

**Diaphragm Seal System  
EJXC80A, EJAC80E,  
EJXC81A, EJAC81E,  
EJXC50A and EJAC50E**

IM 01C25W01-01EN



# Diaphragm Seal System

## EJXC80A, EJAC80E, EJXC81A, EJAC81E, EJXC50A and EJAC50E

IM 01C25W01-01EN 4th Edition

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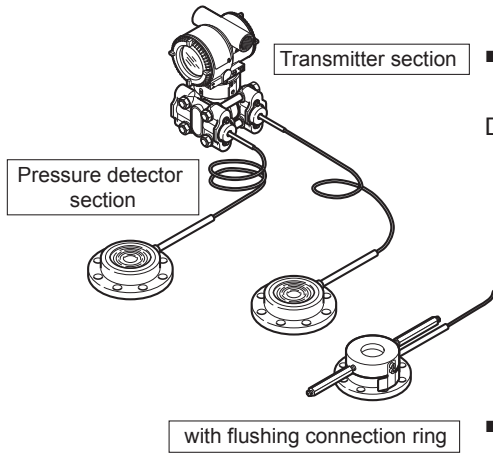
When using the Transmitters in a Safety Instrumented Systems(SIS) application,  
refer to Functional Safety Manual(Document number: TI 01C25A05-01EN or  
TI 01C25A05-21EN for option code SLT )

# 1. Introduction

Thank you for purchasing the DPharp Pressure transmitter.

Your Transmitter was precisely calibrated at the factory before shipment. To ensure both safety and efficiency, please read this manual carefully before you operate the instrument.

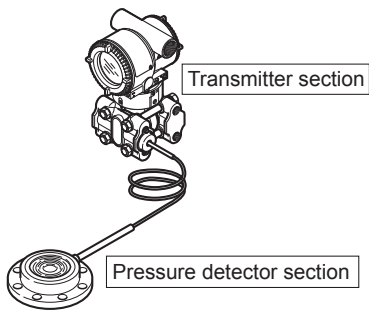
This manual describes the diaphragm seal system that consists of a transmitter section and a pressure detector section (diaphragm seal). Please confirm the model and suffix code (MS code) and the style code of the transmitter section on the product nameplate.



■ **Differential Pressure Diaphragm Seal System (High and low pressure remote seals)**

Diaphragm Seal System

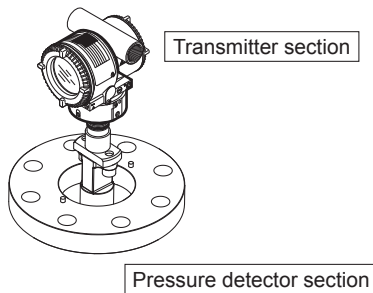
- └ Differential pressure transmitter
- └ Remote Mounted Diaphragm Seal (High pressure side)
- └ Remote Mounted Diaphragm Seal (Low pressure side)
- └ Flushing connection ring (High pressure side)\*1
- └ Flushing connection ring (Low pressure side)\*1



■ **Differential Pressure Diaphragm Seal System (Single pressure remote seal)**

Diaphragm Seal System

- └ Differential pressure transmitter
- └ Remote Mounted Diaphragm Seal (High pressure side)
- └ Flushing connection ring (High pressure side)\*1



■ **Gauge/Absolute Pressure Diaphragm Seal System**

Diaphragm Seal System

- └ Gauge/Absolute pressure transmitter
- └ Remote Mounted Diaphragm Seal (High pressure side)
- └ Flushing connection ring (High pressure side)\*1

■ **Direct Mounted Diaphragm Seal System**

Diaphragm Seal System

- └ Differential/Gauge pressure transmitter
- └ Direct Mounted Diaphragm Seal
- └ Flushing connection ring\*1

\*1: Specify when a flushing connection ring is required.

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**Table 1.1 Transmitter Model**

	Transmitter	Model	Style code	GS No.	IM No.
Transmitter section	Differential pressure transmitter	EJX110A	S3	GS 01C25B01-01EN	IM 01C25B01-01E
		EJA110E	S1, S2	GS 01C31B01-01EN	
	Gauge pressure transmitter	EJX430A	S2	GS 01C25E01-01EN	
		EJA430E	S1, S2	GS 01C31E01-01EN	
		EJX530A	S2	GS 01C25F01-01EN	IM 01C25F01-01E
		EJA530E	S1, S2	GS 01C31F01-01EN	
		Absolute pressure transmitter	EJX310A	S2	
	EJA310E		S1, S2	GS 01C31D01-01EN	

 **WARNING**

This manual describes the hardware configurations of the diaphragm seal system.

For wiring and precautions for the use in hazardous area, please refer to the users' manual(IM) of each transmitter section as listed in table 1.1 or "EJX/EJA-E series Installation Manual"(IM 01C25A01-01E) attached to the transmitter upon shipment.

For information on the software configuration and operation, please refer to either IM 01C25T03-01E for the BRAIN communication type, or IM 01C25T01-06EN for the HART communication type.

For FOUNDATION Fieldbus protocol type, please refer to IM 01C25T02-01E.

For PROFIBUS PA protocol type, please refer to IM 01C25T04-01EN.

For the specifications, environmental conditions, configurations and external dimensions, please refer to the General Specifications listed in the Chapter 7.

To ensure correct use of this instrument, read both the hardware and software manuals thoroughly before use.

The manuals and General Specifications in pdf format are available on our website (Website address: <https://www.yokogawa.com/solutions/products-platforms/field-instruments/>).

 **WARNING**

When using the transmitters in a Safety Instrumented System application, refer to the Functional Safety Manual (Document ID: TI 01C25A05-01EN or TI 01C25A05-21EN for option code SLT) and follow the instructions and procedures described there. The document can be downloaded from the website of Yokogawa. (Website address:

<https://www.yokogawa.com/solutions/products-platforms/field-instruments/>)

In order to satisfy the requirement of Safety Instrumented System, executing parameters setting is required. Please refer to the clause of "Setting Parameters" for setting range in the following manuals for the actual operation.

BRAIN: IM 01C25T03-01E  
HART: IM 01C25T01-06EN

Please also refer to the contact output setting in the same clause. After installing the transmitter, confirm that the range and unit is set correctly. Calibration of the transmitters shall be done after completing the range setting.

 **NOTE**

When describing the model name like EJ□C80□, EJ□C81□, or EJ□C50□, it shows the applicability for both EJXC80A and EJAC80E, EJXC81A and EJAC81E, or EJXC50A and EJAC50E respectively.

## ■ Regarding This Manual

- This manual should be provided to the end user.
- 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 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 <sup>TM</sup> 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) Operation

- Wait 10 min. after the power is turned off, before opening the covers.

### (d) 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.

### (e) Explosion Protected Type Instrument

- Users of explosion protected type instruments should refer first to the section "Installation of an Explosion Protected Instruments" of the IM (users' manual) of the transmitter section.
- The use of this instrument is restricted to those who have received appropriate training in the device.
- Take care not to create sparks when accessing the instrument or peripheral devices in a hazardous location.

### (f) Modification

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

### (g) Product Disposal

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



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## 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 chapter provides important information on how to handle the transmitter. Read this carefully before using the transmitter.

**! WARNING**

The codes of the diaphragm seal system represent a seal system type. CE and other standard certifications are acquired for each transmitter section.

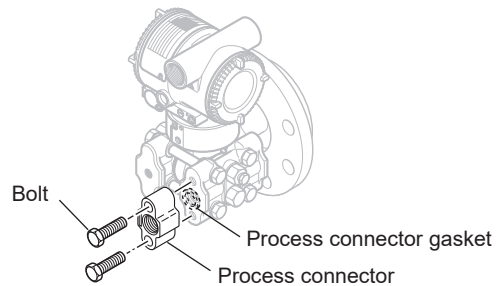
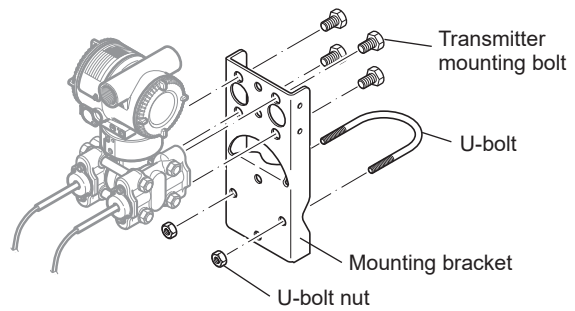
Please refer to the designated sections of each transmitter’s users’ manual(IM) for these information as “Installation of an Explosion Protected Instrument”, “EMC conformity standards”, ”Pressure Equipment Directive(PED)” and “Safety Requirement Standards”.

**Table 2.1 Transmitters Manual List**

Diaphragm Seal System	Applicable Transmitter	Users’ Manual(IM)
EJXC80A, EJAC80E	EJX110A, EJA110E, EJX430A, EJA430E	IM 01C25B01-01E
EJXC81A, EJAC81E	EJX310A, EJA310E	
EJXC50A, EJAC50E	EJX530A, EJA530E	IM 01C25F01-01E

The transmitters are thoroughly tested at the factory before shipment. When taking delivery of an instrument, visually check them to make sure that no damage occurred during shipment.

Also check that all the transmitter mounting hardware shown in figure 2.1 is included. If the transmitter is ordered without a mounting bracket or a process connector, such mounting hardware will not be included.

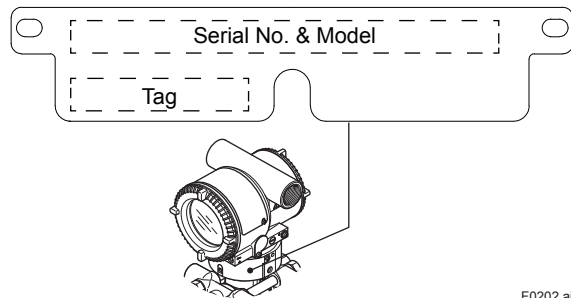


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**Figure 2.1 Transmitter Mounting Hardware**

## 2.1 Model and Specifications Check

The model name and specifications are written on the name plate attached to the case.



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**Figure 2.2 Name Plate**

## 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

\* –15°C when /HE is specified.

Relative humidity:

0% to 100% R.H. (at 40°C)

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 and the diaphragm surface of high pressure-detector section, so that there is no process fluid remaining inside or on it. Before placing it in storage, also make sure that the pressure-detector section 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 direct sunlight or radiant heat from plant equipment, provide adequate shade, 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.
- (d) Installation of Explosion-protected Transmitters  
An explosion-protected transmitter is certified for installation in a hazardous area containing specific gas types. See subsection 2.9 “Installation of an Explosion-Protected Transmitters” of each transmitter’s manual as of table 1.1.

## 2.5 Pressure Connection



### WARNING

- Never loosen the flange bolts when an instrument is installed in a process. The device is under pressure, and a loss of seal can result in a sudden and uncontrolled release of process fluid.
- When draining toxic process fluids that have condensed inside the pressure detector, take appropriate steps to prevent the contact of such fluids with the skin or eyes and the inhalation of vapors from these fluids.
- Since the accumulated process fluid may be toxic or otherwise harmful, take appropriate steps to prevent the contact of such fluids with the skin or eyes and the inhalation of vapors from these fluids even after dismantling the instrument from process line for maintenance.

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

- (a) Make sure that all the process connector bolts are tightened firmly.
- (b) Make sure that there are no leaks in the impulse piping.
- (c) Never apply a pressure higher than the specified maximum working pressure.

## 2.6 Waterproofing of Cable Conduit Connections

Apply a non-hardening sealant to the threads to waterproof the transmitter cable conduit connections.

## 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 500 V DC (100 V DC with an internal lightning protector) for the insulation resistance test, nor a voltage exceeding 500 V AC (100 V AC with an internal lightning protector) 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:

### • Insulation Resistance Test

- 1) Short-circuit the + and – SUPPLY terminals in the terminal box. In case of 1 to 5 V output, short-circuit the SUPPLY+, SUPPLY – and A (VOUT +) terminals.
- 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

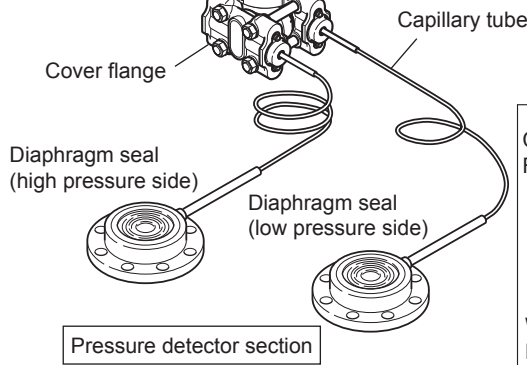
- 1) Short-circuit the + and – SUPPLY terminals in the terminal box. In case of 1 to 5 V output, short-circuit the SUPPLY+, SUPPLY – and A (VOUT +) terminals.
- 2) Turn OFF the dielectric strength tester. Then connect the tester between the shorted SUPPLY terminals and the grounding terminal. Be sure 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.

# 3. Component Names

EJ□C80□ Differential pressure transmitter

Transmitter section\*

\*See figure 3.2.

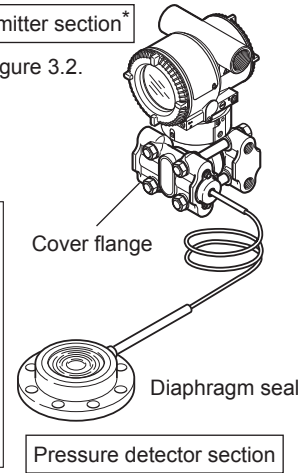
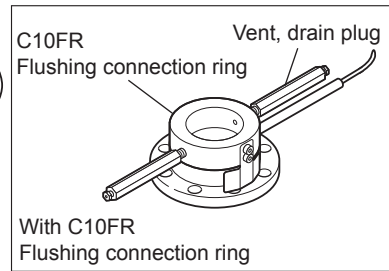


EJ□C80□ Pressure transmitter

EJ□C81□ Absolute Pressure transmitter

Transmitter section\*

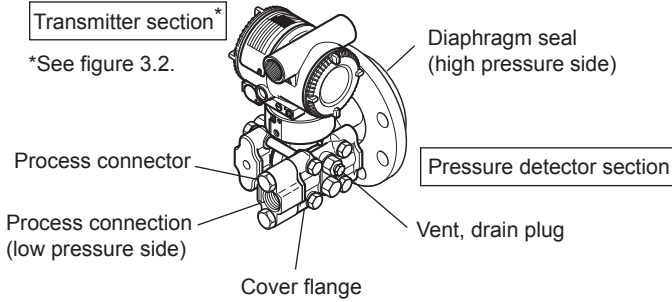
\*See figure 3.2.



EJ□C80□ Differential pressure transmitter

Transmitter section\*

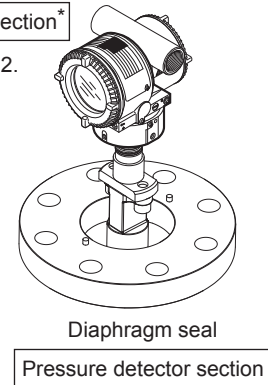
\*See figure 3.2.



EJ□C50□ Pressure transmitter

Transmitter section\*

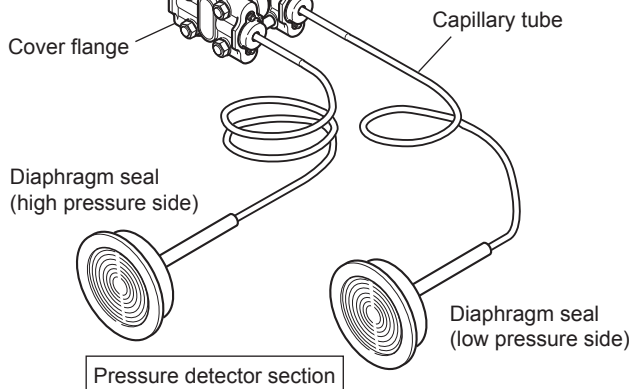
\*See figure 3.2.



EJ□C80□ Hygienic Differential pressure transmitter

Transmitter section\*

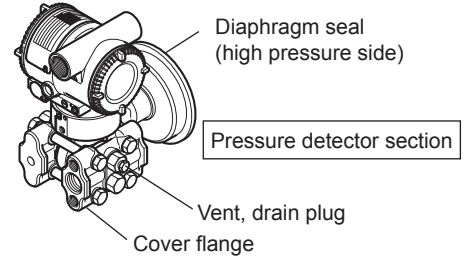
\*See figure 3.2.



EJ□C80□ Hygienic pressure transmitter

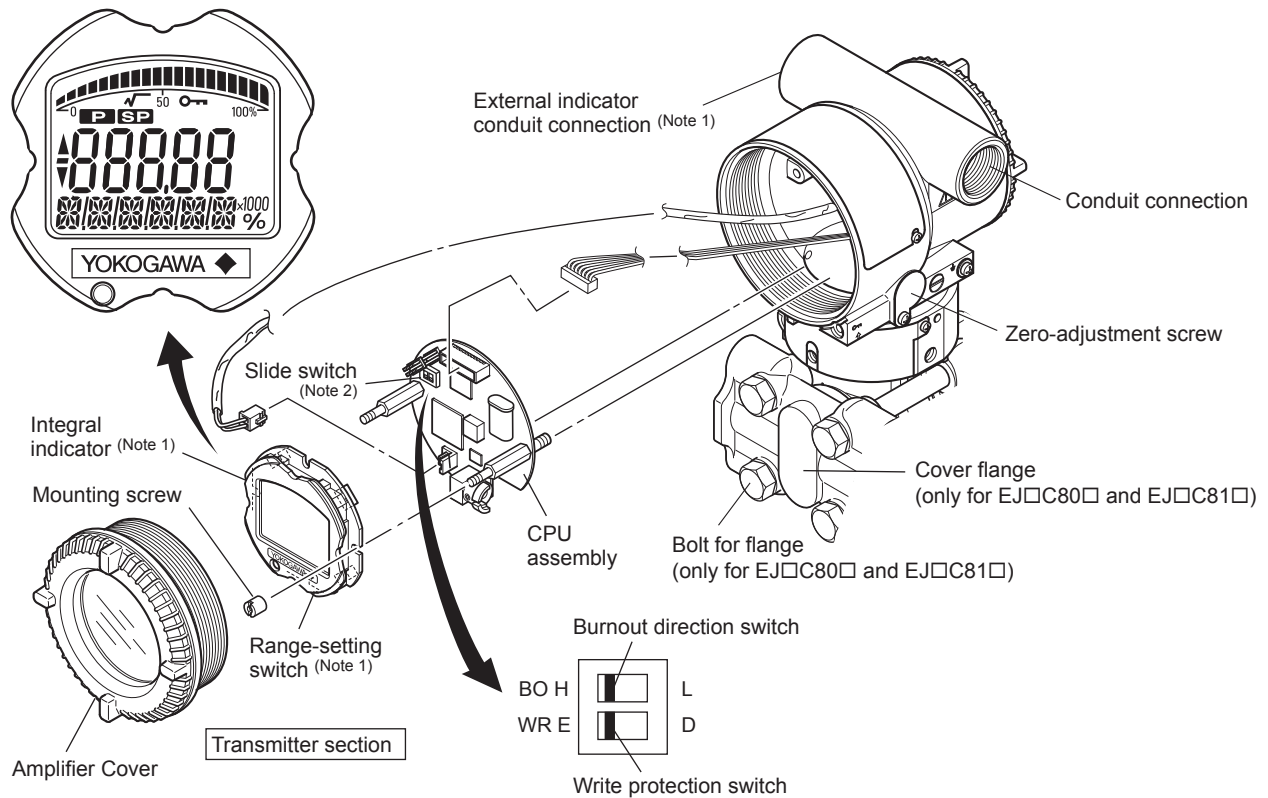
Transmitter section\*

\*See figure 3.2.



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Figure 3.1 Components Name(Figures Show Flush Type Diaphragm Seals)



Burnout direction switch (BO)		Hardware write protection switch (WR)		
Burnout Direction Switch Position (Note 2)				
Burnout Direction	HIGH	LOW	NO (Write enabled)	YES (Write disabled)

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Note 1: As of specified upon ordering. See GS for details.

Note 2: Applicable for BRAIN/HART communication type. Set the switches as shown in the figure above to set the burn-out direction and write protection. The Burnout switch is set to the H side for delivery (unless option code /C1 or /C2 is specified in the order), and the hardware write protection switch is set to E side. The setting of the switches can be confirmed via communication. An external zero adjustment screw can only be disabled by communication. To disable the screw, set a parameter before activating the hardware write protect function. See each communication manual for details.

Figure 3.2 Component Names (Transmitter Section)

Table 3.1 Display Symbol

Display Symbol	Meaning of Display Symbol
▲	The output signal being zero-adjusted is increasing. Besides, this symbol lights when local parameter setting is in progress.
▼	The output signal being zero-adjusted is decreasing. Besides, this symbol lights when local parameter setting is in progress.
⏏	Write protect function is enabled.

F0303.ai

# 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 ambient conditions allowed at the installation location, refer to in the GS.(See Chapter 7)



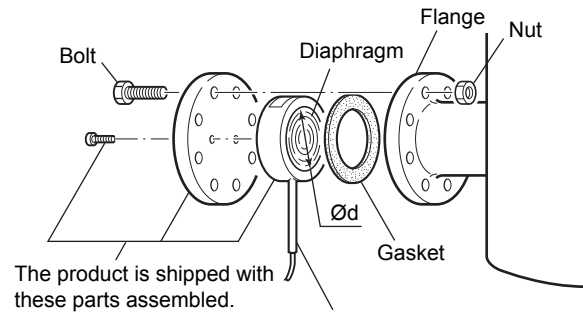
### IMPORTANT

- When welding piping during construction, take care not to allow welding currents to flow through the transmitter.
- Do not step on this instrument after installation.
- For the EJ□C80□ gauge transmitter, there is a small hole in the low pressure side cover flange that is used to measure the atmospheric pressure. The hole must not face upward.
- Never loosen the four bolts securing the cover flanges (Refer to figure 3.2) for EJ□C80□ and EJ□C81□ diaphragm seal system. If the seal liquid leaks, the transmitter cannot be used.
- When installing diaphragm seals, process connectors or manifolds, make sure that no foreign matter has adhered to the seal surface of the gasket (or O-ring) before assembling. If foreign matter adheres, it may lead to leaks.

## 4.2 Mounting the Diaphragm Seals (Remote Seals)

### 4.2.1 Mounting Flush type/Extended type Seals

Mount the diaphragm seals using the flanges as shown in Figure 4.1 Figure 4.2 shows how to mount the diaphragm seals on a tank. The mating flange, gasket, bolts and nuts are to be procured by the customer.



Correctly install the diaphragm seals on the high and low pressure sides of the process (The label on each diaphragm seal is marked **HIGH** or **LOW**.)

F0401.ai

**Figure 4.1 Mounting the Diaphragm Seals (Remote seal)**



### IMPORTANT

Please use a gasket with an inside diameter (ød) that is greater than the diameter of the diaphragm seal. If a gasket with a smaller inside diameter is used, the diaphragm may not function correctly.

C20FW C80FW	Flange size	80A(3B)	50A(2B)	40A(1 1/2B)
	ød (mm)	90	61	44*

\* Combination with C10FR is necessary.



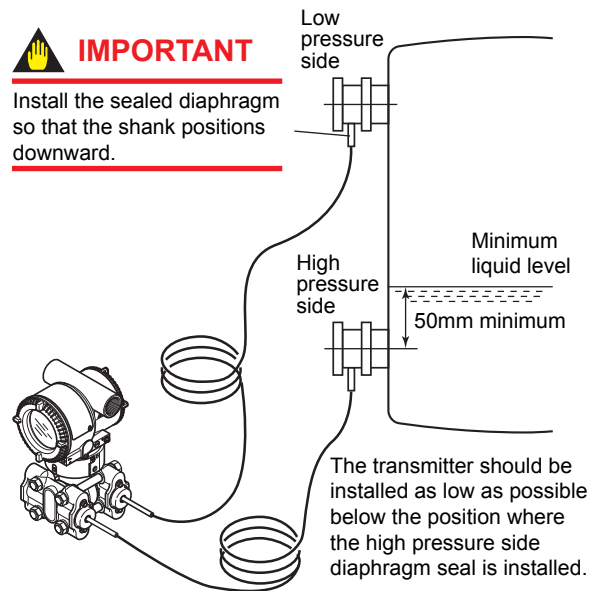
### IMPORTANT

- When measuring the liquid level of the tank, the minimum liquid level (zero point) must be set to a level at least 50 mm above the center of the high pressure side diaphragm seal (see Figure 4.2).
- Correctly install the diaphragm seals on the high and low pressure sides of the process, checking the label on each seal.
- To avoid measuring error due to temperature difference between the two diaphragm seals, capillary tube must be bound together. The capillary tube must be securely fixed to the tank wall to prevent movement by wind or vibration. If the capillary tube is too long, loosely coil the extra tube portion (coil diameter of 300 mm or more) and secure the coiled tube with a clamp.
- During the diaphragm seal installation, ensure as far as possible that no seal liquid head pressure is applied to the diaphragm seals.
- Exercise care so as not to damage diaphragm surfaces. Since the diaphragm protrudes approx. 1 mm from the flange surface, do not place the pressure detector section face down on a surface as this can damage the diaphragm.
- Do not sharply bend or twist capillary tube or apply excessive stress to them.



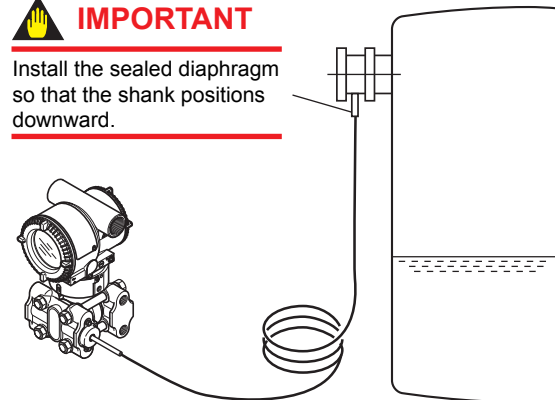
### IMPORTANT

Install the sealed diaphragm so that the shank positions downward.



### IMPORTANT

Install the sealed diaphragm so that the shank positions downward.



F0402.ai

Figure 4.2 Installing the Diaphragm Seals to a Tank



### 4.2.2 Mounting Inner Diaphragm Type Seals

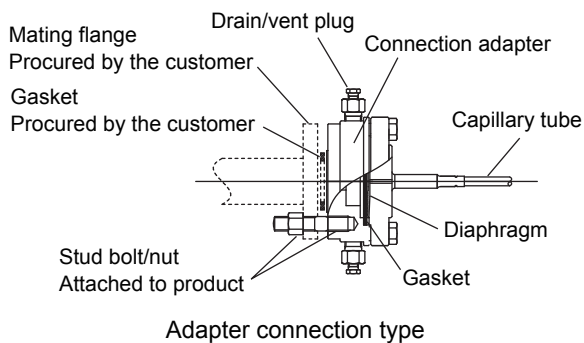
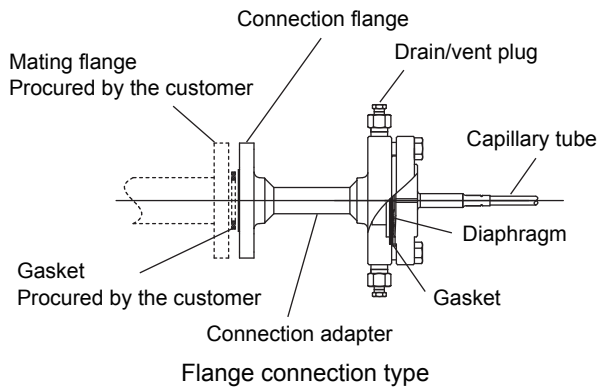
Install the seal in accordance with the Figure 4.3. The bolts, nuts, mating flange and gasket are to be procured by the customer. Position the connection adapter so that the drain/vent plugs are aligned straight up and down.



### IMPORTANT

- Please use the gasket whose inside diameter is greater than the inside pipe diameter.
- Do not sharply bend or twist capillary tube or apply excessive stress to them.
- For differential pressure transmitters, capillary tubes must be bundled together to avoid measuring error duets temperature difference between the two diaphragm seals.
- The product is performing temperature compensation by the temperature sensor in the transmitter section. When a difference of temperature appears between the transmitter section and capillary tube, an output error occurs.

Please use thermal insulants to decrease the effect of temperature difference between the transmitter section and capillary tube.



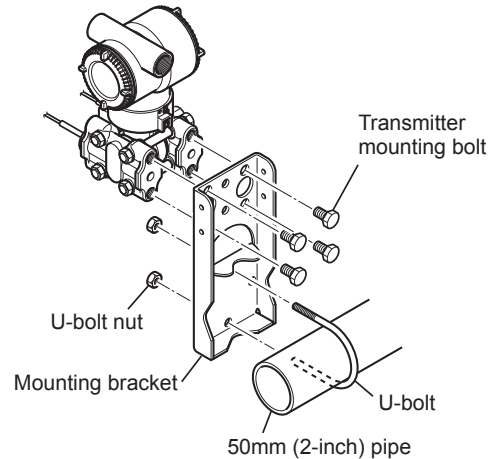
F0403.ai

Figure 4.3 Mounting Inner Diaphragm Seal

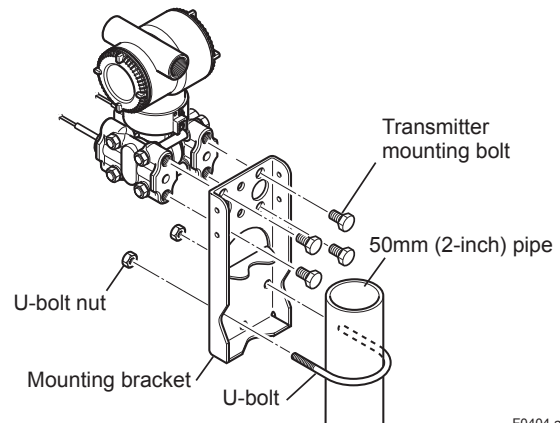
### 4.3 Mounting EJ□C80□ and EJ□C81□ with Remote Seal

- The transmitter can be mounted on a nominal 50 mm (2 to inch) pipe using the mounting bracket supplied, as shown in Figure 4.4. The transmitter can be mounted on either a horizontal or a vertical pipe.
- When mounting the bracket on the transmitter, tighten the (four) bolts that hold the transmitter to a torque of approximately 39 N·m {4 kgf·m}.

#### Horizontal pipe mounting



#### Vertical pipe mounting



F0404.ai

Figure 4.4 Transmitter Mounting



### IMPORTANT

When using the absolute pressure transmitter of M-Capsule, please care so that the sum of the head pressure and atmospheric pressure does not exceed Upper Range Limit (130 kPa abs.)



**IMPORTANT**

The transmitter should be installed at least 600 mm below the high pressure (HP) process connection to ensure a positive head pressure of fill fluid. Pay special attention to vacuum applications.

If it can not be installed at least 600 mm below the HP process connection, please use the equation below:

$$h = \frac{(P - P_0)}{ds} \times 0.102 \text{ [mm]}$$

h: Vertical height between the HP process connection and the transmitter (mm)

h ≤ 0: Install the transmitter at least h (mm) below the HP process connection

h > 0: Install the transmitter at most h (mm) above the HP process connection

P: Pressure in the tank (Pa abs)

P<sub>0</sub>: Minimum working pressure limit of the transmitter (Pa abs). See below table.

[For fill fluid code A, B, D, E, F, P]

Wetted parts material code	Capillary length	Process connection size code	
		6	9
S	1 to 5 m	6790	3190
	6 to 10 m	10030	3520
	11 to 15 m	13310	3840
H	1 to 5 m	19150	6140
	6 to 10 m	32090	8290
	11 to 15 m	-----	10480
T	1 to 5 m	9620	3620
	6 to 10 m	15090	4210
	11 to 15 m	-----	4800
U	1 to 5 m	9540	4750
	6 to 10 m	14930	6050
	11 to 15 m	-----	7360
M	1 to 5 m	10910	3970
	6 to 10 m	17380	4780
	11 to 15 m	-----	5600
K	1 to 5 m	10910	3970
	6 to 10 m	17380	4780
	11 to 15 m	-----	5600
V	1 to 5 m	10910	3970
	6 to 10 m	-----	4780
	11 to 15 m	-----	-----
J	1 to 5 m	-----	13070
	6 to 10 m	-----	19540
	11 to 15 m	-----	-----

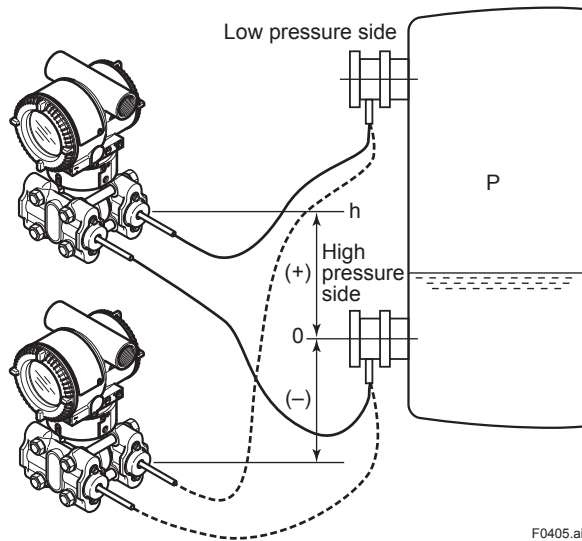
[For fill fluid code 1, 2, 4]

Wetted parts material code	Capillary length	Process connection size code	
		6	9
S	1 to 5 m	2570	320
	6 to 10 m	4680	530
H	1 to 5 m	10220	2050
	6 to 10 m	18650	3450
T	1 to 5 m	4270	570
	6 to 10 m	7780	960

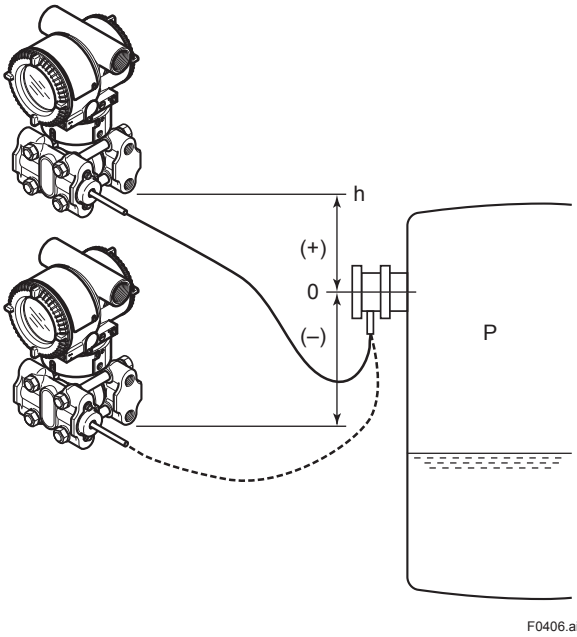
ds: Specific gravity of fill fluid (at 25°C).

Fluid type and code	Density*
Silicone oil (general use) A	1.07
Silicone oil (general use) B	0.94
Silicone oil (low temperature use) F	0.88
Fluorinated oil (oil-prohibited use) D	1.90 to 1.92
Ethylene glycol (low temperature use) E	1.09
Propylene glycol P	1.04
Silicone oil (high temp. and high vacuum use) 1	1.07
Silicone oil (high temp. and high vacuum use) 2	1.09
Silicone oil (high vacuum use) 4	1.07

\* Approximate values at a temperature of 25°C (77°F)



**Figure 4.5 Example of Installation to Tank for Differential Pressure Transmitter (Caution on Installation)**

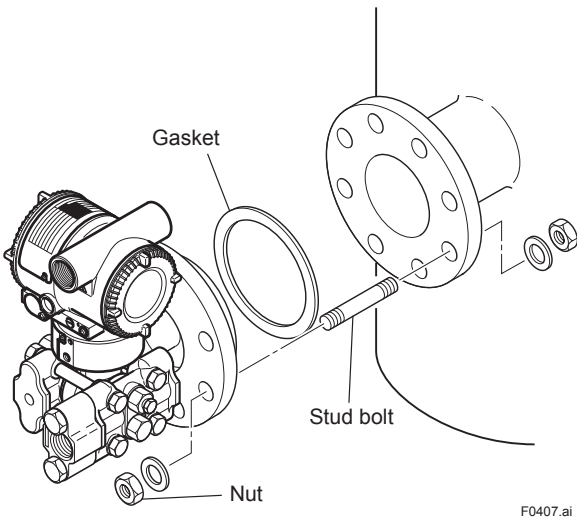


**Figure 4.6** Example of Installation to Tank for Gauge Pressure Transmitter (Caution on Installation)

## 4.5 Mounting EJ□C80□ with Direct Mount Seal

### 4.5.1 Mounting

The transmitter is mounted on a process using its high-pressure side flange as shown in Figure 4.7. The mating flange, gasket, stud bolts and nuts are to be procured by the customer.



**Figure 4.7** Transmitter Mounting



## IMPORTANT

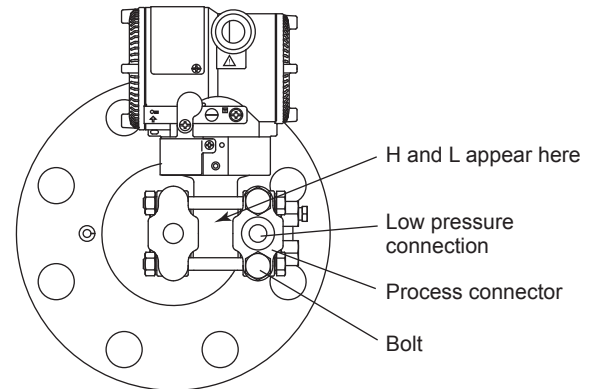
Please use a gasket with an inside diameter ( $\phi d$ ) that is greater than the diameter of the diaphragm seal. If a gasket with a smaller inside diameter is used, the diaphragm may not function correctly. (See the table in 4.2.1.)

### 4.5.2 Connecting Impulse Piping to the Transmitter

The impulse piping that connects the process outputs to the transmitter must convey the process pressure accurately. If, for example, gas collects in a liquid-filled impulse line, or the drain of a gas-filled impulse line becomes plugged, it will not convey the pressure accurately. Since this will cause errors in the measurement output, select the proper piping method for the process fluid (gas, liquid, or steam). Pay careful attention to the following points when routing the impulse piping and connecting the impulse piping to a transmitter.

#### (1) Check the High and Low Pressure Connections on the Transmitter (Figure 4.8)

The letters H and L on the capsule assembly indicate the high and low pressure sides. For liquid level measurement in an open tank, the low pressure side measures atmospheric pressure. For a closed tank, connect the impulse line to the low pressure side of the transmitter to measure the pressure in the tank.



**Figure 4.8** H and L Symbols on a Capsule Assembly

**(2) Tightening the Process Connector Mounting Bolts**

After connecting the impulse line, tighten the process connector mounting bolts uniformly.

**(3) Removing the Impulse Piping Connecting Port Dustproof Cap**

The impulse piping connecting port of the transmitter may be covered with a plastic cap to keep out dust. This cap must be removed before connecting the line. (Be careful not to damage the threads when removing this cap. Never insert a screwdriver or other tool between the cap and port threads to remove the cap.)

**(4) Impulse Piping Slope**

The impulse piping must be routed with only an upward or downward slope. Even for horizontal routing, the impulse piping should have a slope of at least 1/10 to prevent condensate (or gases) from accumulating in the pipes.

**(5) Preventing Freezing**

If there is any risk that the process fluid in the impulse piping or transmitter could freeze, use a steam jacket or heater to maintain the temperature of the fluid.

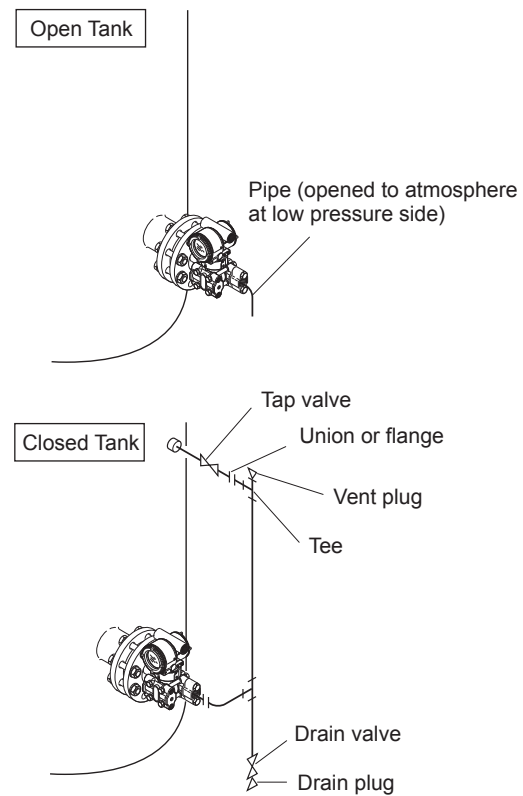


**NOTE**

After completing the connections, close the valves on the process pressure taps (main valves), the valves at the transmitter (stop valves), and the impulse piping drain valves, so that condensate, sediment, dust and other extraneous material cannot enter the impulse piping.

**(6) Impulse Piping Connection Examples**

Figure 4.9 shows examples of typical impulse piping connections. Before connecting the transmitter to the process, study the transmitter installation location, the process piping layout, and the characteristics of the process fluid (corrosiveness, toxicity, flammability, etc.), etc. and make appropriate changes and additions to the connection configurations.



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**Figure 4.9 Impulse Piping Connection Examples**

### 4.6 Mounting EJ□C50□ with Direct Mount Seal

The transmitter is mounted on a process using its high-pressure side flange as shown in Figure 4.10. The mating flange, gasket, stud bolts and nuts are to be procured by the customer.

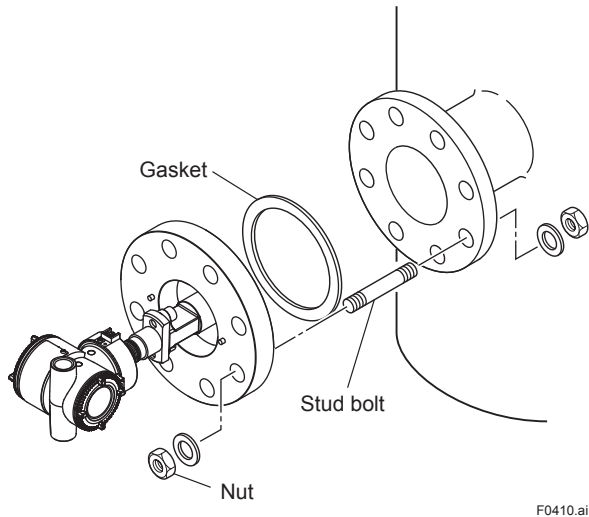


Figure 4.10 Transmitter Mounting



### IMPORTANT

Please use a gasket with an inside diameter (ød) that is greater than the diameter of the diaphragm seal. If a gasket with a smaller inside diameter is used, the diaphragm may not function correctly. (See the table in 4.2.1.)

### 4.7 Mounting EJ□C50□ and EJ□C80□ with Hygienic Seal

#### 4.7.1 Hygienic Seal (Flush Type)

The flush diaphragm type is mounted on a process tank as shown in Figure 4.11.

- 1) Fit the gasket into the gasket slot and attach it to the transmitter .
- 2) With the gasket attached, mount the transmitter onto the sleeve.
- 3) Use the clamp to secure the connecting section in position.

\*: The customer should prepare the mating gasket and clamp, They are also available from Yokogawa; if required, please order them separately. Refer to Table 4.2.

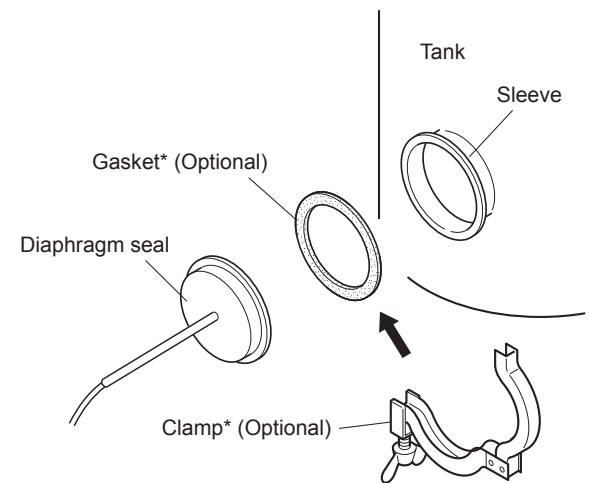
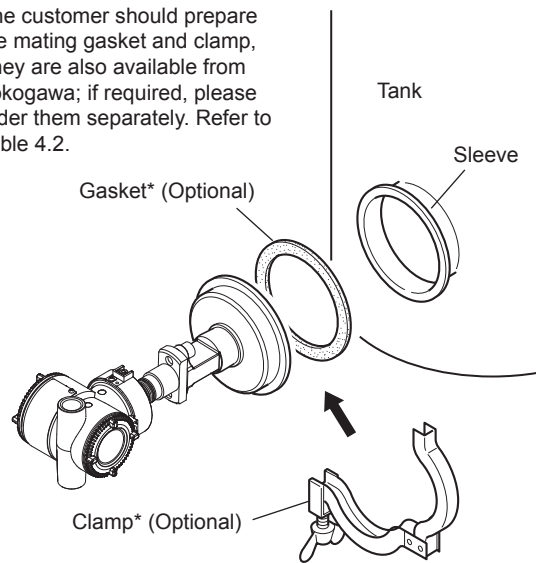


Figure 4.11 Mounting Hygienic Seal (Flush Type)

### 4.7.2 Hygienic Seal (Extended Type)

The extended diaphragm type is mounted on a process tank as shown in Figure 4.12.

- 1) Fit the O-ring into the O-ring slot of the transmitter.
- 2) With the O-ring attached, mount the transmitter onto the tank spud.
- 3) Use the clamp to secure the connecting section in position.

\*: The customer should prepare the mating O-ring, clamp, and tank spud. They are also available from Yokogawa; if required, please order them separately. Refer to Table 4.1 and 4.2.

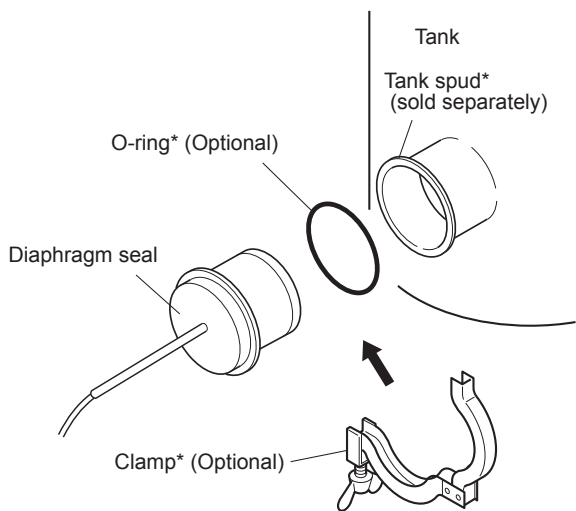
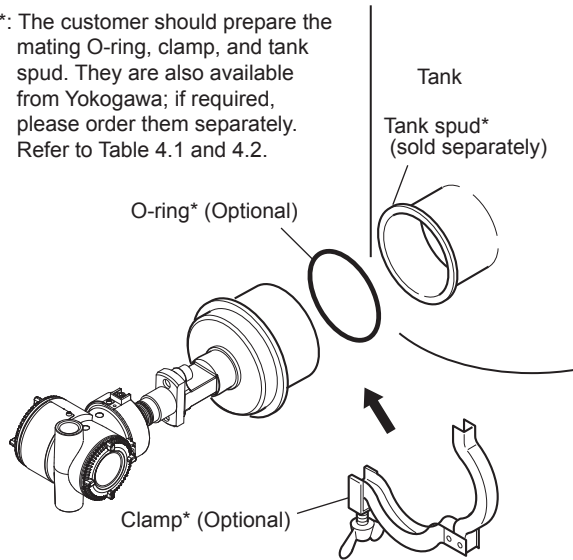


Figure 4.12 Mounting Hygienic Seal (Extended Type)

For the installation of a tank spud, read the following section very carefully.

### 4.7.3 Tank Spud Mounting Method

A tank spud is used to joint a tank and an extended diaphragm type of level transmitter.

It is imperative for sanitary use that the contact parts of the transmitter and the tank are securely and tightly sealed in order to avoid the process fluid spouting and the decomposition by stagnant fluid. The construction of the tank spud using a O-ring eliminates the clearance between the contact parts and ensures the tightness.

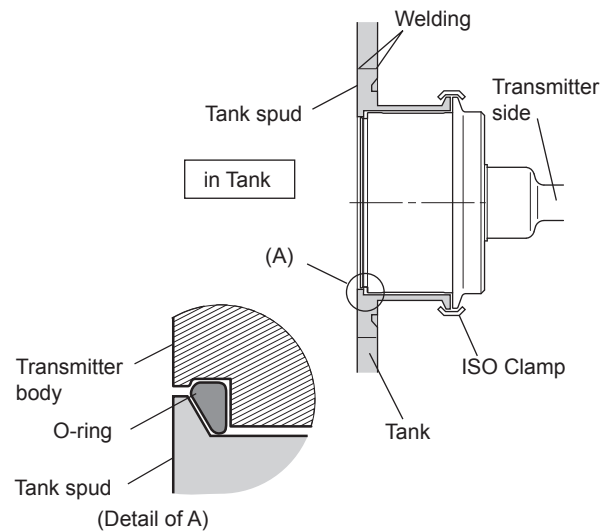


Figure 4.13 Details of Transmitter Mounting

#### ■ Welding

When welding a tank spud to a tank, take great care not to change its shape by heat. The deformation of the shape eventually makes a dead space between the transmitter and the tank spud, resulting in the process fluid spouting and the decomposition the coupling by stagnant fluid.

#### ■ Mounting Position

Set the center of the tank spud to a level at least 50mm above the minimum liquid level (zero point).



### IMPORTANT

- Clean thoroughly the tank after the welding the tank spud to the hole on a tank.
- Be sure that the surface is finished smoothly by using a grinder except the hole is made by the machinery cutting.

■ **Mounting Direction**

Fit the tank spud onto the tank so that the drain outlet faces downward. Then carry out the temporary welding at four points outside the spud, making sure to keep the boundary of the inside surface of the tank wall and spud flat. Also, set the spud vertical against the tank wall, in order for the transmitter to be installed correctly.

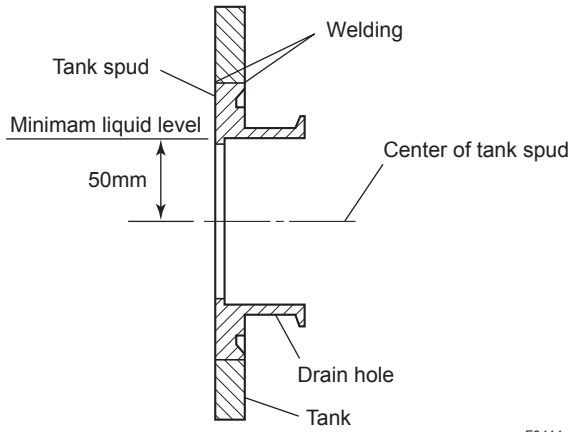


Figure 4.14 Mounting Tank Spud

■ **Welding method and Cautions**

- Welding work should start with the inside of tank, then continue to outside.
- Before starting the welding work, cool the welding part with dry ice and so on. The welded part should be cooled down one welding part after another.
- Set the welding heat level as low as possible to avoid the deformation of the spud.
- Since the tank spud materials used are SUS304, SUS316, and SUS316L, use the welding stick material as follows;  
Covered arc welding: D316L  
Tig or Mig welding: Y316L
- Take care not to damage the O-ring sealing part.

■ **Finishing Welding Surface**

Make sure that all the welded parts are ground smooth and flat in a way that no dust is stuck to the surface.

[Special Tools for Tank Spud Welding]

Yokogawa provides special tools exclusively designed for the tank spud welding to make the installation easily and effectively. These tools can be ordered separately.

- Cooling tool.....reduces the strain on the spud during welding process.  
For extension length L = 52 mm:  
Part No. 1J833A063-31  
For extension length L = 102 mm:  
Part No. 1J833A063-32
- Strain check gauge.....determines whether the transmitter can be mounted.  
For extension length L = 52 mm:  
Part No. 1J833A063-41  
For extension length L = 102 mm:  
Part No. 1J833A063-42

Table 4.1 Tank Spud model code

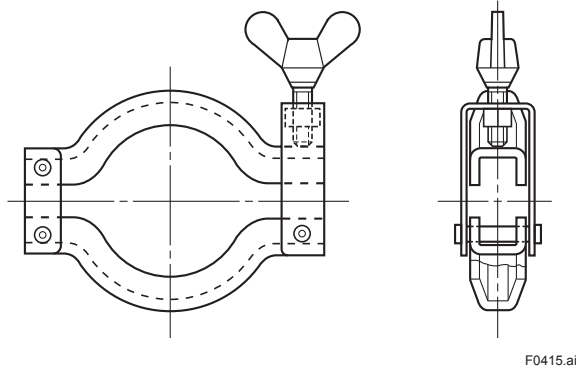
Model	Suffix Code	Description
<b>TS</b>	.....	Tank spud
Extension length	<b>-E</b> .....	2 inch (50 mm) for ISO101.6 Clamp
	<b>-F</b> .....	4 inch (100 mm) for ISO101.6 Clamp
	<b>-J</b> .....	2 inch (50 mm) for ISO76.1 Clamp
	<b>-K</b> .....	4 inch (100 mm) for ISO76.1 Clamp
	<b>-G</b> .....	2 inch (50 mm) for ISO51 Clamp
	<b>-H</b> .....	4 inch (100 mm) for ISO51 Clamp
Material	<b>U</b> .....	304 SST
	<b>V</b> .....	316 SST
	<b>W</b> .....	316L SST
Welding part plate thickness	<b>A</b> .....	16 mm
	<b>B</b> .....	12 mm
	<b>C</b> .....	8 mm
	<b>D</b> .....	16 mm
	<b>E</b> .....	12 mm
	<b>F</b> .....	8 mm
		for ISO101.6 for ISO76.1
		for ISO51

\*: For the overview of the tank spud, refer to Subsection 4.7.3.

**Table 4.2 Mounting tool, Gasket, and o-ring**

Item	Part No.	Description
Clamp	G9726AE	for ISO101.6 clamp
	G9726AB	for ISO51 clamp
	G9726AD	for ISO76.1 clamp
Gasket	F9500DZ	for ISO101.6 clamp
	F9500DX	for ISO51 clamp
	F9500DY	for ISO76.1 clamp
O-ring	F9271QK	for ISO101.6 clamp
	F9357EL	for ISO51 clamp
	F9995CB	for ISO76.1 clamp

\*: Observe the condition of the gasket when unscrewing the clamp. If the gasket is worn away or changed its shape, it must be replaced with new one.



**Figure 4.15 Clamp Overview**

### 4.8 Rotating Transmitter Section

The transmitter section can be rotated to any desired position. Note that there is a stopper which prevents the transmitter from being rotated more than 360°.

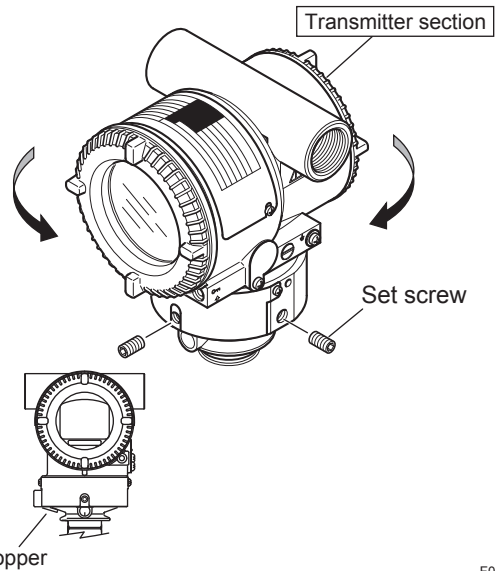
- 1) Using the Allen wrench, remove the two setscrews securing the transmitter section to the capsule assembly.
- 2) Rotate the transmitter section slowly to the desired position.
- 3) Tighten the two setscrews to a torque of 1.5 N·m {15 kgf·cm}.

#### **WARNING**

In the case of the explosion-proof/flameproof type transmitter, do not rotate the transmitter part in the hazardous area while the transmitter is energized.

#### **IMPORTANT**

Do not rotate the transmitter section more than the above limit.



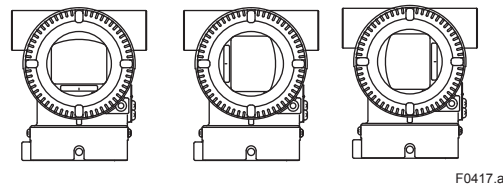
**Figure 4.16 Rotating Transmitter Section**

### 4.9 Changing Integral Indicator Direction

#### **IMPORTANT**

- Always turn OFF power and shut off and release pressures before disassembly.
- For changing the integral indicator direction, the transmitter must be removed to a non-hazardous area.

An integral indicator can be installed in the following three directions, Refer to subsection 6.4 for attaching and removing the integral indicator.



**Figure 4.17 Integral Indicator Direction**



## 4.10 Mounting the Flushing Connection Ring

### 4.10.1 Mounting to Pressure Detector Section

The flushing connection ring is mounted to the pressure detector section as shown in Figure 4.18.

At the factory shipment, the flushing connection ring is enclosed with the diaphragm seal section without being tightly attached to the pressure detector section with screw, bolt/nut or welding. Therefore, when taking it out, please handle it with care not to damage the diaphragm with ring holders or vent/drain plugs of the flushing connection ring.

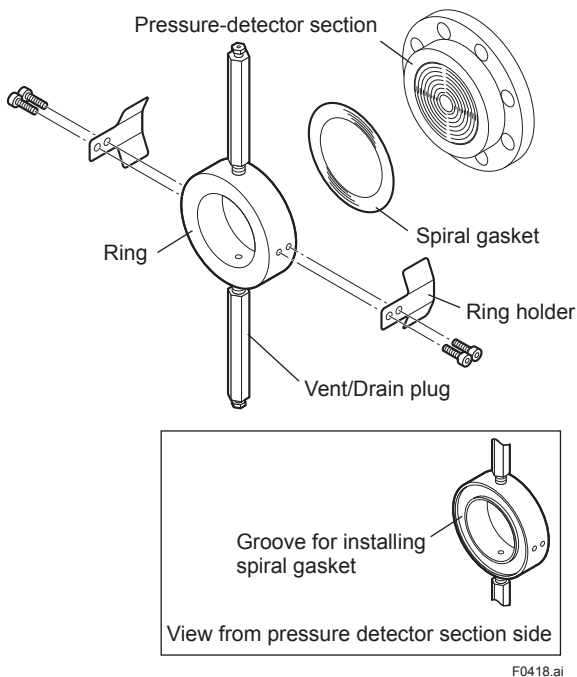


Figure 4.18 Mounting to Pressure Detector Section

- (1) Mount the ring holder on the ring and loosely tighten the mounting screws.
- (2) Place the spiral gasket in the ring groove. With the ring correctly aligned and flush with the face of the pressure detector, securely tighten each ring holder's mounting screws.
- (3) Position the ring so that the vent/drain plugs are aligned straight up and down.

### 4.10.2 Mounting to Process Flange

Tighten the bolts to completely close the gap between the ring and the pressure detector section.

The mating flange, gasket, stud bolts and nuts are to be procured by the customer.

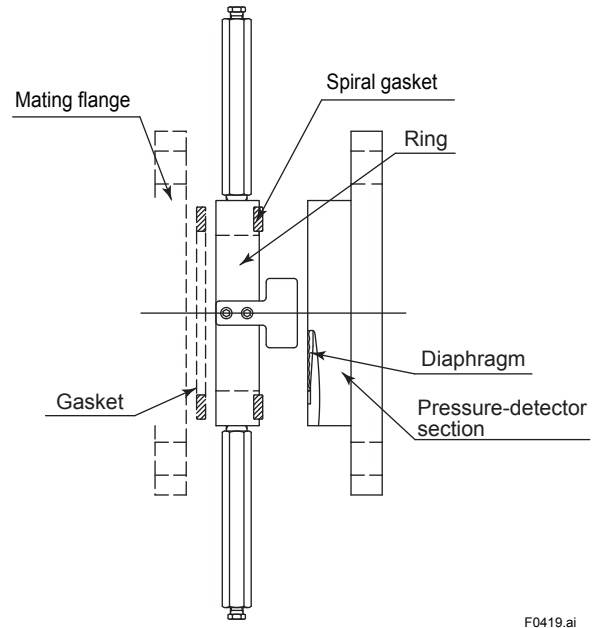


Figure 4.19 Mounting to Process Flange



**IMPORTANT**

- Confirm that there is no gap between the ring and the process-detector section after they are mounted on the process flange. A gap can lead to a sudden, explosive release of process fluids.
- When mounting or removing the ring, take care not to tilt the pressure detector downward as the ring can slip off and cause injury.
- When re-mounting the ring, use the new spiral gasket as shown in below table.

**Table 4.3 Spiral Gasket for Pressure Detector Section Side\***

Gasket size	Specifications	Hoop material/Parts No.		
		SUS316	SUS316L	Hastelloy C-276
ø100×ø120×t4.5	For 3-inch General use	F9350SV	F9350SW	F9990BR
ø100×ø120×t4.5	For 3-inch High temperature use	F9990BK	F9990BN	-----
ø100×ø120×t4.5	For 3-inch Oil-prohibited use**	F9970XF	F9970XG	-----
ø70×ø90×t4.5	For 2-inch General use	F9350ST	F9350SU	F9990BQ
ø70×ø90×t4.5	For 2-inch High temperature use	F9990BJ	F9990BM	-----
ø70×ø90×t4.5	For 2-inch Oil-prohibited use**	F9970XD	F9970XE	-----
ø60×ø75×t4.5	For 1 1/2-inch General use	F9346ZH	F9970XA	F9990BP
ø60×ø75×t4.5	For 1 1/2-inch High temperature use	F9990BH	F9990BL	-----
ø60×ø75×t4.5	For 1 1/2-inch Oil-prohibited use**	F9970XB	F9970XC	-----

\*: Filler materials  
 General use, oil-prohibited use : PTFE  
 High temperature use : inorganic paper  
 \*\*: For oil-prohibited use (Option code: /K31, /K35)

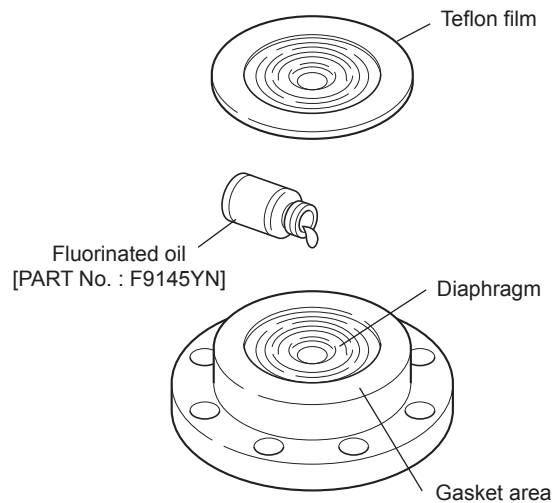
**4.11 Affixing the Teflon Film**

The FEP Teflon option includes a teflon film and fluorinated oil. Before mounting the transmitter to the process flange, affix the teflon film as follows:



**IMPORTANT**

- 1) Position the diaphragm so that the diaphragm is in a upward position.
- 2) Pour the fluorinated oil on the diaphragm and gasket area covering it completely and evenly. Be careful not to scratch the diaphragm or change the its shape.
- 3) Affix the teflon film over the diaphragm and gasket area.
- 4) Next, carefully inspect the cover and try to identify any entrapped air between the diaphragm and the teflon film. The air must be removed to ensure optimum performance. If air pockets are present, use your fingers to remove the air by starting at the center of the diaphragm and work your way out. However, do not lay too much stress on the diaphragm, as it may cause a deform of the diaphragm.
- 5) Position the gasket on the Teflon film.
- 6) Mount the transmitter onto the process flange.



PART No.	Process Flange size
F9347XA	3 inch (80mm)
F9347YA*1	2 inch (50mm)

\*1: F9347YD when Diaphragm Material code is "H" and Sealing Face Material code is "S."

F0420.ai

**Figure 4.20 Affixing the Teflon Film**

# 5. Operation

## 5.1 Preparation for Starting Operation

This section describes the operation procedure for the EJ□C80□ differential pressure transmitter as shown in Figure 5.1 when measuring liquid level in a closed tank, and EJ□C80□ differential pressure or gauge pressure transmitter as shown in Figure 5.2 or 5.3 or EJ□C50□ as shown in Figure 5.4 when measuring liquid level or pressure in a tank.

- (a) Confirm that there is no leak in the connecting part of each diaphragm seal mounting flange.
- (b) Turn ON power and connect the communicator. Open the terminal box cover and connect the communicator to the SUPPLY + and – terminals.
- (c) Using the communicator, confirm that the transmitter is operating properly. Check parameter values or change the setpoints as necessary.

See IM 01C25T03-01E (BRAIN communication) or IM 01C25T01-06EN (HART communication) for communicator operation. If the transmitter is equipped with an integral indicator, its indication can be used to confirm that the transmitter is operating properly.

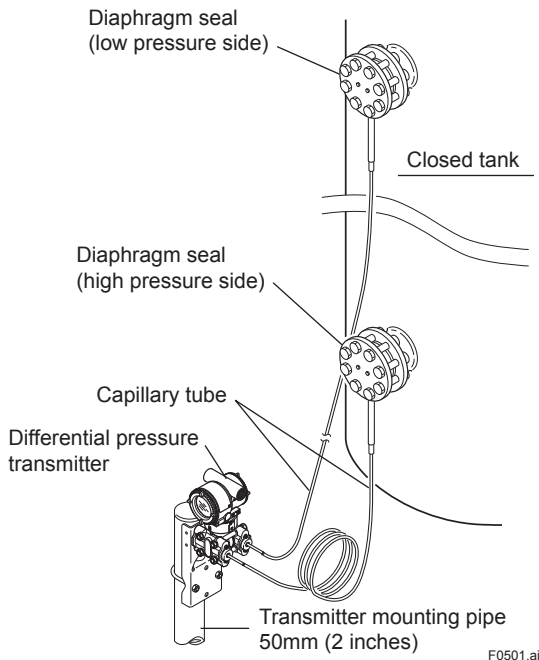


Figure 5.1 Liquid Level Measurement in a Closed Tank

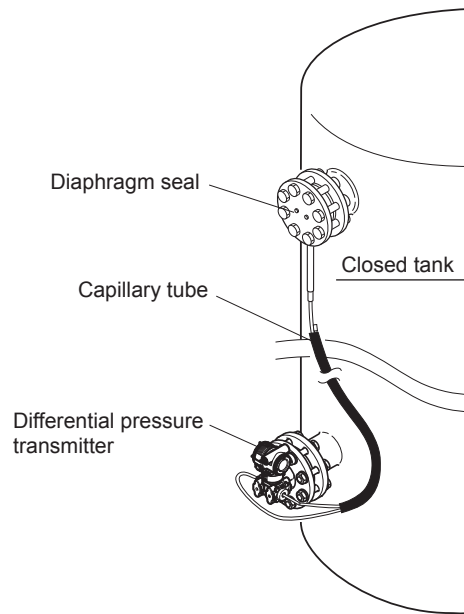


Figure 5.2 Liquid Level Measurement in a Closed Tank

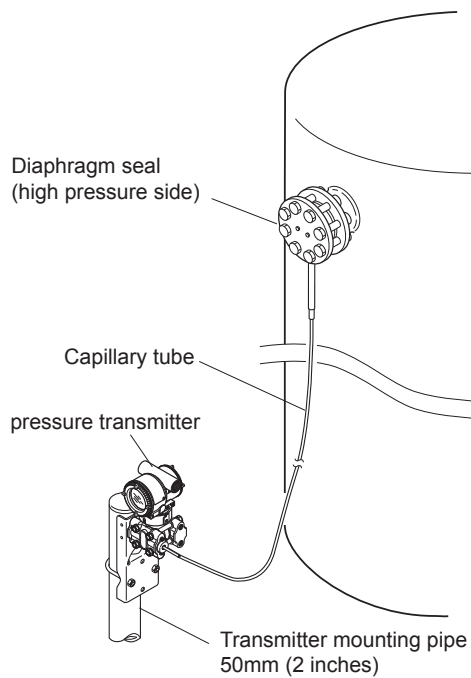


Figure 5.3 Pressure Measurement

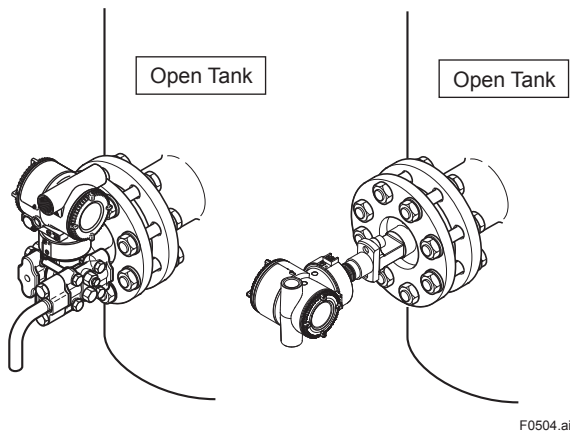


Figure 5.4 Liquid Level Measurement

■ **Confirming that Transmitter is Operating Properly**

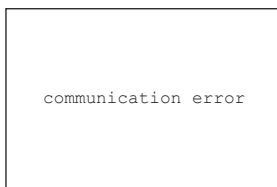
Using the BT200



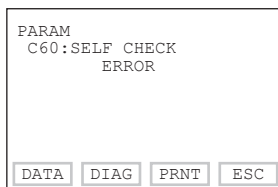
**IMPORTANT**

- Analog output may change temporally in connecting with BRAIN terminal due to an initial current flowed to it. To prevent communication signal affecting the upper system, it is recommended to install a low-pass filter (approximately 0.1s).
- Communication signal is superimposed on analog output signal. It is recommended to set a low-pass filter (approximately 0.1s) to the receiver in order to reduce the output effect from communication signal. Before online-communication, confirm that communication signal does not give effect on the upper system.

- If the wiring system is faulty, 'communication error' appears on the display.
- If the transmitter is faulty, 'SELF CHECK ERROR' appears on the display.



Communication error (Faulty wiring)



Self-diagnostic error (Faulty transmitter)

F0505.ai

**Using the integral indicator**

- If the wiring system is faulty, the display stays blank.
- If the transmitter is faulty, an error code is displayed.



Self-diagnostic error on the integral indicator (Faulty transmitter)

F0506.ai



**NOTE**

If any of the above errors are indicated on the display of the integral indicator or the communicator, refer to subsection 6.6.3 for corrective action.

■ **Verify and Change Transmitter Parameter Setting and Values**

The parameters related to the following items are set at factory as specified by the customer.

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

Other parameters like following are shipped with the default setting.

- Low-cut
- Process alarm setting
- Static pressure range
- Signal characterizer
- Write protection

To confirm or change the values, see IM 01C25T01-06EN, 01C25T03-01E, 01C25T02-01E or 01C25T04-01EN.

## 5.2 Zero Point Adjustment

After completing preparations for operating the transmitter, adjust the zero point.

Zero point adjustment can be done by turning the transmitter's zero-adjustment screw or by using the communicator. This section describes the procedure for the zero-adjustment screw. For the communicator procedure, see the communication manual.



### 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.

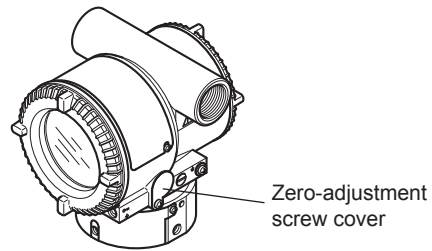


### NOTE

Before performing this adjustment, make sure that the external zero adjustment function has NOT been disabled by a parameter setting.

To check the output signal, use a digital multimeter, calibrator, or communicator.

- (1) **When you can obtain Low Range Value from actual measured value of 0% (0 kPa, atmospheric pressure);**



The zero-adjustment screw is located inside the cover.

Use a slotted screwdriver to turn the zero-adjustment screw. Turn the screw clockwise to increase the output or counterclockwise to decrease the output. The zero point adjustment can be made with a resolution of 0.01% of the setting range. The degree of zero adjustments varies with the screw turning speed; turn the screw slowly to make a fine adjustment, quickly to make a rough adjustment.

When adjusting the transmitter zero point, the liquid level in a tank does not have to be set to the low limit (0%) of the measuring range; use a digital manometer or a glass gauge to match the transmitter output signal with the actual measured value.

- (2) **When you cannot obtain Low Range Value from actual measured value of 0%;**

Adjust the transmitter output to the actual measured value obtained by a digital manometer or a glass gauge.

[Example]

The measuring range of 50 to 250 kPa; the actual measured value of 130 kPa.

$$\text{Actual measured value} = \frac{130 - 50}{250 - 50} \times 100 = 40.0\% \quad (=10.4\text{mA})$$

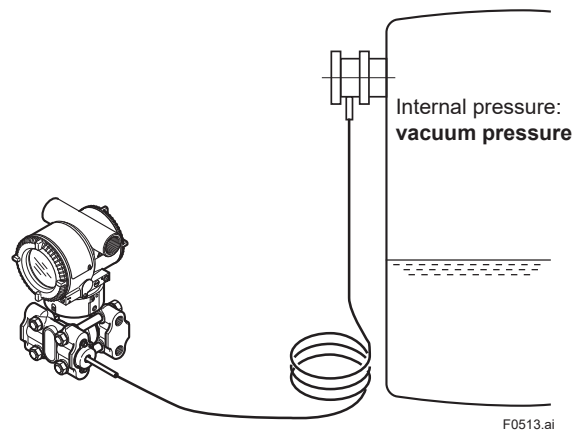
Turn the screw to match the output signal to the actual measured value.

### 5.2.1 Zero point adjustment for Absolute Pressure Diaphragm Seal System

In the case of the Absolute Pressure Diaphragm Seal System, because a head pressure is caused by the fill fluid in the capillary, it is basically recommended to perform zero adjustment after installing the transmitter in the process and with decompressing the process pressure to vacuum pressure. However, if it is difficult to make the process pressure to the zero state after installation, there are a couple of applicable methods. Select the most suitable method according to the situation.

	Timing	Process pressure	Outline
a	After installation	Vacuum pressure	Decompressing the process pressure to the vacuum pressure standard and adjust the zero to it. Accurate measurement can be expected.
b	After installation	Atmospheric pressure	Performing adjustment to atmospheric pressure. Measuring atmospheric pressure with a digital manometer and adjust the output to it.
c	Before installation	Atmospheric pressure	Performing zero adjustment with using calculated head pressure. This procedure is performed via Communication. Select when neither 'a' nor 'b' can be applied. Errors for zero point may be caused when there's a gap between the installation position used for calculation and the actual installation position.

- (a) Decompressing the process pressure to the vacuum pressure standard and adjust the zero to it.

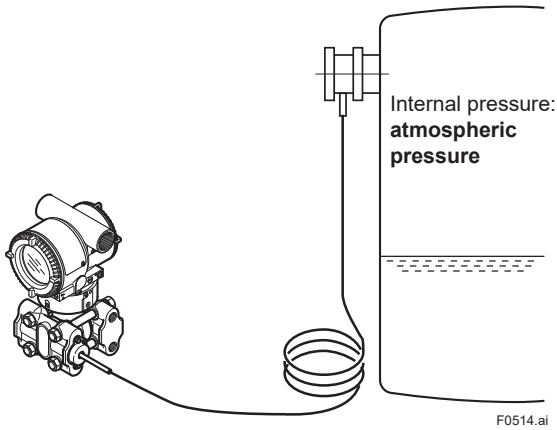


Adjustment is performed after installation under vacuum pressure.

Make the process pressure to the vacuum pressure.

Follow the procedures of “(1) When you can obtain Low Range Value from actual measured value of 0%” to adjust zero point to the vacuum pressure. You can also perform adjustment via communication with using a parameter “J11:P ZERO ADJ.” for BRAIN communication type, “Auto Lower pt” at “Pres trim” for HART communication type, or “CAL POINT LO” parameter for FOUNDATION fieldbus type. Please refer to each communication manual.

(b) Performing adjustment to atmospheric pressure.



Adjustment is performed after installation under atmospheric pressure.

Measure the atmospheric pressure with a highly accurate digital manometer, and perform adjustment by following the procedures of “(2) When you cannot obtain Low Range Value from actual measured value of 0%.”

You can also perform adjustment by setting the measured atmospheric value to the parameter “J11:P ZERO ADJ.” for BRAIN communication type, “Auto Lower pt” at “Pres trim” for HART communication type, or “CAL POINT LO” parameter for FOUNDATION fieldbus type. Please refer each communication manual.

 **NOTE**

When entering the atmospheric pressure, set all the available number under decimal point as much as possible to minimize errors. If you round the number, it may lead to the errors. [Example] When setting span is 20 kPa, if the measured atmospheric pressure is “97.25 kPa” and set it as “97.3 kPa”, error of 0.05 kPa (0.25% at 20 kPa) may be caused.

(c) Performing zero adjustment with using calculated head pressure.

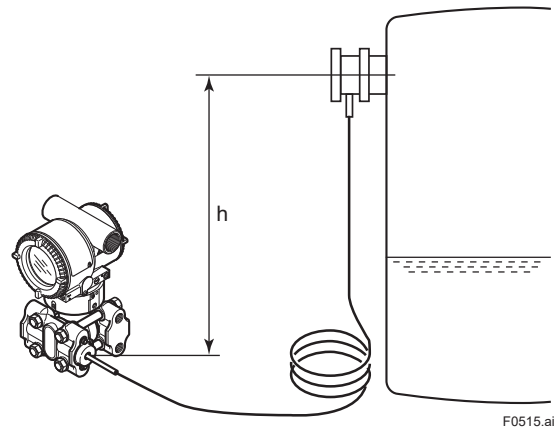
Adjustment is performed before installation under atmospheric pressure.

Use the following equation to calculate the head pressure.

$$\text{Head pressure} = h \text{ (mm)} \times ds \times 9.80665 \times 10^{-3} \text{ (kPa)}$$

h: Vertical height between the HP process connection and the connection of remote seal on cover flange.

ds: Specific gravity of fill fluid (at 25°C). See table in the clause 4.3.



Set the calculated value to “J15: P ZERO DEV” for BRAIN communication type, “Manual Lower Pt” for HART communication type, or “CAL\_DEVIATION\_LO” for FOUNDATION fieldbus type. The value should be negative, as the head pressure shall be subtracted from the atmospheric pressure. If a value of the adjustment in the past are already existing in the parameter, add that value to make the new adjustment value.

[Example]

Calculated head pressure is 50 kPa, and adjustment value in “J15” is -0.04 kPa;  
 $-50 + (-0.04) = -50.04 \text{ (kPa)}$

Set “-50.04” to “J15” parameter as a new adjustment value.

### 5.3 Starting Operation

After completing the zero point adjustment, follow the procedure below to start operation.

- 1) Confirm the operating status. If the output signal exhibits wide fluctuations (hunting) due to periodic variation in the process pressure, use the communicator to dampen the transmitter output signal. Confirm the hunting using a receiving instrument or the integral indicator, and set the optimum damping time constant.
- 2) After confirming the operating status, perform the following:



#### IMPORTANT

- Remove the communicator from the terminal box, and confirm that none of the terminal screws are loose.
- Close the terminal box cover and the amplifier cover. Screw each cover in tightly until it will not turn further.
- There are two covers that must be locked on the ATEX Flameproof type transmitters. An Allen head bolt (shrouding bolt) under the edge of each cover is used to lock the cover. When the shrouding bolt is driven counterclockwise with an Allen wrench, the bolt rotates upward and locks the cover. (See page 6-4.) After locking the covers, confirm that they are secure and cannot be opened by hand.
- Tighten the zero-adjustment cover mounting screw to fix the cover in position.

### 5.4 Shutting Down Operation

Turn off the power.



#### NOTE

Whenever shutting down the transmitter for a long period, detach the transmitter from the tank.

### 5.5 Venting or Draining Transmitter Pressure-detector Section

If condensate (or gas) collects in the transmitter pressure-detector section, the measured pressure may be in error. If it is not possible to configure the piping for self-draining (or self-venting) operation, you will need to loosen the drain (vent) screw on the transmitter to completely drain (vent) any stagnated liquid (gas).

However, since draining condensate or bleeding off gas gives the pressure measurement disturbance, this should not be done when the loop is in operation.



#### WARNING

Since the accumulated liquid (or gas) may be toxic or otherwise harmful, take appropriate care to avoid contact with the body, or inhalation of vapors.

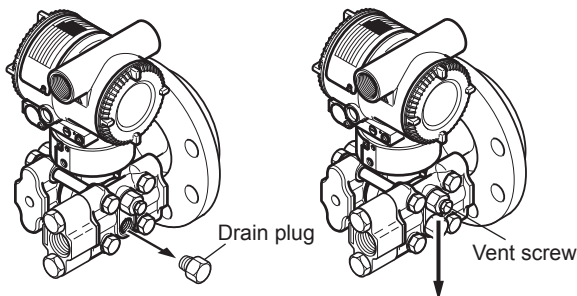


### 5.5.1 Draining Condensate

- 1) Gradually open the drain plug and drain the transmitter pressure-detector section.  
(See Figure 5.5)
- 2) When all accumulated liquid is completely removed, close the drain plug.
- 3) Tighten the drain plug to a torque of 34 to 39 N·m {3.5 to 4 kgf·m}.

### 5.5.2 Venting Gas

- 1) Gradually open the vent screw to vent gas from the transmitter pressure-detector section.  
(See Figure 5.5)
- 2) When the transmitter is completely vented, close the vent screw.
- 3) Tighten the vent screw to a torque of 10 N·m {1 kgf·m}.

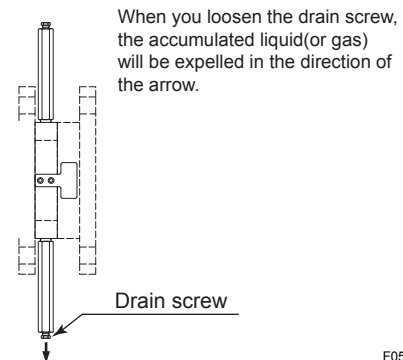


When you loosen the drain plug or the vent screw, the accumulated liquid (or gas) will be expelled in the direction of the arrow. F0508.ai

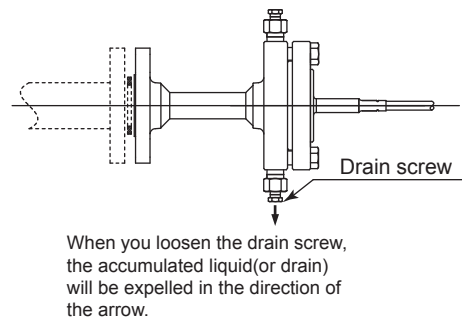
**Figure 5.5 Draining/Venting the Transmitter**

### 5.5.3 Draining Condensate for Flushing Connection Ring or Inner Diaphragm Type Seal

- 1) Gradually open the drain screw to drain from the flushing connection ring.
- 2) When the flushing connection ring or the connection adapter of the inner diaphragm type seal is completely drained, close the drain screw.
- 3) Tighten the drain screw to a torque of 10 N·m {1 kgf·m}.



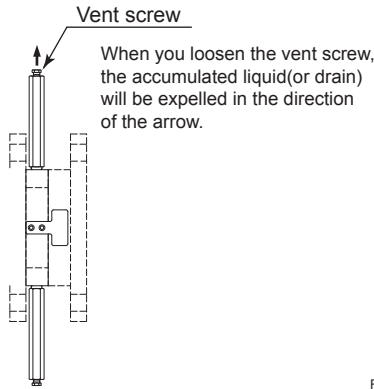
**Figure 5.6 Draining for Flushing Connection Ring**



**Figure 5.7 Draining for Inner Diaphragm Type Seal**

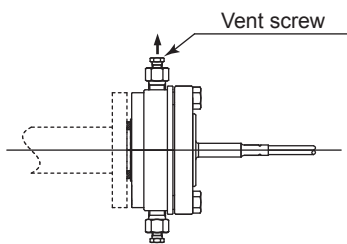
### 5.5.4 Venting Gas for Flushing Connection Ring or Inner Diaphragm Type Seal

- 1) Gradually open the vent screw to vent gas from the flushing connection ring.
- 2) When the flushing connection ring or the connection adapter of the inner diaphragm type seal is completely vented, close the vent screw.
- 3) Tighten the vent screw to a torque of 10 N·m {1 kgf·m}.



F0511.ai

Figure 5.8 Venting for Flushing Connection Ring



When you loosen the vent screw, the accumulated liquid(or gas) will be expelled in the direction of the arrow.

F0512.ai

Figure 5.9 Venting for Inner Diaphragm Type Seal

## 5.6 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.

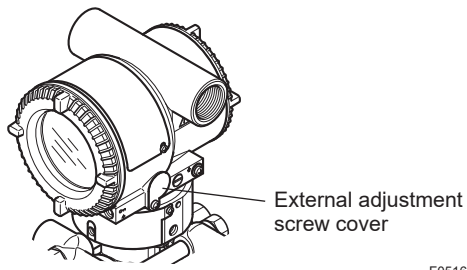


### IMPORTANT

- 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 01C25T (HART/BRAIN) for the setting procedure.
- The Local Parameter Setting function is available with HART or BRAIN communication type.  
LCD update will be slower at low ambient temperature, and it is recommended to use LPS function at temperatures above -10 degrees C.

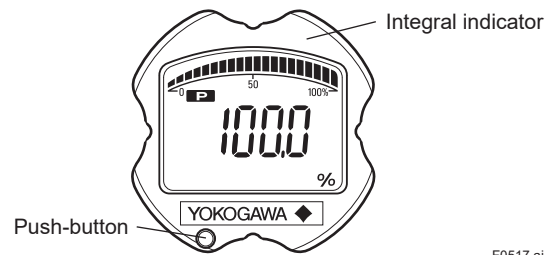
### 5.6.1 Local Parameter Setting (LPS) Overview

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



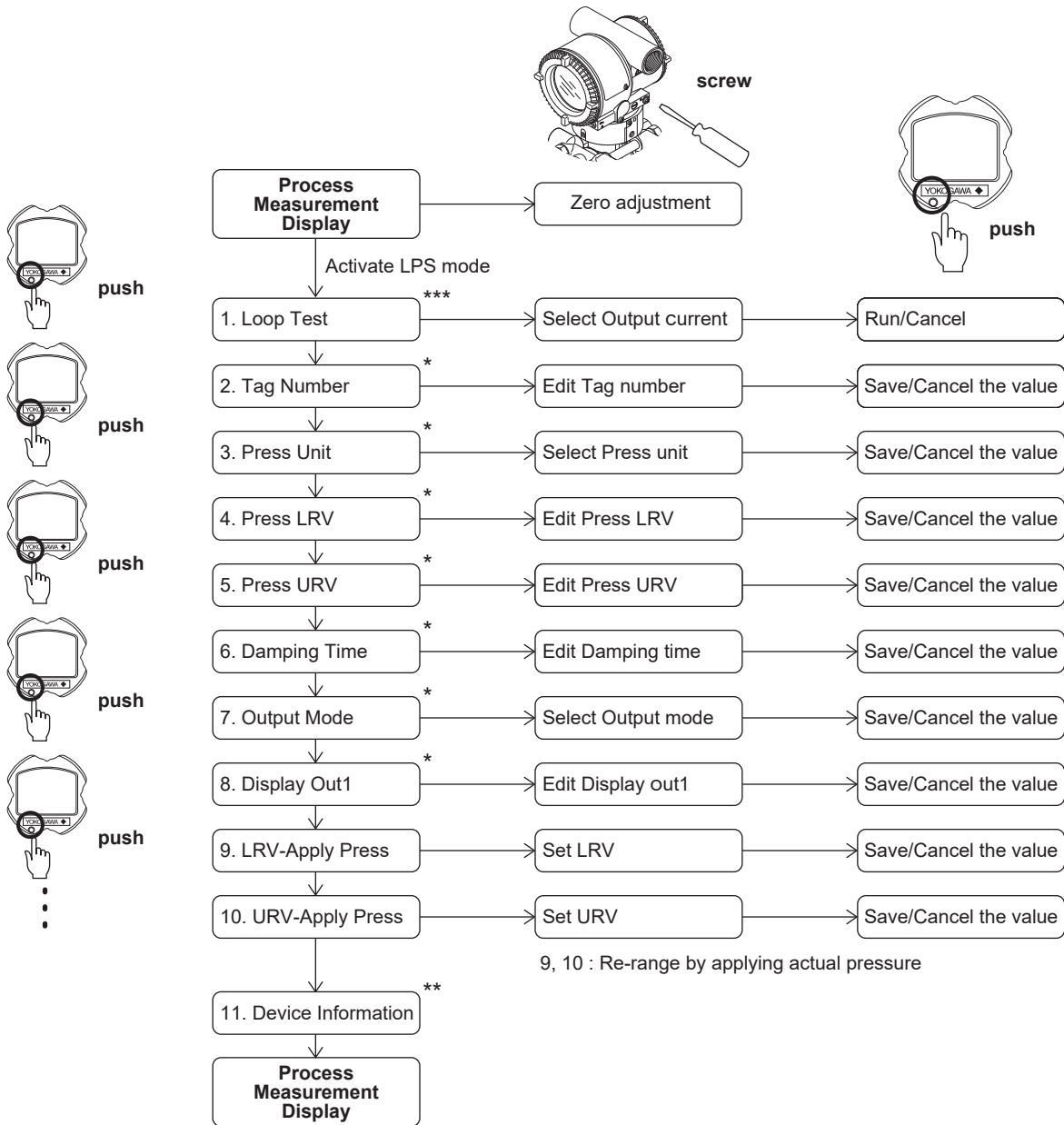
F0516ai

Figure 5.10 External Adjustment Screw



F0517.ai

Figure 5.11 Range-Setting Switch (push button)



F0518.ai

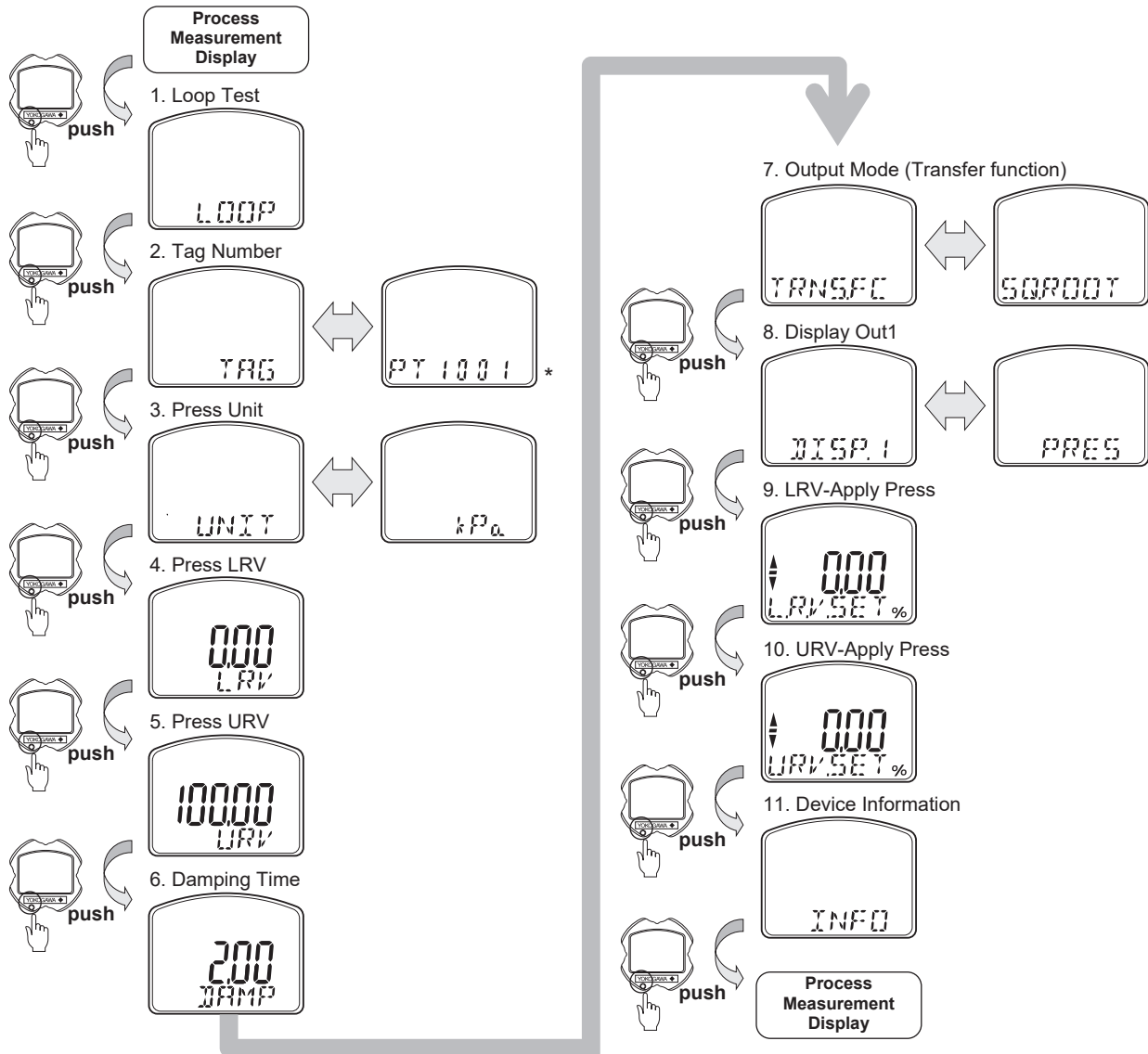
\*: These parameter configurations are available with the software revision (SOFT REV)2.03 or later. Software revision can be checked via a field communicator (HART/BRAIN) or DTM. Please refer to IM 01C25T01 for HART parameter "Software rev" and IM 01C25T03 for BRAIN "SOFT REV."  
 \*\*: This parameter configuration is available with the software revision (SOFT REV) 3.01 or later.  
 \*\*\*: This parameter configuration is available with the software revision (SOFT REV) 5.01 or later.

### 5.6.2 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.

### 5.6.3 Parameter Setting Review

Current setting value for the below parameters are shown sequentially by each press of the push button. Loop test, Tag number, Unit, LRV, URV, Damping, Output mode (linear/square root), Display out 1, Re-range by applying actual pressure (LRV/URV) and Device Information.



F0519.ai

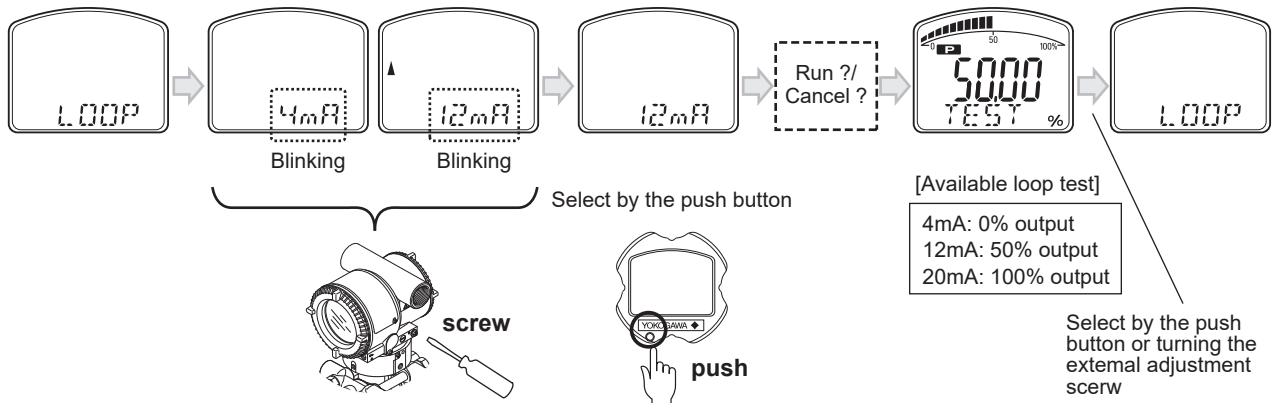
\*: [Software revision: 2.03] Up to 6 characters are shown in the bottom line. To review after the 7th character, turn the external adjustment screw and press the push button six times or more.  
 [Software revision: 3.01 or later] The display automatically scrolls to show all the characters.

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 5.6.13 Save or Cancel and 5.6.14 Abort Configuration.

### 5.6.4 Loop Test Configuration

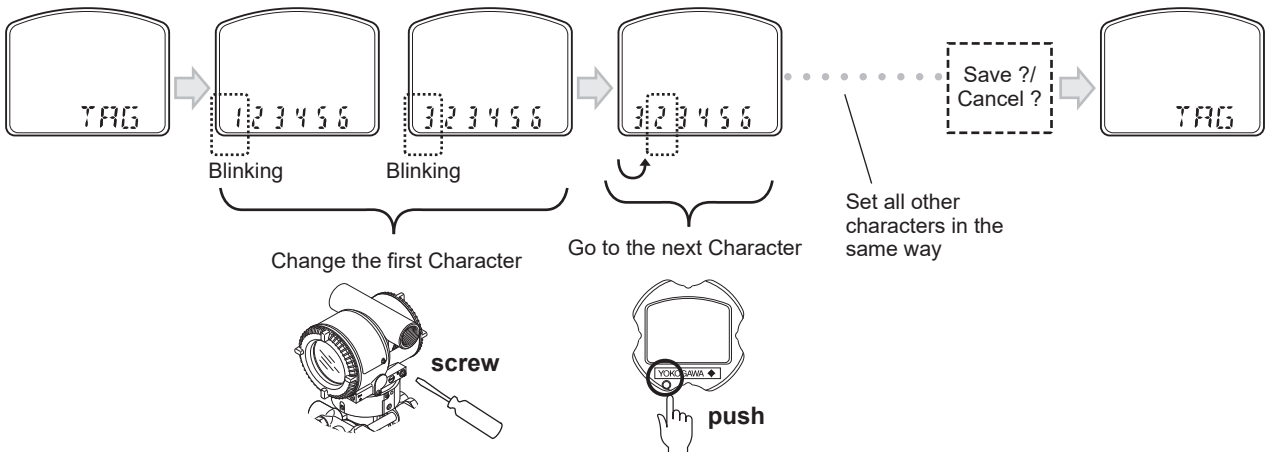
Loop test configuration can be changed as below. Output current value (4 mA, 12 mA or 20 mA) for Loop test can be selected by turning the external adjustment screw.



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### 5.6.5 Tag Number Configuration

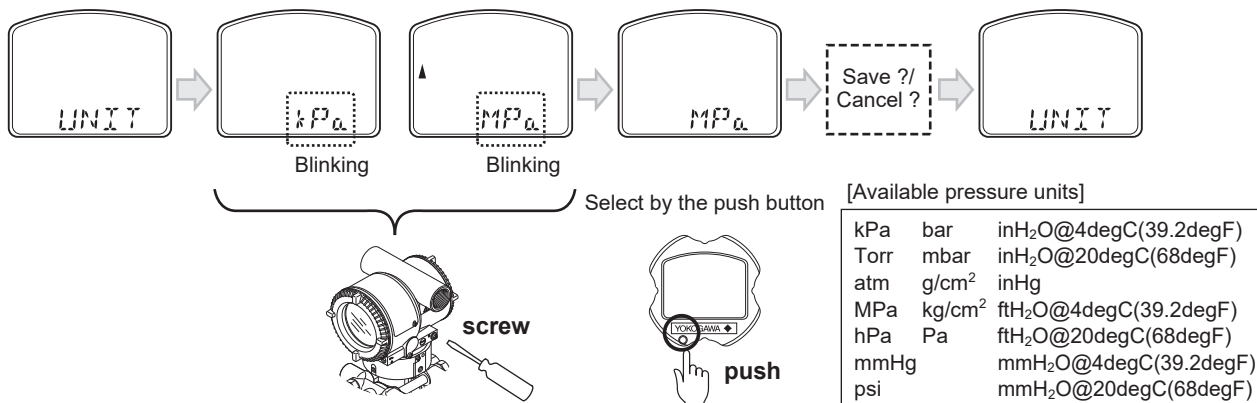
Tag Number is edited by turning the external adjustment screw. Up to 8 alphanumeric characters for HART or 16 alphanumeric characters for BRAIN can be set.



F0521.ai

### 5.6.6 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.



In addition to the above units, mmAq@4degC, mmAq@20degC, mmWG@4degC and mmWG@20degC are available for BRAIN communication type.

F0522.ai

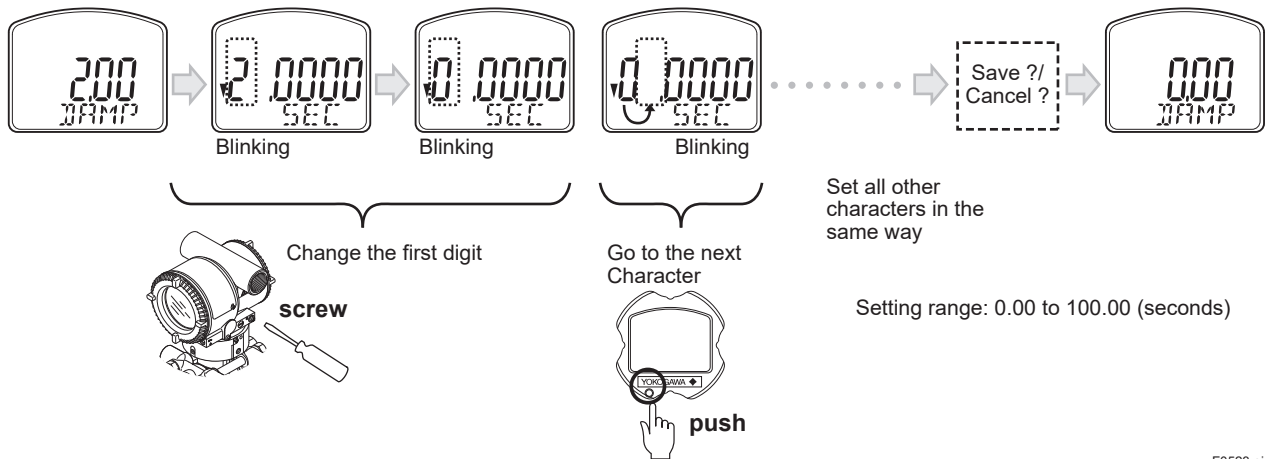
### 5.6.7 Pressure LRV/URV Configuration

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 5.6.8 Damping Time Constant Configuration for how to change the numerical value.

When the setting is out of the limit, an alarm will be generated.

### 5.6.8 Damping Time Constant Configuration

The damping time constant for the amplifier assembly can be set. Quick Response Parameter is automatically set to ON when the damping time constant is set to less than 0.5 seconds. Damping time constant is rounded off to two decimal places.



### 5.6.9 Output Mode Configuration

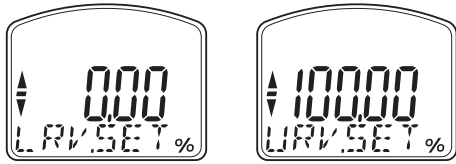
Pressure Output Mode (Linear or Sq root) can be selected by turning the external adjustment screw. Please refer to 5.6.6 Pressure Unit Configuration for how to select and set the enumerated value.

### 5.6.10 Display Out 1 Configuration

Display Out1 can be selected by turning the external adjustment screw. Please refer to 5.6.6 Pressure Unit Configuration for how to select and set the enumerated value.

### 5.6.11 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.



F0524.ai

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 6.1 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.

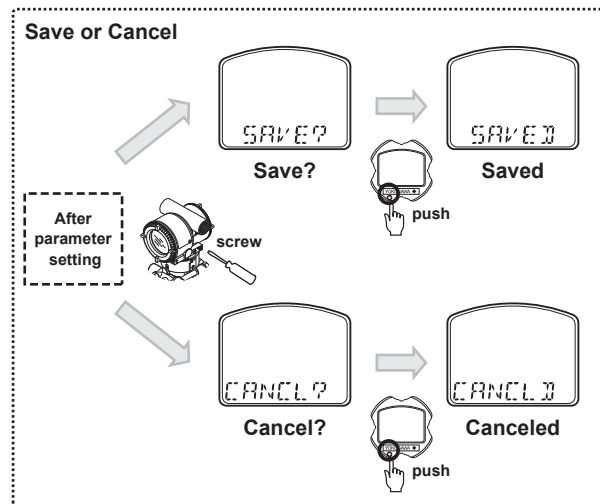
Note 3: Changing the lower range value (LRV) also automatically changes the upper range value (URV), keeping the span constant. New URV=previous URV+(new LRV–previous LRV)

### 5.6.12 Device Information Display

Model name, communication protocol, device revision and software revision are displayed repeatedly.

### 5.6.13 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.

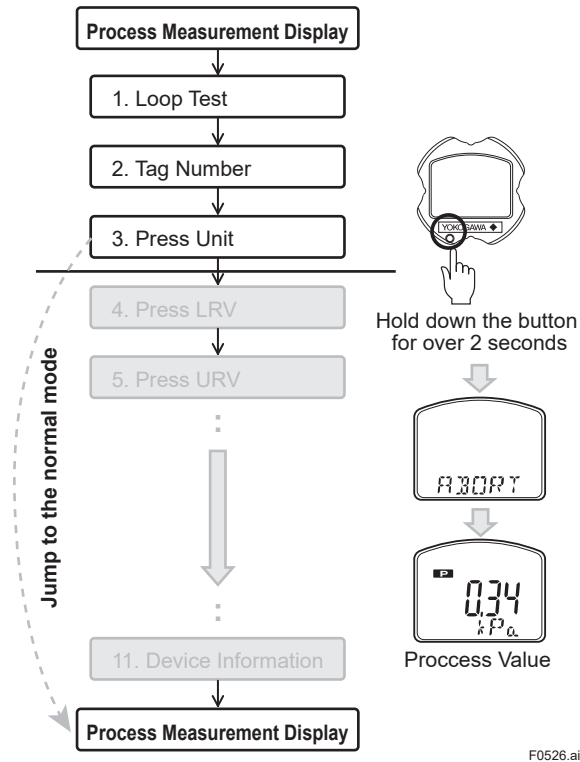


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### 5.6.14 Abort Configuration

#### 5.6.14.1 Abort Configuration (Menu)

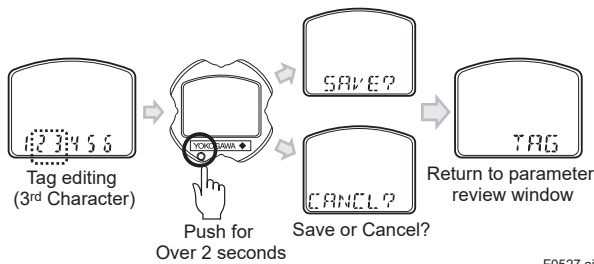
Hold down the push button for over 2 seconds to exit the Local Parameter Setting mode.



F0526.ai

#### 5.6.14.2 Abort Configuration (Parameter)

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



F0527.ai

### 5.6.15 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 (EXT ZERO ADJ = disable)	<ul style="list-style-type: none"> <li>External Zero Adjustment</li> <li>Local Parameter Setting</li> </ul>
Communication Parameter Write Protect = On (WRT PROTECT = Yes)	<ul style="list-style-type: none"> <li>Local Parameter Setting</li> <li>All Communication Parameters *</li> </ul>
Hardware write protection switch on CPU assembly = D (Disable)	<ul style="list-style-type: none"> <li>Local Parameter Setting</li> <li>All Communication Parameters *</li> </ul>

\*External Zero Adjustment is unlocked.

The above parameter setting is carried out by using field communicator or DTM. See the user's manual IM 01C25T (HART/BRAIN) 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.

### 5.6.16 Others

- Difference between BRAIN and HART

	HART	BRAIN
Tag Number	Up to 8 characters can be set	Up to 16 characters can be set
Output Mode (Linear/Sq root)	"TRNS.FC" shown on the integral indicator	"OUT.MOD" shown on the integral indicator

- 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.



# 6. Maintenance

## 6.1 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.

## 6.2 Calibration Instruments Selection

Table 6.1 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.

## 6.3 Calibration

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

- 1) Connect the instruments as shown in figure 6.1a and 6.1b and warm up the instruments for at least five minutes.



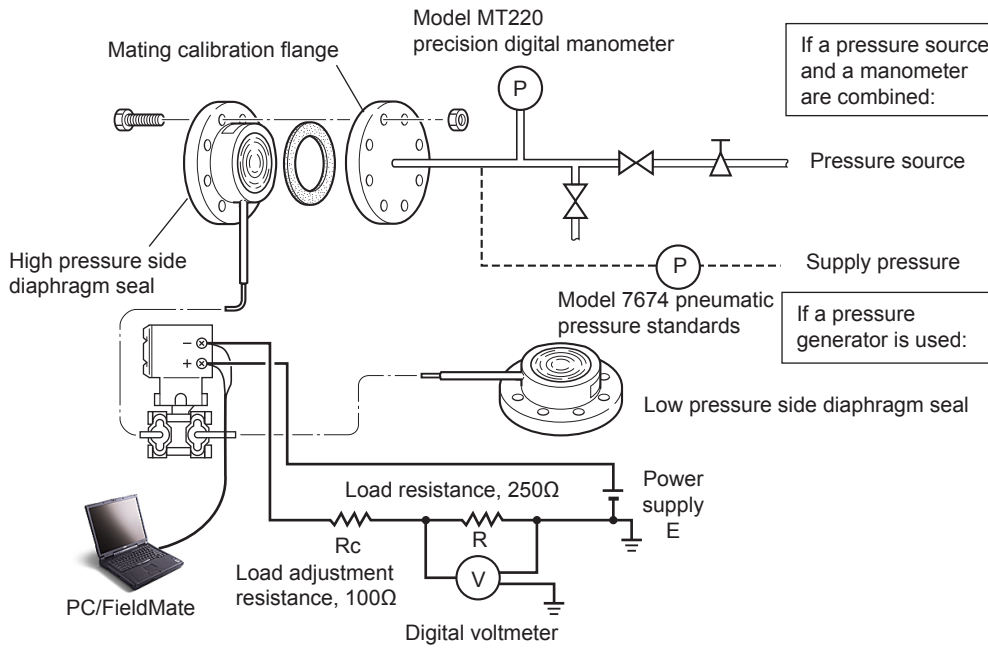
### IMPORTANT

- 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 6.1 Instruments Required for Calibration**

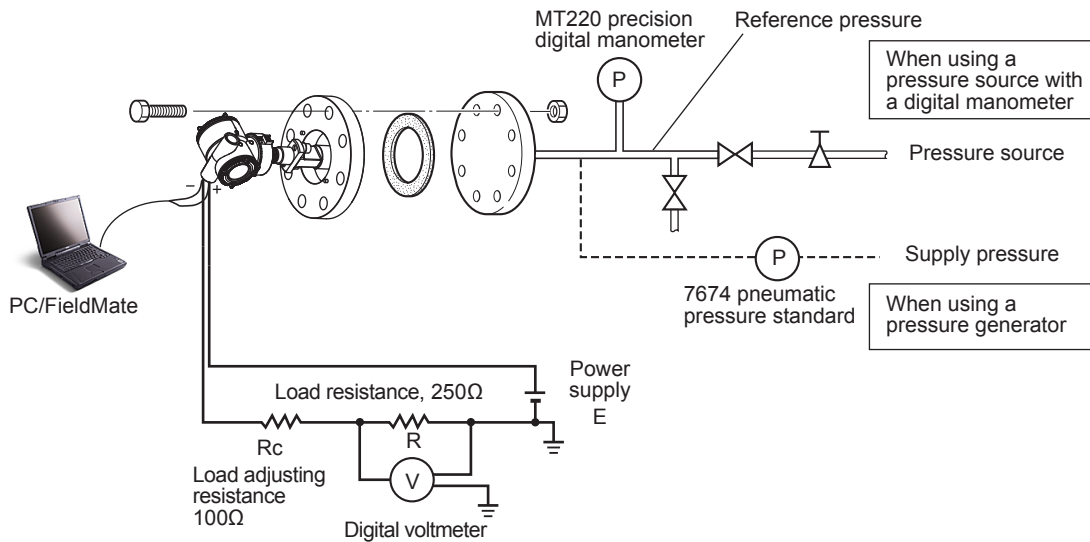
Name	Yokogawa-recommended Instrument	Remarks
Power supply	Model SDBT or SDBS distributor	4 to 20 mA DC signal
Load resistor	Model 2792 standard resistor [250 Ω ±0.005%, 3 W] Load adjustment resistor [100 Ω ±1%, 1 W]	
Voltmeter	Model 2501 A digital multimeter Accuracy (10V DC range): ±(0.002% of rdg + 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 <sup>2</sup> }, 25 kPa {2500 mmH <sub>2</sub> O} Accuracy: ±0.05% of F.S. Dead weight gauge tester 25 kPa {2500 mmH <sub>2</sub> O} Accuracy: ±0.03% of setting	Requires air pressure supply. 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% level, contact Yokogawa representatives from which the instrument was purchased or the nearest Yokogawa office.



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Figure 6.1a EJXC80A/EJAC80E Instrument Connections (4 to 20 mA output)



F0602.ai

Figure 6.1b EJXC50A/EJAC50E Instrument Connections (4 to 20 mA output)

## 6.4 Disassembly and Reassembly

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

Always turn OFF power and shut off and release pressures before disassembly. Use proper tools for all operations. Table 6.2 shows the tools required.

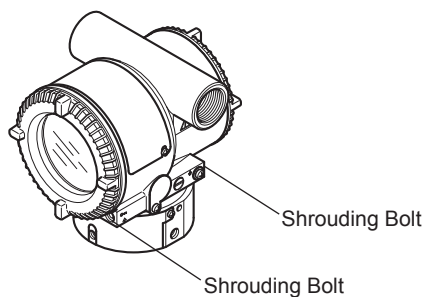
**Table 6.2 Tools for Disassembly and Reassembly**

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	

### CAUTION

#### Precautions for ATEX Flameproof Type Transmitters

- Flameproof type transmitters must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
  - On the flameproof type transmitters the two covers are locked, each by an Allen head bolt (shrouding bolt). When a shrouding bolt is driven clockwise by an Allen wrench, it is going in and cover lock is released, and then the cover can be opened.
- When a cover is closed it should be locked by a shrouding bolt without fail. Tighten the shrouding bolt to a torque of 0.7 N·m {7 kgf·cm}.



**Figure 6.2 Shrouding Bolts**

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### 6.4.1 Replacing the Integral Indicator

#### CAUTION

##### Cautions for Flameproof Type Transmitters

Users are prohibited by law from modifying the construction of a flameproof type transmitter. This would invalidate the agency approval for the use of the transmitter in a rated area. It follows that the user is prohibited from using a flameproof type transmitter with its integral indicator removed, or from adding an integral indicator to a transmitter. If such modification is absolutely required, contact Yokogawa.

This subsection describes the procedure for replacing an integral indicator. (See figure 6.3)

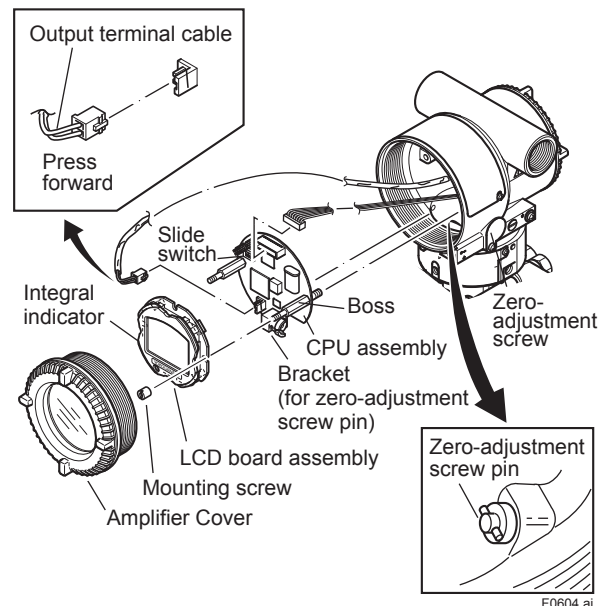
#### ■ Removing the Integral Indicator

- 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.



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**Figure 6.3 Removing and Attaching LCD Board Assembly and CPU Assembly**

### 6.4.2 Replacing the CPU Board Assembly

This subsection describes the procedure for replacing the CPU assembly. (See figure 6.3)

#### ■ Removing the CPU Assembly

- 1) Remove the cover. If an integral indicator is mounted, refer to subsection 6.4.1 and remove the indicator.
- 2) Turn the zero-adjustment screw to the position (where the screw head slot is horizontal) as shown in figure 6.3.
- 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 are free of pinching between the case and the CPU assembly edge.

- 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.
- 4) Tighten the two bosses. If the transmitter is equipped with an integral indicator, refer to subsection 6.4.1 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.

### 6.5 Replacing the Process Connector Gasket

This section describes the procedure for replacing the process connector gasket. (See Figure 6.4)

- 1) Loosen the two bolts and remove the process connector.
- 2) Replace the process connector gasket.
- 3) Mount the process connector. Tighten the bolts securely and uniformly to a torque of 39 to 49 N·m {4 to 5 kgf·m}, and verify that there are no pressure leaks.

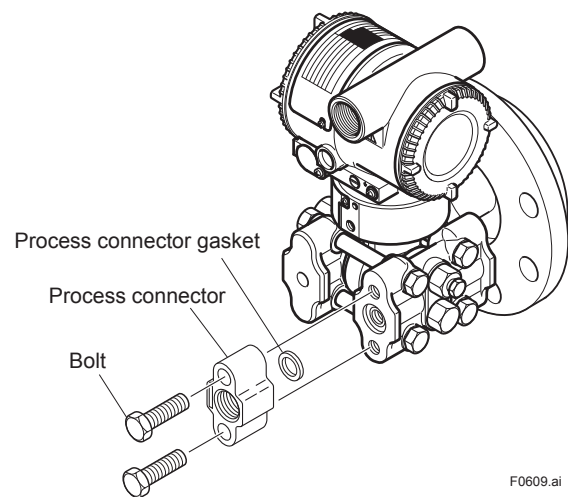


Figure 6.4 Replacing the Process Connector Gasket

## 6.6 Disassembly and Reassembly of Connection Adapter of Inner Diaphragm Type Seal

- Removing the connection adapter, exercise care so as not to damage the diaphragm surfaces. (See figure 4.3)
- When re-mounting the connection adapter, use the new gasket as shown in the table.
- Install the connection adapter, and use a torque wrench to tighten the four bolts uniformly to a torque of 59N·m.
- After the pressure detector section has been reassembled, a leak test must be performed to verify that there are no pressure leaks.

Part No.	Description
F9270AM	For general use
F9270AM-A	For oil-prohibited use
F9994CA	For high temperature use
F9300AS	For special material
F9300AT	For special material and oil-prohibited use
F9994CC	For high temperature and oil-prohibited use

## 6.7 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.

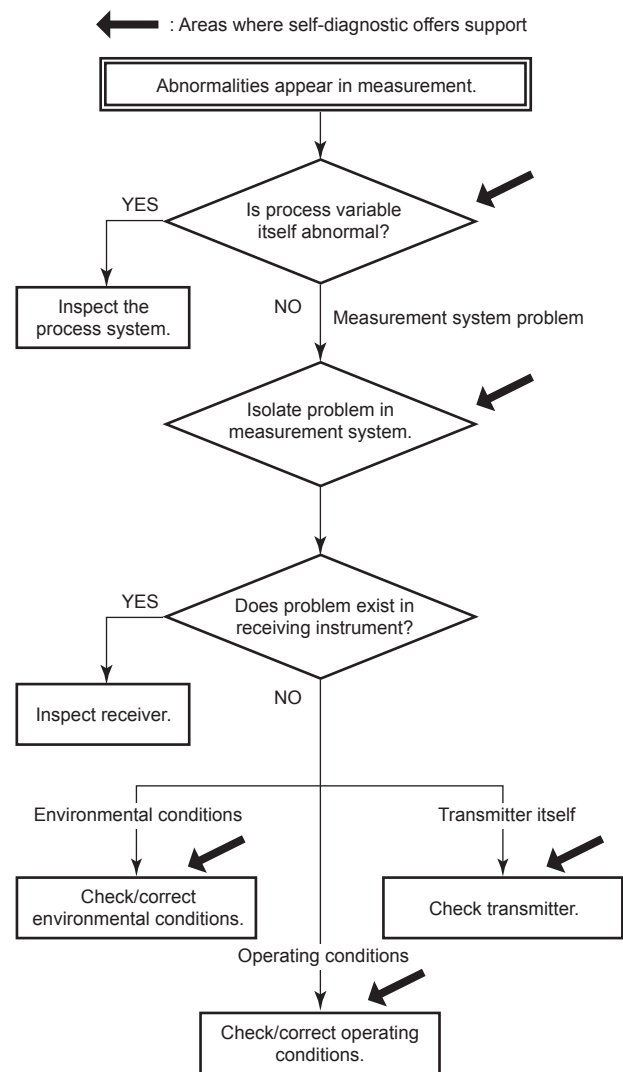
### 6.7.1 Basic Troubleshooting

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 6.7.3 for the list of alarms. See also each communication manual.

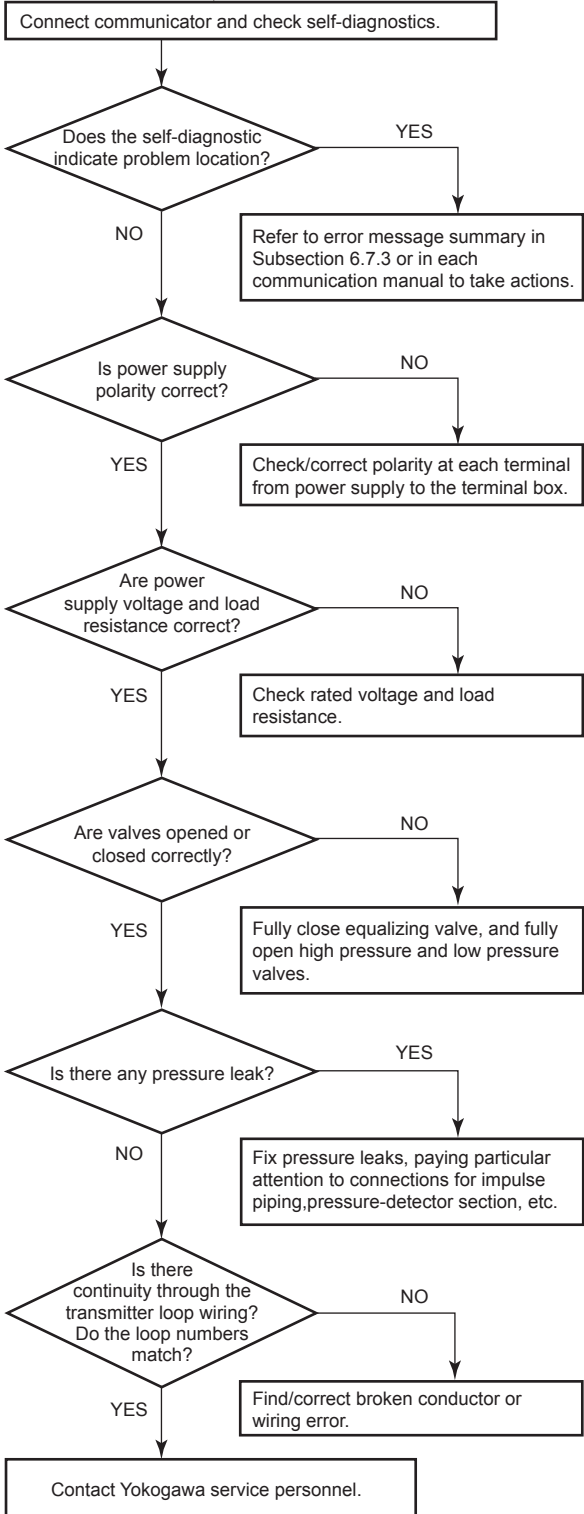


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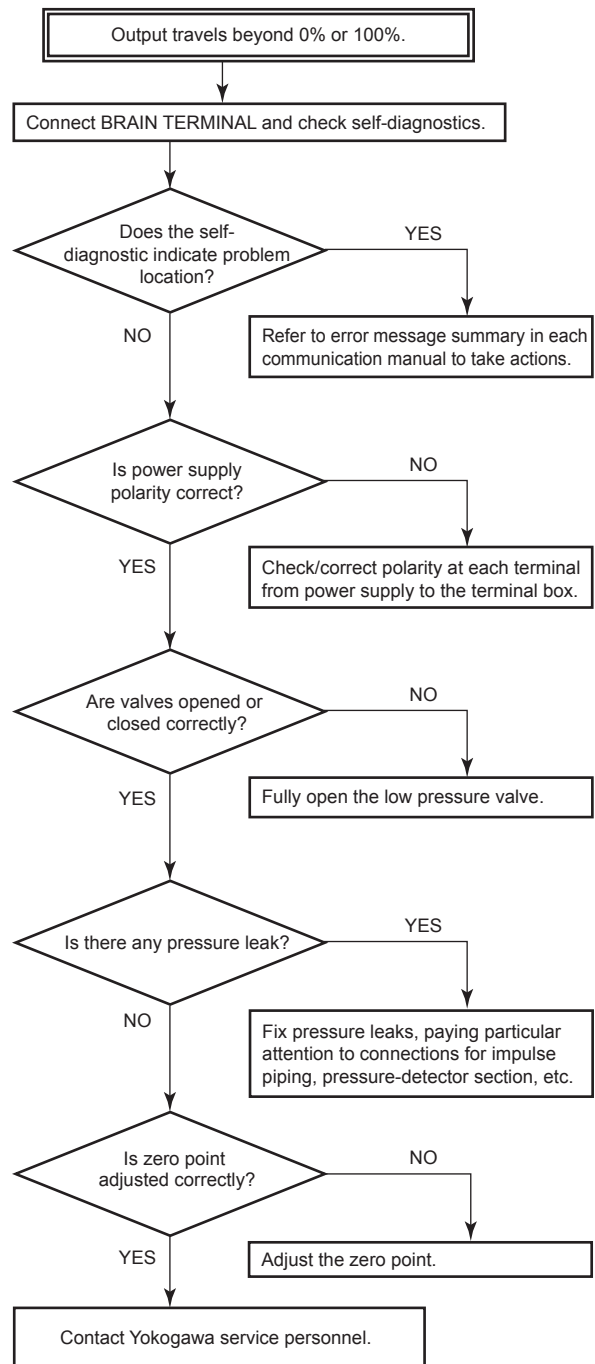
Figure 6.5 Basic Flow and Self-Diagnostics

6.7.2 Troubleshooting Flowcharts

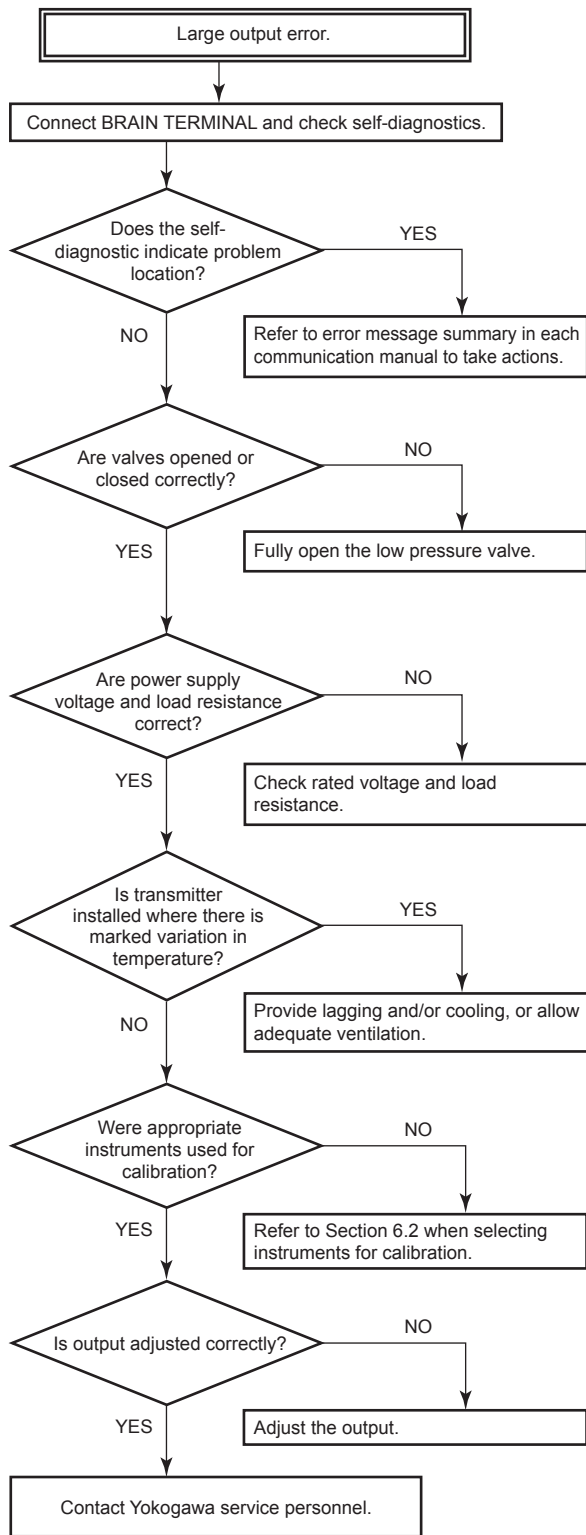
The following sorts of symptoms indicate that transmitter may not be operating properly.  
 Example : • There is no output signal.  
 • Output signal does not change even though process variable is known to be varying.  
 • Output value is inconsistent with value inferred for process variable.



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6.7.3 Alarms and Countermeasures

Table 6.3 Alarm Message Summary

Indicator	Cause	Output Operation during Error	Countermeasure
None			
AL. 01 CAP. ERR	Sensor problem. Capsule temperature sensor problem. Capsule EEPROM problem.	Outputs the signal (Hold, High, or Low) set with parameter.	Replace capsule when error keeps appearing even after restart.
AL. 02 AMP. ERR	Amplifier temperature sensor problem. Amplifier EEPROM problem. Amplifier problem.	Outputs the signal (Hold, High, or Low) set with parameter.	Replace amplifier.
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.  Use heat insulation or make lagging to keep temperature within range.
AL. 11 ST. PRSS	Static pressure exceeds limit.	Continues to operate and output.	
AL. 12 CAP. TMP	Capsule temperature is outside range (-50 to 130°C).		
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.	Check input.
AL. 35 *1 P. HI	Input pressure exceeds specified threshold.		
AL. 36 *1 P. LO			
AL. 37 *1 SP. HI	Input static pressure exceeds specified threshold.		
AL. 38 *1 SP. 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. 54 SP. RNG		Continues to operate and output holding static pressure in %.	Check setting and change them as needed.
AL. 55 SP. 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.	
AL. 79 OV. DISP	Displayed value exceeds limit.		

\*1: These alarms may appear only when process alarm function is activated.

# 7. General Specifications

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

For the specifications specific to the diaphragm seal system, refer to the General Specification of diaphragm seal system(GS 01C25W01-01EN.)

For those specifications which are common with the original transmitters, refer to the General of each transmitter(EJ□110□, EJ□310□, EJ□430□, and EJ□530□.)

The General Specifications can be downloaded from the website of Yokogawa.

Website address: <https://www.yokogawa.com/solutions/products-platforms/field-instruments/>

## ■ General Specifications List

Model	Document Title	Document No.
EJX110A	Differential Pressure Transmitter	GS 01C25B01-01EN
EJX120A	Differential Pressure Transmitter	GS 01C25B03-01EN
EJX130A	Differential Pressure Transmitter	GS 01C25B04-01EN
EJX210A	Flange Mounted Differential Pressure Transmitter	GS 01C25C01-01EN
EJX310A	Absolute Pressure Transmitter	GS 01C25D01-01EN
EJX430A	Gauge Pressure Transmitter	GS 01C25E01-01EN
EJX440A	Gauge Pressure Transmitter	GS 01C25E02-01EN
EJX510A, EJX530A	Absolute and Gauge Pressure Transmitters	GS 01C25F01-01EN
EJX610A, EJX630A	Absolute and Gauge Pressure Transmitters	GS 01C25F05-01EN
EJX118A	Diaphragm Sealed Differential Pressure Transmitter	GS 01C25H01-01EN
EJX118A	Diaphragm Sealed Differential Pressure Transmitter (Inner Diaphragm type)	GS 01C25H01-11EN
EJX438A	Diaphragm Sealed Gauge Pressure Transmitter	GS 01C25J03-01EN
EJX438A	Diaphragm Sealed Gauge Pressure Transmitter (Inner Diaphragm type)	GS 01C25J03-11EN
EJX115A	Low Flow Transmitter	GS 01C25K01-01EN
EJX910A	Multivariable Transmitter	GS 01C25R01-01EN
EJX930A	Multivariable Transmitter	GS 01C25R04-01EN
EJXC50A, EJXC40A, EJAC50E, C20FE, C20FW, C10FR, EJXC80A, EJAC80E, C81FA, C82FA, C81FD, C82FD, C30SW, C30SE, C80FW, C80FE, EJXC81A, EJAC81E, C70SE, C70SW	Diaphragm Seal System	GS 01C25W01-01EN
EJXC40A	Digital Remote Sensor	GS 01C25W05-01EN
EJX110A, EJX130A	Differential Pressure Transmitter High Damping Capsule (Option Code: /HD)	GS 01C25V01-01EN
EJX110A	Differential Pressure Transmitters High Damping Capsule (General) (Option Code: /HD2)	GS 01C25V02-01EN
EJX-A, EJA-E	Explosion Protected Type and Marine Certificate Type	GS 01C25A20-01EN
EJA110E	Differential Pressure Transmitter	GS 01C31B01-01EN
EJA120E	Differential Pressure Transmitter	GS 01C31B03-01EN
EJA130E	Differential Pressure Transmitter	GS 01C31B04-01EN
EJA210E	Flange Mounted Differential Pressure Transmitter	GS 01C31C01-01EN
EJA310E	Absolute Pressure Transmitter	GS 01C31D01-01EN
EJA430E	Gauge Pressure Transmitter	GS 01C31E01-01EN
EJA440E	Gauge Pressure Transmitter	GS 01C31E02-01EN
EJA510E, EJA530E	Absolute Pressure Transmitter and Gauge Pressure Transmitter	GS 01C31F01-01EN
EJA118E	Diaphragm Sealed Differential Pressure Transmitter	GS 01C31H01-01EN
EJA118E	Diaphragm Sealed Differential Pressure Transmitter (Inner Diaphragm type)	GS 01C31H01-11EN
EJA438E	Diaphragm Sealed Gauge Pressure Transmitter	GS 01C31J03-01EN
EJA438E	Diaphragm Sealed Gauge Pressure Transmitter (Inner Diaphragm type)	GS 01C31J03-11EN
EJA115E	Low Flow Transmitter	GS 01C31K01-01EN
EJAC60E, EJA560E	Hygienic Adapter System (Fluidless Type) Hygienic Gauge Pressure Transmitter (Fluidless Type)	GS 01C31Y01-01EN
EJA110E, EJA130E	Differential Pressure Transmitter High Damping Capsule (Option Code: /HD)	GS 01C31V01-01EN
EJA110E	Differential Pressure Transmitters High Damping Capsule (General) (Option Code: /HD2)	GS 01C31V02-01EN

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

# Revision Information

- Title : Diaphragm Seal System  
EJXC80A, EJAC80E, EJXC81A, EJAC81E, EJXC50A and EJAC50E
- Manual No. : IM 01C25W01-01EN

Edition	Date	Page	Revised Item
1st	June 2016	—	New publication
2nd	Dec. 2016		<p>Delete sections 1.3, 2.9 to 2.12, and chapter 5. (Those contents are to be referred to each transmitter's manual from this edition.)</p> <p>Add model EJXC80A, EJAC80E, C80FW, C80FE, C81FA, C82FA, C81FD, C82FD, C30SW, and C30SE.</p> <p>1-1 1. Add outline of the series of products and document list.</p> <p>3-1 3. Add EJ□C80□.</p> <p>3-2 Change the figure 3.2.</p> <p>4-1 to 4-9 Add 4.2 to 4.5 and 4.7.</p> <p>5-1 5.1 Add figure of EJ□C80□.</p> <p>5-4 Add 5.5.</p> <p>6-3 6.2 Add figure of EJ□C80□.</p> <p>6-5 to 6-6 Add 6.5 and 6.6.</p> <p>7-1 to 7-95 Reflect GS 01C25W01-01EN(2).</p>
3rd	Oct. 2018		<p>Add EJ□C81□ Absolute Diaphragm Seal System. Add Combination Type (Direct-mount and Remote-mount) and Hygienic Type for EJ□C80□ Diaphragm System. Add EJ□C8□C Modify BT200 screen image.</p> <p>1-1 to 1-2 1. Add Absolute Diaphragm Seal System. Add style S2 of EJA-E series.</p> <p>2-1 2. Add EJ□C81□ and EJ□310□.</p> <p>3-1 to 3-2 3. Add EJ□C81□.</p> <p>4-1 4.1 Add EJ□C81□.</p> <p>4-3 4.3 Add EJ□C81□ to the title and add descriptions to IMPORTANT.</p> <p>4-7 4.7 Add EJ□C80□.</p> <p>4.7.1 and 4.7.2 Add figure of hygienic remote seal.</p> <p>4.7.3 Add ISO51 clamp in Table 4.1 and 4.2.</p> <p>4-9 4.8 Modify description for rotation. Add WARNING.</p> <p>4-10 4.10.2 Correct parts No. in Table 4.3 (9900 &gt; 9990)</p> <p>4-12 4.11 Add *1 in Figure 4.20.</p> <p>5-1 to 5-2 5.1 Add Figure 5.2 and 5.4.</p> <p>5-4 to 5-5 5.2.1 Add subsection "Zero point adjustment for Absolute Pressure Diaphragm Seal System."</p> <p>6-6 6.6 Add parts number for high temperature and oil-prohibited use.</p> <p>7-1 to 7-112 7. Add specifications.</p>
4th	Nov. 2019		<p>1-2 1. Change NOTE to WARNING. Update contents. Update the contents of WARNING for SIS.</p> <p>4-1 4.1 Add items in IMPORTANT.</p> <p>4.2.1 Add table for ød.</p> <p>4-4 4.3 Add fill fluid density table .</p> <p>5-8 5.6 Update the descriptions for LPS.</p> <p>7-1 7. Delete Standard Specifications and add guide to GS.</p>