4mA
- 2 20mA
- 3 Other
- 4 End

ABORT

ENTER

- Select 4mA to set the output signal level to 4mA (0%).
- Select 20mA to set the output signal level to 20mA (100%).
- Select Other and press ENTER, then use communicator's keyboard to enter other values.
- When the transmitter has the display, the PV which is set will flash.
- Select End and press ENTER. The communicator will notify you that it is returning transmitter to its original output.

8-2 : Configuring Ranges with Applying Pressure

This shows how to configure ranges with applying 4mA / 20mA input pressure.



CAUTION

If this operation is executed when the process is in automatic control mode, the output may vary, resulting in a hazardous operation status.

Be sure to switch the loop control mode of the process to Manual before performing this operation.

(Device setup) - (Diag/Service) - (Calibration) - (Rearrange) - (Apply Values)

You will be warned to remove the loop from automatic control. After doing so, press ENTER.

Then the following screen will be appeared.

PTG: TAG001

Set the:

- 1 4mA
- 2 20mA
- 3 Exit

ABORT

ENTER

- Choose 4mA then press ENTER.

A display will prompt you to apply new 4mA input.

When “Current applied process value” display appears, choose “Set as 4mA value” then press ENTER.

Return the loop to automatic.

Chapter 9 : Calibration

This section provides information about calibrating the transmitter's analog output and measuring range. It also covers the procedure for resetting calibration to default values.

9-1 : Calibrating Analog Output Signal

You can calibrate the transmitter's analog output circuit at its and 100% levels by using the transmitter in its constant-current source mode.

(Device setup) - (Detailed setup) - (Output Condition) - (Analog output) - (D/A trim)



CAUTION

If this operation is executed when the process is in automatic control mode, the output may vary, resulting in a hazardous operation status.

Be sure to switch the loop control mode of the process to Manual before performing this operation.

STEP	Action/Description
1	You will be warned to remove the loop from automatic control. After doing so, press OK. When prompt appears, connect a precision milliammeter or volt meter (0.03% accuracy or better) in loop to check readings. Press OK.
2	The following display prompts will appear: <ul style="list-style-type: none"> • Setting field device output to 4 mA. Press OK. • Enter meter value. Key in meter value, then press OK. • Is field device output 4.000 mA equal to reference meter? <ol style="list-style-type: none"> 1 Yes 2 No If not equal, select No, press ENTER, then key in new meter value. (returns to "Enter meter value" prompt until field device output equals reference meter.) If equal, select Yes, press ENTER.

3	<p>The following display prompts will appear:</p> <ul style="list-style-type: none">• Setting field device output to 20 mA. Press OK.• Enter meter value. Key in meter value, then press ENTER.• Is field device output 20.000 mA equal to reference meter? <p>1 Yes 2 No</p> <p>If not equal, select No, press ENTER, then key in new meter value. (Returns to “Enter meter value” prompt until field device output equals reference meter.)</p> <p>If equal, select Yes, press ENTER.</p> <p>Prompt notifies you that the field device will be returned to its original output.</p>
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9-2 : Calibrating the set range by inputting the actual pressure

Overview

This section describes how to calibrate URV and LRV for the set range by inputting a reference pressure into the Transmitter using the HART Communicator.

Calibrate the LRV first and then URV.

Calibration devices

Generally, the calibration devices listed below are required:

- Reference pressure generator : A generator capable of producing pressure over a range of measurement close to that of the transmitter to be tested.
- Accuracy : $\pm 0.05\%$ F.S. or $\pm 0.1\%$ (whichever is larger)
- Power supply : 24 V DC
- Standard resistor : $250\ \Omega \pm 0.005\%$
- Voltmeter : Digital voltmeter (10 V DC range) with an accuracy of $\pm 0.02\%$ rdg + 1dgt
- HART Communicator

Requirements for calibration



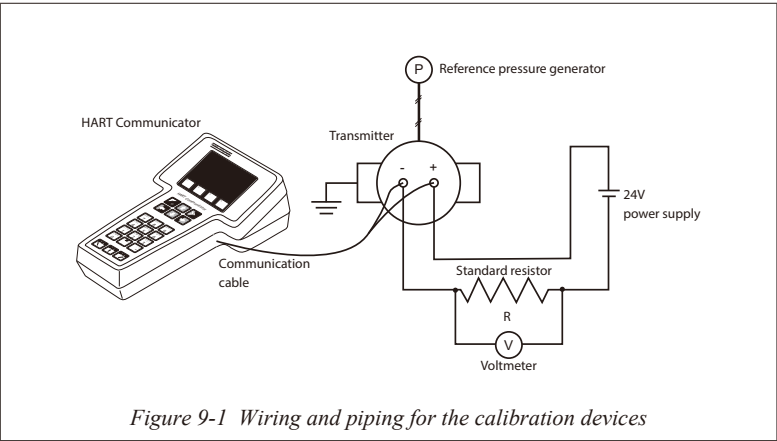
CAUTION

When conducting the actual-pressure calibration, the following requirements must be satisfied:

- The calibration must be conducted in a testing laboratory where there is no wind.
- The standard temperature is 23°C $\{73^{\circ}\text{F}\}$ and the standard humidity is 65%. Room temperatures from 15°C $\{59^{\circ}\text{F}\}$ to 35°C $\{95^{\circ}\text{F}\}$ and room humidity from 45% to 75% are acceptable as long as the result of measurement is not influenced.
- It is best if the accuracy of the measuring instruments to be four times greater than that of the Transmitter.

Assembling the calibration devices

Connect the calibration devices as shown below:



Model PTG Smart Transmitter has two-point calibration. This means when you calibrate two points in the range, all the points in that range adjust to that calibration.

(Device setup) - (Diag/Service) - (Calibration) - (Correct Input)



CAUTION

If this operation is executed when the process is in automatic control mode, the output may vary, resulting in a hazardous operation status.

Be sure to switch the loop control mode of the process to Manual before performing this operation.

PTG: TAG001

Correct Input

1→Zero Trim

2 Correct Input LRV

3 Correct Input URV

4 Reset Corrects

HELP SEND HOME

- Select “Correct Input LRV” or “Correct Input URV”.
- You will be warned to remove the loop from automatic control. After doing so, press OK.
- When prompted, adjust pressure source to apply pressure equal to LRV (0%) or URV (100%), then press OK.
- When pressure is stable, press OK.
- When prompted, remove pressure.

9-3 : Resetting Calibration



CAUTION

If this operation is executed when the process is in automatic control mode, the output may vary, resulting in a hazardous operation status.

Be sure to switch the loop control mode of the process to Manual before performing this operation.

A Corrects Rest returns the zero and span calibration factors to their default values. The transmitter calculates its output based on the characterization equation alone, without any compensation for the residual errors.

(Device setup) - (Diag/Service) - (Calibration) - (Reset Corrects)

- When prompted, remove the loop from automatic control. Press OK.
- Prompt notifies you that a Reset Corrects is about to occur. Press OK.
- When message “Reset Corrects OK” appears, press OK.

- Calibration is reset to default values.
- When prompted, return the loop to automatic control and press OK.

Chapter 10 : Spare Parts

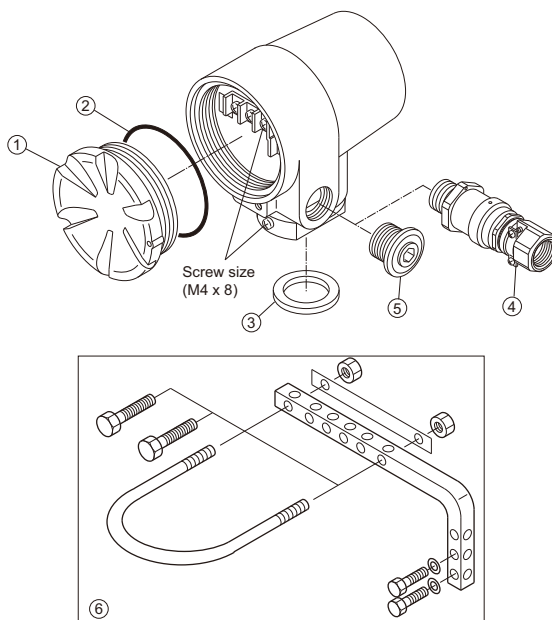


Figure 10-1 Exploded view

Table 10-1 Spare parts

No.	Parts description	Part number	Qty.	Unit
1	Case cover (with an O-ring)	80370406-001	1	1EA
2	O-ring	80020935-842	1	1-F
3	Gasket (for male screw)	80370122-001	1	1-F
	Gasket (for male screw)	80370122-002		
4	Pressure packing set	80370411-001	1	1EA
5	Plug (with an O-ring)	80381081-002	1	1EA
6	Mounting hardware	80370404-001	1	1EA
7	Unit seal set	80370187-001	1	1-F

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

1.1 Warranty period

Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

1.2 Warranty scope

In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

- (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
- (2) Failure caused for other reasons than Azbil Corporation's product;
- (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
- (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
- (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
- (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

- (1) Regulations and standards or laws that your Equipment is to comply with.
- (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
- (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use

Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

*1. A design that is safe even if the user makes an error.

*2. A design that is safe even if the device fails.

*3. Avoidance of device failure by using highly reliable components, etc.

*4. The use of redundancy.

3. Precautions and restrictions on application

3.1 Restrictions on application

Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

*5. Nuclear power quality: compliance with JEAG 4121 required

*6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes," etc.

*7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

Any Azbil Corporation's products shall not be used for/with medical equipment.

The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil product can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

3.2 Precautions on application

you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

- (1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
 - (2) For use of specific purposes, such as:
 - * Nuclear energy/radiation related facilities
[When used outside a radiation controlled area and where nuclear power quality is not required]
[When the limit switch for nuclear power is used]
 - * Machinery or equipment for space/sea bottom
 - * Transportation equipment
[Railway, aircraft, vessels, vehicle equipment, etc.]
 - * Antidisaster/crime-prevention equipment
 - * Burning appliances
 - * Electrothermal equipment
 - * Amusement facilities
 - * Facilities/applications associated directly with billing
 - (3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
 - (4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
 - (5) Machinery or equipment that may affect human lives, human bodies or properties
 - (6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety
4. Precautions against long-term use
- Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.
5. Recommendation for renewal
- Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.
- In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.
6. Other precautions
- Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.
7. Changes to specifications
- Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquiries or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.
8. Discontinuance of the supply of products/parts
- Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.
- For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.
9. Scope of services
- Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:
- (1) Installation, adjustment, guidance, and attendance at a test run
 - (2) Maintenance, inspection, adjustment, and repair
 - (3) Technical guidance and technical education
 - (4) Special test or special inspection of a product under the conditions specified by you
- Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

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