User's Manual

DPharp EJA™

EJAC60E
Hygienic Adapter System (Fluidless Type)

EJA560E
Hygienic Gauge Pressure Transmitter (Fluidless Type)

IM 01C31Y01-01EN

YOKOGAWA
Yokogawa Electric Corporation

IM 01C31Y01-01EN
6th Edition

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Hygienic Adapter System (Fluidless Type)
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IM 01C31Y01-01EN 6th Edition

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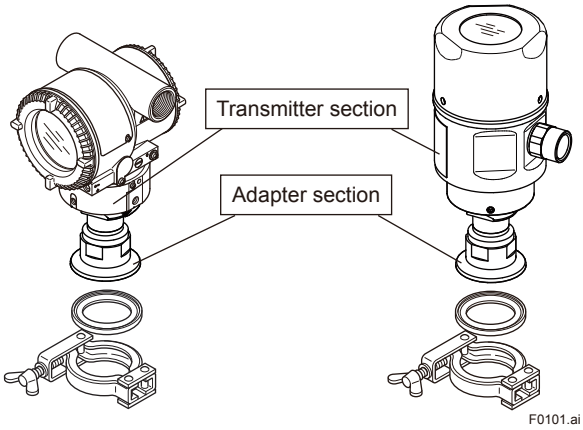
Revision Information

1. Introduction

Thank you for choosing our pressure transmitter. Your transmitter was precisely calibrated at our factory prior to shipment based on the requested specifications. To ensure both safety and efficiency when using all the functions of this transmitter, please read this manual carefully before you operate the instrument to ensure you have a sufficient understanding of the functions and operations and to familiarize yourself with the transmitter. This manual is intended for hygienic adapter system products. The basic specification code of the hygienic adapter system consists of the transmitter section and the adapter section. Check the model and style code of the transmitter section indicated on the product name plate.

EJAC60E Hygienic Adapter System (Fluidless type)
- Hygienic Gauge Pressure Transmitter (Fluidless type)
- Hygienic Adapter



NOTE

This manual describes the hardware configurations of Hygienic Adapter System and Hygienic Gauge Pressure Transmitter.
For information on the software configuration and operation, please refer to IM 01C25T01-06EN for the HART communication type.
To ensure correct use of this instrument, read both the hardware and communication manual thoroughly before use.
The manuals in pdf format are available on our website (http://www.yokogawa.com/).

[Hardware Manual]

Models	Document No.	Style
EJAC60E, EJA560E	IM 01C31Y01-01EN	S2

[Communication Manual]

Models	Document No.	Style
DPharp HART 5/HART 7 Communication type	IM 01C25T01-06EN	—

Note: An exclusive User's Manual might be attached for the products whose suffix codes or optional codes contain code "Z". Please read it along with the standard manuals.

WARNING

Hygienic Adapter System (Fluidless type)

Combination Mode	Applicable Transmitter
EJAC60E	EJA560E

The models for combination, applicable transmitter and accessories represent a Hygienic Adapter System.
CE marking and other certification are acquired for model code of EJA560E transmitter.
See section "Model and Suffix Codes" of this document.

■ Regarding This Manual

- This manual should be provided to the end user.
- This manual and the identification tag attached on packing box are essential parts of the product; keep them in a safe place for future reference.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- Yokogawa assumes no responsibility for this product except as stated in the warranty.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.
- The following safety symbols are used in this manual:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

⎓ Direct current

⏚ Functional grounding terminal

⚠ Caution
This symbol indicates that the operator must refer to an explanation in the user's manual in order to avoid the risk of injury or death of personnel or damage to the instrument.

■ Trademarks

- 'DPharp', 'EJX', 'EJA', 'FieldMate' and 'BRAIN TERMINAL' are registered trademarks or trademarks of Yokogawa Electric Corporation. Company names and product names used in this material are registered trademarks or trademarks of their respective owners.
- In this manual, trademarks or registered trademarks are not marked with ™ or ®.

1.1 Safe Use of This Product

For the safety of the operator and to protect the instrument and the system, please be sure to follow this manual's safety instructions when handling this instrument. If these instructions are not heeded, the protection provided by this instrument may be impaired. In this case, Yokogawa cannot guarantee that the instrument can be safely operated. Please pay special attention to the following points:

(a) Installation

- This instrument may only be installed by an engineer or technician who has an expert knowledge of this device. Operators are not allowed to carry out installation unless they meet this condition.
- With high process temperatures, care must be taken not to burn yourself by touching the instrument or its casing.
- Never loosen the process connector nuts when the instrument is installed in a process. This can lead to a sudden, explosive release of process fluids.
- When draining condensate from the pressure detector section, take appropriate precautions to prevent the inhalation of harmful vapors and the contact of toxic process fluids with the skin or eyes.
- When removing the instrument from a hazardous process, avoid contact with the fluid and the interior of the meter.
- All installation shall comply with local installation requirements and the local electrical code.

(b) Wiring

- The instrument must be installed by an engineer or technician who has an expert knowledge of this instrument. Operators are not permitted to carry out wiring unless they meet this condition.
- Before connecting the power cables, please confirm that there is no current flowing through the cables and that the power supply to the instrument is switched off.

(c) Maintenance

- Please carry out only the maintenance procedures described in this manual. If you require further assistance, please contact the nearest Yokogawa office.
- Care should be taken to prevent the build up of dust or other materials on the display glass and the name plate. To clean these surfaces, use a soft, dry cloth.

(d) Modification

- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.

(e) Product Disposal

- The instrument should be disposed of in accordance with local and national legislation/ regulations.

(f) Authorized Representative in EEA

- In relation to the CE Marking, The authorized representative for this product in the EEA (European Economic Area) is:
  Yokogawa Europe B.V.
  Euroweg 2, 3825 HD Amersfoort,The Netherlands
  and the importer for this product into the EU/EEA market via the YOKOGAWA sales channel is:
  Yokogawa Europe B.V.
  Euroweg 2, 3825 HD Amersfoort,The Netherlands

(g) Control of Pollution Caused by the Product

- This is an explanation for the product based on "Control of Pollution caused by Electronic Information Products" in the People's Republic of China. The information is valid only in China.

(h) morocco conformity mark

- This conformity mark indicates that the product complies with Moroccan safety and EMC requirements.

产品中有害物质或元素的名称及含量

型号	部件名称	有害物质					
		铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
EJX/EJA-E/ EJA/EJA-A Series 差压/压力变送器	壳体	×	○	○	○	○	○
	膜盒组件	×	○	○	○	○	○
	基板组件	×	○	○	○	○	○
	电源连接线	×	○	○	○	○	○

○：表示该部件的所有均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以下。

×：表示至少该部件的某些均质材料中的有害物质的含量均在 GB/T26572 标准中所规定的限量以上。

环保使用期限：

该标识适用于 SJ /T11364 中所述，在中华人民共和国销售的电子电气产品的环保使用期限。

注）该年数为“环保使用期限”，并非产品的质量保证期。

1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurring during the warranty period shall basically be repaired free of charge.
- If any problems are experienced with this instrument, the customer should contact the Yokogawa representative from which this instrument was purchased or the nearest Yokogawa office.
- If a problem arises with this instrument, please inform us of the nature of the problem and the circumstances under which it developed, including the model specification and serial number. Any diagrams, data and other information you can include in your communication will also be helpful.
- The party responsible for the cost of fixing the problem shall be determined by Yokogawa following an investigation conducted by Yokogawa.
- The purchaser shall bear the responsibility for repair costs, even during the warranty period, if the malfunction is due to:
  - Improper and/or inadequate maintenance by the purchaser.
  - Malfunction or damage due to a failure to handle, use, or store the instrument in accordance with the design specifications.
  - Use of the product in question in a location not conforming to the standards specified by Yokogawa, or due to improper maintenance of the installation location.
  - Failure or damage due to modification or repair by any party except Yokogawa or an approved representative of Yokogawa.
  - Malfunction or damage from improper relocation of the product in question after delivery.
  - Reason of force majeure such as fires, earthquakes, storms/floods, thunder/ lightening, or other natural disasters, or disturbances, riots, warfare, or radioactive contamination.

2. Handling Cautions

This transmitter was thoroughly tested at the factory before shipment. When the transmitter is delivered, visually check it to make sure that no damage occurred during shipment. Also check that all transmitter mounting hardware shown in figure 2.1 are included. If the transmitter is ordered without the Clamp gasket, the transmitter mounting hardware will not be included. This chapter provides the required information on how to handle the transmitter. Read this carefully before using the transmitter. For items not described in this chapter, refer to the related sections.

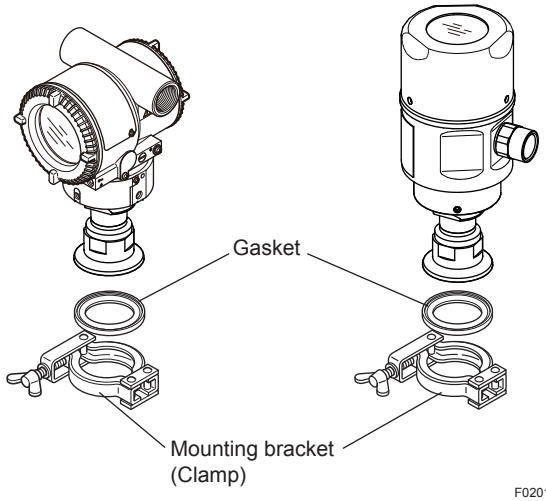
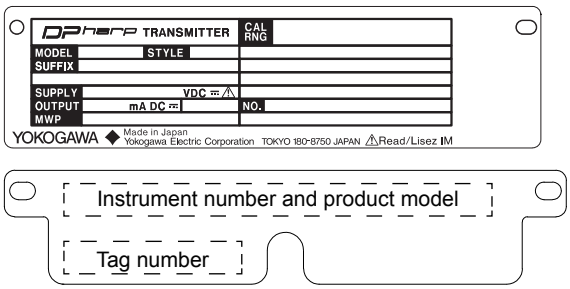


Figure 2.1 Transmitter Mounting Hardware

2.1 Model and Specifications Check

The model name and specifications are indicated on the name plate outside the case. Correspond “Model and Suffix Codes” shown in Chapter 8 to the specifications, and make sure that the specifications are as you requested. When making inquiries, also provide this information.



For cast aluminum housing (without 3A option)

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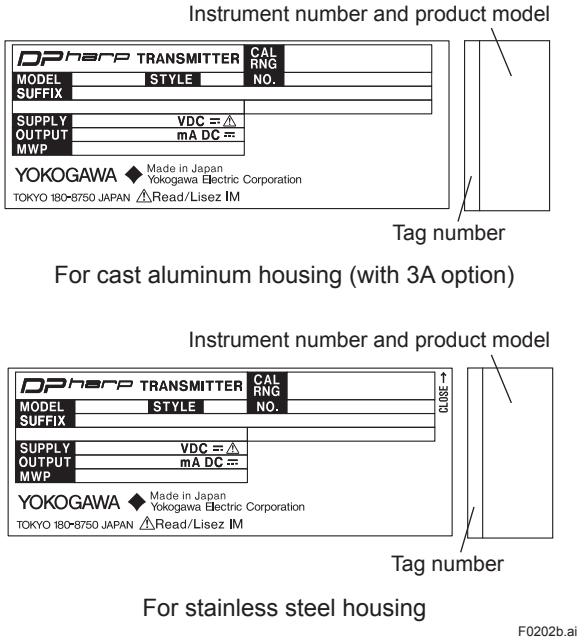
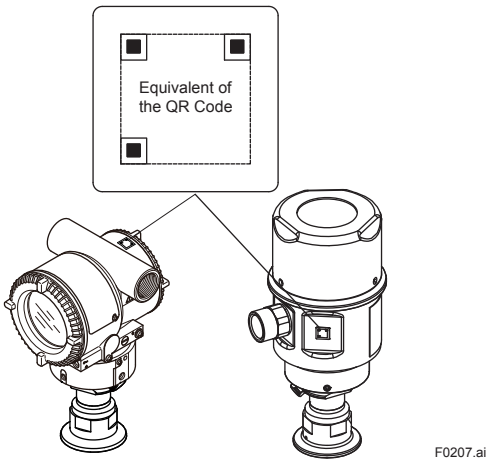


Figure 2.2 Name Plate Example

NOTE

This product has a QR Code for efficient plant maintenance work and asset information management.
It enables to confirm the specifications of purchased product, user’s manual and test certificate.
For the purpose, usage and any inquiries of QR Code, refer to the following URL.
https://dm10.yokogawa.com/qr-code
QR Code is a registered trademark of DENSO WAVE INCORPORATED.



2.2 Unpacking

Keep the transmitter in its original packaging to prevent it from being damaged during shipment. Do not unpack the transmitter until it reaches the installation site.

2.3 Storage

The following precautions must be observed when storing the instrument, especially for a long period.

(a) Select a storage area which meets the following conditions:
- It is not exposed to rain or subject to water seepage/leaks.
- Vibration and shock are kept to a minimum.
- It has an ambient temperature and relative humidity within the following ranges.

Ambient temperature:
–40 to 85°C without integral indicator
–30 to 80°C with integral indicator
Alternatively, the temperature specified by each specification.
Relative humidity:
0% to 100% R.H. (Non-condensing)
Preferred temperature and humidity:
approx. 25°C and 65% R.H.

(b) When storing the transmitter, repack it carefully in the packaging that it was originally shipped with.

(c) If the transmitter has been used, thoroughly clean the chambers inside the cover flanges, so that there is no process fluid remaining inside. Before placing it in storage, also make sure that the pressure-detector is securely connected to the transmitter section.

2.4 Selecting the Installation Location

The transmitter is designed to withstand severe environmental conditions. However, to ensure that it will provide years of stable and accurate performance, take the following precautions when selecting the installation location.

(a) Ambient Temperature
Avoid locations subject to wide temperature variations or a significant temperature gradient. If the location is exposed to radiant heat from plant equipment, provide adequate thermal insulation and/or ventilation.

(b) Ambient Atmosphere
Do not install the transmitter in a corrosive atmosphere. If this cannot be avoided, there must be adequate ventilation as well as measures to prevent the leaking of rain water and the presence of standing water in the conduits.

(c) Shock and Vibration
Although the transmitter is designed to be relatively resistant to shock and vibration, an installation site should be selected where this is kept to a minimum.

2.5 Pressure Connection

WARNING

The pressure transmitter installed in a process is under pressure; therefore, if you fasten or loosen each component such as the pressure receiver clamp or adapter, there is a danger that the process fluid may spurt out. Never fasten or loosen such components.

The following precautions must be observed in order to prevent the transmitter from being damaged.

(1) The pressure of the fluid that is subjected to measurement is received by a metallic diaphragm in the structure of this transmitter. Exercise care not to damage the diaphragm when cleaning.
(2) The diaphragm may be damaged due to the measurement fluid freezing in the pressure receiver. If there is a possibility that the diaphragm may freeze, take appropriate measures such as applying lagging materials.
(3) Clean the CIP (cleaning in place) and SIP (sterilize in place) while observing the transmitter temperature and pressure specifications.

The following precautions must be observed when applying pressure to the transmitter in order to safely operate the transmitter.

(1) Make sure that the gasket is correctly mounted and that the clamp and adapter is correctly fastened.
(2) Make sure that there are no leaks in the lead piping.
(3) Never apply a level of pressure higher than the specified maximum working pressure.

You should observe this transmitter to check whether it exhibits certain behavior due to overpressure.
For the allowable overpressure and breakdown withstand voltage, see the general specification (GS 01C31Y01-01EN).

(1) If pressure is applied up to the withstand pressure limit over the allowable overpressure, re-calibration is required.
(2) Exercise care not to exceed the breakdown withstand voltage. Doing so may damage the wetted part, which may cause process fluid to leak. The normal sanitary clamp has a withstanding pressure of 1 MPa. If there is a possibility that pressure greater than 1 MPa is applied, use a clamp, etc. with the required pressure resistance.
(3) Behavior with regards to Over Pressure
Applied pressure also include maximum momentary pressure(surge pressure). The measurement method of this sensor is pressure detection using strain of metal diaphragm. The maximum momentary pressure exceeding the above pressure affects the characteristics of the sensor. The causes of the momentary pressure (surge pressure) are considered as follows:
- Surge pressure of bubbly mixed fluid when installed to the upper end of the pipe (Figure 2.3)
- Inrush pressure when installed to the bending pipe (Figure 2.4)
- Water hammer
- Steam explosion by steam and water contact (Figure 2.5)
- Direct washing of sensor with washing nozzle (Figure 2.6)

Concerning installation, please take the above contents into consideration while installing.

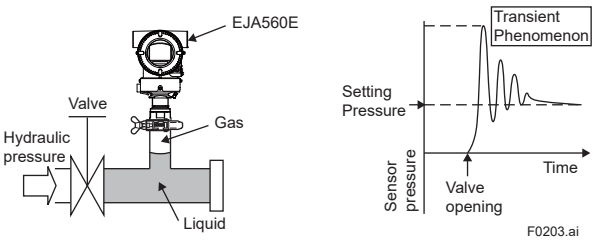


Figure 2.3 Surge Pressure of Bubbly Mixed Fluid When Installed to the Upper End of the Pipe

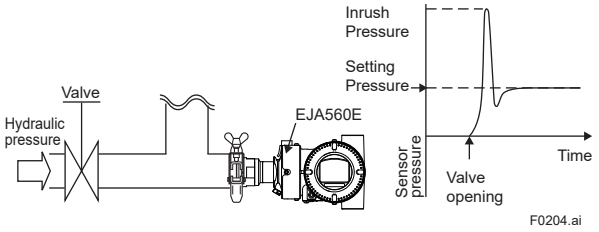


Figure 2.4 Inrush Pressure When Installed to the Bending Pipe

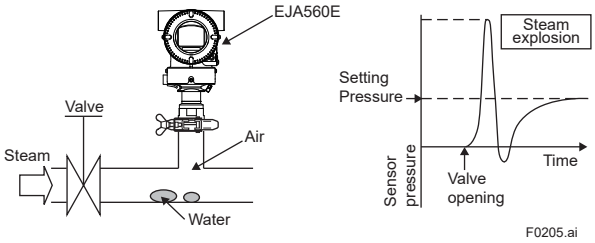


Figure 2.5 Steam Explosion by Steam and Water Contact

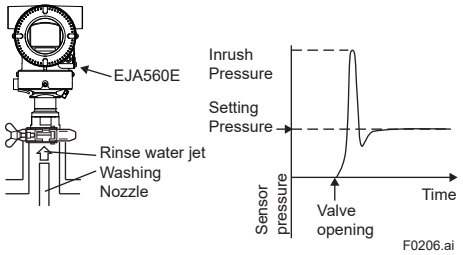


Figure 2.6 Direct washing of Sensor with Washing Nozzle

2.6 Waterproofing of Cable Conduit Connections

Apply a non-hardening sealant to the threads to waterproof the transmitter cable conduit connections. (See section 5.1)

2.7 Restrictions on Use of Radio Transceivers

IMPORTANT

Although the transmitter has been designed to resist high frequency electrical noise, if a radio transceiver is used near the transmitter or its external wiring, the transmitter may be affected by high frequency noise pickup. To test this, start out from a distance of several meters and slowly approach the transmitter with the transceiver while observing the measurement loop for noise effects. Thereafter use the transceiver outside the range where the noise effects were first observed.

2.8 Insulation Resistance and Dielectric Strength Test

Since the transmitter has undergone insulation resistance and dielectric strength tests at the factory before shipment, normally these tests are not required. If the need arises to conduct these tests, heed the following:

(a) Do not perform such tests more frequently than is absolutely necessary. Even test voltages that do not cause visible damage to the insulation may degrade the insulation and reduce safety margins.

(b) Never apply a voltage exceeding 100 V DC for the insulation resistance test, nor a voltage exceeding 100 V AC for the dielectric strength test.

(c) Before conducting these tests, disconnect all signal lines from the transmitter terminals. The procedure for conducting these tests is as follows:

CAUTION

In case of a transmitter with stainless steel housing, when conducting these tests with the CPU assembly holder removed, please be careful that parts mounted on the CPU assembly do not touch the housing.

• Insulation Resistance Test

1) Short-circuit the + and – SUPPLY terminals in the terminal box.
2) Turn OFF the insulation tester. Then connect the insulation tester plus (+) lead wire to the shorted SUPPLY terminals and the minus (–) leadwire to the grounding terminal.
3) Turn ON the insulation tester power and measure the insulation resistance. The voltage should be applied as briefly as possible to verify that the insulation resistance is at least 20 MΩ.
4) After completing the test and being very careful not to touch exposed conductors disconnect the insulation tester and connect a 100 kΩ resistor between the grounding terminal and the short-circuiting SUPPLY terminals. Leave this resistor connected at least one second to discharge any static potential. Do not touch the terminals while it is discharging.

• Dielectric Strength Test

1) Short-circuit the + and – SUPPLY terminals in the terminal box.
2) Turn OFF the dielectric strength tester. Then connect the tester between the shorted SUPPLY terminals and the grounding terminal. Be sure to connect the grounding lead of the dielectric strength tester to the ground terminal.
3) Set the current limit on the dielectric strength tester to 10 mA, then turn ON the power and gradually increase the test voltage from ‘0’ to the specified voltage.
4) When the specified voltage is reached, hold it for one minute.
5) After completing this test, slowly decrease the voltage to avoid any voltage surges.

2.9 EMC Conformity Standards

EN 61326-1 Class A, Table2
EN 61326-2-3

CAUTION

To meet EMC regulations, Yokogawa recommends that customers run signal wiring through metal conduits or use shielded twisted-pair cabling when installing EJX/EJA-E series transmitters in a plant.

CAUTION

This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

2.10 Safety Requirement Standards

Applicable standard: EN 61010-1

(1) Pollution Degree 2

"Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. " 2 " applies to normal indoor atmosphere. Normally, only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation must be expected.

(2) Installation Category I

"Overvoltage category (Installation category)" describes a number which defines a transient overvoltage condition. It implies the regulation for impulse withstand voltage. " I " applies to electrical equipment which is supplied from the circuit when appropriate transient overvoltage control means (interfaces) are provided.

(3) Indoor/Outdoor use

3. Component Names

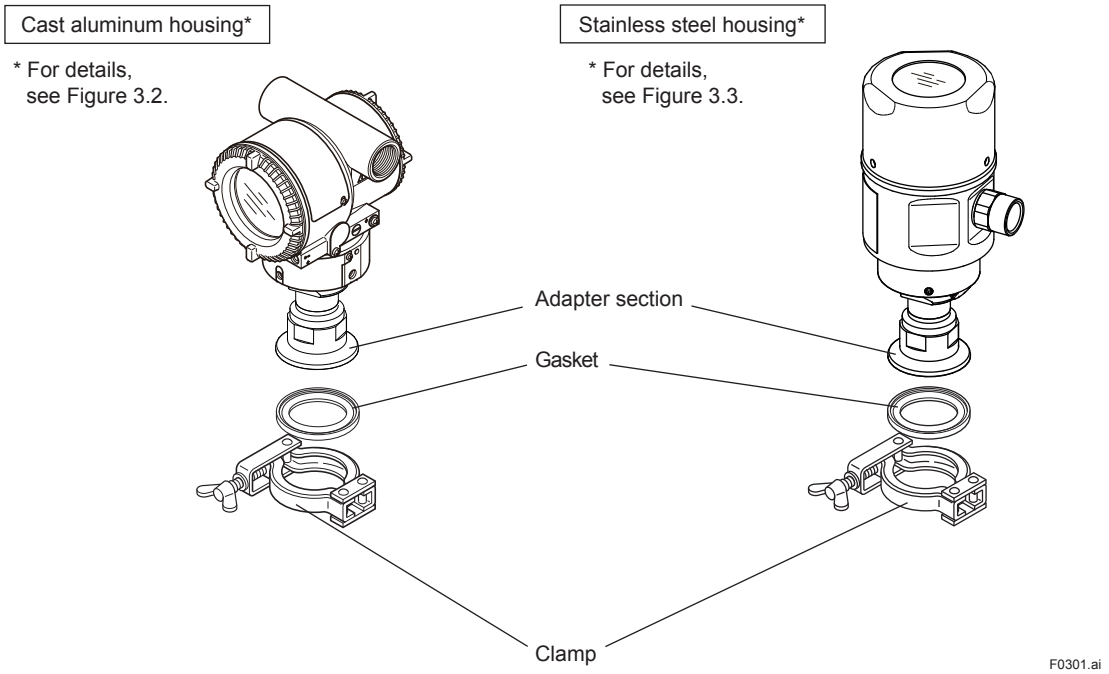
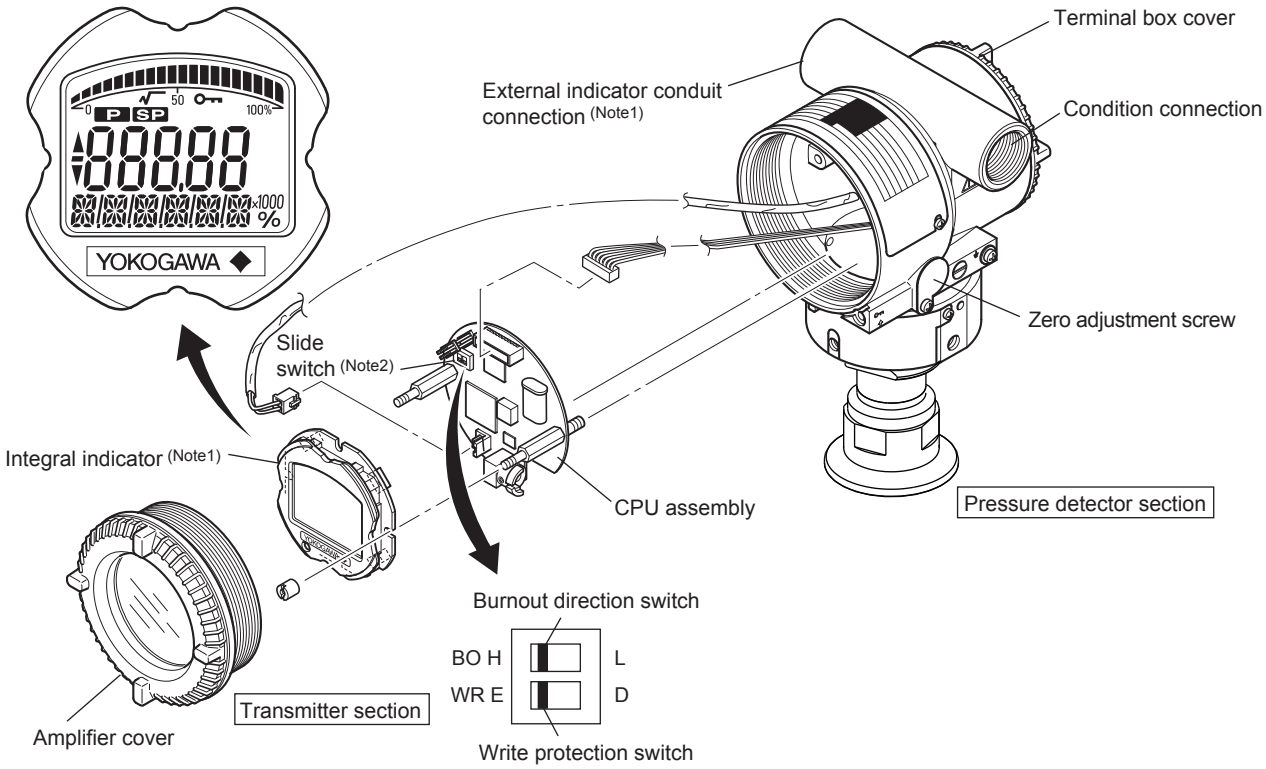


Figure 3.1 Name of each Component



Burnout direction switch (BO)		
Burnout direction switch position (Note2)	H E L D	H E L D
Burnout direction	HIGH	LOW

Hardware write protection switch (WR)		
Hardware write protection switch (WR) (Note2)	H E L D	H E L D
Write protection	NO (Write enable)	YES (Write disable)

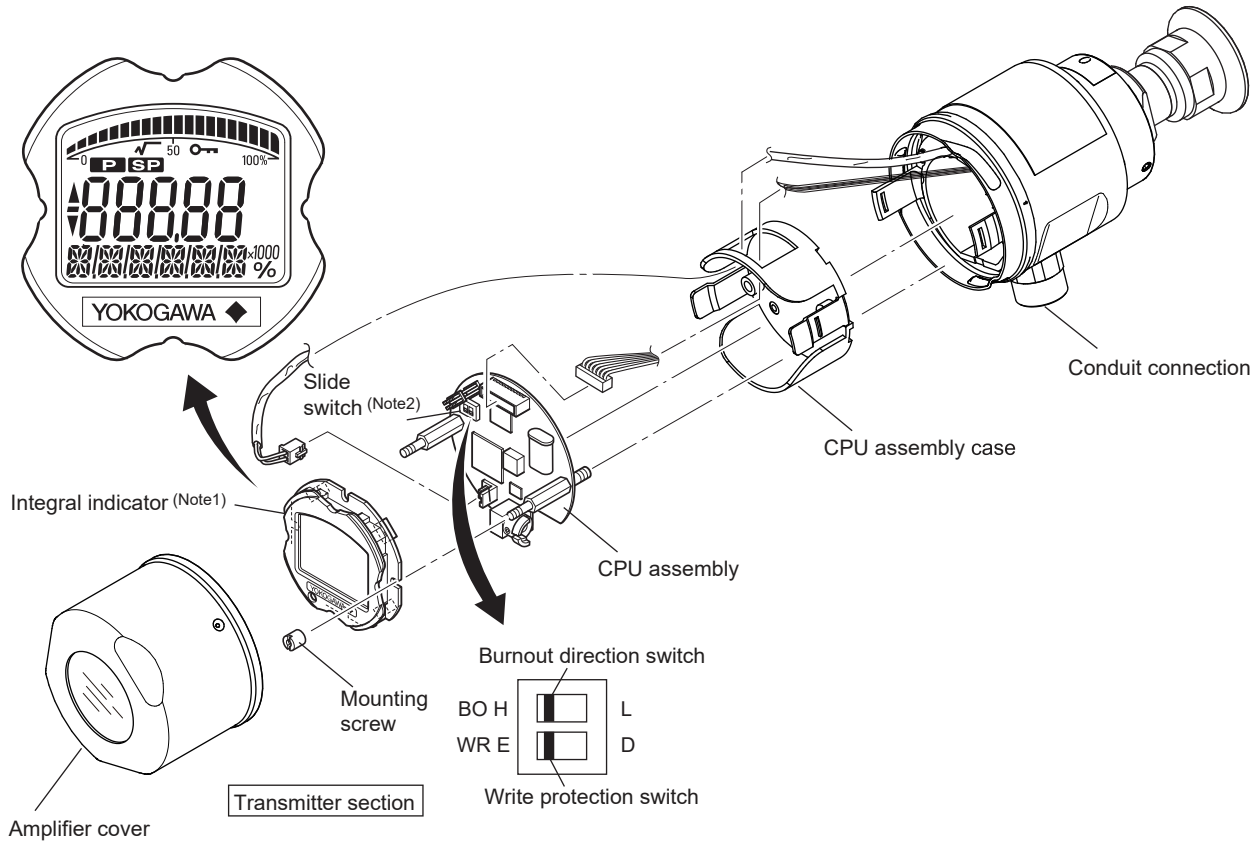
F0302.ai

Note 1. Depends on the specifications. See 8.2 “Model and Suffix Codes”.
Note 2. • To set the burnout direction and write-protect switch against a CPU error, slide the configuration switch (BO or WR) shown in the figure.
The Burnout switch is set to the H side for delivery (L side when option code C1 or C2 is specified), and the hardware write protection switch is set to the E side (write enable state).
• You can confirm the settings by calling the AO alm typ or the write protect parameter using the HART configuration tool.
• To prohibit the zero-point adjustment using the external zero adjustment screw, change the setting of the Ext Sw parameter while the write-protection switch is set to the E side. When option code /CJ is specified, the Ext SW parameter is set to “Disabled” upon shipment.

Figure 3.2 Name of each component (Cast aluminum housing Details of Transmitter)

Table 3.1 Display of Integral Indicator

Display No.	Remarks
▲	The output signal being zero-adjusted is increasing.
▼	The output signal being zero-adjusted is decreasing.
o-r	Write protect function is enabled.



Burnout direction switch (BO)		
Burnout direction switch position (Note2)	H E L D	H E L D
Burnout direction	HIGH	LOW

Hardware write protection switch (WR)		
Hardware write protection switch (WR) (Note2)	H E L D	H E L D
Write protection	NO (Write enable)	YES (Write disable)

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Note 1. Depends on the specifications. See 8.2 “Model and Suffix Codes”.
Note 2. • To set the burnout direction and write-protect switch against a CPU error, slide the configuration switch (BO or WR) shown in the figure.
The Burnout switch is set to the H side for delivery (L side when option code C1 or C2 is specified), and the hardware write protection switch is set to the E side (write enable state).
• You can confirm the settings by calling the AO alm typ or the write protect parameter using the HART configuration tool.
• To prohibit the zero-point adjustment using the external zero adjustment screw, change the setting of the Ext Sw parameter while the write-protection switch is set to the E side. When option code /CJ is specified, the Ext Sw parameter is set to “Disabled” upon shipment.

Figure 3.3 Name of each component (Stainless steel housing Details of Transmitter)

Table 3.2 Display of Integral Indicator

Display No.	Remarks
▲	The output signal being zero-adjusted is increasing.
▼	The output signal being zero-adjusted is decreasing.
⚷	Write protect function is enabled.

4. Installation

4.1 Precautions

Before installing the transmitter, read the cautionary notes in section 2.4, “Selecting the Installation Location”.
For additional information on the permitted ambient conditions at the installation location, see Chapter 8 “Standard Specifications”.

IMPORTANT

- When welding piping for local piping construction, exercise care not to allow welding currents to flow through the transmitter.
- Do not step on this instrument.
- The filter (atmospheric opening) must not face upward because cleaning solution, etc. may adhere to the filter (atmospheric opening), which may lead to a deterioration of the filter performance. Use the transmitter with the GORE-TEX filter attached to the atmospheric opening. Not doing so may affect performance.
- When option code “HH”(for high humidity environment) is selected, the seal screw is attached instead of the filter. In this case, atmosphere must be supplied through the wiring cable. (For details, see Section 5.1.)
- When this transmitter is installed upside down, process fluid may accumulate in the dent of the sensor section. To avoid this, ensure there is an angle of 45 degrees or more when installing the transmitter.

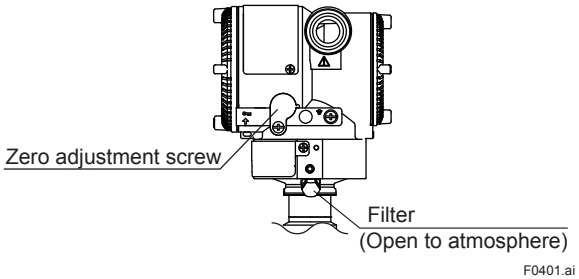


Figure 4.1 Atmospheric Opening and Filter

4.2 Mounting

IMPORTANT

- Do not press on or hit the pressure receiving diaphragm because it is thin and easily damaged.
- When removing the adapter from the transmitter body, always replace the gasket and the O-ring.
- Use the gasket and O-ring that comply with the Hygienic Standards as needed.
- When connecting a cool water tank, position it 30 cm or more away using the tank spud, and take measures against formation of condensation by ensuring the difference between the transmitter temperature and ambient temperature is within 5°C.

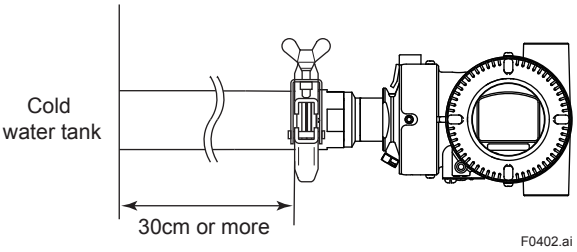


Figure 4.2 Mounting for cold water tank

- Install the transmitter so that the entire surfaces of the pressure-receiving diaphragm and the fluid contact section of the adapter are in contact with the fluid to be measured. If they are only in partial contact with the fluid due to air accumulation or fluid accumulation, performance may be adversely affected.

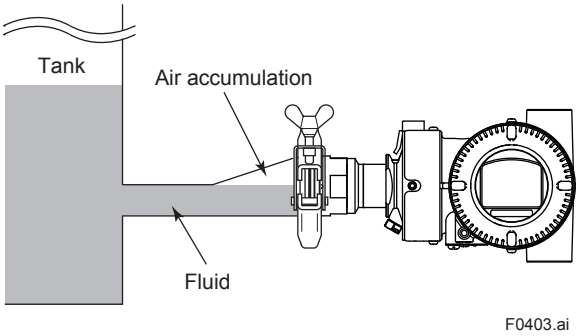


Figure 4.3 Example of installation adversely affecting performance (in the case of air accumulation)

■ Clamp Mounting

1. Attach the gasket to the transmitter.
2. Align the transmitter with the gasket to the sleeve, and fix it using the clamp.

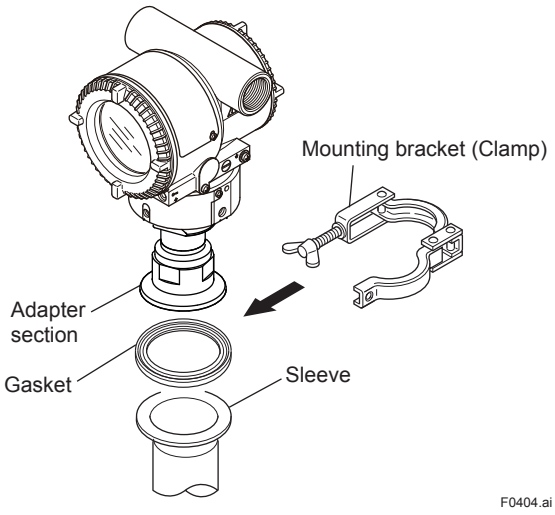


Figure 4.4 Mounting on The Tank Using the Clamp

■ Coupling Nut Mounting (for Union connection)

1. Attach the gasket to the adapter.
2. Align the adapter with the gasket to the sleeve, and fix it using the Coupling nut.

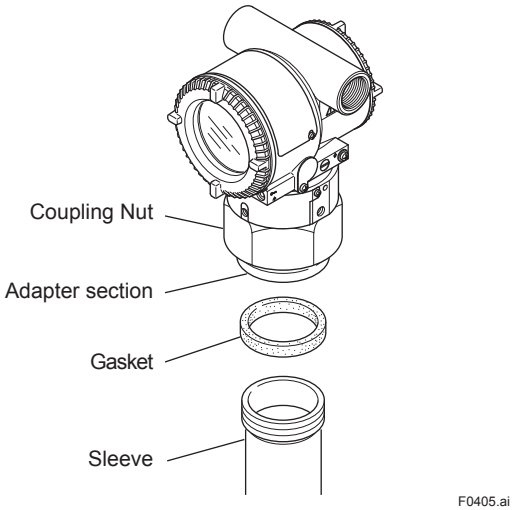
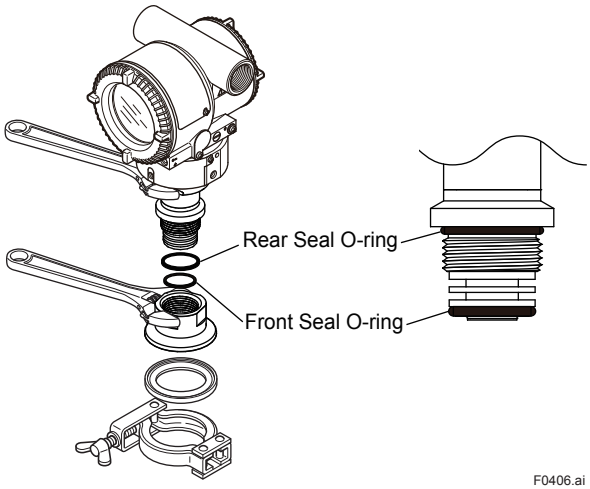


Figure 4.5 Mounting on The Tank Using the Coupling Nut

■ O-ring Mounting Position when Installing the Adapter

Attach the rear seal O-ring and front seal O-ring (wetted part), and screw the adapter carefully so that no dust or other substances will get caught.



Adapter tightening torque: 20 to 30 N·m

Figure 4.6 O-ring Mounting Position

Description	Part Number	Materials	Dimensions
Front seal O-ring	B1070ER	EPDM	Ø2.5×Ø17
	B1071ER	FKM	Ø2.5×Ø17
Rear seal O-ring	B1072ER	EPDM	S-24

IMPORTANT

To install the transmitter horizontally, fix it so that the filter (atmospheric opening) and leak detection port face downward in the horizontal direction. Be sure to fix the zero-adjustment screw so that it faces down.
For 3-A approval, consider that holes and pockets do not hold water.

Mounting example for horizontal piping

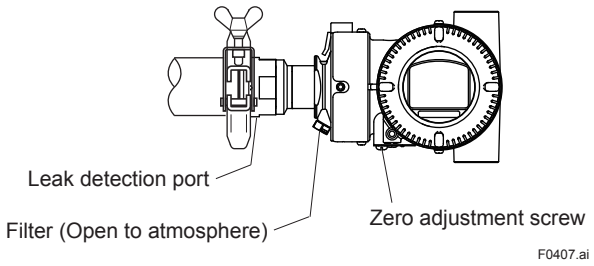


Figure 4.7 Transmitter Mounting (Horizontal Direction)

The integral indicator must be installed in advance in the easy-to-see direction as shown above. If the zero-adjustment screw does not face down after the transmitter has been installed, rotate the transmitter and fix it at the position at which the zero-adjustment screw faces down. (In case of a transmitter with cast aluminum housing) (See Section 4.3.)

4.3 Rotating Transmitter Section

This transmitter can be fixed at any angle by rotating the transmitter section by up to 360 degrees.

(1) Sufficiently loosen the hexagon socket head cap screws (two pieces) at the point where the transmitter section and the pressure receiving section touch using a hexagonal wrench.
(2) Carefully rotate the transmitter section to the target angle. If the stopper does not rotate any further because it is pressed against the atmospheric opening, remove the pipe once and rotate the case. Then, mount the pipe again.
(3) Tighten the hexagon socket head cap screws (two pieces), and fix the transmitter section and pressure receiving section. (The tightening torque is 1.5 N·m.)

IMPORTANT

Rotate the transmitter section in the range that is limited by the stopper fixed to the transmitter section.

IMPORTANT

In case of a transmitter with stainless steel housing, do not rotate the transmitter section.

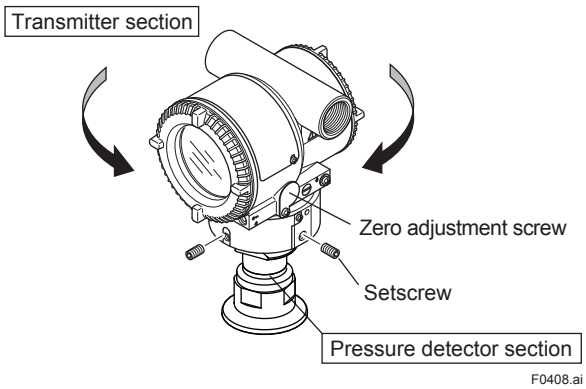


Figure 4.8 Rotating the Transmitter Section

The integral indicator can be mounted in one of the following three directions. Change to the easy-to-see direction in advance depending on the transmitter mounting direction. For details on how to remove and install the indicator, see Section 7.4.

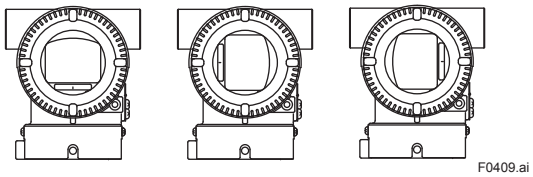


Figure 4.9 Integral Indicator Direction

IMPORTANT

Before removing or installing the indicator, be sure to turn the power off, stop the pressure, and move the transmitter to a non-hazardous area.

5. Wiring

5.1 Wiring Precautions

IMPORTANT

- Lay wiring as far as possible from electrical noise sources such as large capacity transformers, motors, and power supplies.
- Remove the electrical connection dust cap before wiring.
- All threaded parts must be treated with waterproofing sealant. (A non-hardening silicone group sealant is recommended.)
- To prevent noise pickup, do not pass signal and power cables through the same ducts.

CAUTION

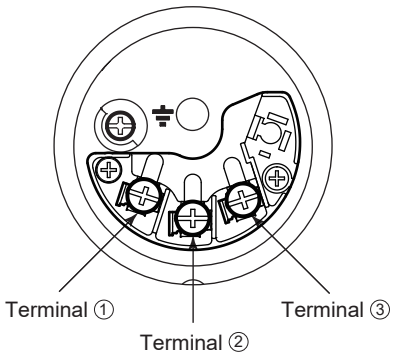
When the option code “HH” (for high humidity environment) is selected, ensure the reference atmospheric pressure using a sealed cable, etc. In this case, exercise care not to block the cable terminal with potting, etc.

5.2 Selecting the Wiring Materials

(a) Use stranded leadwires or cables which are the same as or better than 600 V grade PVC insulated wire (JIS C3307) or its equivalent.
(b) Use shielded wires in areas that are susceptible to electrical noise.
(c) In areas with higher or lower ambient temperatures, use appropriate wires or cables.
(d) In environment where oils, solvents, corrosive gases or liquids may be present, use wires or cables that are resistant to such substances.
(e) It is recommended that crimp-on solderless terminal lugs (for 4 mm screws) with insulating sleeves be used for leadwire ends.

5.3 Connections of External Wiring to Terminal Box

- **Terminal Configuration**



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- **Terminal Wiring for 4 to 20 mA**

SUPPLY + −	① ②	Power supply and output terminals
CHECK + −	③ ②	External indicator (ammeter) terminals*1
⏚		Ground terminal

*1: When using an external indicator or check meter, the internal resistance must be 10 Ω or less.

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Figure 5.1 Terminal

IMPORTANT

In case of a transmitter with stainless steel housing, remove the CPU assembly holder before wiring and be careful not to apply excessive force to the cables. When turning on the power with the CPU assembly holder removed, please be careful that parts mounted on the CPU assembly do not touch the housing.

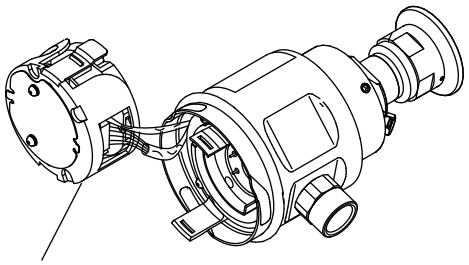

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Figure 5.2 Removing the CPU assembly holder

5.3.1 Power Supply Wiring Connection

IMPORTANT

Connecting with the commercial AC power supply will damage the device. Be sure to use the DC power supply in the predetermined range.

Connect the power supply wiring to the SUPPLY + and – terminals.

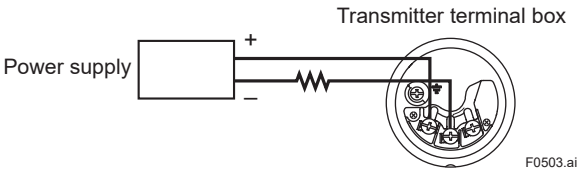


Figure 5.3 Power Supply Wiring Connection

5.3.2 External Indicator Connection

Connect wiring for external indicators to the CHECK (+) and SUPPLY – terminals.

(Note) Use an external indicator whose internal resistance is 10 Ω or less.

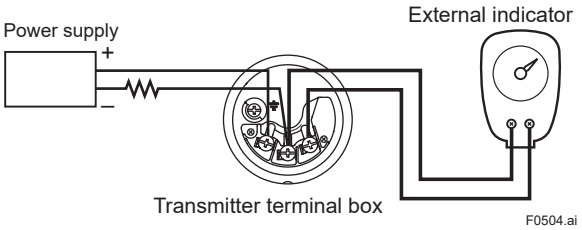


Figure 5.4 External Indicator Connection

5.3.3 Connecting the HART Configuration Tool

IMPORTANT

When the HART configuration tool is connected, the initial circuit current flows to the HART configuration tool, causing a temporary output change. It is recommended that a low-pass filter (approximately 0.1s) be set for the receiver in order to prevent the upper system from being affected.

Connect the HART configuration tool to the SUPPLY + and – terminals. (Use hooks.) Ignore the polarity. A connection example is as follows.

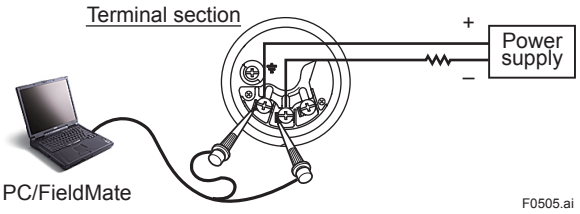


Figure 5.5 Connecting the HART Configuration Tool

5.3.4 Check Meter Connection

Connect the check meter to the CHECK (+) and SUPPLY – terminals. (Use hooks.)

- A 4 to 20 mA DC output signal from the CHECK (+) and SUPPLY – terminals.

(Note) Use a check meter whose internal resistance is 10 Ω or less.

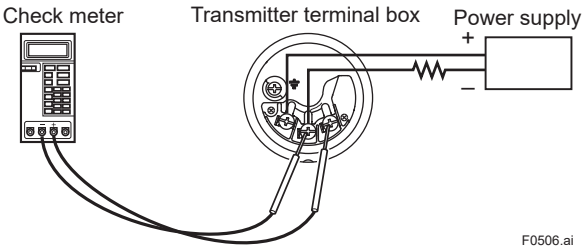


Figure 5.6 Check Meter Connection

5.4 Wiring

5.4.1 Loop Configuration

Since the DPharp uses a two-wire transmission system for 4 to 20 mA output, signal wiring is also used as power wiring.

DC power is required for the transmitter loop. The transmitter and distributor are connected as shown below.
For details of the power supply voltage and load resistance, see section 5.6 for communications line requirements, see section 8.1.

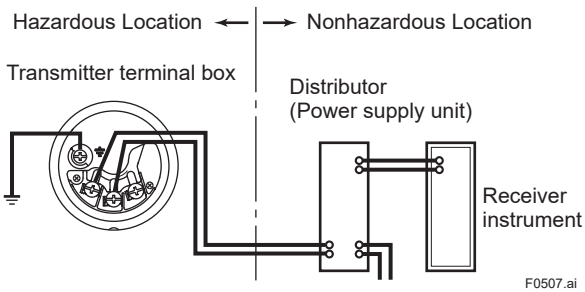


Figure 5.7 Connection between Transmitter and Distributor

5.4.2 Wiring Installation

With the cable wiring, use a metallic conduit or waterproof glands.

- Apply a non-hardening sealant to the terminal box connection port and to the threads on the flexible metal conduit for waterproofing.

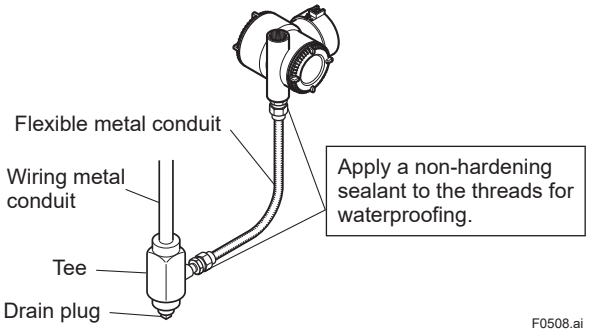


Figure 5.8 Typical Wiring Using Flexible Metal Conduit

CAUTION

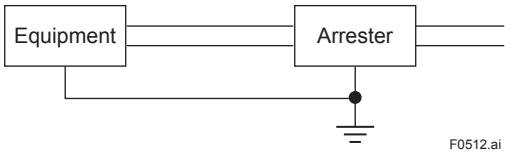
In case of a transmitter with stainless steel housing, with the cable wiring or unwiring, please lock the conduit connection pipe to prevent from getting loosened from the housing.
(Conduit connection pipe tightening torque: 1N·m)

5.5 Grounding

The class C grounding work (ground resistance: 10Ω or less) is required. Ground terminals are located on the inside and outside of the terminal box. Either of these terminals may be used.

CAUTION

To use an external arrester, carry out the interlocked grounding as shown below, and perform the class C grounding work (ground resistance: 10Ω or less) in the arrester side.



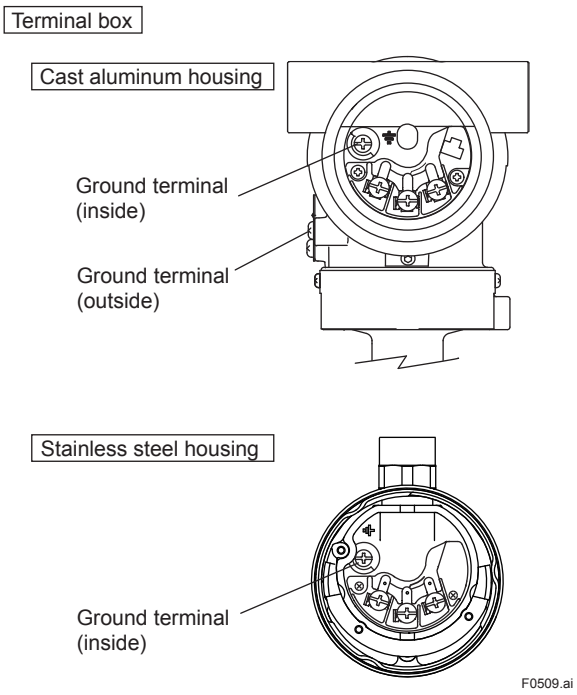


Figure 5.9 Ground Terminals

5.6 Power Supply Voltage and Load Resistance

When configuring the loop, make sure that the external load resistance is within the range in the figure below.

(Note) In case of an intrinsically safe transmitter, external load resistance includes safety barrier resistance.

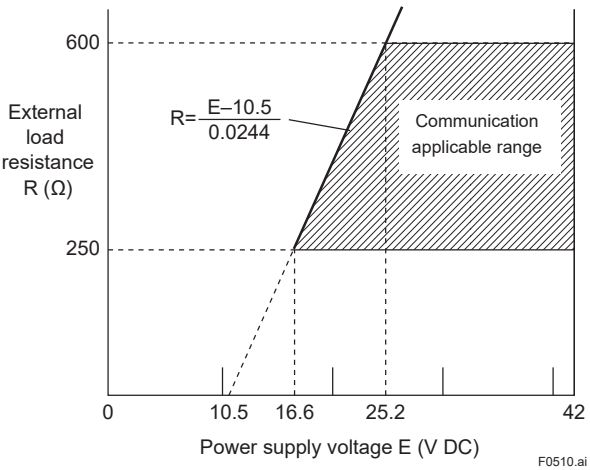
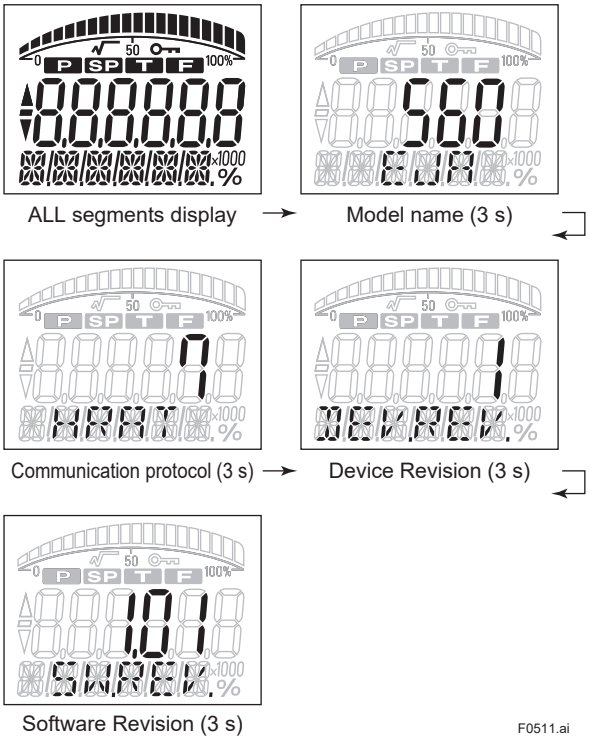


Figure 5.10 Relationship between Power Supply Voltage and External Load Resistance

5.7 Display of the Integral Indicator at Power-On

When the transmitter is turned on, the LCD screen lights up in full mode, and then it is changed to the screen shown below.



On the screen of the communication protocol "HART" is displayed as a protocol. For explanation of HART communication, refer to IM 01C25T01-06EN

NOTE

To check the software revision, follow the below steps.

Parameter Calling	[Route Menu] → Review → Software rev

NOTE

If necessary, the LCD screen can be set to the full light-up only mode by configuring the parameters as shown below.

- **Calling the Screen Setting at Power-On**

Parameter Calling	[Route Menu] → Detailed setup → Display condition → Chg power on info
On	When the power is turned on, the display is changed in the order: full light-up - model code - communication protocol - equipment/software revision.
Off	When the power is turned on, the LCD screen lights up in full mode only.

6. Operation

6.1 Preparation for Starting Operation

This section describes the operation procedure used to measure the pressure of the fluid shown in Figure 6.1.

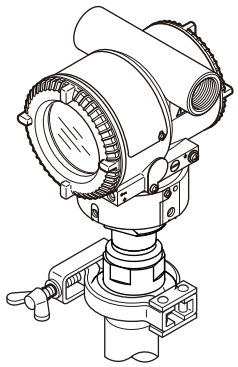


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Figure 6.1 Pressure Measurement

(1) Checking the wetted part for a leak

Make sure that there are no leaks in the transmitter mounting section.

(2) Connecting the HART configuration tool

Turn the power on, and connect the HART configuration tool. Open the cover of the terminal box, and connect the HART configuration tool to the SUPPLY + and - terminals (see 5.3.3).

(3) Making sure that the transmitter is operating normally

Operate the HART configuration tool to check that the transmitter is operating normally, and confirm the parameter values or change a setting value as needed.

For details on how to operate the HART configuration tool, see IM 01C25T01-06EN. If the transmitter has the integral indicator, you can check that the transmitter is operating normally via the display.

■ Using the integral indicator

- For details on the transition of the display at power-on, see Section 5.7.
- If the wiring system is faulty, the display stays blank.
- If the transmitter is faulty, an error code is displayed.

Self-diagnostic error (Faulty transmitter)

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Figure 6.2 Integral Indicator with Error Code

NOTE

If any of the above errors are indicated on the display of the integral indicator or the communicator, refer to subsection 7.5.3 for the corrective action.

NOTE

When capsule A is used with a setting span of 40 kPa or less, the output may temporarily exceed the setting range when the temperature of the fluid to be measured changes rapidly. In this case, it is recommended that the damping time constant is set to 10 sec. or longer.

■ Verify and Change Transmitter Parameter Setting and Values

The parameters related to the following items are set at factory as specified in order.

- Calibration range
- Integral indicator display
- Software damping (optional)

Other parameters like following are shipped with the default setting.

- Low-cut
- Process alarm setting
- Signal characterizer
- Write protection

To confirm or change the values, see IM 01C25T01-06EN.

6.2 Zero Point Adjustment

IMPORTANT

Do not turn off the power to the transmitter immediately after performing a zero point adjustment.
Powering off within 30 seconds of performing this procedure will return the zero point to its previous setting.

When the transmitter is ready to start operations, perform the zero point adjustment. The zero point adjustment of this transmitter can be performed using the following two methods.

(1) When the process pressure can be set to the lower limit (0%) of the measurement range;

■ Using the zero-adjustment screw of the transmitter

When performing the zero point adjustment using the zero-adjustment screw outside the body case, check the following points.

- The display of the Ext SW parameter is set to “Enabled”. (This is set to “Enabled” at shipment. When option code /CJ is specified, the parameter is set to "Disabled" at shipment.) For the procedure, see IM 01C25T01-06EN 3.3.8.
- Use a slotted screwdriver to turn the zero-adjustment screw. Turn the screw clockwise to increase the output or counterclockwise to reduce the output. The zero point adjustment can be made with a resolution of 0.01% of the setting range.

Since the degree of the zero adjustment varies with the screw turning speed, turn the screw slowly to make a fine adjustment or quickly to make a rough adjustment.

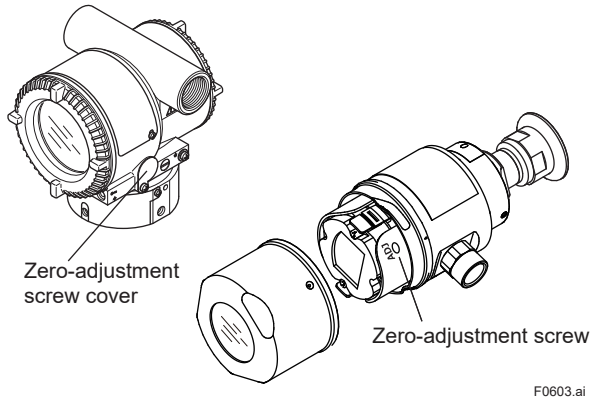


Figure 6.3 Zero-point Adjustment Screw

WARNING

In case of a transmitter with stainless steel housing, remove the cover before zero-adjustment. Use a precision screwdriver for zero-adjustment screw. After opening the cover, check that the adapter of the wetted part is not loosened, if loosened, screw it again.

■ Using the HART configuration tool

The zero point adjustment can be performed via easy key operations of the HART configuration tool. Follow the below steps.
This method is only available when the pressure equivalent to the lower limit of the measurement range is set to “0”.

- Calling and setting the zero point adjustment parameter (Pres Zero trim)

Parameter Calling	[Route Menu] → Diag/Service → Calibration → Pres sensor trim →
→ Pres Zero trim	After the pressure has been stabilized, decide the value.

Make sure that the applied “0” pressure is stabilized on the Pres Zero trim parameter, and decide the value.

(2) When the process pressure cannot be set to the lower limit (0%) of the measurement range;

Adjust the transmitter output signal to the actual measured value that is obtained by a high-accuracy instrument used for measuring pressure.
[Example]
Measurement range: 50 to 250 kPa,
Actual measured value: 130 kPa

$$\text{Actual measured value} = \frac{130\text{-}50}{250\text{-}50} \times 100 = 40.0\%$$

■ Using the zero-adjustment screw of the transmitter

Turn the zero-adjustment screw to match the output signal to the actual measured value.

■ Using the HART configuration tool

While applying the pressure at the target measurement point, set the pressure value to the parameter. The transmitter automatically obtains the adjustment value to make adjustments.

- Calling and setting the zero point adjustment parameter (Pres trim)

Parameter Calling	[Route Menu] → Diag/Service → Calibration → Pres sensor trim → Pres trim →
→ Auto, Lower Pt	Specify the numeric value (130 kPa) to be adjusted.

6.3 Starting Operation

When the zero point adjustment is completed, the transmitter is already set to the operating status. Follow the below steps.

(1) Confirm the operating status.
If the output signal exhibits wide fluctuations (hunting) due to periodic variation in the process pressure. In such a case, you can dampen the transmitter output signal using the HART configuration tool. Confirm the hunting using a receiving instrument or the integral indicator, and set the optimum damping time constant. See IM 01C25T01-06EN 3.2.5 “Optimum Damping Time Constant”.

(2) After confirming the operating status, perform the following procedure.

IMPORTANT

- Remove the HART configuration tool from the terminal box, and check each terminal for looseness.

In case of a transmitter with cast aluminum housing.

- Close the terminal box cover and amplifier cover. Screw each cover in tightly until the screw will not turn any further.
- Fix the zero-adjustment screw cover to the specified position, and tighten the mounting screw.

In case of a transmitter with stainless steel housing.

- Close the cover so that the hollow matches to the "CLOSE". (Figure 6.4)
- When closing the cover, be careful that no dust or other substances will get caught.

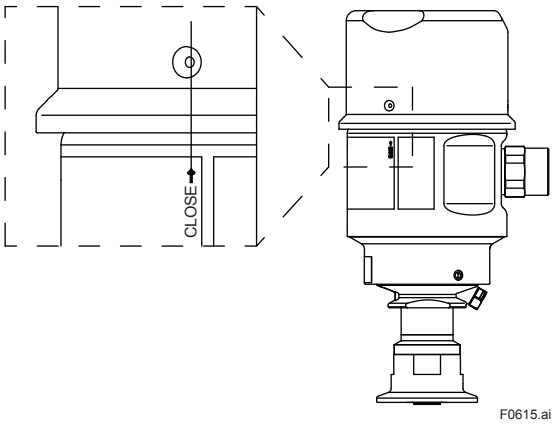


Figure 6.4 Cover close position

6.4 Shutting Down the Transmitter

To shut down the transmitter, turn the power off.

NOTE

Whenever shutting down the transmitter for a long period of time, remove the transmitter from the process line.

6.5 Local Parameter Setting

WARNING

The local push button on the integral indicator must not be used in a hazardous area. When it is necessary to use the push button, operate it in a non- hazardous location.

IMPORTANT

- Do not turn off the power to the transmitter immediately after performing parameter setting. Powering off within 30 seconds of performing this procedure will return the parameter to its previous setting.
- The parameter of Ext SW must be “Enabled” to perform this configuration. See the user’s manual IM 01C25T01-06EN (HART) for the setting procedure. When option code /CJ is specified, the parameter is set to "Disabled" upon shipment.
- LCD update will be slower at low ambient temperature, and it is recommended to use LPS function at temperatures above -10°C.

6.5.1 Local Parameter Setting (LPS) Overview

Parameter configuration by the zero-adjustment screw and push button (integral indicator code E) offers easy and quick setup for parameters of Tag number, Unit, LRV, URV, Damping, Output mode (linear/square root/ signal characterizer), Display out 1, and Re-range by applying actual pressure (LRV/URV). There is no effect on measurement signal (analog output or communication signal) when Local Parameter Setting is carried out.

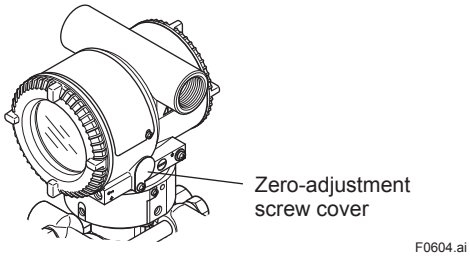


Figure 6.5 External Adjustment Screw

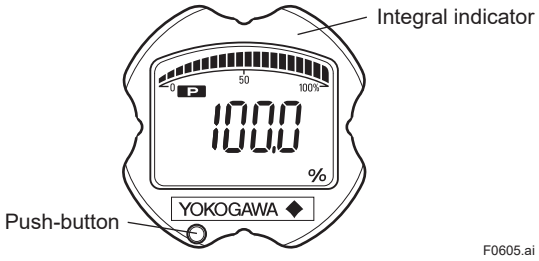


Figure 6.6 Range Setting Switch (push button)

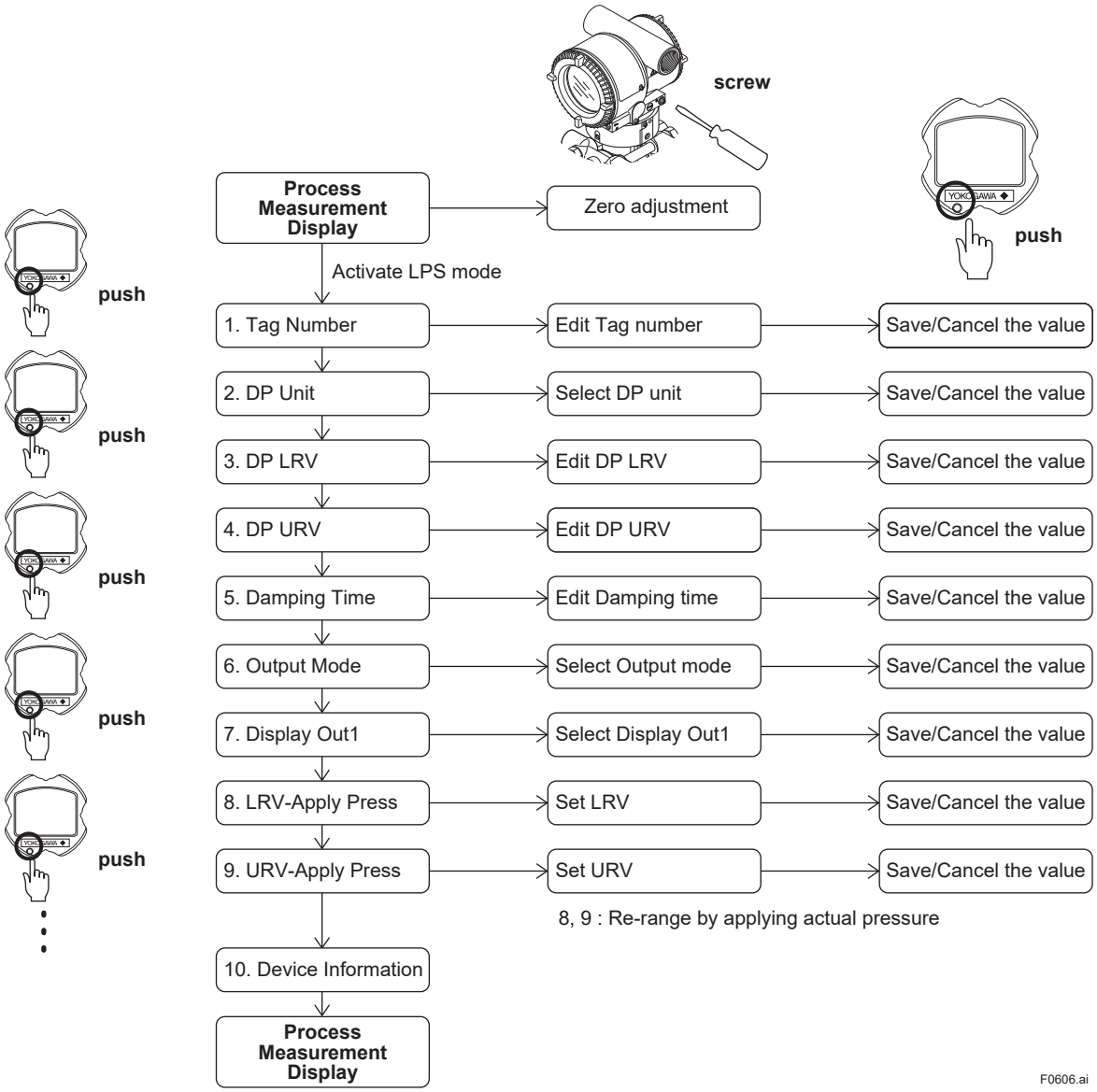


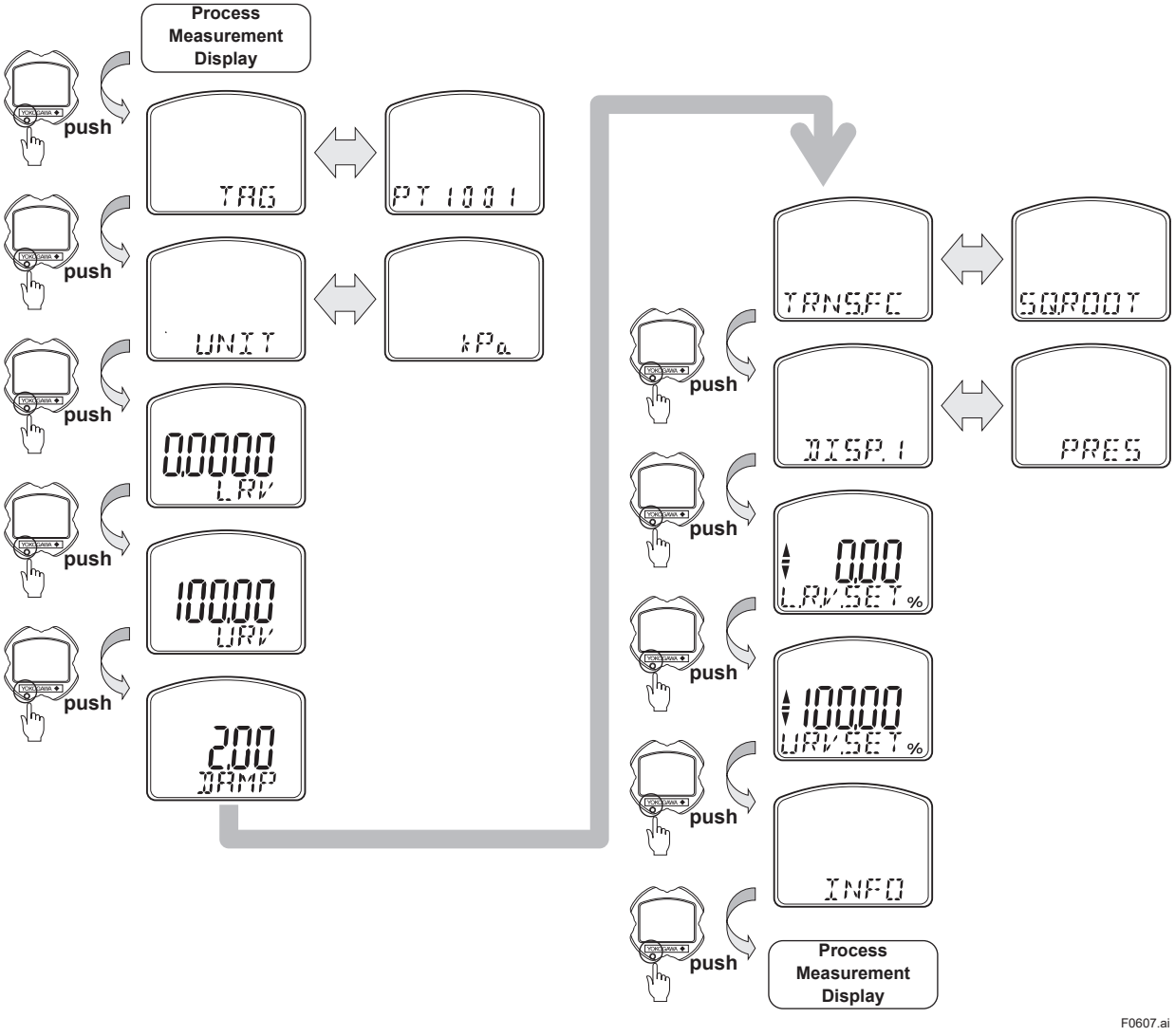
Figure 6.7

6.5.2 Activating Local Parameter Setting

Press the push button on the integral indicator to activate the Local Parameter Setting mode. The transmitter will exit automatically from the Local Parameter Setting mode if no operation is carried out for 10 minutes.

6.5.3 Parameter Setting Review

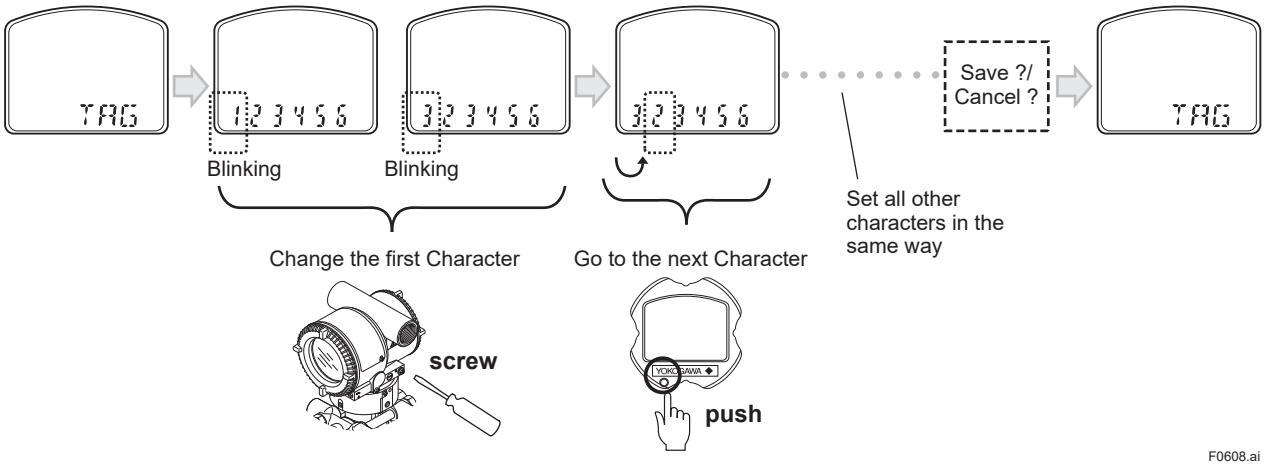
Current setting value for the below parameters are shown sequentially by each press of the push button.
Tag number, Unit, LRV, URV, Damping, Output mode (linear/square root/signal characterizer), Display out 1.



To configure each parameter value, turn the external adjustment screw on each parameter screen after activating the Local Parameter Setting mode.
To cancel the Local Parameter Setting configuration, please refer to 6.5.11 Save or Cancel and 6.5.12 Abort Configuration.

6.5.4 Tag Number Configuration

Tag Number is edited by turning the external adjustment screw. Up to 8 alphanumeric characters can be set.



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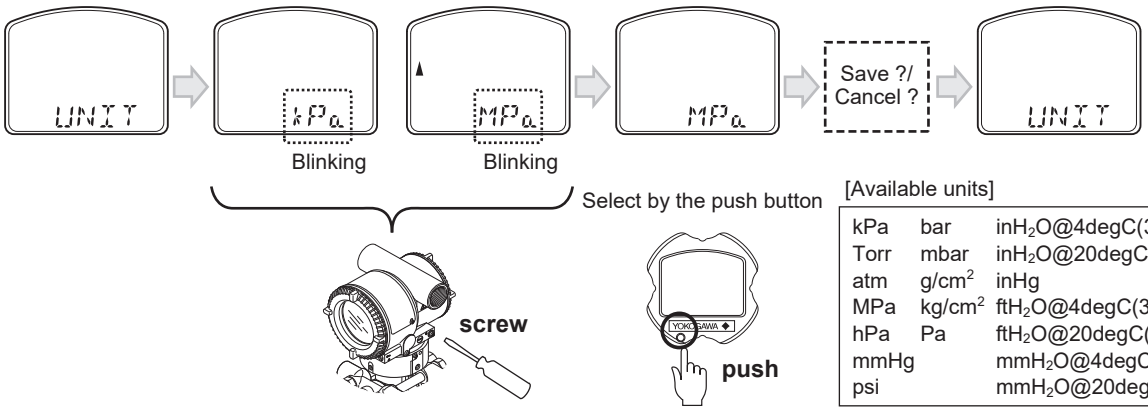
6.5.5 Pressure Unit Configuration

Pressure unit for the below table can be changed as below. By turning the external adjustment screw, user can scroll between the various available pressure units.



[Available units]

kPa	bar	inH_2O@4degC(39.2degF)
Torr	mbar	inH_2O@20degC(68degF)
atm	g/cm^2	inHg
MPa	kg/cm^2	ftH_2O@4degC(39.2degF)
hPa	Pa	ftH_2O@20degC(68degF)
mmHg		mmH_2O@4degC(39.2degF)
psi		mmH_2O@20degC(68degF)

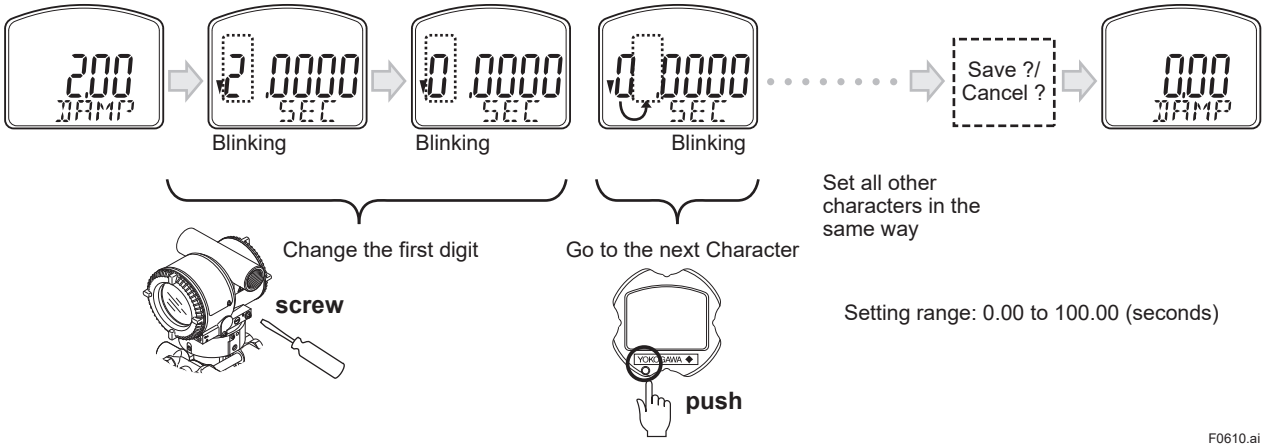
F0609.ai

6.5.6 Pressure LRV/URV Configuration

Pressure LRV and URV can be set. The number for each digit is changed by turning the external adjustment screw and set by pressing the push button. Please refer to 6.5.7 Damping Time Constant Configuration for how to change the numerical value.
When the setting is out of the limit, an alarm will be generated.

6.5.7 Damping Time Constant Configuration

The damping time constant for the pressure transmission part can be set. Damping time constant is rounded off to two decimal places.



6.5.8 Output Mode Configuration

Pressure Output Mode (“TRNS.FC” shown on the integral indicator) can be selected by turning the external adjustment screw. Please refer to 6.5.5 Pressure Unit Configuration for how to select and set the enumerated value.

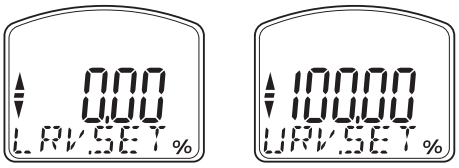
value	display
linear	LINEAR
square root	SQ.ROOT
signal characterizer (spcl curve)	SC.TABL

6.5.9 Display Out 1 Configuration

Display Out1 can be selected by turning the external adjustment screw. Please refer to 6.5.5 Pressure Unit Configuration for how to select and set the enumerated value.

6.5.10 Re-range by applying actual pressure (LRV/URV).

This feature allows the lower and upper range values to be setup with the actual input applied.



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Follow the procedure below to change the LRV and URV settings.

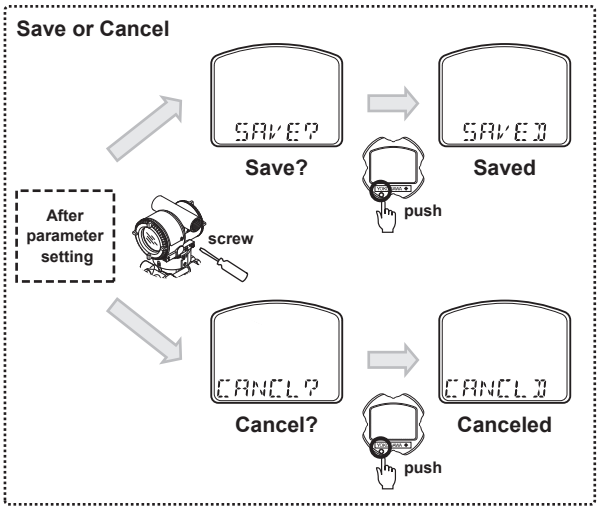
[Example]
Rerange LRV to 0 and URV to 3 MPa.

1) Connect the transmitter and apparatus as shown in Figure 7.1 and warm it up for at least five minutes.
2) Press the push-button. The integral indicator then displays “LRV.SET.”
3) Apply a pressure of 0 kPa (atmospheric pressure) to the transmitter. (Note 1)
4) Turn the external adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
5) Adjust the output signal to 0% (1 V DC) by rotating the external adjustment screw. Press the push button to save the value. Doing so completes the LRV setting. (Note 3)
6) Press the push-button. The integral indicator then displays “URV.SET.”
7) Apply a pressure of 3 MPa to the transmitter. (Note 1)
8) Turn the external adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
9) Adjust the output signal to 100% (5 V DC) by rotating the external adjustment screw. Press the button to save the value. Doing so completes the URV setting.
10) Press the push-button. The transmitter then switches back to the normal operation mode with the measurement range of 0 to 3 MPa.

Note 1: Wait until the pressure inside the pressure-detector section has stabilized before proceeding to the next step.
Note 2: If the pressure applied to the transmitter exceeds the previous LRV (or URV), the integral indicator may display error number “AL.30” (In this case, the output signal percent and “AL.30” are displayed alternately every two seconds). Although “AL.30” is displayed, you may proceed to the next step. However, should any other error number be displayed, take the appropriate measure in reference to, “Errors and Countermeasures” in each communication manual.
Note 3: Changing the lower range value (LRV) also automatically changes the upper range value (URV), keeping the span constant. New URV=previous URV+(new LRV–previous LRV)

6.5.11 Save or Cancel

At the end of each parameter setting, select “Save” or “Cancel” by the external adjustment screw and press the push button to save or cancel the configuration.



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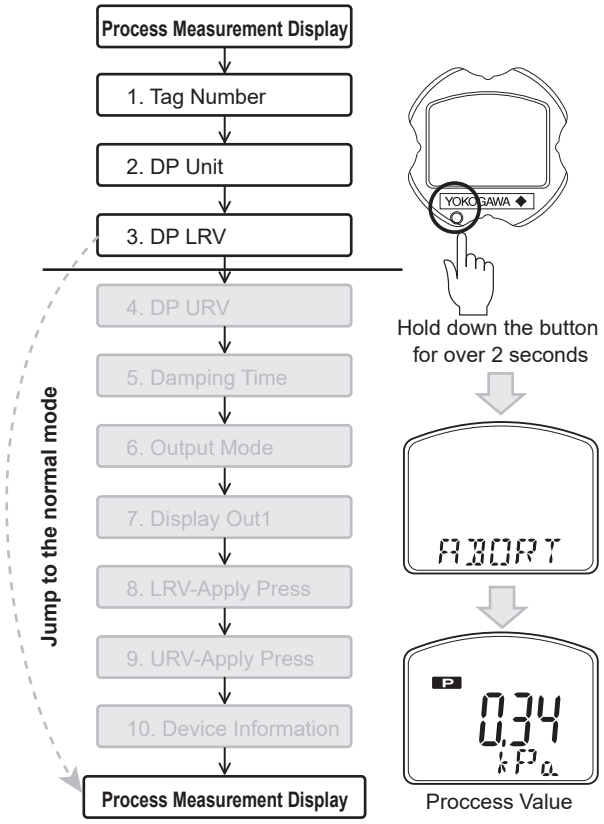
6.5.12 Abort Configuration

6.5.12.1 Abort Configuration (Menu)

Hold down the push button for over 2 seconds to exit the Local Parameter Setting mode.



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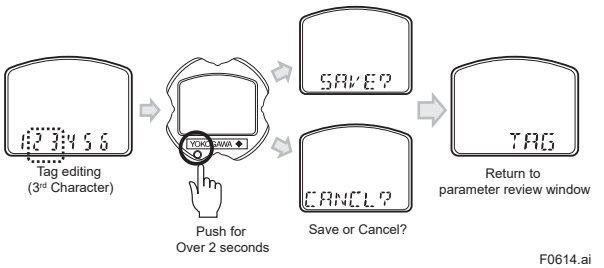
6.5.12.2 Abort Configuration (Parameter)

To exit the configuration while editing the value, hold down the button for over 2 seconds and select “Save” or “Cancel”.



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6.5.13 Local Parameter Setting Lock

To disable parameter changes by the Local Parameter Setting there are three different ways.

	Locked features
Communication Parameter Ext SW =disable	• External Zero Adjustment • Local Parameter Setting
Communication Parameter Write Protect = On	• Local Parameter Setting • All Communication Parameters *
Hardware write protection switch on CPU assembly = D (Disable)	• Local Parameter Setting • All Communication Parameters *

*External Zero Adjustment is unlocked.

The above parameter setting is carried out by using HART configuration tool. See the user’s manual IM 01C25T01-06EN (HART) for the setting procedure. Reviewing local parameter setting by push button on the integral indicator is available at any time even when the Local Parameter Setting is locked.

6.5.14 Others

- The degree of adjustment depends on the speed of turning the adjustment screw. Turn the screw slowly for fine tuning and turn the screw fast for quick tuning.

7. Maintenance

7.1 Overview

WARNING

Since the accumulated process fluid may be toxic or otherwise harmful, take appropriate care to avoid contact with the body or inhalation of vapors when draining condensate or venting gas from the transmitter pressure-detector section and even after dismounting the instrument from the process line for maintenance.

Maintenance of the transmitter is easy due to its modular construction. This chapter describes the procedures for calibration, adjustment, and the disassembly and reassembly procedures required for component replacement.

Transmitters are precision instruments. Please carefully and thoroughly read the following sections for information on how to properly handle them while performing maintenance.

IMPORTANT

- As a rule, maintenance of this transmitter should be done in a shop that has all the necessary tools.
- The CPU assembly contains sensitive parts that can be damaged by static electricity. Take precautions such as using a grounded wrist strap when handling electronic parts or touching the board circuit patterns. Also be sure to place the removed CPU assembly into a bag with an antistatic coating.

7.2 Calibration Instruments Selection

Table 7.1 lists the instruments that can be used to calibrate a transmitter. When selecting an instrument, consider the required accuracy level. Exercise care when handling these instruments to ensure they maintain the specified accuracy.

7.3 Calibration

Use the procedure below to check instrument operation and accuracy during periodic maintenance or troubleshooting.

1) Connect the instruments as shown in figure 7.1 and warm up the instruments for at least five minutes.

IMPORTANT

- To adjust the transmitter for highest accuracy, make adjustments with the power supply voltage and load resistance including leadwire resistances set close to the conditions under which the transmitter is installed.
- If the measurement range 0% point is 0 kPa or shifted in the positive direction (suppressed zero), the reference pressure should be applied as shown in the figure. If the measurement range 0% point is shifted in the negative direction (elevated zero), the reference pressure should be applied using a vacuum pump.

2) Apply reference pressures of 0%, 50%, and 100% of the measurement range to the transmitter. Calculate the errors (differences between digital voltmeter readings and reference pressures) as the pressure is increased from 0% to 100% and is decreased from 100% to 0%, and confirm that the errors are within the required accuracy.

Table 7.1 Instruments Required for Calibration

Name	Yokogawa-recommended Instrument	Remarks
Power supply	Model SDBT or SDBS distributor	4 to 20 mA DC signal
Load resistor	Model 2792 standard resistor [250 Ω ±0.005%, 3 W]	
	Load adjustment resistor [100 Ω ±1%, 1 W]	
Voltmeter	Model 2501 A digital multimeter Accuracy (10V DC range): ±(0.002% of rdg + 1 dgt)	
Digital manometer	Model MT220 precision digital manometer 1) For 10 kPa class Accuracy: ±(0.015% of rdg + 0.015% of F.S.). . . . for 0 to 10 kPa ±(0.2% of rdg + 0.1% of F.S.). . . . . for -10 to 0 kPa 2) For 130 kPa class Accuracy: ±0.02% of rdg. . . . . for 25 to 130 kPa ±5digits. . . . . for 0 to 25 kPa ±(0.2% of rdg + 0.1% of F.S.). . . . . for -80 to 0 kPa 3) For 700 kPa class Accuracy: ±(0.02% of rdg + 3digits) . . . . . for 100 to 700 kPa ±5 digits . . . . . for 0 to 100 kPa ±(0.2% of rdg + 0.1% of F.S.). . . . . for -80 to 0 kPa 4) For 3000 kPa class Accuracy: ±(0.02% of rdg + 10 digits). . . . . for 0 to 3000 kPa ±(0.2% of rdg + 0.1% of F.S.). . . . . for -80 to 0 kPa 5) For 130 kPa abs class Accuracy: ±(0.03% of rdg + 6 digits). . . . . for 0 to 130 kPa abs	Select a manometer having a pressure range close to that of the transmitter.
Pressure generator	Model 7674 pneumatic pressure standard for 200 kPa {2 kgf/cm^2}, 25 kPa {2500 mmH$_2$O} Accuracy: ±0.05% of F.S.	Requires air pressure supply.
	Dead weight gauge tester 25 kPa {2500 mmH$_2$O} Accuracy: ±0.03% of setting	Select the one having a pressure range close to that of the transmitter.
Pressure source	Model 6919 pressure regulator (pressure pump) Pressure range: 0 to 133 kPa {1000 mmHg}	Prepare the vacuum pump for negative pressure ranges.

Note: The above table contains the instruments capable of performing calibration to the 0.2% level. Since special maintenance and management procedures involving traceability of each instrument to higher-level standards are required for calibration to the 0.1% or higher level, there may be difficulties in calibration to this level in the field. For calibration to the 0.1% or higher level, use proper instruments for required level or contact Yokogawa representatives from which the instrument was purchased or the nearest Yokogawa office.

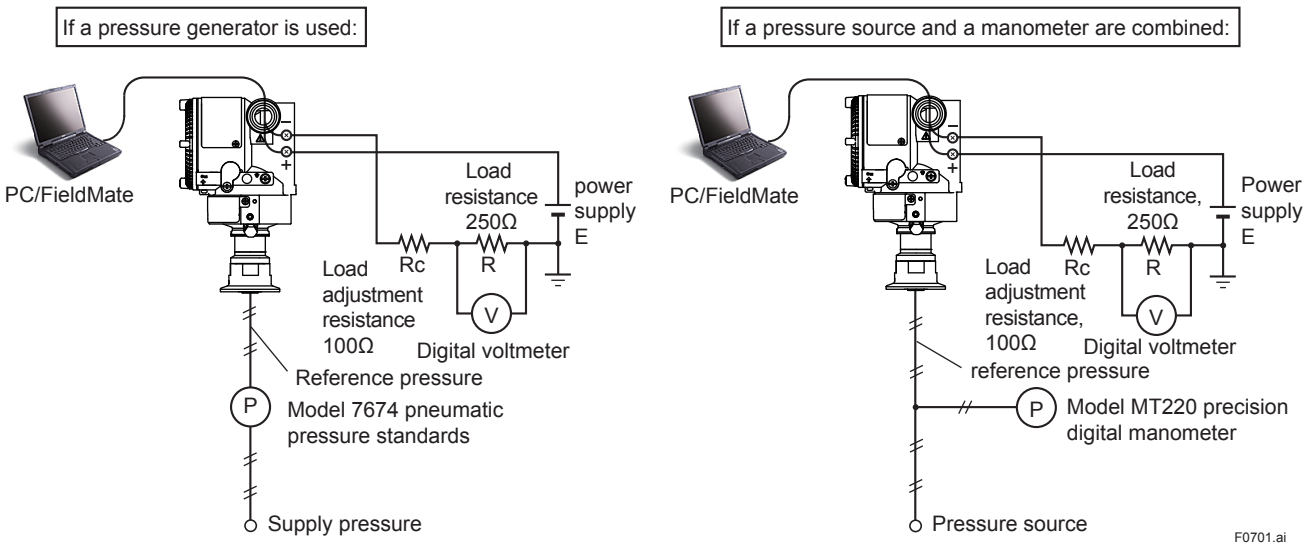


Figure 7.1 Instrument Connections (4 to 20 mA output)

7.4 Disassembly and Reassembly

This section describes procedures for disassembly and reassembly for maintenance and component replacement.

IMPORTANT

When removing the adapter from the transmitter body, always replace the gasket and the O-ring. Refer to Chapter 4 “Installation” for installation procedure.

Always turn OFF power and shut off and release pressures before disassembly. Use proper tools for all operations. Table 7.2 shows the tools required.

Table 7.2 Tools for Disassembly and Reassembly

Tool	Quantity	Remarks
Phillips screwdriver	1	JIS B4633, No. 2
Slotted screwdriver	1	
Allen wrenches	3	JIS B4648 One each, nominal 3, 4 and 2.5 mm Allen wrenches
Wrench	1	Width across flats, 17 mm
Torque wrench	1	
Adjustable wrench	1	
Socket wrench	1	Width across flats, 16 mm
Socket driver	1	Width across flats, 5.5 mm
Tweezers	1	

7.4.1 Replacing the Integral Indicator

This subsection describes the procedure for replacing an integral indicator. (See figure 7.2)

■ **Removing the Integral Indicator**

1) Remove the cover.
2) While supporting the integral indicator with one hand, loosen its two mounting screws.
3) Dismount the LCD board assembly from the CPU assembly.
   When doing this, carefully pull the LCD board assembly straight forward so as not to damage the connector pins between it and the CPU assembly.

■ **Attaching the Integral Indicator**

1) Align both the LCD board assembly and CPU assembly connectors and engage them.
2) Insert and tighten the two mounting screws.
3) Replace the cover.

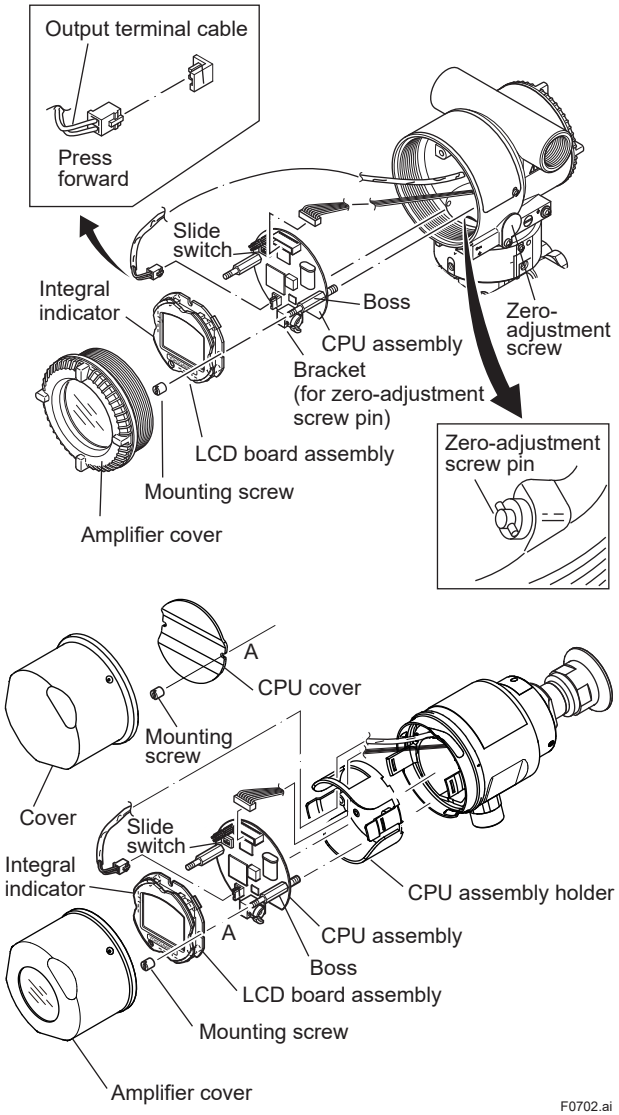


Figure 7.2 Removing and Attaching LCD Board Assembly and CPU Assembly

7.4.2 Replacing the CPU Board Assembly

This subsection describes the procedure for replacing the CPU assembly. (See figure 7.2)

■ **Removing the CPU Assembly**

1) Remove the cover. If an integral indicator or CPU cover is mounted, refer to subsection 7.4.1 and remove the indicator.
2) Turn the zero-adjustment screw to the position (where the screw head slot is horizontal) as shown in figure 7.2.
   (In case of a transmitter with cast aluminum alloy housing)
3) Disconnect the output terminal cable (cable with brown connector at the end). When doing this, lightly press the side of the CPU assembly connector and pull the cable connector to disengage.
4) Use a socket driver (width across flats, 5.5mm) to loosen the two bosses.
5) Carefully pull the CPU assembly straight forward to remove it.
6) Disconnect the flat cable (cable with white connector at the end) that connects the CPU assembly and the capsule.

NOTE

Be careful not to apply excessive force to the CPU assembly when removing it.

■ **Mounting the CPU Assembly**

1) Connect the flat cable (with white connector) between the CPU assembly and the capsule.
2) Connect the output terminal cable (with brown connector).

NOTE

Make certain that the cables do not get pinched between the case and the edge of the CPU assembly.

3) Align and engage the zero-adjustment screw pin with the groove on the bracket on the CPU assembly. Then insert the CPU board assembly straight onto the post in the amplifier case.
   (In case of a transmitter with cast aluminum alloy housing)
4) Tighten the two bosses. If the transmitter is equipped with an integral indicator or CPU cover, refer to subsection 7.4.1 to mount the indicator.

NOTE

Confirm that the zero-adjustment screw pin is placed properly in the groove on the bracket prior to tightening the two bosses. If it is not, the zero-adjustment mechanism will be damaged.

5) Replace the cover.

7.4.3 Cleaning and Replacing the Capsule Assembly

This subsection describes the procedures for cleaning and replacing the capsule assembly. (See figure 7.3.)

■ **Removing the Capsule Assembly**

IMPORTANT

Exercise care as follows when cleaning the capsule assembly.

- Handle the capsule assembly with care, and be especially careful not to damage or distort the diaphragms that contact the process fluid.
- Do not use a chlorinated or acidic solution for cleaning.
- Rinse thoroughly with clean water after cleaning.

1) Remove the CPU assembly as shown in subsection 7.4.2.
2) Remove the two setscrews that connect the transmitter section and pressure-detector section.
3) Remove the hexagon-head screw and the stopper.
4) Separate the transmitter section and capsule assembly.
5) Clean the capsule assembly or replace with a new one.

■ **Reassembling the Capsule Assembly**

1) Insert the capsule assembly to the transmitter section. Reattach the stopper with the hexagon head screw.
2) Tighten the two setscrews. (Tighten the screws to a torque of 1.5 N·m)
3) Install the CPU assembly according to subsection 7.4.2.
4) After completing reassembly, adjust the zero point and recheck the parameters.

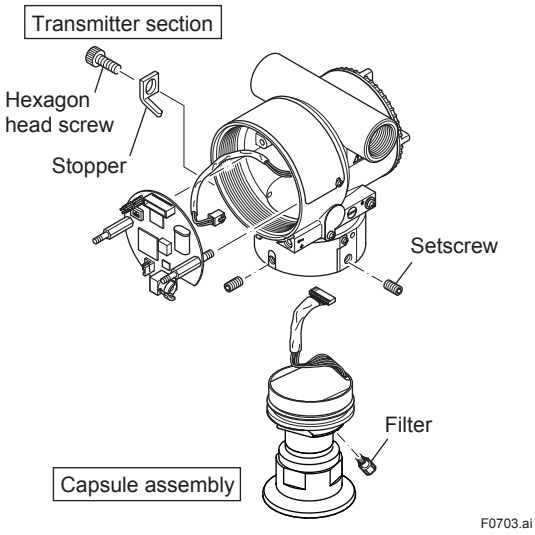


Figure 7.3 Removing and Mounting the Pressure detector Section

7.4.4 Adapter Replacing

To replace the adapter or O-ring, or to perform disassembly cleaning, remove the adapter using two wrenches. Exercise care not to apply excessive force to the case.
However, if wrenches cannot be used depending on the adapter, first fix the adapter using a clamp, etc., and then remove the adapter using wrenches.

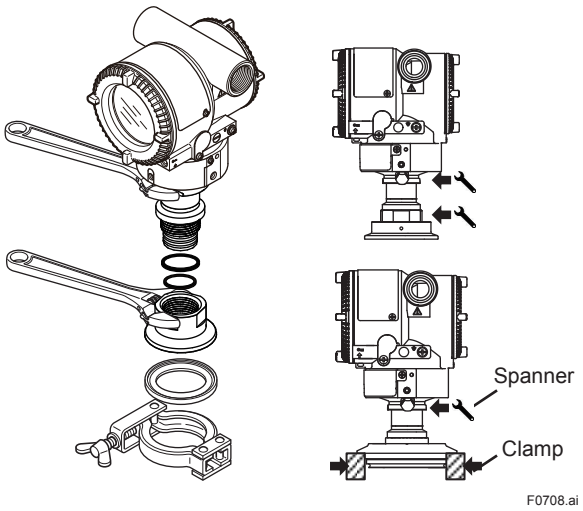


Figure 7.4 Mounting Adapter

7.5 Troubleshooting

If any abnormality appears in the measured values, use the troubleshooting flow chart below to isolate and remedy the problem. Since some problems have complex causes, these flow charts may not identify all. If you have difficulty isolating or correcting a problem, contact Yokogawa service personnel.

7.5.1 Basic Troubleshooting

First determine whether the process variable is actually abnormal or a problem exists in the measurement system.

If the problem is in the measurement system, isolate the problem and decide what corrective action to take.

This transmitter is equipped with a self-diagnostic function which will be useful in troubleshooting, and the transmitter equipped with an integral indicator will show an alarm code as a result of self-diagnosis.
See subsection 7.5.3 for the list of alarms.
See also each communication manual.

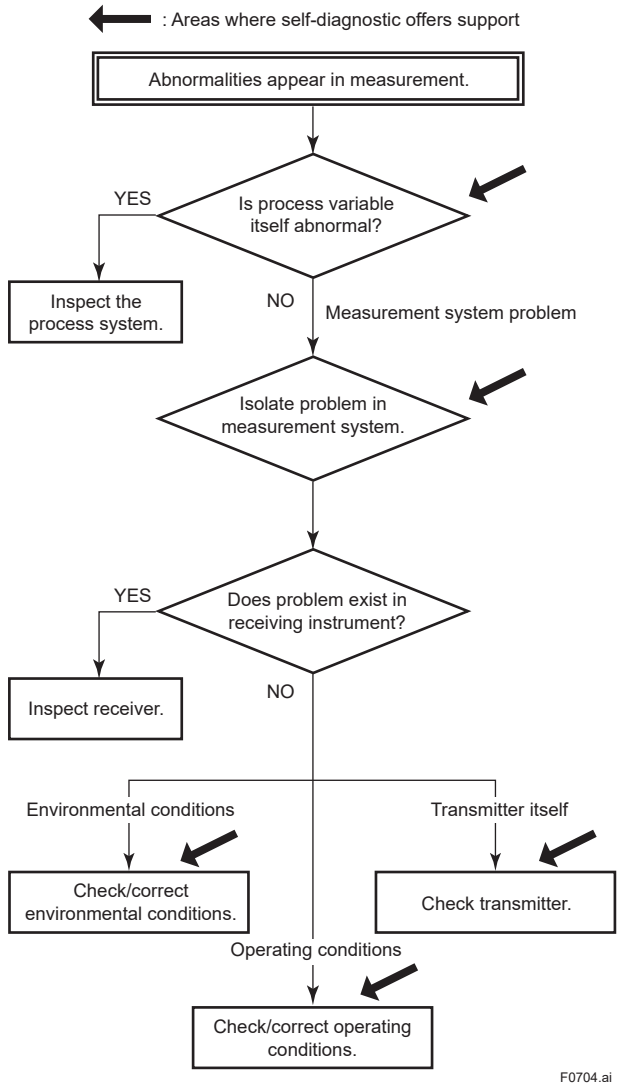
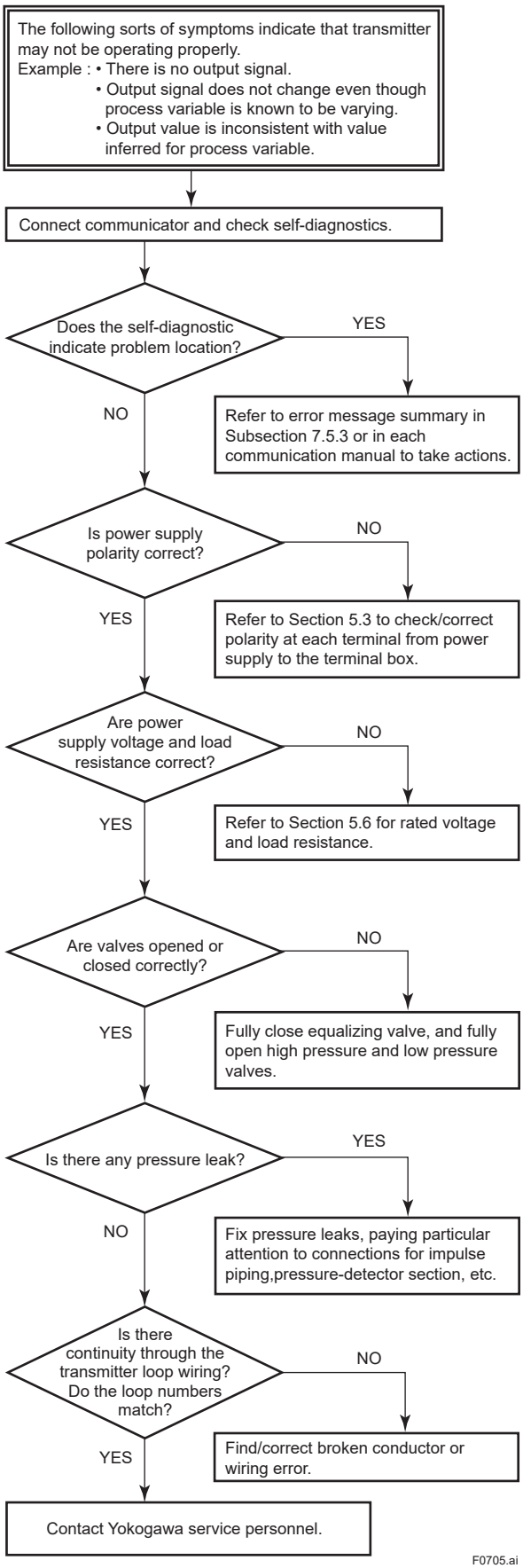
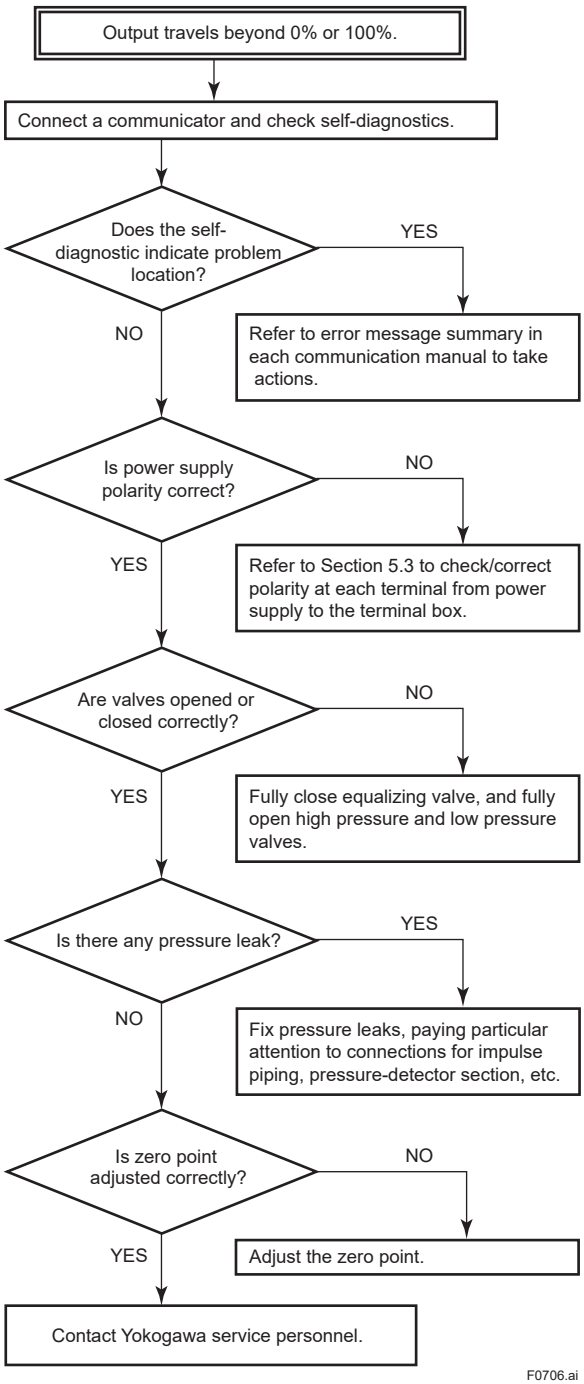


Figure 7.5 Basic Flow and Self-Diagnostics

7.5.2 Troubleshooting Flowcharts





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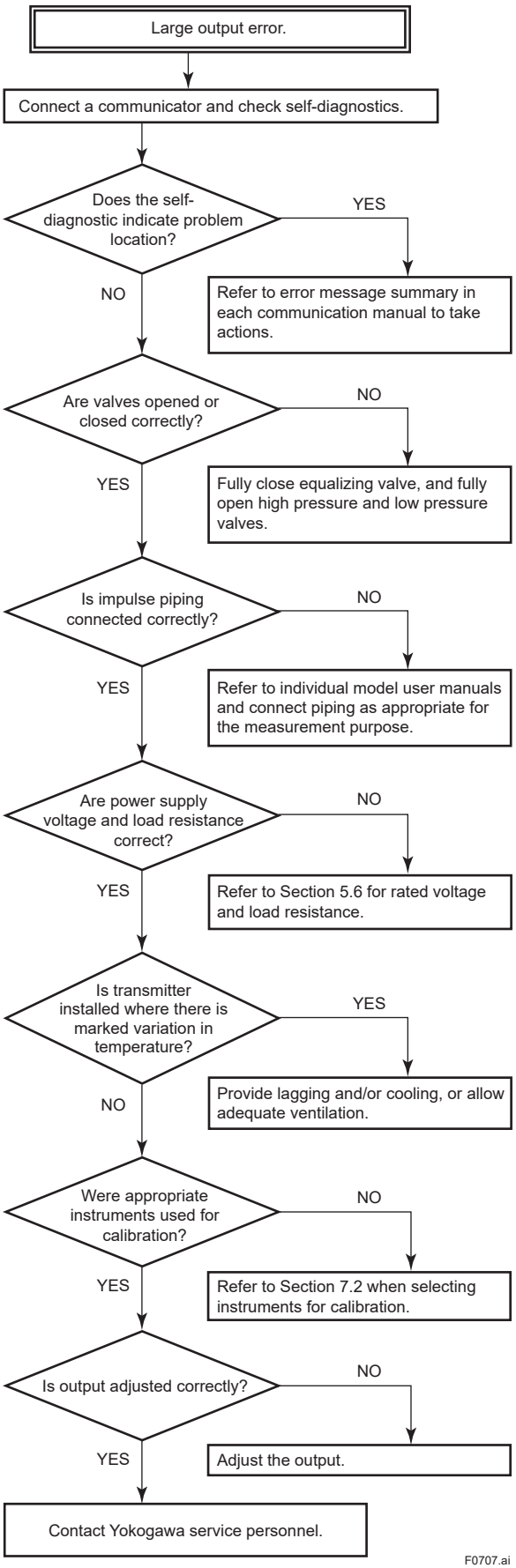

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7.5.3 Alarms and Countermeasures

Table 7.3 Alarm Message Summary

Indicator	Cause	Output Operation during Error	Countermeasure
None			
AL. 01 CAP. ERR	Sensor problem.	Outputs the signal (Hold, High, or Low) set with parameter.	Replace capsule when error keeps appearing even after restart.
	Capsule temperature sensor problem.		
	Capsule EEPROM problem.		
AL. 02 AMP. ERR	Amplifier temperature sensor problem.	Outputs the signal (Hold, High, or Low) set with parameter.	Replace amplifier.
	Amplifier EEPROM problem.		
	Amplifier problem.		
AL. 10 PRESS	Input is outside measurement range limit of capsule.	Outputs high range limit value or low range limit value.	Check input or replace capsule when necessary.
AL. 11 ST. PRSS	Static pressure exceeds limit.	Continues to operate and output.	
AL. 12 CAP. TMP	Capsule temperature is outside range (–50 to 160°C).		Use heat insulation or make lagging to keep temperature within range.
AL. 13 AMP. TMP	Amplifier temperature is outside range (–50 to 95°C)		
AL. 30 RANGE	Output is outside upper or lower range limit value.	Outputs high range limit value or low range limit value.	Check input and range setting, and change them as needed.
AL. 31 SP. RNG	Static pressure exceeds specified range.	Continues to operate and output.	
AL. 35 *1 P. HI	Input pressure exceeds specified threshold.		Check input.
AL. 36 *1 P. LO			
AL. 39 *1 TMP. HI	Detected temperature exceeds specified threshold.		
AL. 40 *1 TMP. LO			
AL. 50 P. LRV	Specified value is outside of setting range.	Holds output immediately before error occurred.	Check setting and change them as needed.
AL. 51 P. URV			
AL. 52 P. SPN			
AL. 53 P. ADJ		Continues to operate and output.	Check input.
AL. 60 SC. CFG	Specified values or settings to define signal characterizer function do not satisfy the condition.	Continues to operate and output.	Check setting and change them as needed.
AL. 79 OV. DISP	Displayed value exceeds limit.		
AL. 91 *2 P. SIM	Under Simulation Mode for device variables.	Output the setting value of Simulate-Value	Check Simulation Mode
AL.91 *2 SP. SIM		Continues to operate and output.	
AL. 91 *2 T. SIM			

*1: These alarms may appear only when process alarm function is activated.
*2: Message only supported in HART 7

8. General Specifications

Please refer to the following General Specifications for the specifications, model, suffix and option codes, and external dimensions of the product.

Document Title

EJAC60E Hygienic Adapter System (Fluidless Type)
EJA560E Hygienic Gauge Pressure Transmitter (Fluidless Type)

Document No.

GS 01C31Y01-01EN

The General Specifications can be downloaded from our website.
Website address: https://www.yokogawa.com/solutions/products-platforms/field-instruments/

If you cannot find it on our website, please contact YOKOGAWA office.

Revision Information

- Title : EJAC60E Hygienic Adapter System (Fluidless Type)
  EJA560E Hygienic Gauge Pressure Transmitter (Fluidless Type)
- Manual No. : IM 01C31Y01-01EN

Edition	Date	Page	Revised Item
1st	June 2017	—	New publication.
2nd	Apr. 2018	2-1 3-1 3-3 4-1 4-2 5-1 5-3 6-2 6-3 7-3 7-5 8-5 8-7 8-10 to 8-15	Add stainless steel housing to Figure 2.2 Name Plate Example. Add stainless steel housing to 3. Component Names. Add stainless steel housing. Add Figure 4.2 Mounting for cold water tank. Add Mounting example for horizontal piping. Add Figure 5.2 Removing the CPU assembly holder. Add stainless steel housing to Figure 5.9 Ground Terminals. Add stainless steel housing to Figure 6.3 Zero-point Adjustment Screw. Add stainless steel housing to Figure 6.4 Cover close position. Add stainless steel housing to Figure 7.2 Removing and Attaching LCD Board Assembly and CPU Assembly. Add Figure 7.4 Mounting Adapter. Add Stainless steel . Add 3-A Sanitary Certification. Add Stainless steel housing.
3rd	Sep. 2018	1-1 1-3 8-4 8-7	Add NOTE and WARNING. Add (f) Authorized Representative in EEA. Add EU RoHS Directive. Revise Wetted Parts Materials and Non-wetted Parts Materials. Add Connections. Change Description for Suffix codes “U” and “G”.
4th	Feb. 2021	6-2 7-3	Revise Figure 6.3 Zero-point Adjustment Screw Revise Figure 7.2 Removing and Attaching LCD Board Assenbly and CPU Assenbly
5th	July 2021	8-4	Update EU RoHS Directive.
6th	Jan. 2023	1-3 3-1, 3-2 6-2 6-3 7-8 8-1	1.1 (f) Add statement about the importer. 3. Add note for /CJ. 6.2 Add note for /CJ 6.5 Add note for /CJ. 7.5.3 Correct the description for AL91. 8. Change the descriptions. (Guide the readers to refer to GS.)