User's Manual

DPharp EJX®

EJX110B, EJX310B and EJX430B Differential Pressure and Pressure Transmitters

IM 01C27B01-01EN

DPharp FOR THE DIGITAL WORLD

YOKOGAWA
Yokogawa Electric Corporation

IM 01C27B01-01EN
12th Edition

EJX110B, EJX310B and EJX430B
Differential Pressure and Pressure Transmitters

IM 01C27B01-01EN 12th Edition

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1. Introduction

Thank you for purchasing the DPharp EJX Differential Pressure and pressure transmitter.

Your EJX Pressure 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.

NOTE

This manual covers the EJX110B differential pressure transmitter, EJX430B gauge pressure transmitter and EJX310B absolute pressure transmitter and describes how to use for the detachable antenna type transmitters (Amplifier housing code 8 or 9).
Unless otherwise stated, the illustrations in this manual are of the EJX110B differential pressure transmitter with a detachable antenna type.
Users of the other models and specifications should bear in mind that certain features of their instrument will differ from those shown in the illustrations of the EJX110B.

MODEL	SUFFIX
EJX110B	-□□□□□-□8□□□* -□□□□□-□9□□□*
EJX310B	
EJX430B	

■ Regarding This Manual

- This manual should be provided to the end user.
- This manual and the identification tag attached on packing box are essential parts of the product; keep them in a safe place for future reference.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments. When products whose suffix code or optional codes contain code "Z" and an exclusive document is attached, please read it along with this manual.
- 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 responsibilities 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 and on the product:

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 or physical damage. 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.

⏚ 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.

Notice

NO RIGHTS OR LICENSES, EXPRESS OR IMPLIED, ARE GRANTED TO USE THIRD-PARTY DEVICES IN COMBINATION WITH THESE PRODUCTS IN A WIRELESS MESH NETWORK, OR TO USE THIRD-PARTY SERVICES TO ACCESS, MONITOR OR CONTROL THESE PRODUCTS IN A WIRELESS MESH NEWORK VIA THE INTERNET OR ANOTHER EXTERNAL WIDE AREA NETWORK.

Patent Marking

Covered by one or more claims of patents: http://sipcollc.com/patent-list/ and http://intusiq.com/patent-list/.

1.1 Safe Use of This Product

This product is designed to be used by a person with specialized knowledge. 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.

(c) Maintenance

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

(d) Explosion Protected Type Instrument

- Users of explosion proof instruments should refer first to section 2.8 (Installation of an Explosion Protected Instrument) of this manual.
- 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.
- Repair or modification to this instrument by customer will cause malfunction of explosion protect function and hazardous situation. If you need to repair or modification, please contact the nearest Yokogawa office.

(e) Modification

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

(f) Product Disposal

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

(g) Authorized Representative in EEA

- In relation to the CE Marking, The authorized representative for this product in the EEA (European Economic Area) is:
  Yokogawa Europe B.V.
  Euroweg 2, 3825 HD Amersfoort,
  The Netherlands

1.2 Radio Wave

IMPORTANT

- This instrument is equipped with a wireless module which is designated as a certification of construction type as a wireless facility for 2.4 GHz band low-power data communication system of the Radio Act. Refer to 2.12 “Regulatory Compliance for Radio and Telecommunication” for detail.
- Due to the designated certification of construction type, users may be subject to legal punishment in case of:
  - Disassembling or modifying the wireless module or antenna in this instrument
  - Peeling off the certification label attached to the wireless module in this instrument
- Preventing interference with other wireless stations
  The operating frequency bandwidth of this instrument may overlap the same range as industrial devices, scientific devices, medical devices, microwave ovens, licensed premises radio stations and non-licensed specified low-power radio stations for mobile object identification systems used in factory production lines.
  Before using this instrument, ensure that neither a premises radio station nor specified low power radio station for mobile object identification systems is in use nearby.
  If this instrument causes radio wave interference to a wireless station for mobile object identification systems, promptly change the frequency being used or turn off the source of radio wave emissions.
  Then, contact a Yokogawa office regarding countermeasures to prevent interference, such as setting up partitions.

1.3 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.

1.4 Trademarks

In this document, trademarks or registered trademarks are not marked with “™” or “®”. Product names and company names in this document are trademarks or registered trademarks of the respective companies

1.5 ATEX Documentation

This is only applicable to the countries in European Union.

GB
All instruction manuals for ATEX Ex related products are available in English, German and French. Should you require Ex related instructions in your local language, you are to contact your nearest Yokogawa office or representative.

DK
Alle brugervejledninger for produkter relateret til ATEX Ex er tilgængelige på engelsk, tysk og fransk. Skulle De ønske yderligere oplysninger om håndtering af Ex produkter på eget sprog, kan De rette henvendelse herom til den nærmeste Yokogawa afdeling eller forhandler.

I
Tutti i manuali operativi di prodotti ATEX contrassegnati con Ex sono disponibili in inglese, tedesco e francese. Se si desidera ricevere i manuali operativi di prodotti Ex in lingua locale, mettersi in contatto con l'ufficio Yokogawa più vicino o con un rappresentante.

E
Todos los manuales de instrucciones para los productos antiexplosivos de ATEX están disponibles en inglés, alemán y francés. Si desea solicitar las instrucciones de estos artículos antiexplosivos en su idioma local, deberá ponerse en contacto con la oficina o el representante de Yokogawa más cercano.

NL
Alle handleidingen voor producten die te maken hebben met ATEX explosiebeveiliging (Ex) zijn verkrijgbaar in het Engels, Duits en Frans. Neem, indien u aanwijzingen op het gebied van explosiebeveiliging nodig hebt in uw eigen taal, contact op met de dichtstbijzijnde vestiging van Yokogawa of met een vertegenwoordiger.

SF
Kaikkien ATEX Ex -tyyppisten tuotteiden käyttöhjeet ovat saatavilla englannin-, saksan- ja ranskankielisinä. Mikäli tarvitsette Ex -tyyppisten tuotteiden ohjeita omalla paikallisella kielellännne, ottakaa yhteyttä lähimpään Yokogawa-toimistoon tai -edustajaan.

P
Todos os manuais de instruções referentes aos produtos Ex da ATEX estão disponíveis em Inglês, Alemão e Francês. Se necessitar de instruções na sua língua relacionadas com produtos Ex, deverá entrar em contacto com a delegação mais próxima ou com um representante da Yokogawa.

F
Tous les manuels d'instruction des produits ATEX Ex sont disponibles en langue anglaise, allemande et française. Si vous nécessitez des instructions relatives aux produits Ex dans votre langue, veuillez bien contacter votre représentant Yokogawa le plus proche.

D
Alle Betriebsanleitungen für ATEX Ex bezogene Produkte stehen in den Sprachen Englisch, Deutsch und Französisch zur Verfügung. Sollten Sie die Betriebsanleitungen für Ex-Produkte in Ihrer Landessprache benötigen, setzen Sie sich bitte mit Ihrem örtlichen Yokogawa-Vertreter in Verbindung.

S
Alla instruktionsböcker för ATEX Ex (explosionssäkra) produkter är tillgängliga på engelska, tyska och franska. Om Ni behöver instruktioner för dessa explosionssäkra produkter på annat språk, skall Ni kontakta närmaste Yokogawakontor eller representant.

GR
Όλα τα εγχειρίδια λειτουργίας των προϊόντων με ATEX Ex διατίθενται στα Αγγλικά, Γερμανικά και Γαλλικά. Σε περίπτωση που χρειάζεστε οδηγίες σχετικά με Ex στην τοπική γλώσσα παρακαλούμε επικοινωνήστε με το πλησιέστερο γραφείο της Yokogawa ή αντιπρόσωπο της.

SK
Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom, nemeckom a francúzskom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

CZ
Všechny uživatelské příručky pro výrobky, na něž se vztahuje nevýbušné schválení ATEX Ex, jsou dostupné v angličtině, němčině a francouzštině. Požadujete-li pokyny týkající se výrobků s nevýbušným schválením ve vašem lokálním jazyku, kontaktujte prosím vaši nejbližší reprezentační kancelář Yokogawa.

LT
Visos gaminiø ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglø, vokieèiø ir prancûzø kalbomis. Norëdami gauti prietaisø Ex dokumentacijà kitomis kalbomis susisiekite su artimiausiu bendrovës "Yokogawa" biuru arba atstovu.

LV
Visas ATEX Ex kategorijas izstrâdâjumu Lietoðanas instrukcijas tiek piegâdâtas angïu, vâcu un franèu valodâs. Ja vçlaties saòemt Ex ierîèu dokumentâciju citâ valodâ, Jums ir jâsazinâs ar firmas Jokogava (Yokogawa) tuvâko ofisu vai pârstâvi.

EST
Kõik ATEX Ex toodete kasutamisjuhendid on esitatud inglise, saksa ja prantsuse keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima lokagava (Yokogawa) kontori või esindaja poole.

PL
Wszystkie instrukcje obsługi dla urządzeń w wykonaniu przeciwwybuchowym Ex, zgodnych z wymaganiami ATEX, dostępne są w języku angielskim, niemieckim i francuskim. Jeżeli wymagana jest instrukcja. obsługi w Państwa lokalnym języku, prosimy o kontakt z najbliższym biurem Yokogawy.

SLO
Vsi predpisi in navodila za ATEX Ex sorodni pridelki so pri roki v angliščini, nemščini ter francoščini. Če so Ex sorodna navodila potrebna v vašem tukejnjem jeziku, kontaktirajte vaš najbliši Yokogawa office ili predstaunika.

H
Az ATEX Ex mûszerek gépkönyveit angol, német és francia nyelven adjuk ki. Amennyiben helyi nyelven kérik az Ex eszközök leírásait, kérjük keressék fel a legközelebbi Yokogawa irodát, vagy képviseletet.

BG
Всички упътвания за продукти от серията ATEX Ex се предлагат на английски, немски и френски език. Ако се нуждаете от упътвания за продукти от серията Ex на родния ви език, се свържете с най-близкия офис или представителство на фирма Yokogawa.

RO
Toate manualele de instructiuni pentru produsele ATEX Ex sunt in limba engleza, germana si franceza. In cazul in care doriti instructiunile in limba locala, trebuie sa contactati cel mai apropiat birou sau reprezentant Yokogawa.

M
Il-manwali kollha ta' l-istruzzjonijiet għal prodotti marbuta ma' ATEX Ex huma disponibbli bl-Ingliż, bil-Ġermaniż u bil-Franċiż. Jekk tkun teħtieġ struzzjonijiet marbuta ma' Ex fil-lingwa lokali tiegħek, għandek tikkuntattja lill-eqreb rappreżentan jew uffiċċju ta' Yokogawa.

1.6 Control of Pollution Caused by the Product

This is an explanation for the product based on “Control of Pollution caused by Electronic Information Products” in the People’s Republic of China.

電子情報製品汚染制御管理弁法（中国版RoHS）
产品中有害物质或元素的名称及含量

产品中有害物质或元素的名称及含量

型号	部件名称	有害物质					
		铅（Pb）	汞（Hg）	镉（Cd）	六价铬（Cr(VI)）	多溴联苯（PBB）	多溴二苯醚（PBDE）
EJX-B series 无线差压 / 压力变送器 YTA510 无线温度变送器	壳体	×	○	○	○	○	○
	膜盒组件	×	○	○	○	○	○
	基板组件	×	○	○	×	○	○
	电源连接线	×	○	○	○	○	○
	天线组件	×	○	○	○	○	○
	电池组件	×	○	○	○	○	○

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

环保使用期限：

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

注）该年数为“环保使用期限”，并非产品的质量保证期。

2. Handling Cautions

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

EJX Series 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 transmitter mounting hardware shown in figure 2.1 is included. If the transmitter is ordered without the mounting bracket and the process connector, the transmitter mounting hardware will not be included. After checking the transmitter, carefully repack it in its box and keep it there until you are ready to install it.

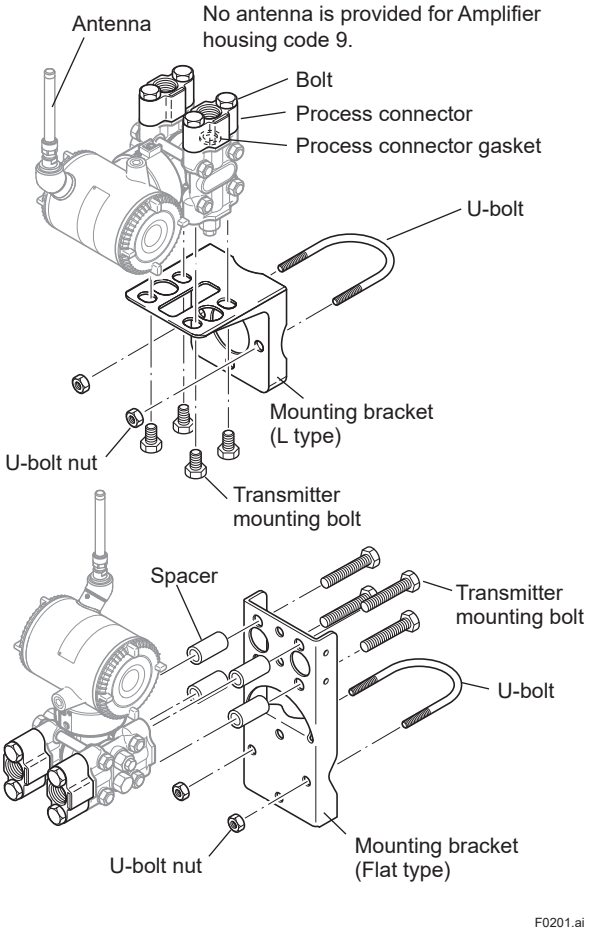


Figure 2.1 Transmitter Mounting Hardware

2.1 Model and Specifications Check

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

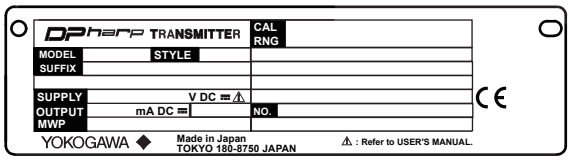


Figure 2.2 Name Plate

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
–30 to 80°C LCD visible range
Relative humidity:
0% to 100% R.H.
Preferred temperature and humidity:
approx. 25°C and 65% R.H.

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

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

(d) Preferably remove the batteries for storage. For maximum battery life, the storage temperature should not exceed 30°C.

NOTE

When storing the instrument with a battery pack, it is recommended to put the instrument in Deep Sleep mode to conserve the batteries. For details on how to switch to Deep Sleep mode, refer to subsection 8.3.16 “Switching to Deep Sleep Mode”.

2.4 Selecting the Installation Location

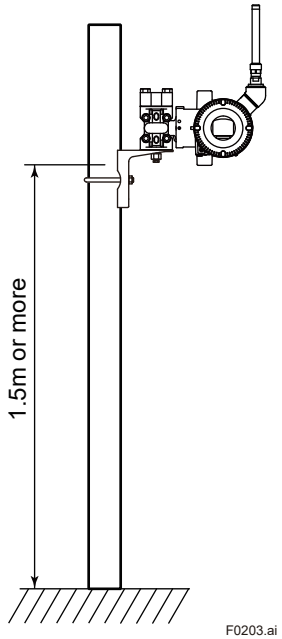
The transmitter is designed to withstand severe environmental conditions. However, to ensure that it will provide years of stable and accurate performance, take the following precautions when selecting the installation location.

(a) Wireless Communication

NOTE

The installation location of this transmitter must meet the following conditions:

- Adjust the direction of the antenna to be in the upright position regardless of the orientation of this transmitter. See section 4 for adjusting the antenna.
- Install the transmitter at least 1.5m above the ground or floor.



- Ensure that there are no obstacles such as walls or pipes within a 30-cm radius of each antenna.
- Confirm that each field wireless equipment compliant with ISA100.11a can see the antenna of other devices which locate within its own communication range. In the star topology network, the visibility to the antenna of gateway is a mandatory clause.

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

(c) Ambient Atmosphere
Do not install the transmitter in a corrosive atmosphere. If this cannot be avoided, there must be adequate ventilation.

(d) 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.

(e) Installation of Explosion-protected Transmitters
An explosion-protected transmitters is certified for installation in a hazardous area containing specific gas types. See subsection 2.8 “Installation of an Explosion-Protected Transmitters.”

2.5 Pressure Connection

WARNING

- Never loosen the process connector 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.

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 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.

2.7 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) The procedure for conducting these tests is as follows:

• Insulation Resistance Test

1) Remove the battery pack. See subsection 9.4.6 for details on how to remove it.
2) Short-circuit the battery connection terminals in the terminal box.
3) Turn OFF the insulation tester. Then connect the insulation tester plus (+) lead wire to the shorted battery connection terminals and the minus (–) leadwire to the grounding terminal.
4) 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.
5) 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 battery connection terminals. Leave this resistor connected at least one second to discharge any static potential. Do not touch the terminals while it is discharging.

NOTE

When storing the instrument with a battery pack, it is recommended to put the instrument in Deep Sleep mode to conserve the batteries. For details on how to switch to Deep Sleep mode, refer to subsection 8.3.16 “Switching to Deep Sleep Mode”.

• Dielectric Strength Test

1) Remove the battery pack. See subsection 9.4.6 for details on how to remove it.
2) Short-circuit the battery connection terminals in the terminal box.
3) Turn OFF the dielectric strength tester. Then connect the tester between the shorted battery connection terminals and the grounding terminal. Be sure to connect the grounding lead of the dielectric strength tester to the ground terminal.
4) Set the current limit on the dielectric strength tester to 0.1 mA, then turn ON the power and gradually increase the test voltage from ‘0’ to the specified voltage.
5) When the specified voltage is reached, hold it for one minute.
6) After completing this test, slowly decrease the voltage to avoid any voltage surges.

NOTE

When storing the instrument with a battery pack, it is recommended to put the instrument in Deep Sleep mode to conserve the batteries. For details on how to switch to Deep Sleep mode, refer to subsection 8.3.16 “Switching to Deep Sleep Mode”.

2.8 Installation of an Explosion-Protected Instrument

If a customer makes a repair or modification to an intrinsically safe instrument and the instrument is not restored to its original condition, its intrinsically safe construction may be compromised and the instrument may be hazardous to operate. Please contact Yokogawa before making any repair or modification to an instrument.

CAUTION

This instrument has been tested and certified as being intrinsically safe. Please note that severe restrictions apply to this instrument’s construction, installation, external wiring, maintenance and repair. A failure to abide by these restrictions could make the instrument a hazard to operate.

WARNING

The battery pack may be replaced in a hazardous area. The battery pack has surface resistivity greater than 1G ohm and must be properly installed in the enclosure of the transmitter. Care must be taken during transportation to and from the point of installation to prevent electrostatic charge build-up.

2.8.1 FM Approval

Caution for FM intrinsically safe type. (Following contents refer “DOC. No. IFM037-A20”)

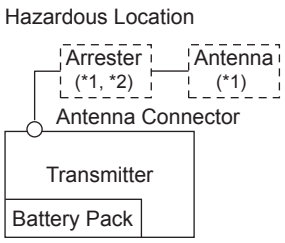
Note 1. Model EJX Series Differential, gauge and absolute pressure transmitters with optional code /FS17 are applicable for use in hazardous locations.

- Applicable Standard: Class 3600, Class 3610, Class 3611, Class 3810, NEMA 250, ANSI/ISA-60079-0, ANSI/ISA-60079-11
- Intrinsically Safe for Class I, Division 1, Groups A, B, C & D, Class II, Division 1, Groups E, F & G and Class III, Division 1, Class I, Zone 0, in Hazardous Locations, AEx ia IIC
- Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division 2, Groups F & G and Class III, Division 1, Class I, Zone 2, Groups IIC, in Hazardous Locations.
- Enclosure: NEMA 4X (Indoors and outdoors).
- Temperature Class: T4
- Ambient temperature: -50 to 70°C

Note 2. Installation

- Installation should be in accordance with ANSI/ISA-RP12.06.01 and the National Electric Code (NFPA 70).
- Dust-tight conduit seal must be used when installed in a Class II, III, Group E, F and G environments.
- Note a warning label worded “SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY,” and “INSTALL IN ACCORDANCE WITH DOC. NO. IFM037-A20”.

[Installation Diagram]



*1: These apparatus are simple apparatus.
*2: Arrester may not be connected.

[Intrinsically Safe]
Class I, II, III, Division 1,
Groups A,B,C,D,E,F,G
Class I, Zone 0
in Hazardous (Classified)
Locations
AEx ia IIC

[Nonincendive]
Class I, II, Division 2,
Groups A,B,C,D,F,G
Class III, Division 1.
Class I, Zone 2, Group IIC,
in Hazardous (Classified)
Locations

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Note 3. Maintenance and Repair
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void FM Approvals approval.

Note 4. Battery Pack
USE ONLY BATTERY PACK YOKOGAWA F9915MA OR F9915NS.

Note 5. Special Conditions for safe use
POTENTIAL ELECTROSTATIC CHARGING HAZARD-SECURE DISTANCE OF 100MM FROM ANTENNA.
DO NOT OPEN WHEN CL II, III, DIV 1,2 ATMOSPHERE IS PRESENT.

2.8.2 CSA Certification

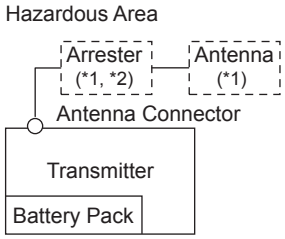
Caution for CSA Intrinsically safe type. (Following contents refer to “DOC No. ICS030”)

Note 1. Model EJX Series differential, gauge, and absolute pressure transmitters with optional code /CS17 are applicable for use in hazardous locations

Certificate: 2325443
- Applicable standard: CAN/CSA-C22.2 No.0, CAN/CSA-C22.2 No.0.4, C22.2 No.25, CAN/CSA-C22.2 No.94, CAN/CSA-C22.2 No.157, C22.2 No.213, CAN/CSA-C22.2 No.61010-1, CAN/CSA- C22.2 No.60079-0, CAN/CSA-E60079-11, IEC60529
- Ex ia IIC T4
- Intrinsically Safe for Class I, Division 1, Groups A, B, C & D, Class II, Division 1, Groups E, F & G, Class III, Division 1
- Nonincendive for Class I, Division2, Groups A, B, C & D, Class II, Division2, Groups F & G, Class III, Division1
- Enclosure: IP66/IP67 and Type 4X
- Temperature Code: T4
- Ambient Temperature: -50 to 70°C
- Max. Process Temp.: 120°C

Note 2. Installation
- Installation should be in accordance with Canadian Electrical Code Part I and Local Electrical Code.
- Do not alter drawing without authorization from CSA.
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void Canadian Standards Intrinsically safe and nonincendive Certification.

[Installation Diagram]



*1: These apparatus are simple apparatus.
*2: Arrester may not be connected.

[Intrinsically Safe]	[Nonincendive]
Group IIC, Zone 0 Class I, II, III, Division 1, Groups A,B,C,D,E,F,G	Class I, II, Division 2, Groups A,B,C,D,F,G Class III, Division 1

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Note 3. Battery Pack
- Use only YOKOGAWA battery pack F9915MA or F9915NS.

Note 4. Special Conditions for safe use
- Potential electrostatic charging hazard - secure distance of 100mm from antenna.

2.8.3 ATEX Certification

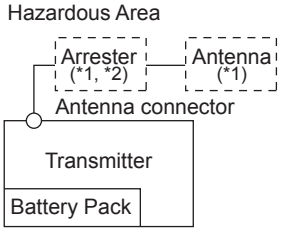
(1) Technical Data

Caution for ATEX Intrinsically safe type.

Note 1. Model EJX Series pressure transmitters with optional code /KS27 for potentially explosive atmospheres:
- No. KEMA 10ATEX0164 X
- Applicable Standard: EN60079-0:2012+A11:2013, EN 60079-11:2012
- Type of Protection and Marking code: Ex ia IIC T4 Ga
- Group: II
- Category: 1 G
- Ambient Temperature: –50°C to 70°C
- Process Temperature (Tp.): 120°C max.
- Enclosure: IP66/IP67

Note 2. Installation
- Installation should be in accordance with local installation requirements. (Refer to the Control Drawing)

[Control Drawing]



*1: These apparatus are simple apparatus.
*2: Arrester may not be connected.

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Note 3. Battery Pack

- Use only YOKOGAWA battery pack F9915MA or F9915NS.

Note 4. Special conditions for Safe Use

- In case the enclosure of the Pressure Transmitter is made of aluminum, if it is mounted in an area where the use of category 1 G apparatus is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- For applications in explosive atmospheres caused by gases, vapors or mists and where category 1 G apparatus is required, electrostatic charges on the non-metallic parts of the Pressure Transmitter shall be avoided.

WARNING

Potential electrostatic charging hazard - secure distance of 100mm from antenna.

(2) Operation

WARNING

Take care not to generate mechanical sparking when access to the instrument and peripheral devices in a hazardous location.

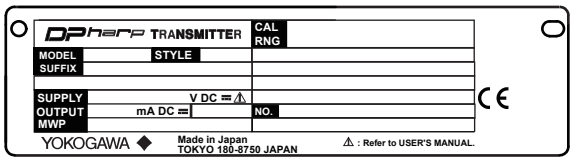
(3) Maintenance and repair

WARNING

The instrument modification or parts replacement by other than an authorized Representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(4) Name Plate

- Name Plate



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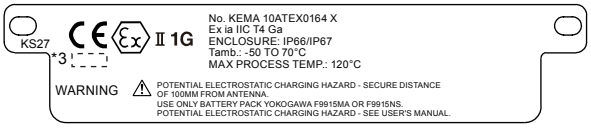
- Tag plate for intrinsically safe type



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MODEL: Specified model code.
STYLE: Style code.
SUFFIX: Specified suffix code.
SUPPLY: Supply voltage.
OUTPUT: Output signal.
MWP: Maximum working pressure.
CAL RNG: Specified calibration range.
NO.: Serial number and year of production *1.
TOKYO 180-8750 JAPAN:
The manufacturer name and the address *2.

*1: The first digit in the final three numbers of the serial number appearing after "NO." on the nameplate indicates the year of production. The following is an example of a serial number for a product that was produced in 2010:

91K819857 032
↑
The year 2010

*2: "180-8750" is a zip code which represents the following address.

2-9-32 Nakacho, Musashino-shi, Tokyo Japan

*3: The identification number of Notified Body.

2.8.4 IECEx Certification

Caution for IECEx Intrinsically safe type.

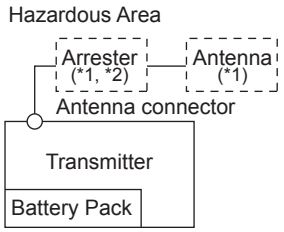
Note 1. Model EJX Series pressure transmitters with optional code /SS27 for potentially explosive atmospheres:

- No. IECEx KEM 10.0074X
- Applicable Standard: IEC 60079-0:2011, IEC 60079-11:2011, IEC 60079-26:2006
- Type of Protection and Marking code: Ex ia IIC T4 Ga
- Ambient Temperature: –50°C to 70°C
- Process Temperature (Tp.): 120°C max.
- Enclosure: IP66/IP67

Note 2. Installation

- Installation should be in accordance with local installation requirements. (Refer to the Control Drawing)

[Control Drawing]



*1: These apparatus are simple apparatus.
*2: Arrester may not be connected.

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Note 3. Maintenance and Repair

- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void IECEx Intrinsically safe Certification.

WARNING

The instrument modification or parts replacement by other than an authorized Representative of Yokogawa Electric Corporation is prohibited and will void the certification.

Note 4. Battery Pack

- Use only YOKOGAWA battery pack F9915MA or F9915NS.

Note 5. Special conditions for Safe Use

- In case the enclosure of the Pressure Transmitter is made of aluminum, if it is mounted in an area where the use of apparatus of equipment protection level Ga is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.
- For applications in explosive atmospheres caused by gases, vapors or mists and mounted in an area where the use of apparatus of equipment protection level Ga is required, electrostatic charges on the non-metallic parts of the Pressure Transmitter shall be avoided.

WARNING

- Potential electrostatic charging hazard - secure distance of 100mm from antenna.
- Take care not to generate mechanical sparking when access to the instrument and peripheral devices in a hazardous location.

2.9 EMC Conformity Standards

EN61326-1 Class A, Table 2 (For use in industrial locations), EN61326-2-3

CAUTION

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

2.10 Pressure Equipment Directive (PED) CE 0038

(1) General

- EJX Series pressure transmitters are categorized as pressure accessories under the vessel section of directive 2014/68/EU, which corresponds to Article 4, Paragraph 3 of PED, denoted as Sound Engineering Practice (SEP).
- EJX110B-☐MS, EJX110B-☐HS, EJX110B-☐VS, EJX510B-☐D, and EJX530B-☐D can be used above 200 bar and therefore considered as a part of a pressure retaining vessel where category III, Module H applies. These models with option code /PE3 conform to that category.

(2) Technical Data

- Models without /PE3
  Article 4, Paragraph 3 of PED, denoted as Sound Engineering Practice (SEP).
- Models with /PE3
  Module: H
  Type of Equipment: Pressure Accessory-Vessel
  Type of fluid: Liquid and Gas
  Group of fluid: 1 and 2

Model	Capsule code	PS (bar)*1	V(L)	PS·V (bar·L)	Category*2
EJX110B	F, L	160	0.01	1.6	Article 4, Paragraph 3 (SEP)
	M, H, V	250	0.01	2.5	
EJX110B with code /PE3	M, H, V	250	0.01	2.5	III
EJX310B	L, M, A, B	160	0.01	1.6	Article 4, Paragraph 3 (SEP)
EJX430B	H, A, B	160	0.01	1.6	Article 4, Paragraph 3 (SEP)
EJX510B	A, B, C	100	0.1	10	Article 4, Paragraph 3 (SEP)
	D	700	0.1	70	
EJX510B with code /PE3	D	700	0.1	70	III
EJX530B	A, B, C	100	0.1	10	Article 4, Paragraph 3 (SEP)
	D	700	0.1	70	
EJX530B with code /PE3	D	700	0.1	70	III

*1: PS is maximum allowable pressure for vessel itself.
*2: Referred to Table 1 covered by ANNEX II of EC Directive on Pressure Equipment Directive 2014/68/EU

(3) Operation

CAUTION

- The temperature and pressure of fluid should be maintained at levels that are consistent with normal operating conditions.
- The ambient temperature should be maintained at a level that is consistent with normal operating conditions.
- Please take care to prevent water hammer and the like from inducing excessive pressures in pipes and valves. If phenomena are likely, install a safety valve or take some other appropriate measure to prevent pressure from exceeding PS.
- Take appropriate measures at the device or system level to protect transmitters if they are to be operated near an external heat source.

2.11 Low Voltage Directive

Applicable standard:
EN61010-1, EN61010-2-030

(1) Pollution Degree 2

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

(2) Installation Category I (Anticipated transient overvoltage 330 V)

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

2.12 Regulatory Compliance for Radio and Telecommunication

Please confirm that a installation region fulfils a standards, require additional regulatory information and approvals, contact to Yokogawa Electric Corporation.

2.12.1 Radio and Telecommunications Terminal Equipment Directive (R&TTE) CE

We, Yokogawa Electric Corporation hereby declare that this equipment, model EJX-L series is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The CE declaration of conformity for R&TTE for this product can be found at http://www.yokogawa.com/fld/

2.12.2 FCC compliance

This equipment contains transmitter module FCC ID: SGJ-WFC001.
This device complies with Part 15 of FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of this device.

Co-located:

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

FCC WARNING:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

NOTE

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual,may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

2.12.3 Industry Canada (IC) compliance

This equipment contains transmitter module IC: 8999A-WIC001.

This Class A digital apparatus complies with Canadian ICES-003.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired, operation of the device.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter IC Number 8999A-WIC001 has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Antenna type:	Gain:
COLLINEAR	9 dBi, 50 Ω
Sleeve	2.14 dBi, 50 Ω

French:

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

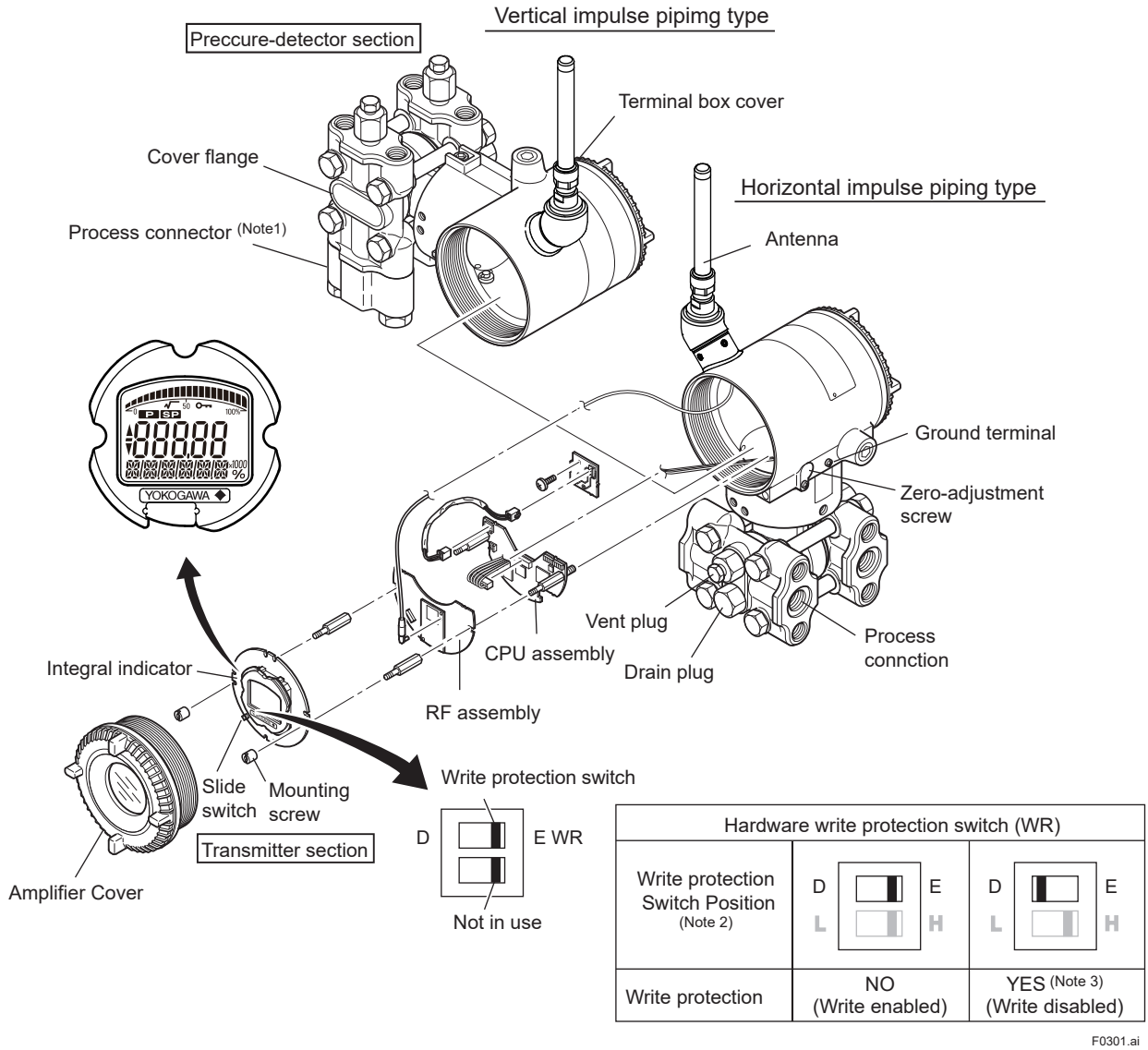
Le présent émetteur radio IC Number 8999A-WIC001 a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Antenne type:	Gain:
COLLINEAR	9 dBi, 50 Ω
Sleeve	2.14 dBi, 50 Ω

2.13 RoHS

Applicable standard: EN50581
(For the products delivered after July 1st, 2017)

3. Component Names



Hardware write protection switch (WR)		
Write protection Switch Position (Note 2)	D E L H	D E L H
Write protection	NO (Write enabled)	YES (Note 3) (Write disabled)

F0301.ai

Note 1: A process connector will not be applied for lower side of EJX430B and EJX310B.
Note 2: Set the switch as shown in the figure above to set the write protection. The hardware write protection switch is set to E side. Set to H side for the switch of not-in-use.
Note 3: When the switch is D side (write protection setting), provisioning is acceptable. For details of provisioning, refer to section 7.4 " Connecting to the Field Wireless Network ".

Figure 3.1 Component Names

Table 3.1 Display Symbol

Display Symbol	Meaning of Display Symbol
√	Display mode is 'square root'. (Display is not lit when 'linear' mode.)
▲	The output signal being zero-adjusted is increasing.
▼	The output signal being zero-adjusted is decreasing.
⚷	Write protect function is enabled.

4. Installation

4.1 Precautions

Before installing the transmitter, read the cautionary notes in section 2.4, “Selecting the Installation Location.” For additional information on the ambient conditions allowed at the installation location, refer to subsection 11.1 “Standard Specifications.”

NOTE

To connect this transmitter to the Field Wireless Network, information for connecting to the field wireless devices needs to be set beforehand. Refer to 7.4 “Connecting to the Field Wireless Network.”

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 EJX430B, the atmospheric opening is located on the low pressure side cover flange. Take care do not enter rain into the opening. The opening must not face upward. See section 11.4, “Dimensions,” for the location of the opening.

4.2 Mounting

- The transmitter is shipped with the process connection, according to the ordering specifications. To change the orientation of the process connections, refer to section 4.3.
- With differential pressure transmitters, the distance between the impulse piping connection ports is usually 54 mm (figure 4.1). By changing the orientation of the process connector, the dimension can be changed to 51 mm or 57 mm.
- The transmitter can be mounted on a nominal 50 mm (2-inch) pipe using the mounting bracket supplied, as shown in figure 4.2 and 4.3. 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 with a torque of approximately 39 N·m {4kgf·m}.

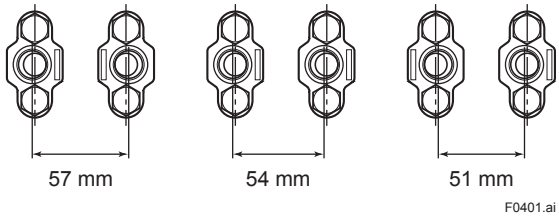


Figure 4.1 Process Connector Impulse Piping Connection Distances for Differential Pressure Transmitters

CAUTION

When the suffix code of the mounting bracket is “B,” make sure to put the spacer between the bracket and transmitter as shown in Figure 4.2.

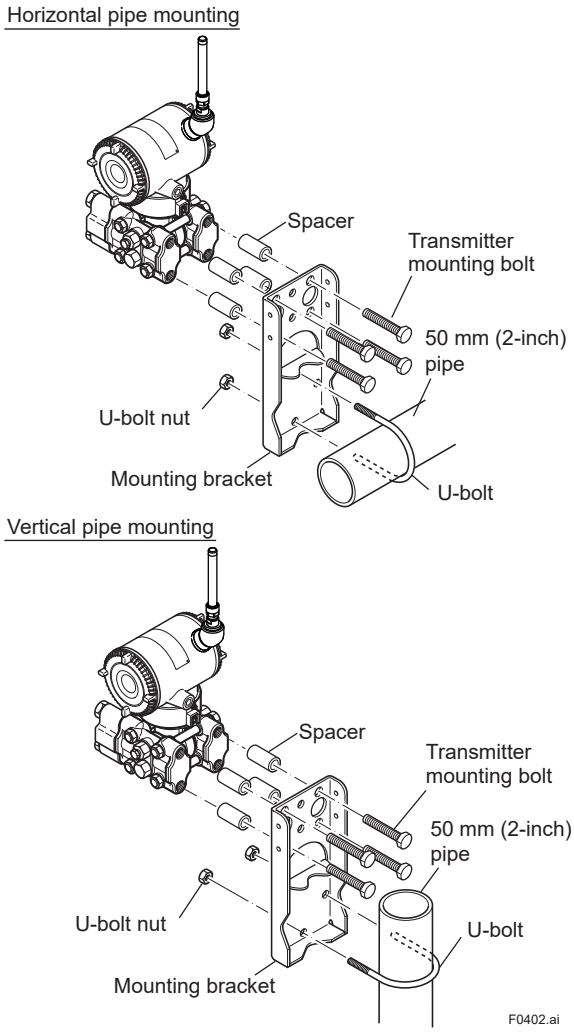
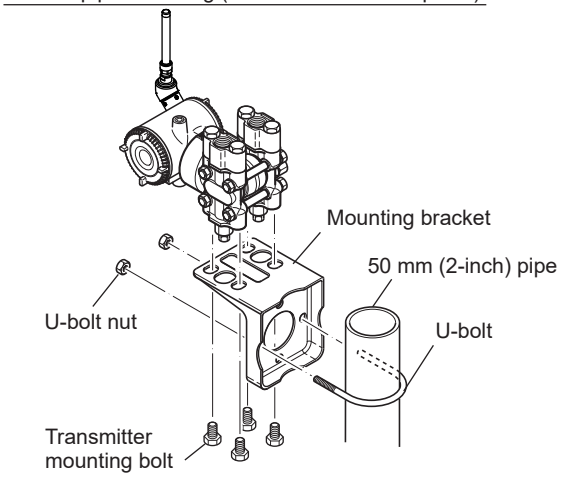
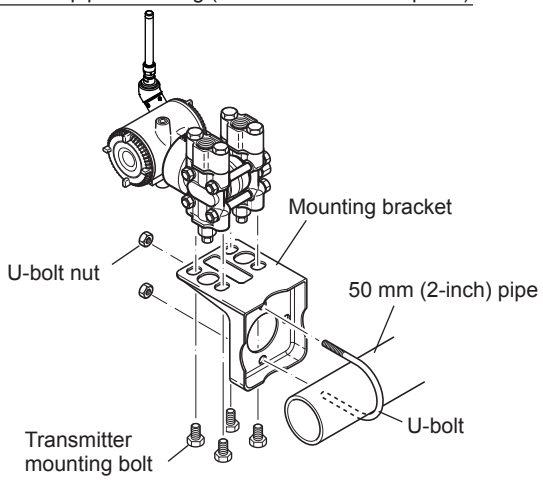


Figure 4.2 Transmitter Mounting (Horizontal Impulse Piping Type)

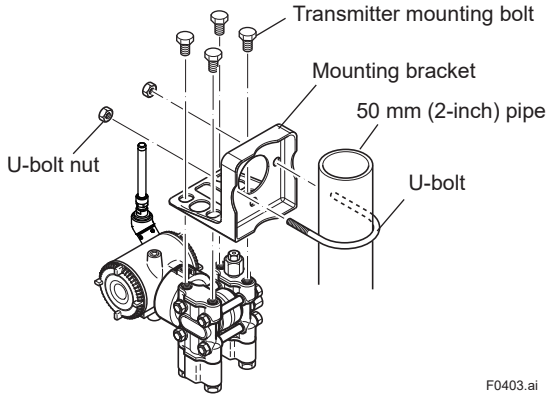
Vertical pipe mounting (Process connector upside)



Horizontal pipe mounting (Process connector upside)



Vertical pipe mounting (Process connector downside)



Horizontal pipe mounting (Process connector downside)

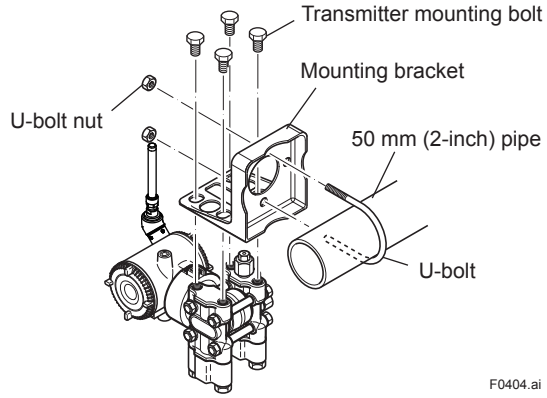


Figure 4.3 Transmitter Mounting (Vertical Impulse Piping Type)

4.3 Changing the Process Connection

The transmitter is shipped with the process connection specified at the time of ordering. To change the process connection, the drain (vent) plug must be repositioned.

To reposition a drain (vent) plug, refer to Figure 4.4 and use a wrench slowly and gently to unscrew it. Then, remove and remount it on the opposite side. Wrap sealing tape around the drain (vent) plug threads (*1 in the figure below), and apply a lubricant to the threads of the drain (vent) screw(s) (*2 below). To tighten the drain (vent) plugs, apply a torque of 34 to 39 N·m (3.5 to 4 kgf·m). Process connector bolts are to be tightened uniformly to a torque shown in table 4.1.

Table 4.1 Torque

Model	EJX110B EJX310B EJX430B
Torque(N·m) {kgf·m}	39 to 49 {4 to 5}

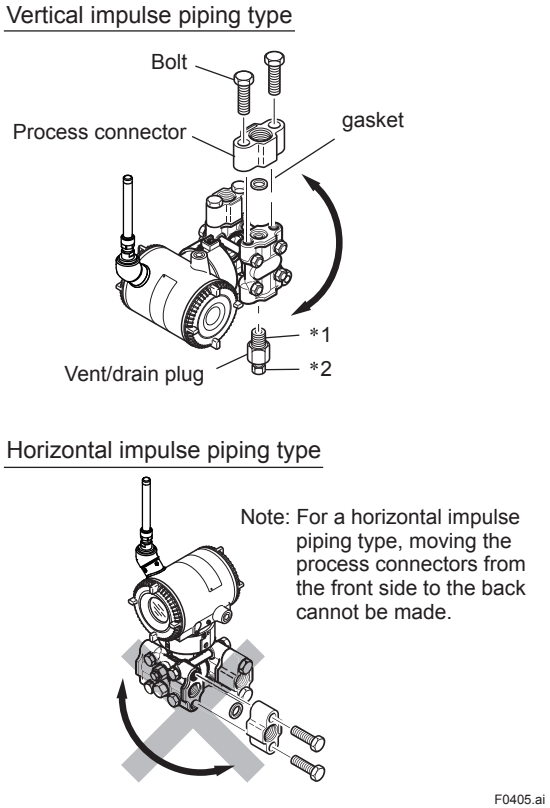


Figure 4.4 Changing Process Connection

4.4 Swapping the High/Low-pressure Side Connection

IMPORTANT

This section is applicable only for EJX110B differential transmitters, and not applicable for gauge or absolute pressure transmitters.

4.4.1 Rotating Pressure-detector Section 180°

This procedure can be applied only to a transmitter with a vertical impulse piping type.

The procedure below can be used to turn the pressure detector assembly 180°. Perform this operation in a maintenance shop with the necessary tools laid out and ready for use, and then install the transmitter in the field after making the change.

1) Use an Allen wrench (JIS B4648, nominal 2.5 mm) to remove the five setscrews at the joint between the pressure-detector section and transmitter section.
2) Leaving the transmitter section in position, rotate the pressure-detector section 180°.
3) Tighten the five setscrews to fix the pressure-detector section and transmitter section together (at a torque of 1.5 N·m).
   Reposition the process connector and drain (vent) plugs to the opposite side as described in subsection 4.3.

IMPORTANT

Do not rotate the transmitter section more than above limit.

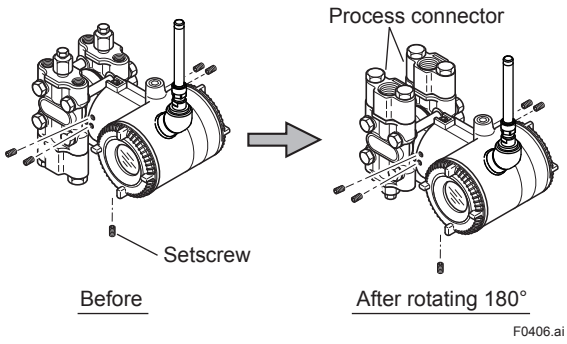


Figure 4.5 Before and After Modification

4.4.2 Using the Configuration Tool

This method is applicable only to the Model EJX110B.

With a configuration tool, you can change which process connection is used as the high-pressure side without mechanically rotating the pressure-detector section 180 as described in subsection 4.4.1. To change, call up the 'H/L_SWAP' parameter and select REVERSE (right side: low pressure; left side: high pressure) or select NORMAL to change back to normal (right side: high pressure; left side: low pressure).

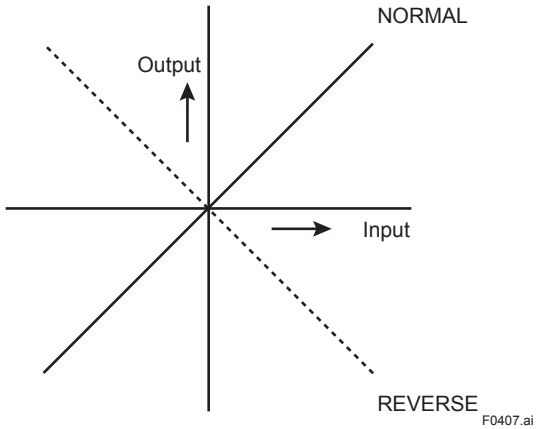


Figure 4.6 Input/Output Relationship

IMPORTANT

Since the H/L label plate on the capsule assembly will remain unchanged, use this function only when you cannot switch the impulse piping. If the 'H/L_SWAP' parameter setting is changed, the input/output relationship is reversed as shown in Figure 4.6; be sure this is understood by all. After reversing the setting, modify the H/L label plate to clearly indicate this change.

4.5 Rotating Transmitter Section

WARNING

Intrinsic safe type transmitters must be, as a rule, do not rotate transmitter section if it is powered. In case you need to rotate when the transmitter is powered, using gas detector and confirm no existence of explosive gas before rotating.

The transmitter section can be rotated approximately 360° (180° to either direction or 360° to one direction from the original position at shipment, depending on the configuration of the instrument.) It can be fixed at any angle within above range.

1) Remove the five setscrews that fasten the transmitter section and capsule assembly, using the Allen wrench.
2) Rotate the transmitter section slowly and stop it at designated position.
3) Tighten the five setscrews to a torque of 1.5 N·m.

IMPORTANT

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

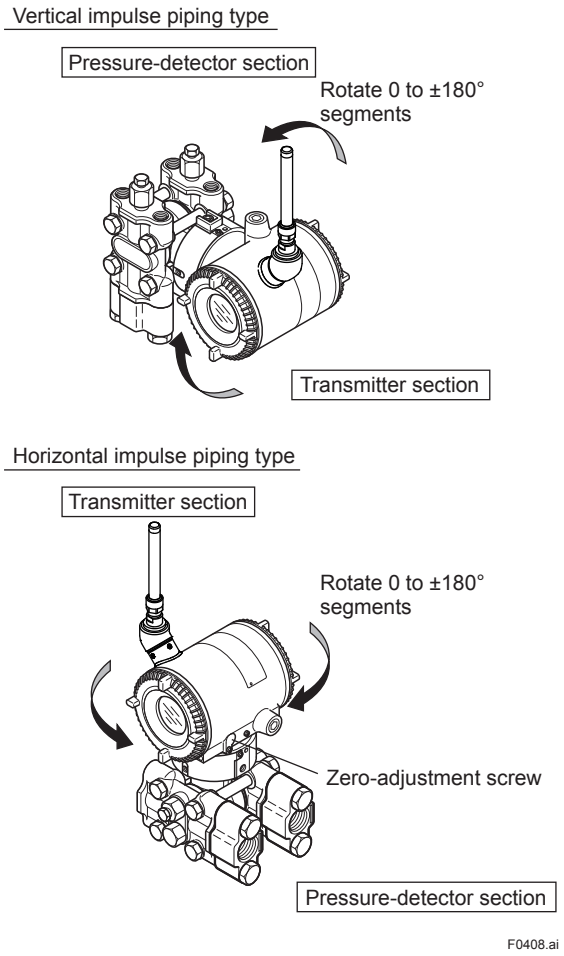


Figure 4.7 Rotating Transmitter Section (Left Side High Pressure Type)

4.6 Changing the Direction of Integral Indicator

WARNING

Intrinsic safe type transmitters must be, as a rule, remove a battery pack in non-hazardous area before open/close the Amplifier Cover or disassembling and reassembling the Integral Indicator.

An integral indicator can be rotated in four positions at 90°. Follow the instructions in section 9.4.1 for removing and attaching the integral indicator.

4.7 Changing the direction of the antenna

Adjust the direction of the antenna to be in the upright position. Figure4.8 shows factory setup antenna position. If the transmitter is installed to vertical impulse piping, follow the procedure below and change the antenna position.

1) Loosen the two mounting screws at the bottom of the antenna by using a 2.5 mm Allen wrench (see Figure 4.8).
   The screws might come off and be lost if loosened too much; loosen the screws by about three rotations.
2) Press forward and down 90 degrees by rotating the axis at the bottom of the antenna.
3) Tighten the two screws to a torque of 1.5 N·m by using a torque wrench. When doing this, be careful not leave a gap between the antenna and housing.

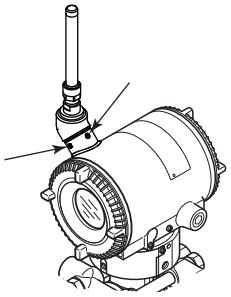


Figure 4.8 Mounting Screw Position

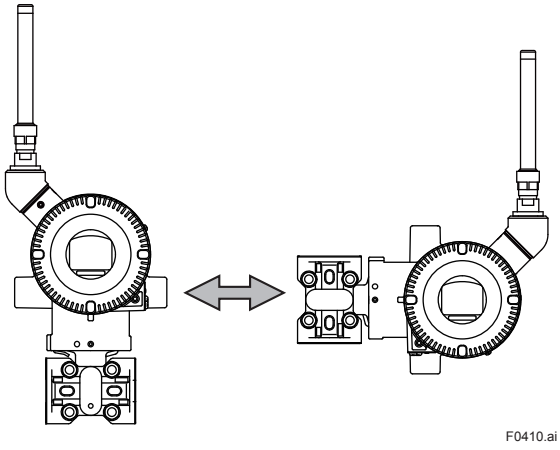


Figure 4.9 Adjusting Antenna Position

5. Installing Impulse Piping

5.1 Impulse Piping Installation Precautions

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 for 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.

5.1.1 Connecting Impulse Piping to a Transmitter

(1) Check the High and Low Pressure Connections on the Transmitter (Figure 5.1)

Symbols “H” and “L” have been placed on the capsule assembly to indicate high and low pressure side. With differential pressure transmitters, connect the high pressure side impulse line to the “H” side, and the low pressure side impulse line to the “L” side.

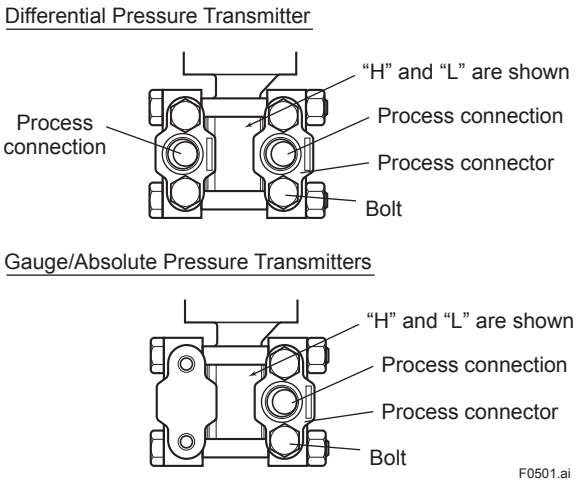


Figure 5.1 “H” and “L” Symbols on a Capsule Assembly

(2) Changing the Process Connector Piping Connections (Figure 4.1) (for differential pressure transmitters)

The impulse piping connection distances can be changed between 51 mm, 54 mm and 57 mm by changing the orientation of the process connectors. This is convenient for aligning an impulse line with a process connectors.

(3) Tightening the Process Connector Mounting Bolts

After connecting an impulse line, tighten the process connector mounting bolts uniformly. (Apply a torque of 39~49N·m {4~5kgf·m})

(4) Removing the Impulse Piping Connecting Port Dustproof Cap

The impulse piping and a 3-valve manifold connecting port on the transmitter is 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.)

(5) Connecting the Transmitter and 3-Valve Manifold (for differential pressure transmitters)

A 3-valve manifold consists of two stop valves to block process pressure and an equalizing valve to equalize the pressures on the high and low pressure sides of the transmitter. Such a manifold makes it easier to disconnect the transmitter from the impulse piping, and is convenient when adjusting the transmitter zero point.

There are two 3-valve manifold types: the pipe-mounting type and the direct-mounting type; care should be taken with respect to the following points when connecting the manifold to the transmitter.

■ Pipe-Mounting Type 3-Valve Manifold (Figure 5.2)

1) Screw nipples into the connection ports on the transmitter side of the 3-valve manifold, and into the impulse piping connecting ports on the process connectors. (To maintain proper sealing, wind sealing tape around the nipple threads.)
2) Mount the 3-valve manifold on the 50 mm (2-inch) pipe by fastening a U-bolt to its mounting bracket. Tighten the U-bolt nuts only lightly at this time.
3) Install the pipe assemblies between the 3-valve manifold and the process connectors and lightly tighten the ball head lock nuts. (The ball-shaped ends of the pipes must be handled carefully, since they will not seal properly if the ball surface is scratched or otherwise damaged.)
4) Now tighten the nuts and bolts securely in the following sequence:
   Process connector bolts → transmitter-end ball head lock nuts → 3-valve manifold ball head lock nuts → 3-valve manifold mounting bracket U-bolt nuts

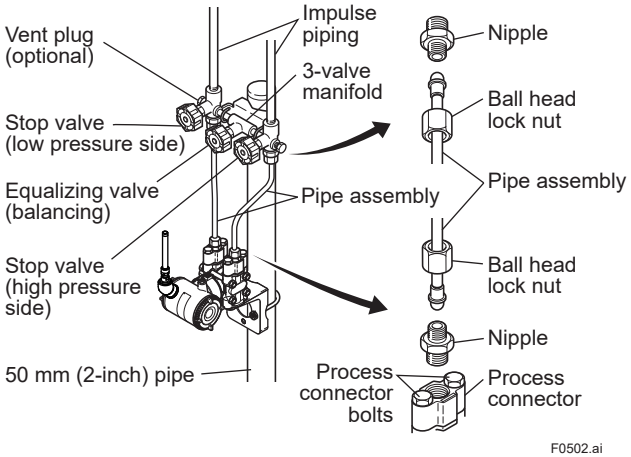


Figure 5.2 3-Valve Manifold (Pipe-Mounting Type)

■ Direct-Mounting Type 3-Valve Manifold (Figure 5.3)

1) Mount the 3-valve manifold on the transmitter. (When mounting, use the two gaskets and the four bolts provided with the 3-valve manifold. Tighten the bolts evenly.)
2) Mount the process connectors and gaskets on the top of the 3-valve manifold (the side on which the impulse piping will be connected).

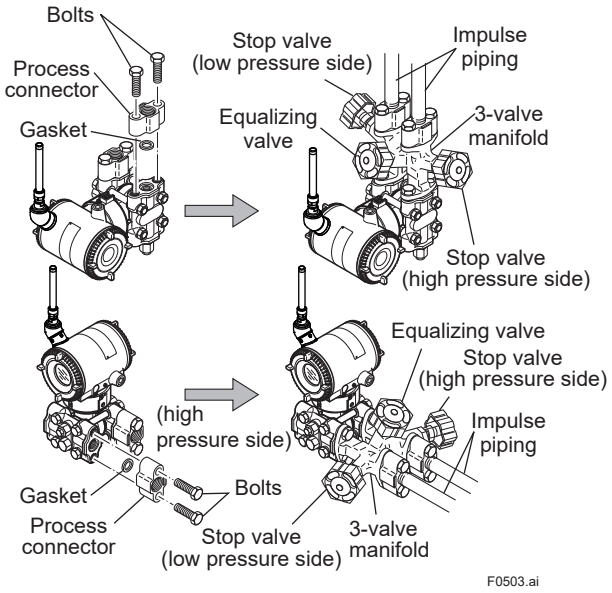


Figure 5.3 3-Valve Manifold (Direct-Mounting Type)

NOTE

After completing the connection of the transmitter and 3-valve manifold, be sure to CLOSE the low pressure and high pressure stop valves, OPEN the equalizing valve, and leave the manifold with the equalizing valve OPEN.
You must do this in order to avoid overloading the transmitter from either the high or the low pressure side when beginning operation.
This instruction must also be followed as part of the startup procedure (chapter 7.)

5.1.2 Routing the Impulse Piping

(1) Process Pressure Tap Angles

If condensate, gas, sediment or other extraneous material in the process piping gets into the impulse piping, pressure measurement errors may result. To prevent such problems, the process pressure taps must be angled as shown in figure 5.4 according to the kind of fluid being measured.

NOTE

- If the process fluid is a gas, the taps must be vertical or within 45° either side of vertical.
- If the process fluid is a liquid, the taps must be horizontal or below horizontal, but not more than 45° below horizontal.
- If the process fluid is steam or other condensing vapor, the taps must be horizontal or above horizontal, but not more than 45° above horizontal.

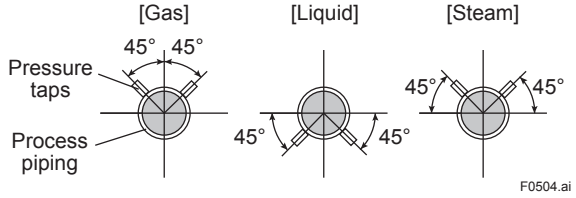


Figure 5.4 Process Pressure Tap Angle (For Horizontal Piping)

(2) Position of Process Pressure Taps and Transmitter

If condensate (or gas) accumulates in the impulse piping, it should be removed periodically by opening the drain (or vent) plugs. However, this will generate a transient disturbance in the pressure measurement, and therefore it is necessary to position the taps and route the impulse piping so that any extraneous liquid or gas generated in the leadlines returns naturally to the process piping.

- If the process fluid is a gas, then as a rule the transmitter must be located higher than the process pressure taps.
- If the process fluid is a liquid or steam, then as a rule the transmitter must be located lower than the process pressure taps.

(3) 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.

(4) Temperature Difference Between Impulse Lines (for differential pressure transmitters)

If there is a temperature difference between the high and low impulse lines, the density difference of the fluids in the two lines will cause an error in the measurement pressure. When measuring flow, impulse lines must be routed together so that there is no temperature difference between them.

(5) Condensate Pots for Steam Flow Measurement (for differential pressure transmitters)

If the liquid in the impulse piping repeatedly condenses or vaporizes as a result of changes in the ambient or process temperature, this will cause a difference in the fluid head between the high pressure and low pressure sides. To prevent measurement errors due to these head differences, condensate pots are used when measuring steam flow.

(6) Preventing Wind Speed Effects in Very Low Differential Pressure Measurement (for differential pressure transmitters)

IMPORTANT

When using a differential pressure transmitter to measure very low pressures (draft pressure), the low pressure connection port is left open to atmospheric pressure (the reference pressure). Any wind around the differential pressure transmitter will therefore cause errors in the measurement. To prevent this, it will be necessary either to enclose the transmitter in a box, or to connect an impulse line to the low pressure side and insert its end into a wind-excluding pot (cylindrical with a base plate).

(7) 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.

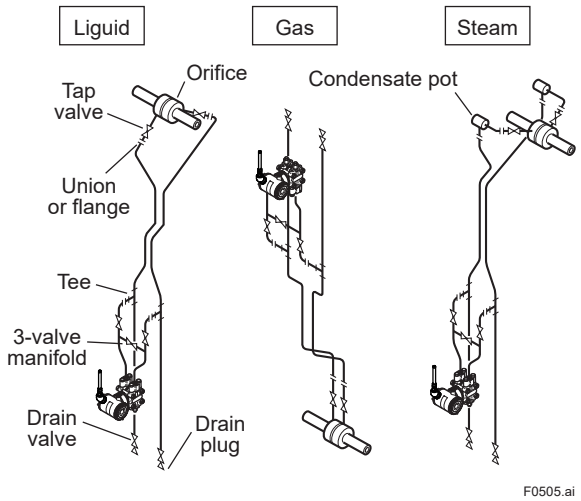


Figure 5.5 Impulse Piping Connection Examples for Differential Pressure Transmitters

5.2 Impulse Piping Connection Examples

Figure 5.5 and 5.6 show 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.), in order to make appropriate changes and additions to the connection configurations.

Note the following points when referring to these piping examples.

- The high pressure connecting port on the transmitter is shown on the right (as viewed from the front).
- The transmitter impulse piping connection is shown for a vertical impulse piping connection configuration in which the direction of connection is either upwards or downwards.
- If the impulse line is long, bracing or supports should be provided to prevent vibration.
- The impulse piping material used must be compatible with the process pressure, temperature, and other conditions.
- A variety of process pressure tap valves (main valves) are available according to the type of connection (flanged, screwed, welded), construction (globe, gate, or ball valve), temperature and pressure. Select the type of valve most appropriate for the application.

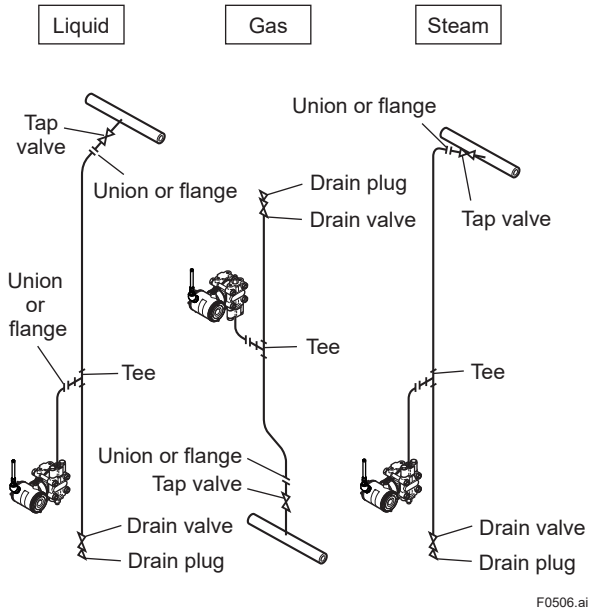


Figure 5.6 Impulse Piping Connection Examples for Gauge/absolute Pressure Transmitters

6. Wiring

6.1 Mounting Antenna and Wiring

An antenna is not attached to the transmitter. The following provides the instructions for mounting the antenna and installing the remote antenna and wiring using antenna extension cable.

IMPORTANT

The antenna connector is covered with a cap at the time of delivery. Keep the cap attached until the installation of the antenna or antenna cables to protect the inside connection part. The unscrewed cap should be stored in order to replace it immediately after the antenna or antenna cables are removed.

CAUTION

To maintain the ultimate conditions of radio-frequency signal, protect the connectors of antenna, extension antenna cable, and arrester from the corrosive atmosphere by the following treatment.

1. Clean the connection to be protected.
2. Wind the butyl rubber self-bonding tape around the connection. See the manual of the tape about the winding.
3. To protect the butyl rubber self-bonding tape from the environment such as ultraviolet rays and so on, wind vinyl tape (or a vinyl type self-bonding tape) on it.

6.1.1 Mounting the antenna

Screw the provided antenna into the antenna connector of the transmitter. The antenna may be sold as available accessories and supplied separately.

1. Unscrew the antenna connector cap on the antenna connector.
2. Screw the provided antenna into the antenna connector. Tighten the antenna connector with a torque of 2 to 3 N·m.

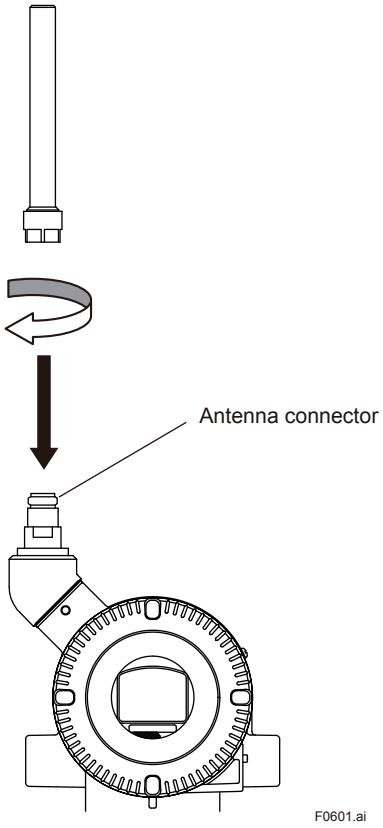


Figure 6.1 Mounting the antenna

CAUTION

When installing the antenna, screw the antenna by tightening the lower nut part. Screwing the antenna by holding the antenna body may cause failure such as cable disconnection. The same manner should be taken when unscrewing the antenna.

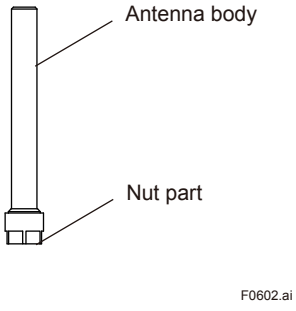


Figure 6.2 Antenna

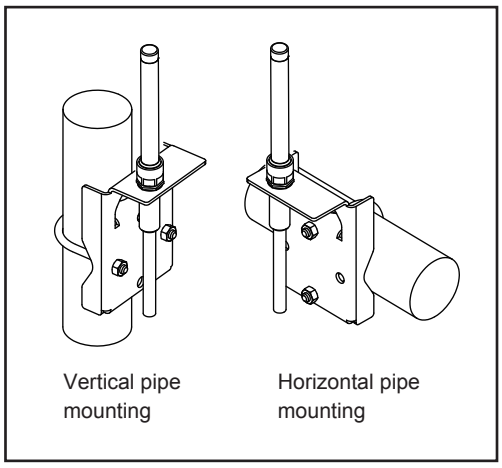
6.1.2 Mounting External Antenna and Wiring Antenna Extension Cable

6.1.2.1 Mounting of External Antenna

Mount the external antenna at the proper location according to the wireless environment described in 2.4 Selecting the Installation Location. The mounting to the pipe such as 50 mm (2-inch) pipe needs to secure the enough strength to endure a strong wind, vibration and so on. The antenna must be mounted vertically.

■ **Fixing of External Antenna**

Fix an external antenna appropriately using the bracket provided as the external antenna option to 50 mm (2-inch) pipe.



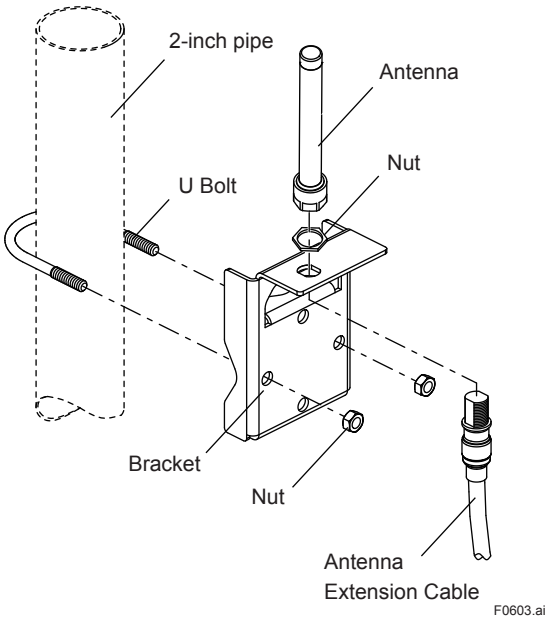


Figure 6.3 Fixing the remote antenna

■ **Mounting Procedure of External Antenna**

1. Fix the bracket by U-bolt and nut to 50 mm (2-inch) pipe.
2. Fix the antenna extension cable to the bracket 1 using the provided nut with a torque of 6 to 7 N·m as shown in the Figure 6.3 above. Use the nut which is attached to the antenna extension cable.
3. Screw the antenna into the antenna connector of the antenna extension cable on the bracket 1.
   Tighten the antenna connector with a torque of 2 to 3 N·m.
4. Protect the connection as necessary. For details of the protection, see “6.1 Mounting Antenna and Wiring.”

6.1.2.2 Wiring of Antenna Extension Cable

1. Use the provided antenna extension cable to connect the antenna connector with the external antenna. Tighten the connector of the antenna extension cable with a torque of 2 to 3 N·m. The minimum bending radius while checking the wiring position should be more than 200 mm.
2. When using two extension cables, the provided arrester should be inserted between these cables.
3. Before the wiring work, confirm the polarities (male/female) of the connectors of antenna, extension antenna cable, and arrester. Tighten the connector of the antenna extension cable with a torque of 2 to 3 N·m.
4. Protect the connectors of antenna, extension antenna cable, and arrester as necessary. See “6.1 Mounting Antenna and Wiring.”
5. Fix the extension antenna cable to the appropriate structure to protect the cable from the vibration, wind, and so on. The minimum bending radius for fixing in the state maintained for a long period should be more than 80 mm.

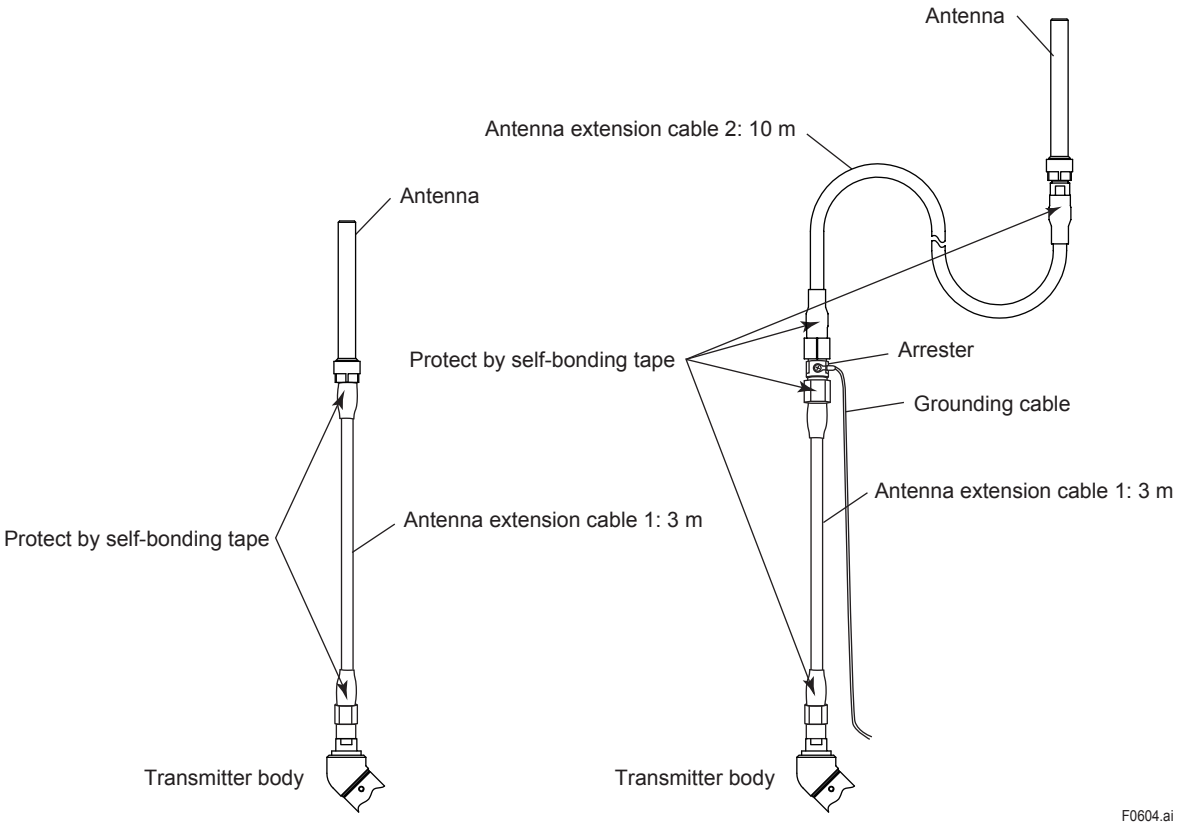


Figure 6.4 Wiring the antenna extension cable

CAUTION

Use the dedicated antenna extension cable provided by Yokogawa as accessories for the transmitters.

6.1.2.3 Mounting of Arrester and Wiring

Mount an arrester between the extension cables and connect the grounding cable to the grounding terminal of the arrester as required.

Connect the grounding cable to the grounding terminal on the transmitter body. Class C grounding with the grounding resistance of 10 Ω or less is necessary. Do not share the ground with other devices.

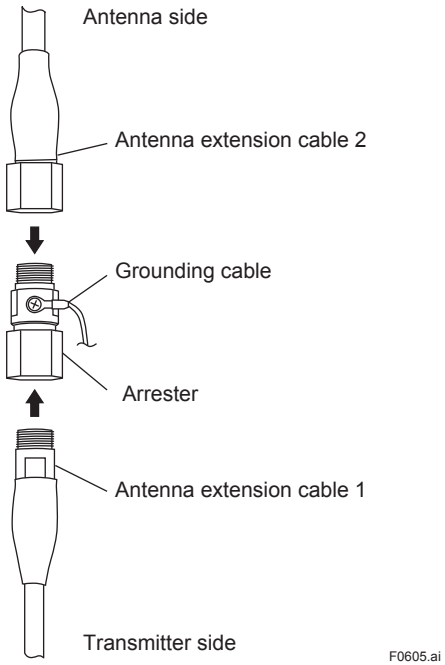


Figure 6.5 Connection of the arrester and antenna extension cable

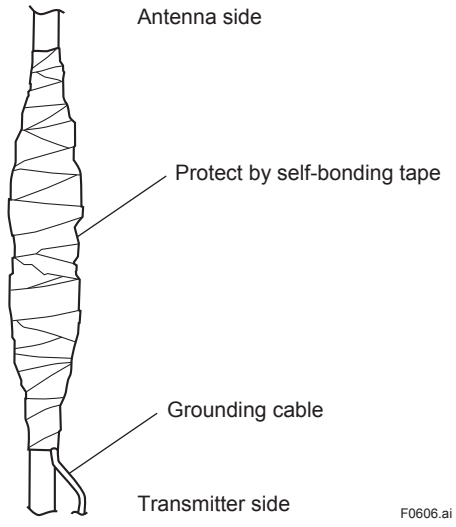


Figure 6.6 Arrester protection by self-bonding tape

6.2 Grounding

When using the antenna extension cable with an arrestor, Class C grounding with the grounding resistance of 10 Ω is required. Always ground the transmitter case in accordance with national and local electrical codes. The most effective transmitter case grounding method is a direct connection to earth ground with minimal impedance.

CAUTION

Grounding is required for safe operation.

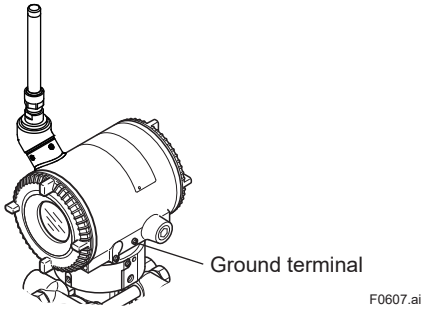


Figure 6.7 Ground Terminal

7. Operation

7.1 Preparation for Starting Operation

This section describes the operation procedure for the EJX110B as shown in figure 7.1 (vertical impulse piping type, high-pressure connection: right side) when measuring the liquid flow rate, and EJX430B as shown in figure 7.2 when measuring pressure.

NOTE

It is required to set security and network information to enable the transmitter to be connected to the Field Wireless Network. For more details, refer to section 7.4 “Connecting to the Field Wireless Network”.

NOTE

Check that the process pressure tap valves, drain valves, and 3-valve manifold stop valves on both the low pressure and high pressure sides are closed, and that the 3-valve manifold equalizing valve is opened.

(a) Follow the procedures below to introduce process pressure into the impulse piping and transmitter.

■ **Differential Pressure Transmitters**

1) Open the low pressure and high pressure tap valves to fill the impulse piping with process liquid.
2) Slowly open the high pressure stop valve to fill the transmitter pressure-detector section with process liquid.
3) Close the high pressure stop valve.
4) Gradually open the low pressure stop valve and completely fill the transmitter pressure-detector section with process liquid.
5) Close the low pressure stop valve.
6) Gradually open the high pressure stop valve. At this time, equal pressure is applied to the low and high pressure sides of the transmitter.
7) Check that there are no liquid leaks in the impulse piping, 3-valve manifold, transmitter, or other components.

■ **Gauge/Absolute Pressure Transmitters**

1) Open the tap valve (main valve) to fill the impulse piping with process fluid.
2) Gradually open the stop valve to introduce process fluid into the transmitter pressure-detector section.
3) Confirm that there is no pressure leak in the impulse piping, transmitter, or other components.

(b) Venting Gas from the Transmitter Pressure-detector Section

Since the piping in the example of figure 7.1 is constructed to be self-venting, no venting operation is required. If it is not possible to make the piping self-venting, refer to subsection 7.5 for instructions. Leave the equalizing valve open even after venting gas.

(c) Insert batteries into the battery case, and install to the transmitter. To insert batteries into the battery case, be careful to polarity of batteries and battery case. For details of Installation of battery, refer to section 9.4.6 and 9.4.7.
Battery case is installed in the transmitter when shipped from the factory, however, batteries are sold separately and not included.

(d) Using the device configuration tool, confirm that the transmitter is operating properly. Check parameter values or change the setpoints as necessary.
Integral Indicator’s indication can be used to confirm that the transmitter is operating properly. For details on how to confirm, refer to subsection 8.4 “Self-Diagnostics.”
ISA100 devices display self-diagnostic information in an easy-to-understand manner using four categories (Check function, Maintenance required, Failure, and Off-specification) according to NAMUR NE107*.

* NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”

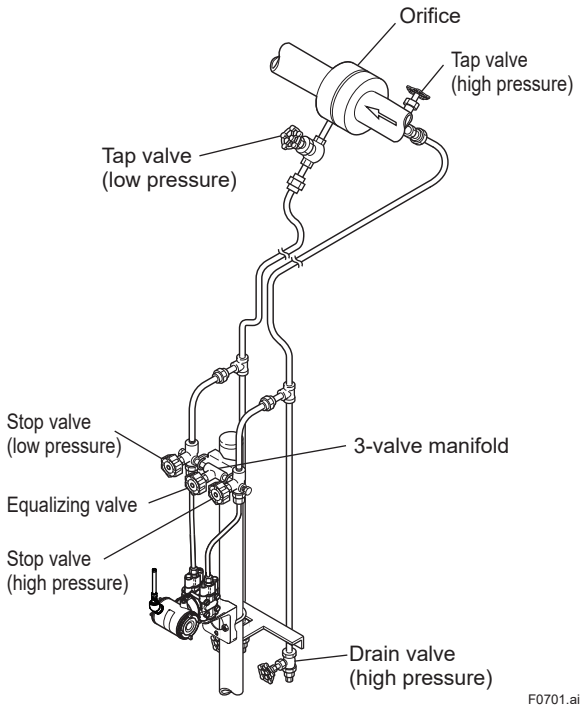


Figure 7.1 Liquid Flow Measurement

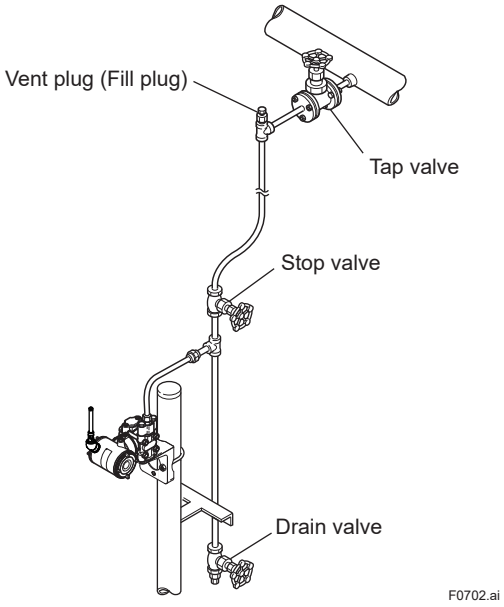


Figure 7.2 Liquid Pressure Measurement

■ **Confirm that transmitter is operating properly by integral indicator.**

If the transmitter is faulty, an error code is displayed.

Self-diagnostic error on integral indicator
(Faulity transmitter)

F0703.ai

Figure 7.3 Integral Indicator with Error Code

NOTE

If any of the above errors are indicated on the display of the integral indicator or the device configuration tool, refer to subsection 9.5.3 for the corrective action.

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

The parameters related to the following items are minimum required to be set for operation, and set at factory as specified in order. Confirm or change the parameters if needed.

- Measurement range(measurement lower/upper limit, unit)
- Output (Non linearization mode / Sq root mode)

7.2 Zero Point Adjustment

After completing preparations for operating the transmitter, adjust the zero point. There are two zero point adjusting ways.

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.

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

■ **Using the transmitter's zero-adjustment screw**

Before adjusting zero point, make sure followings.

- The External zero trim parameter (External Zero Trim) is "Trim on". For details, refer to section 8 "Setting Parameters".
- 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.

■ **Using the Device Configuration Tool**

Refer to subsection 8.3.14 "Zero Point Adjustment and Span Adjustment".

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

Adjust the transmitter output value matches to the actual measured value obtained by precise pressure measurement equipment.

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

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

■ **Using the transmitter's zero-adjustment screw**

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

■ **Using the Device Configuration Tool**

Refer to subsection 8.3.14 "Zero Point Adjustment and Span Adjustment".

7.3 Starting Operation

After completing the zero point adjustment, follow the procedures below to start operation. Steps 1) and 2) are specific to the differential pressure transmitters.

1) Close the equalizing valve.
2) Gradually open the low pressure stop valve. This places the transmitter in an operational condition.
3) After confirming the operating status, perform the following.

IMPORTANT

- Close the terminal box cover and the amplifier cover. Screw each cover in tightly until it will not turn further.
- Tighten the zero-adjustment cover mounting screw to secure the cover.

7.4 Connecting to the Field Wireless Network

■ **Preparation work prior to connecting to a Field Wireless Network**

This transmitter does not need to be connected with a physical wire. Instead of physical wiring, it is necessary to set the field wireless devices to communicate with before installing the transmitter. This procedure is called a provisioning.
This transmitter supports provisioning via infrared communication using a provisioning device and can be securely connected to a network. If the provisioning information is not set, the transmitter cannot be connected to the field wireless network.

Provisioning:

Provisioning is work to set the security and network information to enable the transmitter to be connected to the field wireless network. This transmitter supports a provisioning method using infrared communication.

For details on provisioning using a provisioning device, and procedure for connecting the transmitter to the Field Wireless Network, refer to the User's Manual, FieldMate Versatile Device Management Wizard (IM 01R01A01-01E) and YFGW410 Field Wireless Management Station (IM 01W02D01-01EN).

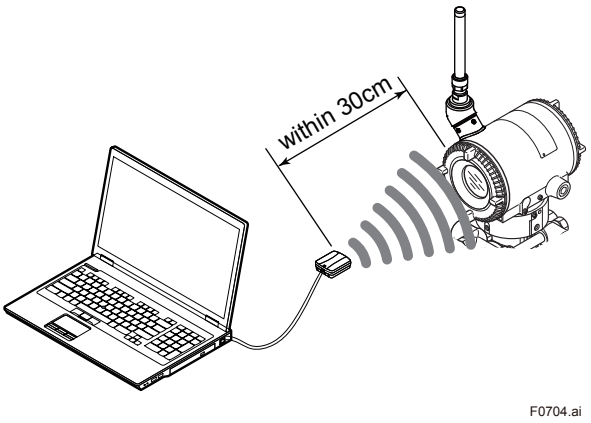


Figure 7.4 Provisioning Example

■ Provisioning work

This subsection describes provisioning work using FieldMate as the provisioning device.
Provisioning work performs provisioning for each field wireless device using FieldMate and an infrared adapter. If Yokogawa - recommended infrared device is used for provisioning, distance between the transmitter glass window and the infrared device should be within 30cm. For details of Yokogawa - recommended infrared device, refer to subsection 9.2 “Calibration Instruments Selection”.
Perform the following provisioning tasks.

- Setting provisioning information
- Creating a provisioning information file

1) Setting provisioning information
Set the device tag and network ID using a FieldMate provisioning function. The device tag, network ID, and join key are set in the Field Wireless Device. It is not necessary to input a join key because FieldMate automatically generates it.

Setting device tag
The device tag is used for the user to recognize the Field Wireless Device.

Setting network ID
This is the network ID for the field wireless network to which the field wireless device is connected. Set a value from 2 to 65535.
The field wireless device is connected to the field wireless network corresponding to the network ID set by provisioning work.

2) Creating a provisioning information file
The following provisioned information is stored in the provisioning information file.

- Network ID
- Device tag
- EUI64
- Join key
- Provisioner (name of the user who performed provisioning work by FieldMate)
- Date (Time and date when provisioning was performed by FieldMate)
This provisioning information file is required to load from the Field Wireless Configurator to the Field Wireless Integrated Gateway. Store the file carefully.

■ Connecting to a field wireless network

The action after installing the battery pack varies depending on the silence setting.
Mounting the battery pack automatically starts a search for the field wireless network. When the Field Wireless Integrated Gateway is found, the instrument enters the join status.
When the field wireless gateway is not found and a specified time based on the silence mode has elapsed, a cycle of a one-hour pause and six-minutes search is repeated until the instrument can join the field wireless network.
For details on the procedure to switch to silence mode, refer to subsection 8.3.17 “Switching to Silence Mode.”

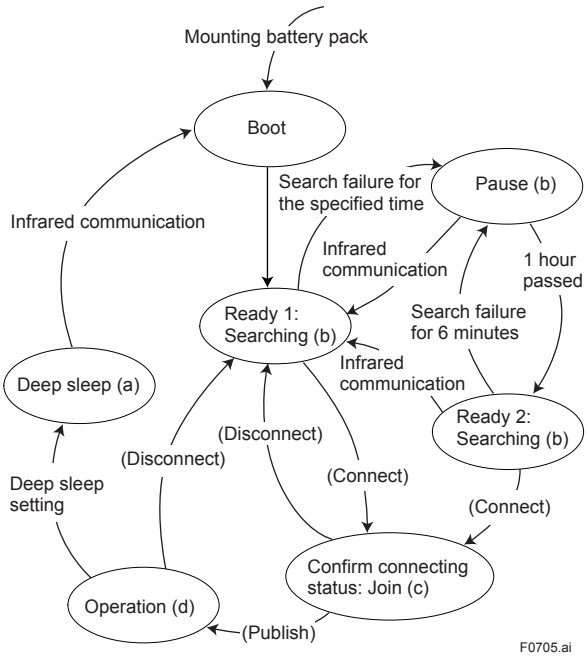
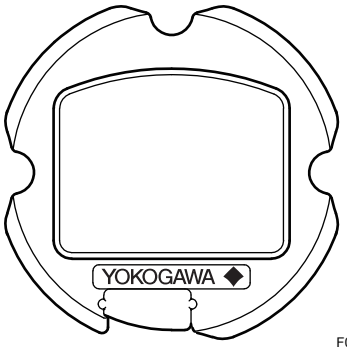


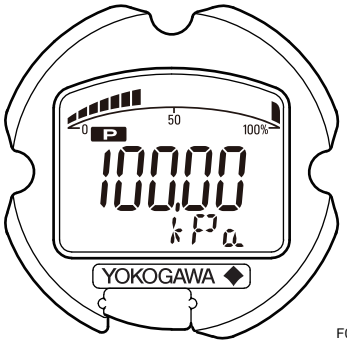
Figure 7.5 Wireless Connection Process

(a) Deep sleep



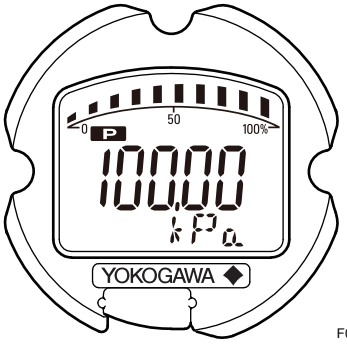
F0706.ai

(b) Ready and pause



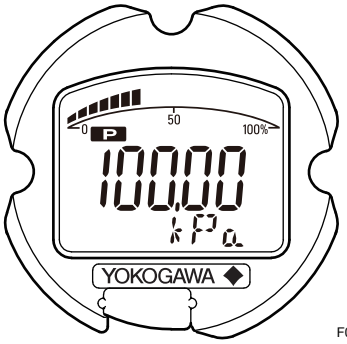
F0707.ai

(c) Confirm connecting status



F0708.ai

(d) Join



F0709.ai

NOTE

If the transmitter searches the Field Wireless Network for long time at low ambient temperature condition, sometimes error “AL.70 LOWBAT” is displayed on the Integral Indicator. Even though using new batteries, it can occur. It occurs because of battery characteristics. After joining to the Field Wireless Network, this error will be cleared within one hour if battery has no failure.

7.5 Shutting Down the Transmitter

Shut down the transmitter as follows.

1) Remove the battery pack or set the transmitter to deep sleep mode by the Device Configuration Tool.
2) Close the low pressure stop valve.
3) Open the equalizing valve.
4) Close the high pressure stop valve.
5) Close the high pressure and low pressure tap valves.

NOTE

- Whenever shutting down the transmitter for a long period, remove any process fluid that is in the impulse piping and in the transmitter pressure-detector section.
- The equalizing valve must be left OPEN.
- Refer to subsection 9.4.6 “Replacing the Battery Pack” for the battery pack removing.
- When storing the instrument with a battery pack inserted, it is recommended to put the instrument into deep sleep mode to conserve battery power. For details on how to switch to deep sleep mode, refer to subsection 8.3.16 “Switching to the Deep Sleep Mode.”

7.6 Venting or Draining Transmitter Pressure-detector Section

Since this transmitter is designed to be self-draining and self-venting with vertical impulse piping connections, neither draining nor venting will be required if the impulse piping is configured appropriately for self-draining or self-venting operation.

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.) After venting or draining, fasten the drain (vent) screw on the transmitter.

IMPORTANT

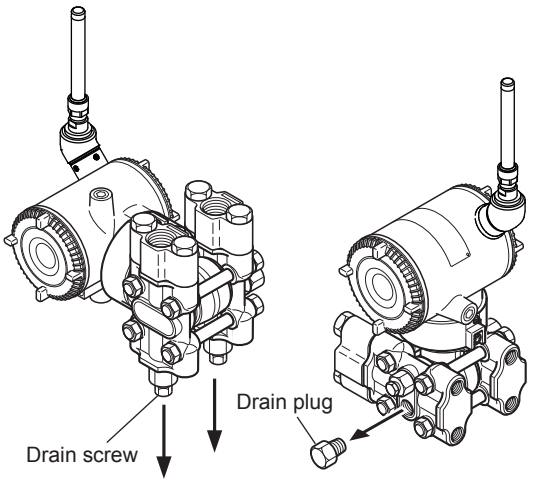
Draining condensate or bleeding off gas disturbs the pressure measurement, this should not be done when the loop is in operation.

7.6.1 Draining Condensate

1) Gradually open the drain screw or drain plug and drain the transmitter pressure-detector section. (See figure 7.7.)
2) When all accumulated liquid is completely removed, close the drain screw or drain plug.
3) Tighten the drain screw to a torque of 10 N·m, and the drain plug to a torque of 34 to 39 N·m.

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.



When you loosen the drain screw or drain plug, the accumulated liquid will be expelled in the direction of the arrow.

F0710.ai

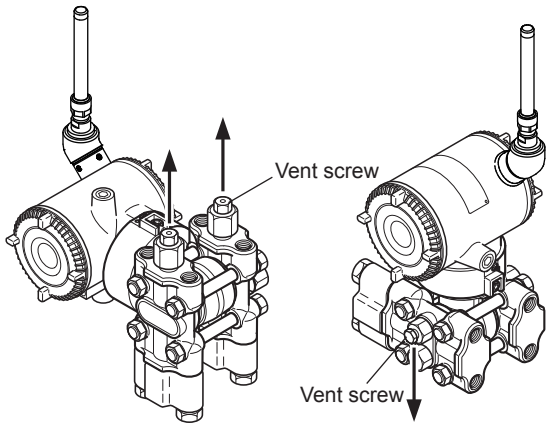
Figure 7.6 Draining the Transmitter

7.6.2 Venting Gas

1) Gradually open the vent screw to vent gas from the transmitter pressure-detector section. (See figure 7.8.)
2) When the transmitter is completely vented, close the vent screw.
3) Tighten the vent screw to a torque of 10 N·m.

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.



When you loosen the vent screw, the gas escpes in the direction of the arrow.

F0711.ai

Figure 7.7 Venting the Transmitter

8. Setting Parameters

This transmitter can remotely handle range changes, Tag No. setup, monitoring of self-diagnostic results, and Zero Point Adjustment, etc. according to communication with the field wireless configuration tool or the device configuration tool.

8.1 Environment for parameter setting

After installing the battery pack, perform provisioning and have the transmitter join the field wireless network.
This transmitter supports the OOB (out-of-band) method using the infrared communication as a provisioning method.
Refer to Subsection 7.4 “Connecting to the Field Wireless Network” for details of the provisioning.

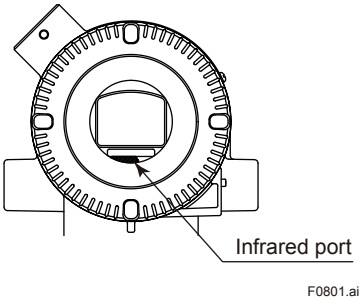


Figure 8.1 Infrared port of the transmitter

8.2 Preparing Software

8.2.1 Softwares for the Field Wireless Configuration Tool and the Device Configuration Tool

Before using the device configuration tool, confirm that CF/DD and DeviceDTM for your transmitter (wireless EJX) are installed in the device configuration tool.
Refer to the following website for the latest information on CF/DD and DeviceDTM.
<http://www.yokogawa.com/>

CF (Capabilities File)/DD (Device Description)

A CF file contains information, such as the vendor of the field device, its model and revision, available types of process data (flow rate, temperature, pressure, etc.), and number of data items. A DD file contains the information on parameters, such as data structures and attributes.

DeviceDTM

DeviceDTM (Device Type Manager) is driver software for field devices provided based on the FDT (Field Device Tool) technology.

The field wireless configuration tool or the device configuration tool allows confirming the device information.
Refer to Subsection 9.2 “Calibration Instruments Selection” for the field wireless configuration tool or the device configuration tool of our recommendation.

8.2.2 Software Download

Software download function permits to update wireless field device software via ISA100.11a wireless communication. For details, refer to YFGW410 Field Wireless Management Station (IM 01W02D01-01EN).

8.3 Setting Parameters

8.3.1 Parameter Usage and Selection

Before setting a parameter, please see the following table for a summary of how and when each parameter is used.

IMPORTANT

After setting and sending data with the field wireless configuration tool or the device configuration tool, wait 30 seconds before turning off the transmitter. If it is turned off too soon, the settings will not be stored in the transmitter.

Table 8.1 Parameter Usage and Selection

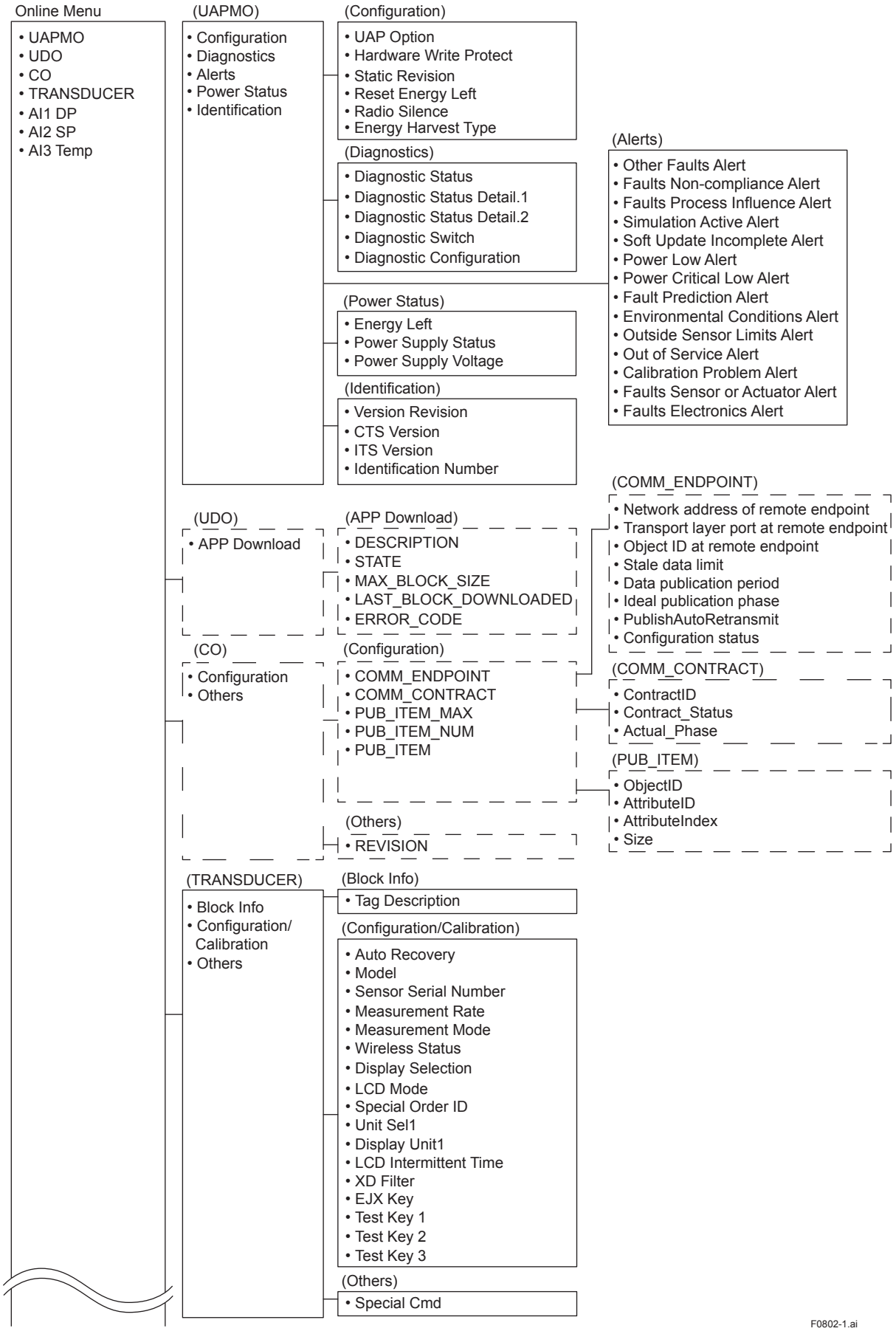
Item	Description
Tag No	Sets the tag No. as Device Tag (Software Tag). Sixteen characters (alphanumeric characters, including - and •) can be set.
Output	The process variable and the diagnostic result can be output. Either or all of differential pressure/pressure (AI1:Process Value), static pressure (AI2:Process Value), temperature(AI3:Process Value) of capsule or amplifier and self-diagnostic information (UAPMO:Diagnostic Status) can be set to the output
Range	Adjust the range corresponding for 0% to 100%. The unit of the range, input value at 0% (LRV) and input value at 100% (URV) is set. Note: LRV and URV can be set within the range of -32000 to 32000.
Damping time constant	Damping time constant is used to reduce the large fluctuation of pressure signal and given by each Process Value Filter Time parameter for differential Pressure/pressure (AI1) and Static pressure (AI2).
Output signal and integral indicator mode	Sets mode for output signal and integral indicator to “linear mode” (proportional to input differential pressure) or to “Square root mode” (proportional to flow).
Output signal low cut mode	Used mainly to stabilize output near 0 if output signal is the square root mode. Two modes are available: forcing output to 0% for input below a specific value, or changing to proportional output for input below a specific value.
Integral indicator range of scale and unit	Sets one of differential pressure/pressure value, static pressure value, or temperature value for the integral indicator scale. Note: LRV and URV can be set within the range of -32000 to 32000.
Unit for displayed temperature	Sets a temperature unit to be displayed.
Unit for displayed static pressure	Sets a pressure unit for the static pressure to be displayed
Direction of impulse piping connection (which is high pressure, L side or R side)	Used where installation conditions makes it imperative to connect high pressure side impulse line to low pressure side of transmitter. Normally, correspond by replacing impulse line, and use this function only when unavoidable.
Range with actual input applied	Range corresponding for 0% to 100% signal is set with actual input applied. The output setting can be done just 100% to user’s reference pressure output. However, when shipping it, the calibration is done in high accuracy as for DPharp. Please do the span setting by a usual range setting.
Zero Point Adjustment and Span Adjustment	Handle Zero Point Adjustment and Span Adjustment. There are two methods of Zero Point Adjustment, using external zero-adjustment screw and using the device configuration tool.
Reset adjustment	The amount of the adjustment set by user can be cleared.
Software write protect	Prohibit writing the setting data.
Operational mode	Set the operational mode of the sensor and integral indicator, etc.

Note: Some of the parameter settings are in the dialogue form called method, the on-line instructions you can configure the parameters easily.

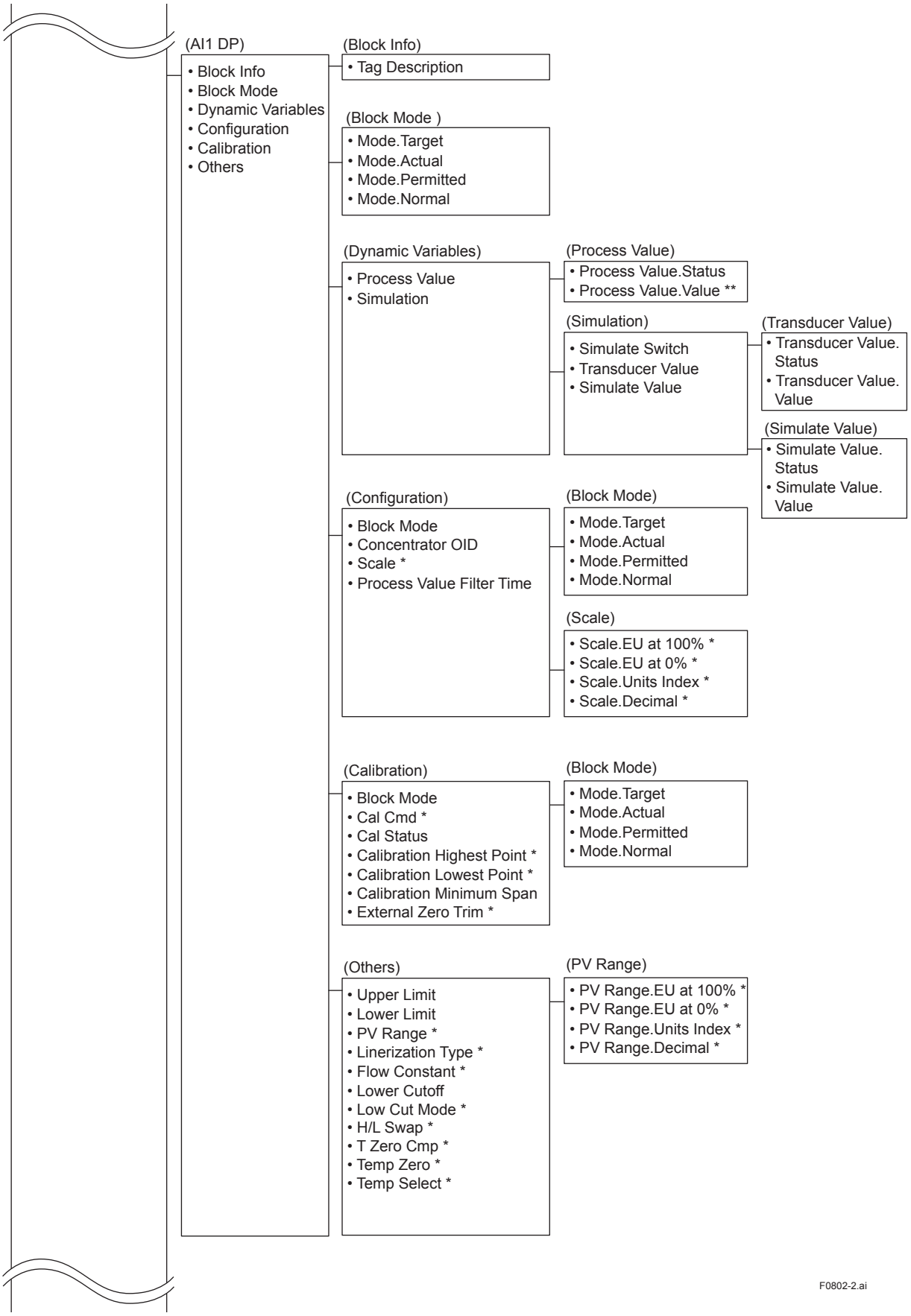
8.3.2 Function Block and Menu Tree

(1) Function Block

The function of this transmitter is shown below. A specific function might not be able to be used according to the field wireless configuration tool used. When the field wireless configuration tool of our recommendation is used, the software attached to the Field Wireless Integrated Gateway is necessary for setting the dotted line part. Refer to Subsection 9.2 “Calibration Instruments Selection” for the field wireless configuration tool of our recommendation.


Online Menu
• UAPMO
• UDO
• CO
• TRANSDUCER
• AI1 DP
• AI2 SP
• AI3 Temp
(UAPMO)
• Configuration
• Diagnostics
• Alerts
• Power Status
• Identification
(Configuration)
• UAP Option
• Hardware Write Protect
• Static Revision
• Reset Energy Left
• Radio Silence
• Energy Harvest Type
(Diagnostics)
• Diagnostic Status
• Diagnostic Status Detail.1
• Diagnostic Status Detail.2
• Diagnostic Switch
• Diagnostic Configuration
(Alerts)
• Other Faults Alert
• Faults Non-compliance Alert
• Faults Process Influence Alert
• Simulation Active Alert
• Soft Update Incomplete Alert
• Power Low Alert
• Power Critical Low Alert
• Fault Prediction Alert
• Environmental Conditions Alert
• Outside Sensor Limits Alert
• Out of Service Alert
• Calibration Problem Alert
• Faults Sensor or Actuator Alert
• Faults Electronics Alert
(Power Status)
• Energy Left
• Power Supply Status
• Power Supply Voltage
(Identification)
• Version Revision
• CTS Version
• ITS Version
• Identification Number
(UDO)
• APP Download
(APP Download)
• DESCRIPTION
• STATE
• MAX_BLOCK_SIZE
• LAST_BLOCK_DOWNLOADED
• ERROR_CODE
(COMM_ENDPOINT)
• Network address of remote endpoint
• Transport layer port at remote endpoint
• Object ID at remote endpoint
• Stale data limit
• Data publication period
• Ideal publication phase
• PublishAutoRetransmit
• Configuration status
(CO)
• Configuration
• Others
(Configuration)
• COMM_ENDPOINT
• COMM_CONTRACT
• PUB_ITEM_MAX
• PUB_ITEM_NUM
• PUB_ITEM
(COMM_CONTRACT)
• ContractID
• Contract_Status
• Actual_Phase
(PUB_ITEM)
• ObjectID
• AttributeID
• AttributeIndex
• Size
(Others)
• REVISION
(TRANSDUCER)
• Block Info
• Configuration/ Calibration
• Others
(Block Info)
• Tag Description
(Configuration/Calibration)
• Auto Recovery
• Model
• Sensor Serial Number
• Measurement Rate
• Measurement Mode
• Wireless Status
• Display Selection
• LCD Mode
• Special Order ID
• Unit Sel1
• Display Unit1
• LCD Intermittent Time
• XD Filter
• EJX Key
• Test Key 1
• Test Key 2
• Test Key 3
(Others)
• Special Cmd
F0802-1.ai

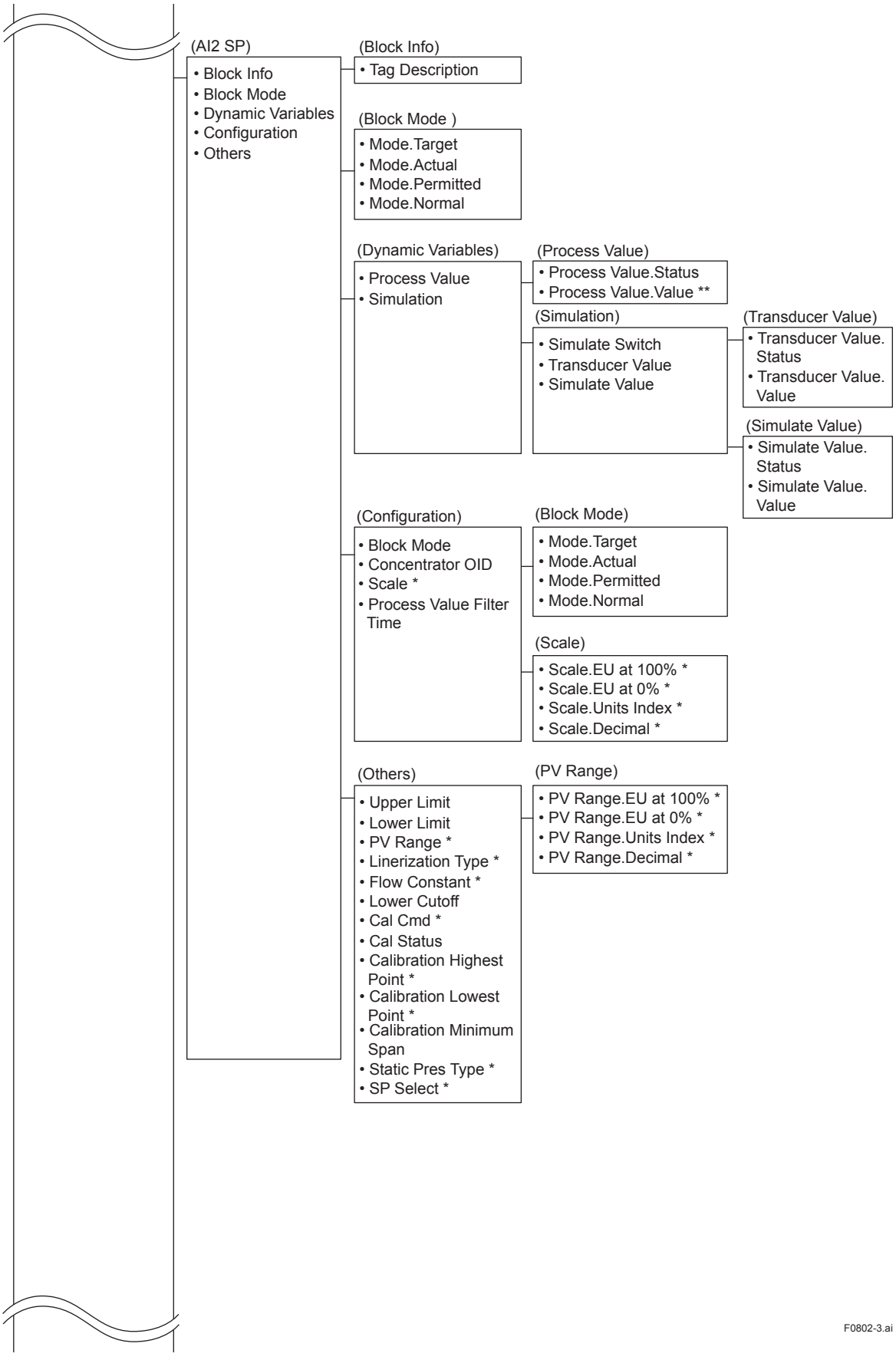
Online Menu (continued)



F0802-2.ai

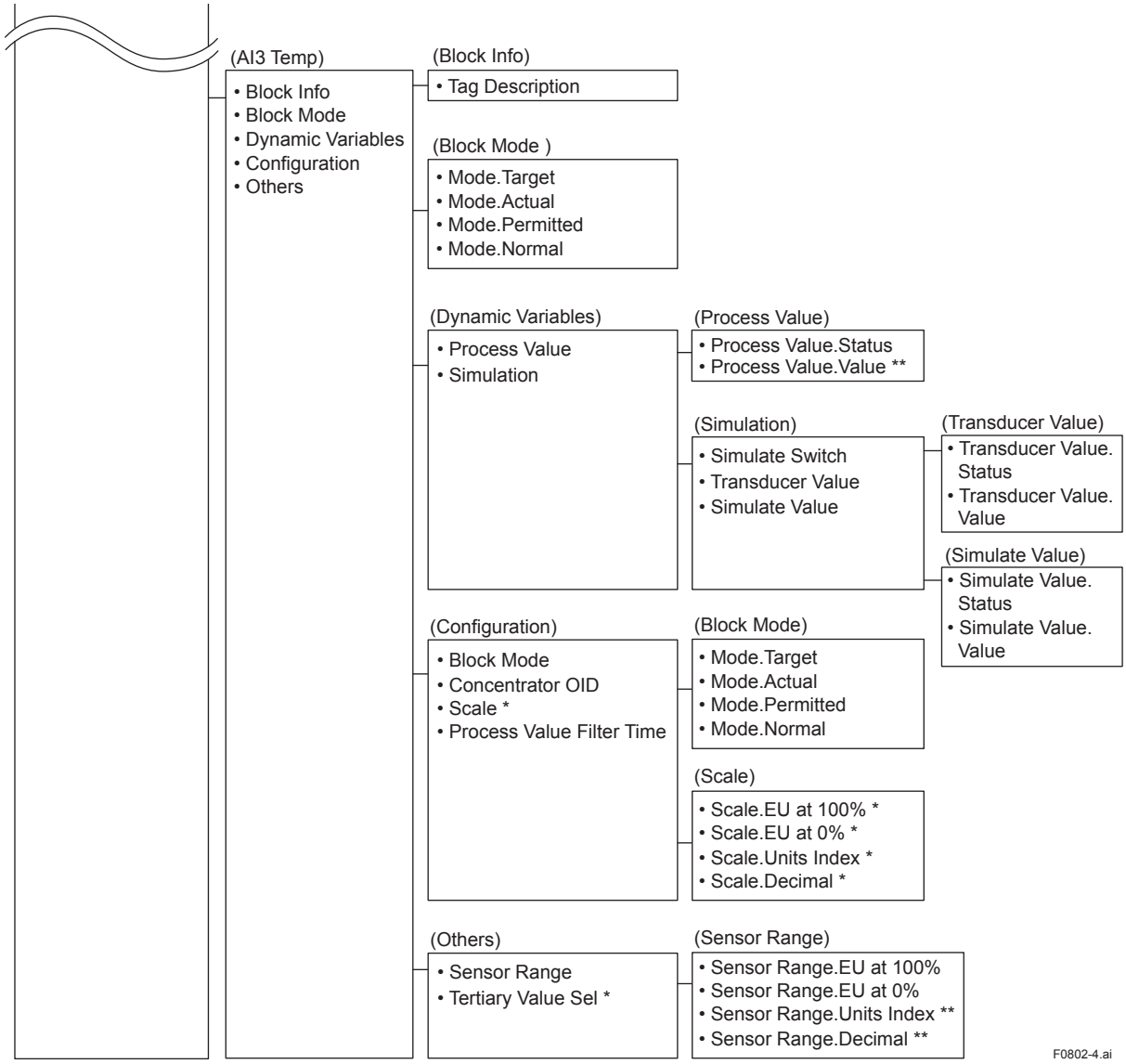
*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
**: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to Manual.

Online Menu (continued)



*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
**: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to Manual.

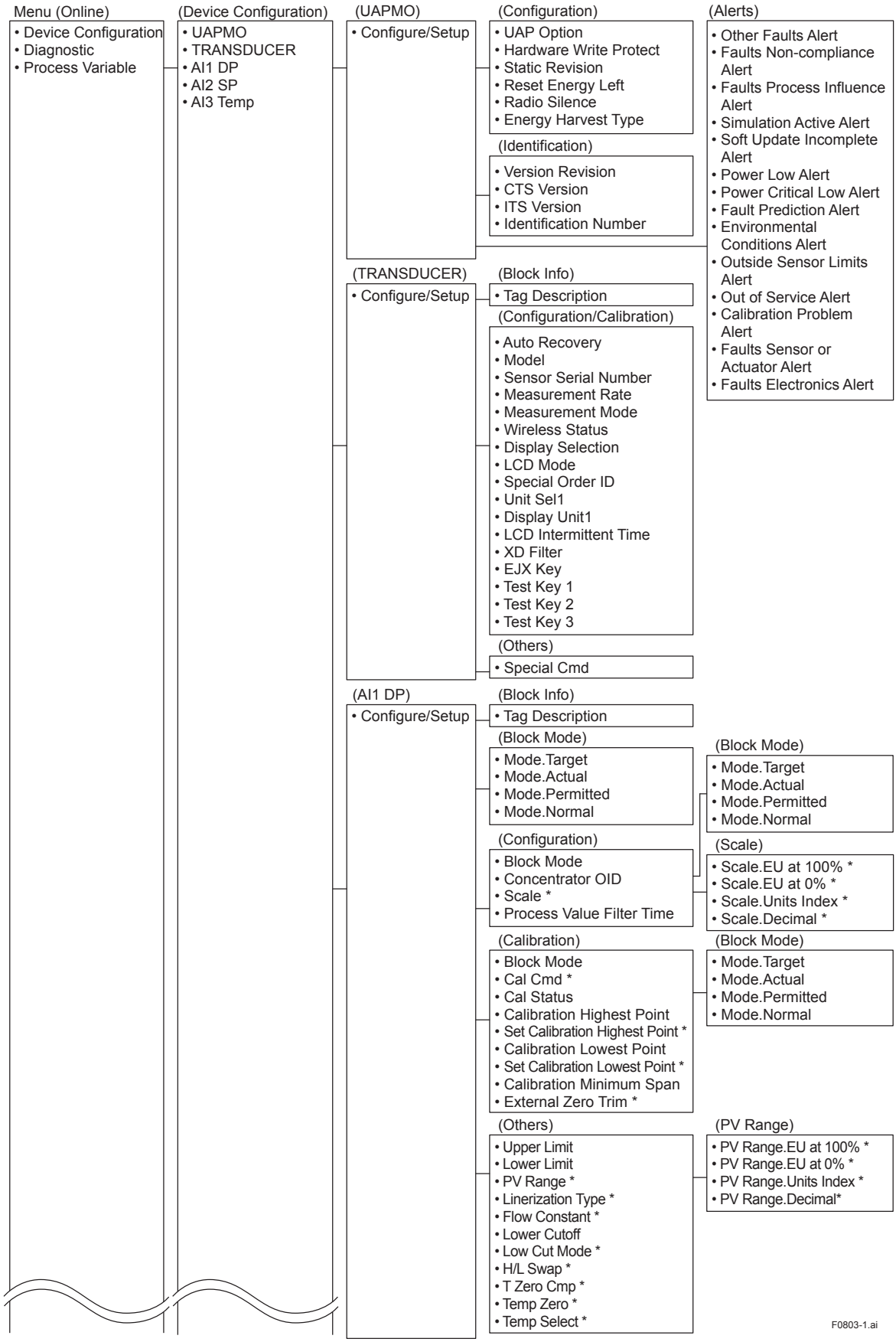
Online Menu (continued)



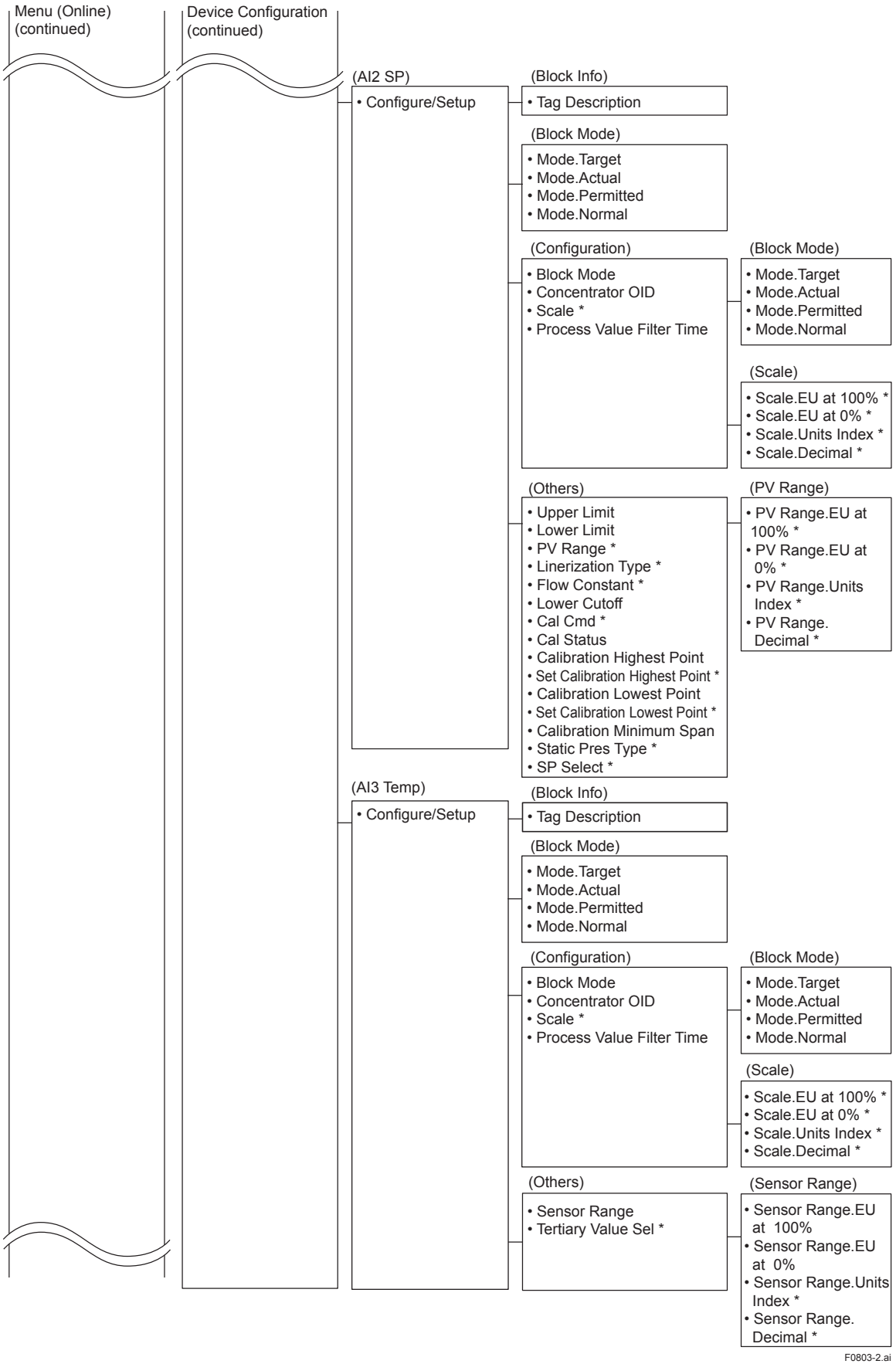
*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).
**: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to Manual.

(2) Menu Tree

The menu tree of the device configuration tool of our recommendation is shown below. Refer to Subsection 9.2 “Calibration Instruments Selection” for the device configuration tool of our recommendation.

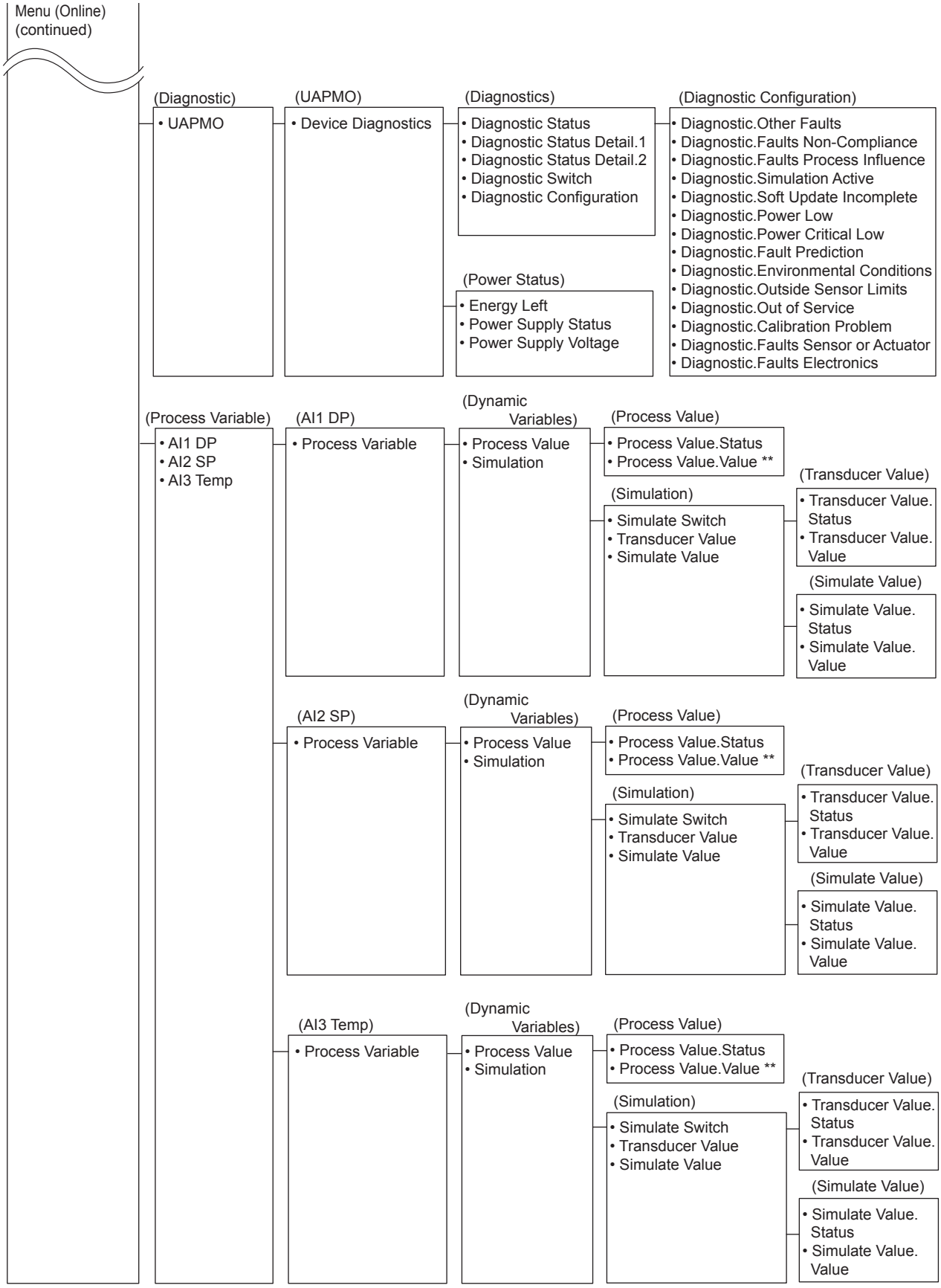


*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).



F0803-2.ai

*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).



F0803-3.ai

*: When the data of these parameters is rewritten, it is necessary to set the operational mode of the block to O/S (Out of Service).

8.3.3 Parameters for Wireless Communication

(1) Network Information

Concentrator object block: Configuration

Allows confirming the network information.

(2) Update Time

CO block: Data publication period

Sets the update time value to 0.5 to 3,600 seconds. The setting affects the battery life.
When update time is set 0 seconds, the transmitter is stopped to update process variables by way of the field wireless network. And the transmitter continues to measure process variables with special interval time internally.

(3) Measurement Mode

TRANSDUCER block: Measurement Mode

The setting affects the battery life; it becomes shorter in the continuous mode.
When the update period is set to 1 second or less in intermittent mode, the mode is continuous mode, regardless of the measurement mode and the display.

(4) Measurement Rate

TRANSDUCER block: Measurement Rate

Reads the measurement rate value from 0.5 to 3600 seconds. The shorter the measurement period, the shorter the battery life.

(5) Remaining battery life

UAPMO block: Energy Left

The number of days of remaining battery life is indicated assuming that a transmitter has been working under ambient temperature condition as 23 degrees Celsius. It takes several days for the indicated value to be stabiilzed after the power on and initialization of the remaining battery life.

UAPMO block: Reset Energy Left

When changing batteries, the remaining battery life is initialized by Reset Energy Left parameter.

(6) LCD display

The following steps describe how to set LCD display.

1. On/Off of display
   When “Enable” in LCD Mode is selected, the LCD displays a set of screens to be shown and turns off for the specified time based on LCD Intermittent Time, and the display keeps the cycle repeatedly. Not selecting this parameter turns the LCD off.
2. On/Off of continuous display mode
   When “Enable” is set to LCD Mode and zero is set to LCD Intermittent Time, the LCD displays continuously.
3. On/Off of bar graph
   Select “LCD Bargraph ON” in LCD Mode when the bar graph is required.

When the wireless connection process is in the status of “ready,” “pause,” or “join,” the LCD display stays on regardless of the status in LCD Mode.

NOTE

When the device detects AL01 and AL02, the LCD display stays on regardless of the status in LCD mode. See Table 9.3 and 9.4 Error Message Summary for details.

8.3.4 Tag and Device Information

If these are specified when ordering, the designated Tag No. and device information are set and shipped. Tag No. and device information can be checked as follows.

- Procedure to call up the tag No. and device information
  - Device Tag (Software Tag)
    This is specified when writing characters (up to 16 characters) of amplifiers TAG that differ from characters specified in Tag No.
    Refer to section 7.4 “Connection to the Field Wireless Network” for confirmation.
  - Tag Description
    This is a universal parameter to store the comment that describes the content of the tag located in the TRANSDUCER and AI blocks.
    The AI1, AI2, and AI3 blocks of the AI blocks correspond to the differential pressure/ pressure, static pressure, and temperature, respectively.

- When changing the device information, input the information based on the following limitation on the number of characters.
  - Message function (up to 32 characters)
    TRANSDUCER block: Tag Description
    AI1-AI3 block: Tag Description

8.3.5 Unit

The unit parameter is set at the factory before shipment if specified at the time of order. Follow the procedure below to change the unit parameter.

- Procedure to call up the Unit display (Units Index)
  AI1 - AI3 block: SCALE: Units Index

  To change the Unit display, choose desired unit among the list of displayed unit selecting AI1 block as for the differential pressure/pressure, AI2 as for the static pressure and AI3 block as for temperature in the AI blocks.

8.3.6 Range Change

The range values are factory-set as specified by the customer. To change the range, follow the steps below.

The measurement span is determined by the upper and lower range values. In this method, the upper and lower range values can be set independently, and the span changes according to the range limit values sent to the transmitter.

- Procedure to call up the PV Range display.
  AI1, AI2 block: PV Range

  Select the AI1 block for the differential pressure/ pressure and the AI2 block for the static pressure, then select “EU at 0%” and “EU at 100%” displayed in the PV Range parameters, and input the lower range and upper range values for the range, respectively.

8.3.7 Output Mode

The output mode of the output signal can be set as No Linearization or Sq root.

- Procedure to call up the Linearization Type display
  AI1 block: Linearization Type

  Select the AI1 block for the differential pressure and then select No Linearization or Sq root for the Linearization Type parameter.

8.3.8 Output Signal Low Cut Mode Setup

Low cut mode can be used to stabilize the output signal near the zero point.
(There is 10% of hysteresis at only point of transition from low to high)

[Setup Low Cut Value]

- Procedure to call up the Low Cutoff* display
  AI1 block: Low Cutoff*

Example: setup LOW_CUT of output to 15%

*Low Cutoff
= (“Eu at 100%” - “Eu at 0%”) × 0.15 + “Eu at 0%”

[Setup Low Cut Mode]

- Procedure to call up the Low Cut Mode display
  AI1 block: Low Cut Mode

Example: Low cut at 20%
[sq root output]

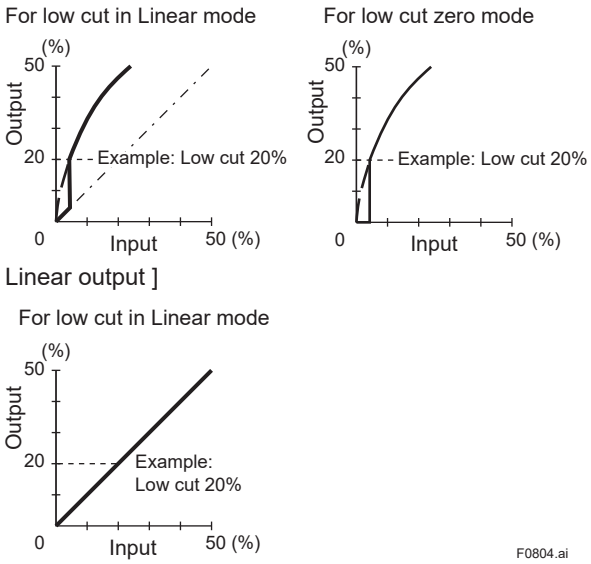
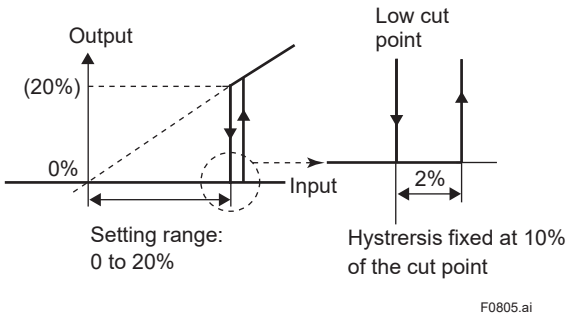


Figure 8.2 Low Cut Mode

The low cut point has hysterisis so that the output around the point is behaved as below figure.

<Example>
Output mode: Linear
Low cut mode: Zero
Low cut: 20.00%



8.3.9 Impulse Line Connection Orientation Setup

This function reverses the impulse line orientation.

Follow the procedure below to assign the high pressure impulse line connection to the L side of the transmitter.

- Procedure to call up the H/L Swap display
  TRANSDUCER block: H/L Swap

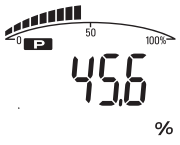
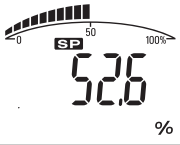
  Select Reverse among two choices (Normal / Reverse) in a H/L Swap parameter.
  Normal is chosen at the time of shipment.

8.3.10 Integral Indicator Display Mode

It is easy to check on the LCD whether Non Linearization or Sq root is set in the Linearization Type parameter selected in the output mode for the output signal.
When Linear is set in the Linearization Type parameter, "√" is displayed on the integral indicator.

8.3.11 Integral Indicator Scale Setup

The following three displays are available for the integral indictor: differential pressure/pressure, static pressure, and temperature. The following three variables can be displayed on the integral indicator: % of differential pressure range, % of static pressure range, and % of temperature range.

Available displays	Description and related parameters
% of range (PRES %) 	Indicates input pressure in –10 to 110% range depending on the set range (**LRV** and **URV**). PRES % 45.6 %
% of static pressure range (SP %) *1 	Indicates input static pressure in –10 to 110% range depending on the set range (**SP LRV** and **SP URV**). SP % 52.6 %

*1: Available for differential pressure transmitter.

Follow the procedure described in (1) to (2) below to set the integral indicator.

(1) Display Selection

Display set to Display Selection is displayed on the integral indicator.

- Procedure to call up the Display Selection display
  TRANSDUCER block: Display Selection

  The Display Selection parameter enables the differential pressure/pressure (AI1 block), static pressure (AI2 block), and temperature (AI3 block) to be displayed on the LCD. Select whether or not to enable each block to be displayed

(2) Cyclic Display

Information in the AI1 to AI3 blocks can be displayed cyclically according to the display On/Off setting for the differential pressure (AI1 block), static pressure (AI2 block), and temperature (AI3 block) selected in the Display Selection parameter.

8.3.12 Unit for Displayed Temperature

When the instrument is shipped, the temperature units are set to **C** (Centigrade). Follow the procedure below to change this setting.

- Procedure to call up the Sensor Range.Units Index display
  AI3 block : Sensor Range.Units Index

  Confirm that °C(deg C) is selected in the Sensor Range.Units Index parameter for the temperature (AI3 block).

Note: When the unit is changed by Sensor Range.Units Index parameter in temperature (AI3 block) , units of capsule temperature is also changed.

8.3.13 Unit for Displayed Static Pressure

Follow the procedure to change the static pressure unit.
Changing this parameter also changes the unit for the static pressure display.

- Procedure to call up the Sensor Range.Units Index display
  AI2 block : Sensor Range.Units Index

  Confirm that KPa is selected in the Sensor Range.Units Index parameter for the static pressure (AI2 block).

Monitoring the high or low static pressure of the capsule depends on the setting of parameter 'SP Select.'

- Procedure to call up the SP Select display
  AI2 block: SP Select

  Select High or Low in the SP Select parameter for the static pressure (AI2 block).

Type of static pressure is set Absolute pressure(Abs) at shipment.
When changing monitoring type of static pressure, Follow below procedure.

- Procedure to call up the Static Press Type display
  AI2 block: Static Press Type

  Select gauge pressure (Gauge) or absolute pressure (Abs) in the Static Press Type parameter for the static pressure (AI2 block).

8.3.14 Zero Point Adjustment and Span Adjustment

Each EJX-B Series Differential Pressure/Pressure Transmitter is characterized by factory. But there are some errors caused by environment and installed posture.

There are Zero and Span Adjustments to fine-tune those errors.
Zero Adjustment is adjustment for one point to adjust the bottom value of the measurement range as 0 % of output.

The Span Adjustment defines input and output characteristic between two points that's one side assumed as standard.
This is used when there is doubt of span drift or when it is impossible to make zero at absolute pressure with adjustment for user's pressure standard.

(1) Zero Point Adjustment

a. To set 0% at current input, perform following procedure.

This method is used only when the pressure at bottom of measurement range is zero.

- Procedure to call up the lower limit adjustment parameter (Calibration Lowest Point).
  AI1 block: Calibration Lowest Point

  Set 0 to Calibration Lowest Point parameter for differential pressure (AI1 block).

- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI1 block: Cal Cmd : CAL_LOW

  Lower limit is changed by using Cal Cmd parameter for differential pressure/pressure (AI1 block).

- Procedure to call up the calibration status parameter (Cal Status).
  AI1 block: Cal Status

  Confirm the calibration status of CAL_ SUCCESS(1) using the Cal Status parameter.

b. To match current input and output value, follow procedure

Like tank level measurement that is impossible to set actual level to zero, output value is adjustment to actual level by other measurement using glassgage.

Example:
Differential Pressure and Pressure Transmitter's span is 0 to 25.00kPa, current level is 13.50kPa, current output is 13.83kPa.

- Procedure to call up the lower limit adjustment parameter (Calibration Lowest Point).
  AI1 block : Calibration Lowest Point

  Set the actual level value of 13.50 kPa to the Calibration Lowest Point parameter for the differential pressure (AI1 block). Apply an actual input and confirm the value specified in Calibration Lowest Point as the output value.
- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI1 block : Cal Cmd : CAL_LOW

  The present output is changed from 13.83 kPa to 13.50 kPa in CAL_LOW of the differential pressure (AI1 block) Cal Cmd parameter.

- Procedure to call up the calibration status parameter (Cal Status).
  AI1 block : Cal Status

  Confirm the calibration status of CAL_ SUCCESS(1) using the Cal Status parameter.

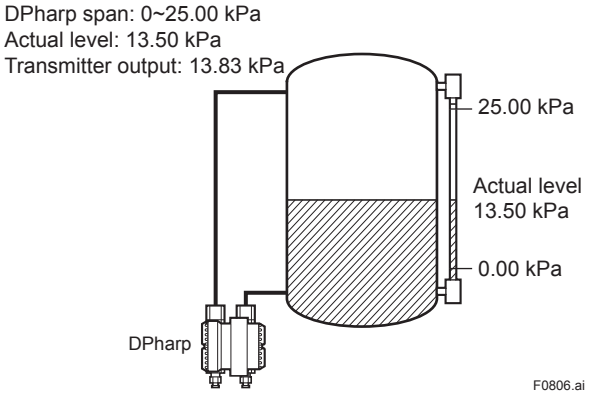


Figure 8.3 Tank level measurement

c. Using External Zero-adjustment Screw

External Zero-adjustment parameter (External Zero Trim) can set permission or prohibition to adjustment by External Zero-adjustment Screw.

Set “Trim on” to use the External Zero-adjustment Screw. (“Trim on” at shipment)

Use a slotted screwdriver to turn the zero-adjustment screw. Equalize the transmitter, then 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.

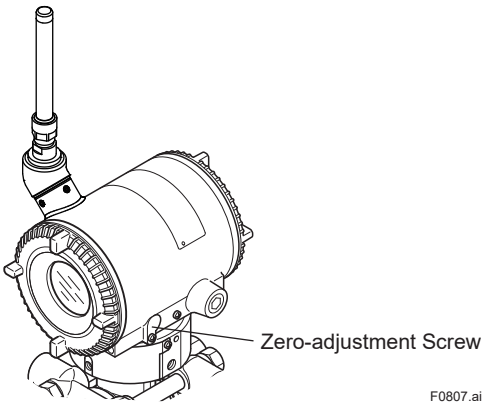


Figure 8.4 Zero-adjustment Screw

(2) Span Adjustment

Span Adjustment is function to change the input and output characteristic that assumed the bottom value (zero point) of measurement range a standard. Therefore, perform span adjustment (adjustment of the upper limit value) after zero adjustment (adjustment of bottom limit value).

After adding the pressure at point of adjustment and setting pressure value as parameter, the transmitter calculates quantity of adjustment and performs adjustment automatically.

- Procedure to call up the lower limit value parameter (Calibration Lowest Point).
  AI1 block: Calibration Lowest Point

  Set the lower limit adjustment value on the differential pressure/pressure (AI1 block) Calibration Lowest Point parameter screen. Apply a reference pressure corresponding to the lower limit of the measurement range to the differential pressure/pressure transmitter and confirm the reference pressure when it has stabilized.

- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI1 block: Cal Cmd: CAL_LOW

  Confirm the lower limit of the measurement range in CAL_LOW of the differential pressure (AI1 block) Cal Cmd parameter.

- Procedure to call up the calibration status parameter (Cal Status).
  AI1 block: Cal Status

  Confirm the calibration status of CAL_ SUCCESS(1) using the Cal Status parameter.

- Procedure to call up the upper limit adjustment parameter (Calibration Highest Point).
  AI1 block: Calibration Highest Point

  Set the upper limit adjustment value for the differential pressure (AI1 block) Calibration Highest Point parameter. Apply a reference pressure corresponding to the upper limit of the measurement range to the differential pressure/ pressure transmitter and confirm the reference pressure when it has stabilized.

- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI1 block: Cal Cmd: CAL_HIGH

  Confirm the upper limit of the measurement range in CAL_HIGH of the differential pressure/ pressure (AI1 block) Cal Cmd parameter.

- Procedure to call up the calibration status parameter (Cal Status).
  AI1 block: Cal Status

  Confirm the calibration status of CAL_ SUCCESS(1) using the Cal Status parameter.

(3) Adjustments for Static Pressure

For the EJX differential transmitters, zero point and span adjustments of static pressure is performed in the same way as with the primary process variable (PV).
Adjustment should be performed using the static pressure (AI2 block) Cal Cmd parameter. After calibration, confirm the status by using the static pressure (AI2 block) Cal Status.

- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI2 block: Cal Cmd

Perform differential pressure zero/span adjustment before static pressure zero/span adjustment.

(4) Reset Adjustment

Reset Adjustment clear the amount of adjustment. Reset Ajustment can be performed using CAL_ CLEAR of the differential pressure (AI1 block) Cal Cmd parameter for the input pressure and using CAL_CLEAR of the static pressure (AI2 block) Cal Cmd parameter for the static pressure. After Reset Adjustment, confirm the status by using Cal Status of the cleared block. The amount of adjustment made by the external zero-adjustment screw can be reset to the initial setting as well.

- Procedure to call up the calibration adjustment parameter (Cal Cmd).
  AI1 block: Cal Cmd: CAL_CLEAR
  AI2 block: Cal Cmd: CAL_CLEAR

8.3.15 Software Write Protect

Hardware write protection and software write protection functions are available for this transmitter.

- Procedure to call up the protection setting parameter (UAP Option)
  UAPMO block: UAP Option

  The following settings can be configured in the UAP Option parameter.
  - Setting to enable or disable software write protection.
  - Setting to enable or disable the hardware write protection switch.
  - Setting to enable or disable changing the setting to the Diagnostic Switch and Diagnostic Configuration parameters.

- Procedure to call up the protection setting display parameter (Hardware Write Protect)
  UAPMO block: Hardware Write Protect

  The Hardware Write Protect parameter enables the switch status of hardware write protection to be displayed.
  For the relationship between hardware write protection and software write protection, refer to section 10. “Parameter Summary.”

8.3.16 Switching to Deep Sleep Mode

When the instrument will not be used for a long time, switch the instrument to deep sleep mode to conserve battery power. To switch to deep sleep mode, follow the procedure below.

- Procedure to call up the switch-to-deep-sleep parameter
  TRANSDUCER block: Special Cmd

  Set Deep Sleep mode(Standby) to the Special Cmd parameter for the TRANSDUCER block. To start from deep sleep mode, either remove and insert the battery pack, or using the provisioning device tool or the device configuration tool via infrared communication.

CAUTION

After setting the deep sleep mode by infrared device configuration tool, keep the infrared port of device away from any other infrared signals.

NOTE

- Transmitter becomes the stop state after setting deep sleep mode and cannot reply any request from the device configuration tool via wireless communication.
- For this reason, there is the case that an error is display on the device configuration tool via wireless communication.
- To wake up from deep sleep mode, please pull battery pack and wait more than 30 seconds before attaching battery pack.

8.3.17 Switching to Silence Mode

This is a function to pause the instrument when it cannot join the field wireless network after a specified time has elapsed. This function is effective in conserving battery power when, for example, the installation of the field wireless integrated gateway is delayed compared to that of field wireless devices. The default value is 28800 seconds (8 hours). Thereafter, a cycle of a one-hour pause and six-minute search is repeated until the instrument can join the field wireless network.

- Procedure to call up the switch-to-silence parameter (Radio Silence)
  UAPMO block: Radio Silence

  Set 0 to 2^{31} seconds for the Radio Silence parameter of the UAPMO block. If 0 is set, the Radio Silence parameter is invalid. To start from deep sleep mode, either remove and insert the battery pack, or use the provisioning device tool or device configuration tool via infrared communication.

8.4 Self-Diagnostics

8.4.1 Identify Problems by Using the Device Configuration Tool

First, check Diagnostic Status of the self-diagnostic result.

UAPMO block: Diagnostic Status

Any of the four categories (Check function, Maintenance required, Failure, and Off specification) according to NAMUR NE107* is supplied to Diagnostic Status of each diagnostic result.

Table 8.2 Diagnostic Status

Bits	Contents	Example NAMUR NE107 Categorization
Bit31 (MSB)	F: Failure status	---
Bit30	C: Function check status	---
Bit29	O: Out of specification status	---
Bit28	M: Maintenance required status	---
Bit27	Faults in electronics	F
Bit26	Faults in sensor or actuator element	F
Bit25	Installation, calibration problem	C
Bit24	Out of service	C
Bit23	Outside sensor limits	O
Bit22	Environmental conditions out of device specification	O
Bit21	Fault prediction: Maintenance required	M
Bit20	Power is critical low: maintenance need short-term	M
Bit19	Power is low: maintenance need mid-term	M
Bit18	Software update incomplete	C
Bit17	Simulation is active	C
Bit16	Faults due to process influence	F
Bit15	Faults due to non-compliance with specified operating conditions	F
Bit14	Other faults	F
Bit13-Bit08	reserved by WCI	---
Bit07-Bit01	vendor specific area	---
Bit00	Detail information available 1: available 0: no available	---

Checking the Diagnostic Status category allows taking the proper action. The Diagnostic Status contents are common for all ISA devices, and the setting for the Diagnostic Status category can be changed. For further details, refer to Diagnostic Status Detail.
In Diagnostic Status Contents that can be diagnosed by the EJX, the alert category set in Out of Service can be changed to Check function. To do so, follow one of the procedures below.

a) UAPMO block: UAP Option, select enable.
b) UAPMO block: Diagnostic Configuration, change Out of Service from Failure to Check function.
c) UAPMO block: UAP Option, select disable.

The contents of diagnostic status are defined either valid or invalid at Diagnostic Switch parameter. Follow the example below to change “Out of Service” to invalid.

a) UAPMO block: UAP Option, select enable.
b) UAPMO block: Diagnostic Switch, turn ON Turn off “Out of Service”. Out of Service.
c) UAPMO block: UAP Option, select disable.

Note: Be careful when changing the alert category and turning detection on and off as described above. Be sure to set UAP OPTION to disable again to prevent setting errors.

*: NAMUR NE107 “Self-Monitoring and Diagnosis of Field Devices”
In Diagnostic Configuration setting, select one from the followings; F: Failure status, C: Function check status, O: Out of specification status, or M: Maintenance required status.

8.4.2 Alert Report

EJX generates alert information related to Diagnostic Status and automatically sends to a field wireless gateway. To use this function, the following alert setting is necessary. When “Out of Service” for Diagnostic Status alert is required, choose “FALSE” for [Out of Service.Alert Disable] in the UAPMO block. Refer to the field wireless gateway User’s Manual for the setting procedure to obtain the alert information from the gateway.
The alert report consists of the list of parameter names as shown Table 8.3 below.

Table 8.3 Contents of Alert Report

Parameter name	Description
DetectObjectTLPort	Alert detection port UAP (0xF0B2) fixed
DetectObject	Alert detection block UAPMO (1) fixed
DetectTime	Time stamp
AlertDirection	1: generated, 0: clear
AlertPriority	Alert priorities set by users
AlertType	Alert types, see 8.4 Self-Diagnostics
AlertValue	NAMUR107 category 0:Failure, 1:checkFunction, 2:OffSpec, 3:MaintenaceRequired

CAUTION

For a wireless gateway which does not support the alert report function, the alert setting in UAPMO block for the transmitter must be set to “Disable.” Note that YFGW710 field wireless integrated gateway does not have the alert report function.

Table 8.4 Diagnostic Results Summary

Diagnostic Status Contents	Alert Type	NAMUR NE107 Category	Diagnostic Status Detail	Description
Faults in electronics	78	F	AMP_EEPROM_FAIL	Amplifier EEPROM failure
			AMP_EEP_IRREGULAR	AMP EEPROM version not correct
			G_A_COMM_FAIL	G/A failure
			FC_DELTA_T_FAIL	C-side delta T circuit failure
			FR_DELTA_T_FAIL	R-side delta T circuit failure
			WL_AD_FAIL	Battery voltage not detected (AMP failure)
Faults in sensor or actuator element	77	F	FC_SENSOR_FAIL	C sensor frequency failure
			FR_SENSOR_FAIL	R sensor frequency failure
			CAP_T_SENSOR_FAIL	Capsule temperature sensor failure
			CAP_EEPROM_FAIL	Capsule EEPROM failure
			CAP_EEP_IRREGULAR	CAP EEPROM version not correct
			FC_UNOSC_FAIL	C sensor oscillation stop failure
			FR_UNOSC_FAIL	R sensor oscillation stop failure
Installation, calibration problem	76	C	DP_TRIM_SPAN_OUTSIDE	"Pressure span adjustment variable outside of range"
			DP_TRIM_ZERO_OUTSIDE	"Pressure zero adjustment variable outside of range"
			SP_TRIM_SPAN_OUTSIDE	"Static pressure span adjustment variable outside of range"
			SP_TRIM_ZERO_OUTSIDE	"Static pressure zero adjustment variable outside of range"
			LCD_OUTSIDE_LIMIT	LCD display outside of limits
Out of service	75	C	AI1_OUT_OF_SERVICE	AI1 O/S mode
			AI2_OUT_OF_SERVICE	AI2 O/S mode
			AI3_OUT_OF_SERVICE	AI3 O/S mode
Outside sensor limits	74	O	DP_OUTSIDE_LIMIT	Pressure outside of range
			SP_OUTSIDE_LIMIT	Static pressure outside of range
			CAPT_OUTSIDE_LIMIT	Capsule temperature outside of range
			AMPT_OUTSIDE_LIMIT	Amplifier temperature outside of range
Environmental conditions out of device specification.	73	O	DP_OUTSIDE_RANGE	Pressure setting outside of range
			SP_OUTSIDE_RANGE	Static pressure setting outside of range
Power is critical low: maintenance need short-term.	71	M	CRITICAL_LOWBAT	Detection of an extreme decrease in the battery voltage
Power is low: maintenance need mid-term	70	M	WL_LOWBAT_ALM	Detection of a decrease in the battery voltage
Simulation is active	68	C	AI1_SIMULATION_ACTIVE	AI1 Simulation mode
			AI2_SIMULATION_ACTIVE	AI2 Simulation mode
			AI3_SIMULATION_ACTIVE	AI3 Simulation mode

Not applicable for the diagnostic regarding AI2 object and static pressure measurement.

8.4.3 Checking with Integral Indicator

NOTE

If an error is detected by running self-diagnostics, an error number is displayed on the integral indicator. If there is more than one error, the error number changes at three-second intervals. See Table 9.3 regarding the error codes.

F0808.ai

Figure 8.5 Integral Indicator

9. Maintenance

9.1 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 maintenance room that has all the necessary tools.
- The CPU assembly, RF assembly and Integral indicator contain 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, RF assembly and Integral indicator into a bag with an antistatic coating.

9.2 Calibration Instruments Selection

Table 9.1 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.

9.3 Calibration

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

1) Insert the battery pack and then perform provisioning to have the transmitter join the Field Wireless Network or preparing the infrared communication for calibration.
2) Set measurement mode to continuous using the field device configuration tool and the update period to 1 second using the field wireless configuration tool.
3) Connect the devices as shown in Figure 9.1 and allow the transmitter to warm up for at least 5 minutes.

IMPORTANT

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.

4) Apply reference pressures of 0%, 50%, and 100% of the measurement range to the transmitter. Calculate the errors (differences between the device configuration tool 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.

(Note) When the output mode is set to “Sg root,” apply reference pressures of 0, 6.25, 25, 56.25, and 100% instead.

5) When the test is finished, reset measurement mode and update time to the initial value using the field device configuration tool and the field wireless configuration tool.

Table 9.1 Instruments Required for Calibration

Name	Yokogawa-recommended Instrument	Remarks
Provisioning device tool	• FieldMate (R2.02.01 or later) • Provisioning Device Tool • Infrared Adapter certified by Yokogawa Supplier: ACTiSYS Product name: IrDA InfraRed USB Adaptor Product number: IR224UN	
Field wireless configuration tool	• Field Wireless Integrated Gateway attached Software Field Wireless Configurator Field Wireless Management Tool • Field Wireless System related Product Plant Resource Manager (PRM) (R3.05 or later) • Device Configuration Tool via ISA100.11a Wireless Communication FieldMate (R2.02.01 or later) DeviceFile (R3.01.01 or later) • Device Configuration Tool via Infrared Communication FieldMate (R2.03.00 or later) DeviceFile (R3.02.01 or later)	
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 MC100 pneumatic pressure standard for 200 kPa { 2 kgf/cm^2 }, 25 kPa { 2500 mmH_2O } Accuracy: ±0.05% of F.S.	Requires air pressure supply.
	Dead weight gauge tester 25 kPa { 2500 mmH_2O } Accuracy: ±0.03% of setting	Select the one having a pressure range close to that of the transmitter.
Pressure source	Model 6919 pressure regulator (pressure pump) Pressure range: 0 to 133 kPa { 1000 mmHg }	Prepare the vacuum pump for negative pressure ranges.

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

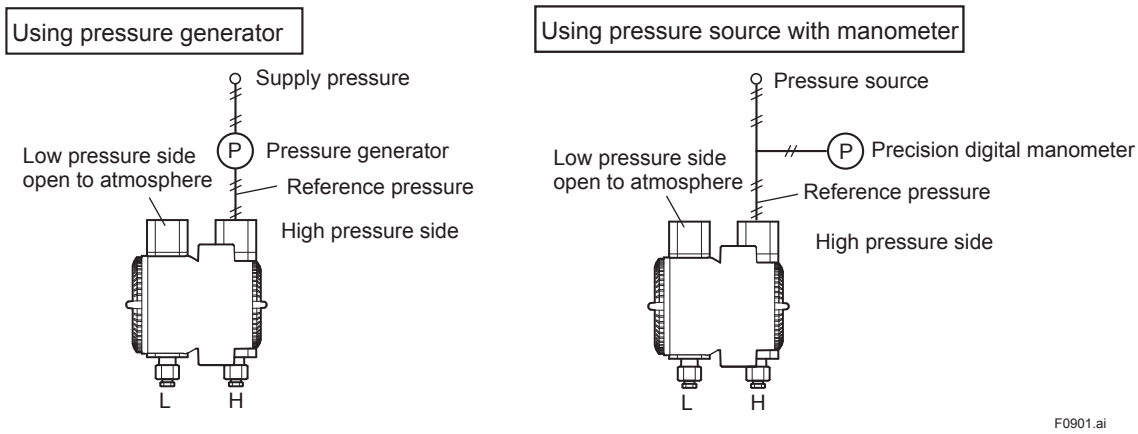


Figure 9.1 Instrument Connections

9.4 Disassembly and Reassembly

CAUTION

Precautions for the intrinsic safety explosion prevention type instrument

Intrinsic safe type transmitters must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state. Check and confirm the insulation when it is reassembled to the original state.
Check and confirm the insulation when it is reassembled to the original state.
Refer to section 2.7 “Insulation Resistance and Dielectric Strength Test” for details of Resistance Test.

IMPORTANT

- Perform the provisioning when replacing the RF assembly. Refer to 7.4 Connecting to the Field Wireless Network for details.
- Replace the batteries and perform the parameter settings when replacing the CPU assembly. Refer to 9.4.7 Replacing the Batteries.

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

CAUTION

Always remove Battery pack and shut off pressures before disassembly and assembly.
Use proper tools for all operations.

Table 9.2 shows the tools required.

Table 9.2 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	

9.4.1 Replacing the Integral Indicator

This subsection describes the procedure for replacing an integral indicator. (See figure 9.2)

■ **Removing the Integral Indicator**

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

■ **Attaching the Integral Indicator**

1) Align both the integral indicator and RF assembly connectors and engage them.
2) Insert and tighten the two mounting screws.
3) Replace the cover.

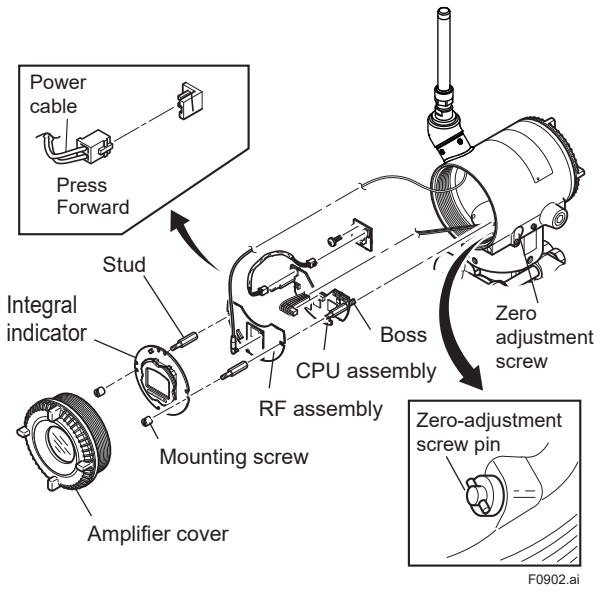


Figure 9.2 Removing and Attaching Integral indicator, RF assembly and CPU Assembly

9.4.2 Replacing the RF Assembly

This subsection describes how to replace the RF assembly (see Figure 9.2).

■ **Removing the RF assembly**

1) Remove the cover.
2) Remove the integral indicator (refer to subsection 9.4.1).
3) Remove the two stud bolts by using a socket driver (width across flats: 5.5 mm).
4) Disconnect the RF assembly from the CPU assembly. When doing this, carefully pull the RF assembly straight forward so as not to damage the connector pins between it and the CPU assembly.
5) Disconnect the antenna cable that connects the RF assembly and the antenna.

NOTE

Be careful not to apply excessive force to the RF assembly and the connector of the antenna cable when removing it.

■ **Mounting the RF assembly**

1) Connect the antenna cable between the RF assembly and the antenna.
2) Align both the RF assembly and CPU assembly connectors and engage them.
3) Tighten the two stud bolts.
4) Mount the integral indicator (refer to subsection 9.4.1).
5) Replace the cover.

9.4.3 Replacing the CPU Assembly

This subsection describes how to replace the CPU assembly (see Figure 9.2).

■ **Removing the CPU assembly**

1) Remove the cover.
   Remove the integral indicator and the RF assembly (refer to subsections 9.4.1 and 9.4.2).
2) Turn the zero-adjustment screw to the position as shown in Figure 9.2.
3) Disconnect the power 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 (see the upper left of Figure 9.2).
4) Use a socket driver (width across flats, 5.5 mm) 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 power cable (with brown connector) to the CPU assembly.

NOTE

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

3) Align and engage the zero-adjustment screw pin with the groove on the bracket on the CPU assembly. Then insert the CPU assembly straight onto the post in the amplifier case.
4) Tighten the two bosses. Mount the RF assembly, and the integral indicator (refer to subsections 9.4.1 and 9.4.2).

IMPORTANT

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.

9.4.4 Cleaning and Replacing the Capsule Assembly

CAUTION

Precautions for the intrinsic safety explosion prevention type instrument
Modification is not permitted by the user for intrinsic safety explosion prevention type transmitter. If you wish to replace the capsule assembly with one of a different measurement range, contact Yokogawa.
The user is permitted, however, to replace a capsule assembly with another of the same specification and measurement range. After completing maintenance, be sure to securely tighten the setscrews that fasten the transmitter section and pressure-detector section together.

This subsection describes the procedures for cleaning and replacing the capsule assembly. (See figure 9.3.)

■ **Removing the Capsule Assembly**

IMPORTANT

Exercise care as follows when cleaning the capsule assembly.
- Handle the capsule assembly with care, and be especially careful not to damage or distort the diaphragms that contact the process fluid.
- Do not use a chlorinated or acidic solution for cleaning.
- Rinse with clean water after cleaning, please dry until completely dry.

1) Remove the CPU assembly as shown in subsection 9.4.3.
2) Remove the five setscrews, the stopper bolt, and the stopper that connect the transmitter section and pressure-detector section.
3) Remove the hexagon-head screw and the stopper.
4) Separate the transmitter section and pressure-detector section.
5) Remove the nuts from the four flange bolts.
6) While supporting the capsule assembly with one hand, remove the cover flange.
7) Remove the capsule assembly.
8) Clean the capsule assembly or replace with a new one.

■ **Reassembling the Capsule Assembly**

1) Insert the capsule assembly between the flange bolts, paying close attention to the relative positions of the H (high pressure side) and L (low pressure side) marks on the capsule assembly.
Replace the two capsule gaskets with new gaskets.
2) Install the cover flange on the high pressure side, and use a torque wrench to tighten the four nuts uniformly to a torque shown below.

Model	EJX110B, EJX310B, EJX430B	
	Wetted parts material code	
	S	H,M,T,A,D,B
Torque(N·m) {kgf·m}	17* {1.7}	40 {4.1}

*: 40 N·m (4.1 kgf·m) for measurement span code F or option code /HD.

3) After the pressure-detector section has been reassembled, a leak test must be performed to verify that there are no pressure leaks.
4) Reattach the transmitter section to the pressure-detector section.
5) Reattach the stopper and stopper bolt. Tighten the five set screws. (Tighten the screws to a torque of 1.5 N·m)
6) Install the CPU assembly according to subsection 9.4.3.
7) After completing reassembly, adjust the zero point and recheck the parameters.

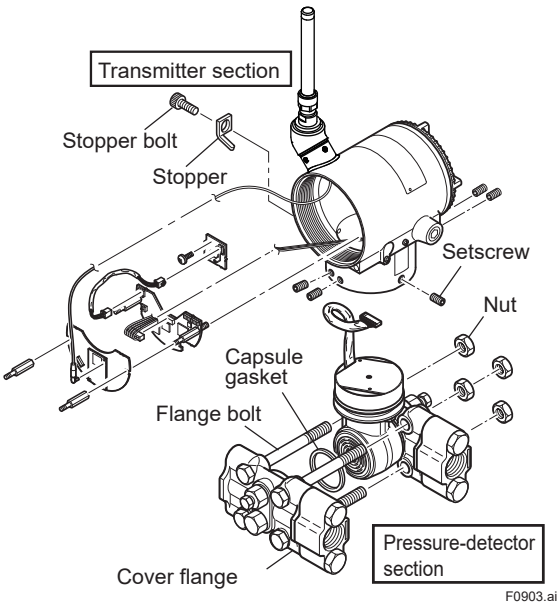


Figure 9.3 Removing and Mounting the Pressure-detector Section

9.4.5 Replacing the Process Connector Gaskets

This subsection describes process connector gasket replacement. (See figure 9.4.)

(a) Loosen the two bolts, and remove the process connectors.
(b) Replace the process connector gaskets.
(c) Remount the process connectors. Tighten the bolts securely and uniformly to a torque shown below, and verify that there are no pressure leaks.

Model	EJX110B, EJX310B, EJX430B
Torque(N·m) {kgf·m}	39 to 49 {4 to 5}

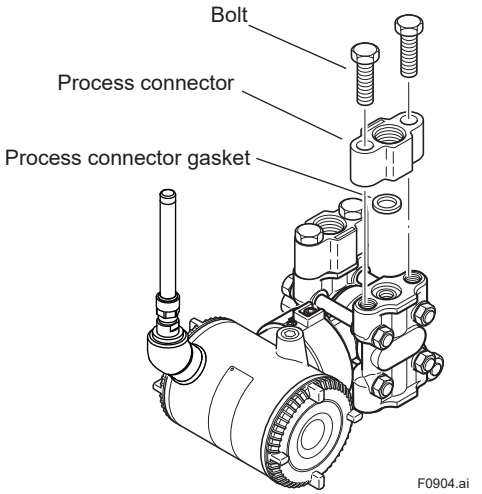


Figure 9.4 Removing and Mounting the Process Connector

9.4.6 Replacing the Battery Pack

Regarding the transmitter with intrinsically safe approval, the battery pack can be replaced without removing the device in hazardous area.

■ **Preparation**

Initialize the remaining battery life by using the parameter of Reset Energy Left in UAPMO block. When the battery power is burned and emptied, initialize the remaining battery after prompt replacement of the battery pack.

■ **Removing**

1) Remove the terminal box cover.
2) Loosen the two battery pack mounting screws (see Figure 9.5).
3) Pull out the Battery pack.

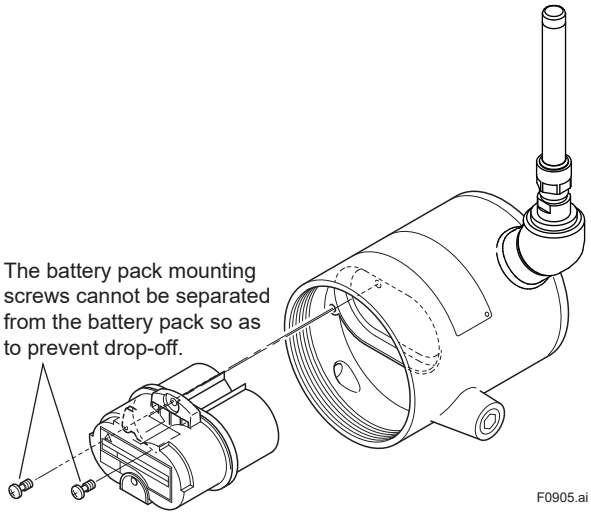


Figure 9.5 Removing the Battery Pack

■ **Remounting**

1) Insert the new battery pack lightly.
2) Push the center of the battery pack and insert it securely.
3) Tighten the two battery pack mounting screws to a torque of approximately 0.7 N·m.
4) Replace the terminal box cover.

9.4.7 Replacing the Batteries

The batteries in the battery pack can be replaced. Batteries are not installed when shipped from the factory. Assemble the battery pack as follows.

WARNING

Be sure to replace the batteries or disassemble and assemble the battery pack in a safe location. Doing so in an explosive area could cause an explosion.

CAUTION

When replacing the batteries, be sure to replace the two batteries at the same time and do not use an old and a new battery together.

■ **Disassembling**

1) Loosen the two battery case mounting screws (Figure 9.6).
2) Separate the battery case into two parts.
3) Remove the old batteries.

■ **Assembling**

1) Insert new batteries into the battery case. Be careful of the orientation of the batteries.
2) Attach the two parts of the battery case to each other.
3) Tighten the two battery case mounting screws to a torque of approximately 0.7 N·m.

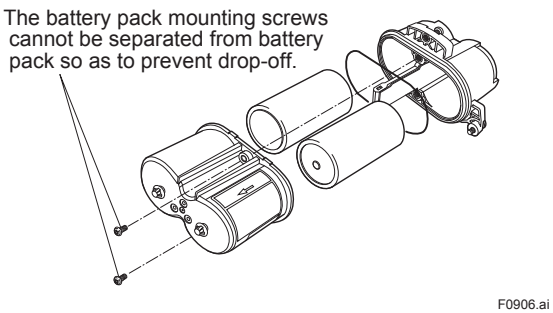


Figure 9.6 Removing the Battery Pack

9.4.8 Handling Batteries

This battery pack uses two primary lithium/ thionyl chloride batteries. Each battery contains approximately 5 grams of lithium, for a total of 10 grams in each pack. Under normal conditions, the battery materials are self-contained and are not reactive as long as the batteries and the pack integrity are maintained. Care should be taken to prevent thermal, electrical or mechanical damage. Protect the electrode of the battery pack to avoid rapid electrical discharge. Discharged a battery may lead to fluid leakage and excessive heat. Batteries should be stored in a clean and dry area. For maximum battery life, storage temperature should not exceed 30°C.

WARNING

Handling the battery pack
The following precautions must be observed in order to safely and effectively use a battery pack. Improper use may lead to fluid leakage, excessive heat, ignition, or explosion.

- Never charge it.
- Do not short-circuit it.
- Do not disassemble, transform, or modify it.
- Do not heat it or throw it into a fire.
- Do not soak it in fresh water or seawater.

CAUTION

Observe the following precautions for the safe disposal of batteries.

- Do not incinerate the battery, and do not expose it to a high temperature of 100°C or more. This may lead to fluid leakage or explosion.
- Dispose of the battery according to laws and regulations.

Use the following dedicated parts for the battery pack and batteries.

■ Battery Pack
Part number: F9915NQ (with batteries)
Part number: F9915NK (without batteries)

■ Batteries
Part number: F9915NR
Alternatively, Tadiran TL-5930/S batteries may be purchased and used.

■ **Transportation of products containing lithium batteries:**

Batteries used for this transmitter contain lithium. Primary lithium batteries are regulated in transportation by the U.S. Department of Transportation, and are also covered by the International Air Transport Association (IATA), the International Civil Aviation Organization (ICAO), and the European Ground Transportation of Dangerous Goods (ARD). It is the responsibility of the shipper to ensure compliance with these or any other local requirements. Consult current regulations and requirements before shipping. When transporting this transmitter with the battery pack inserted, keep it in deep sleep mode in order to conserve battery power. For details on how to switch to deep sleep mode, refer to subsection 8.3.16 “Switching to Deep Sleep Mode.”

■ **How to replace and dispose of the batteries:**

This is an explanation about the new EU Battery Directive(DIRECTIVE 2006/66/EC). This directive is only valid in the EU.
Batteries are used for this product.
When you remove batteries from this product and dispose them, discard them in accordance with domestic law concerning disposal.
Take a right action on waste batteries, because the collection system in the EU on waste batteries are regulated.

Battery type: Primary lithium-thionyl chloride battery

CAUTION

The symbol (see above), which is marked on the batteries, means they shall be sorted out and collected as ordained in ANNEX II in DIRECTIVE 2006/66/EC.

■ **Procedure to remove the batteries safely:**

Refer to subsection 9.4.6 “Replacing the Battery Pack” and subsection 9.4.7 “Replacing the Batteries.”

9.5 Troubleshooting

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

9.5.1 Basic Troubleshooting

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

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

This transmitter is equipped with a self-diagnostic function which will be useful in troubleshooting, and the transmitter equipped with an integral indicator will show an alarm code as a result of self-diagnosis.
See subsection 9.5.3 for the list of alarms.

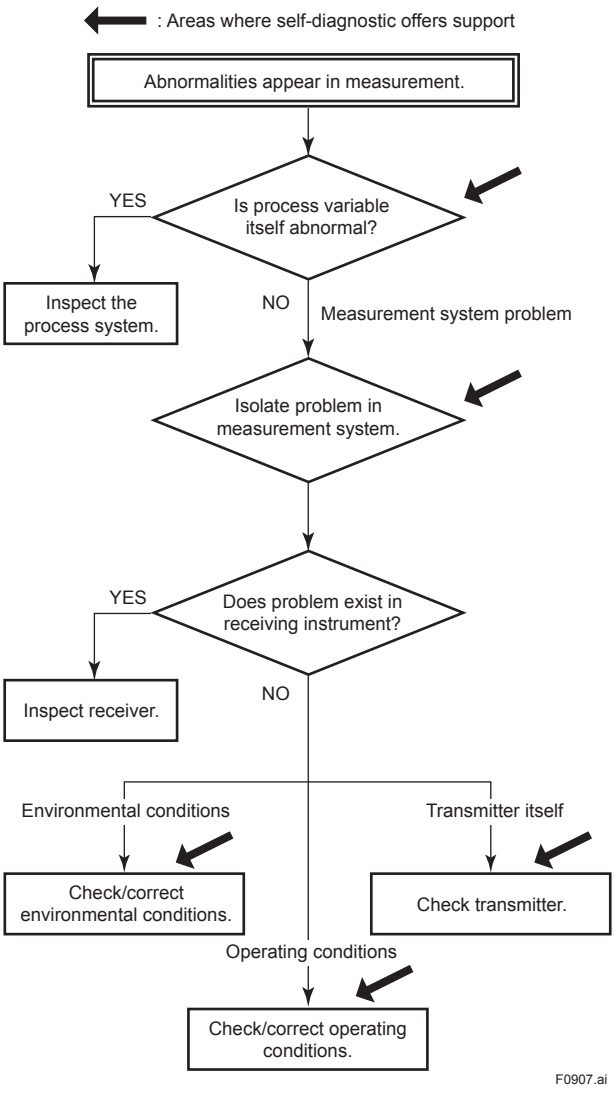
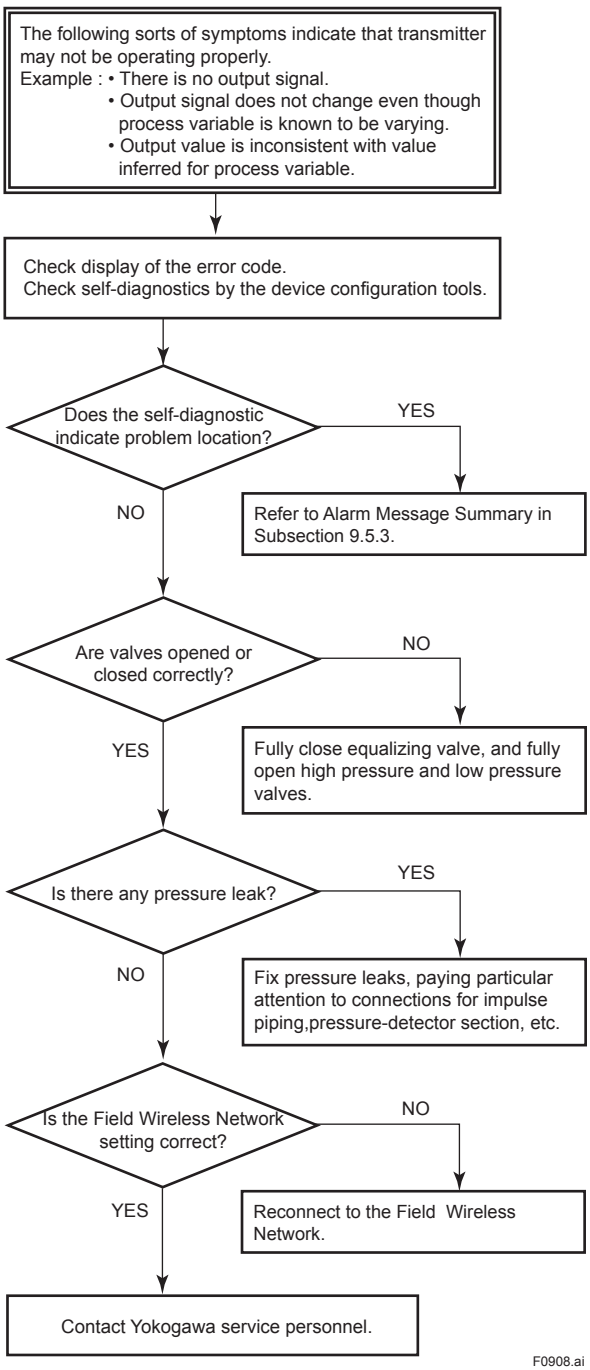
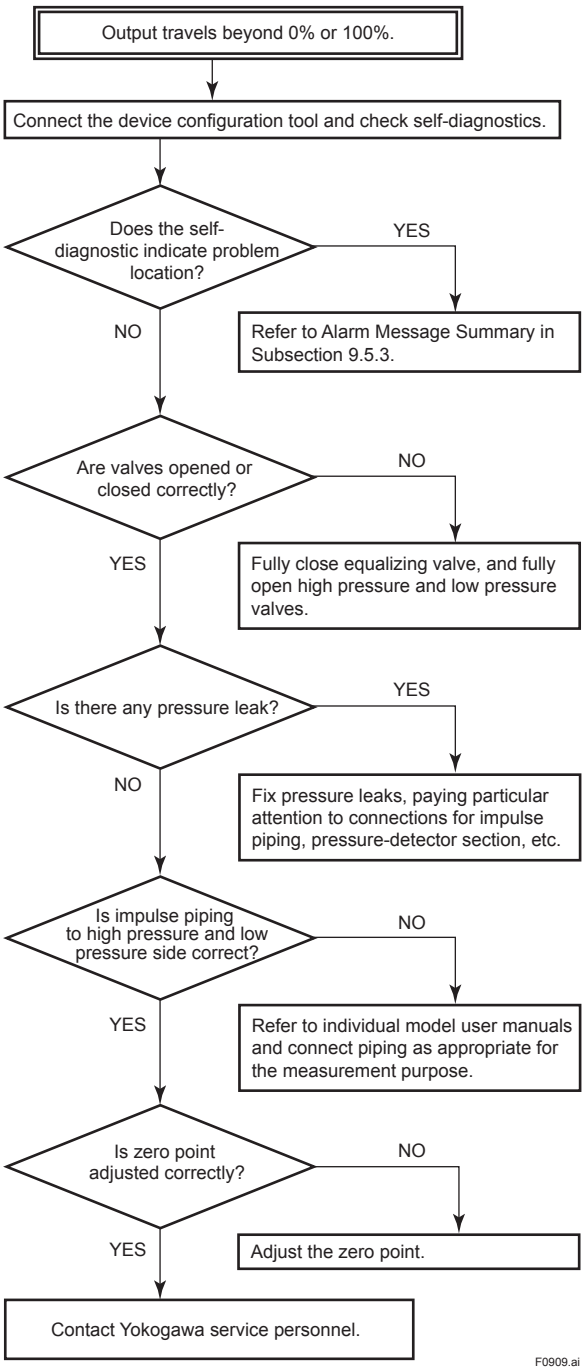
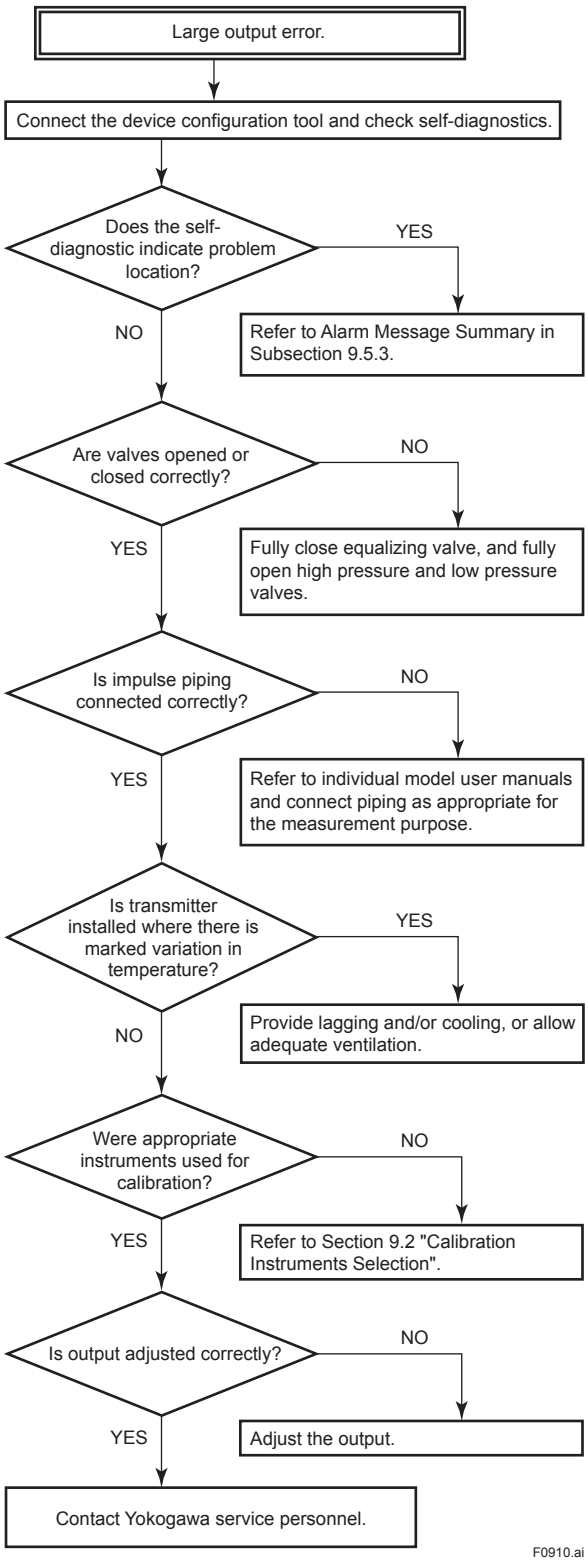


Figure 9.7 Basic Flow and Self-Diagnostics

9.5.2 Troubleshooting Flowcharts




Output travels beyond 0% or 100%.
Connect the device configuration tool and check self-diagnostics.
Does the self-diagnostic indicate problem location?
YES
Refer to Alarm Message Summary in Subsection 9.5.3.
NO
Are valves opened or closed correctly?
NO
Fully close equalizing valve, and fully open high pressure and low pressure valves.
YES
Is there any pressure leak?
YES
Fix pressure leaks, paying particular attention to connections for impulse piping, pressure-detector section, etc.
NO
Is impulse piping to high pressure and low pressure side correct?
NO
Refer to individual model user manuals and connect piping as appropriate for the measurement purpose.
YES
Is zero point adjusted correctly?
NO
Adjust the zero point.
YES
Contact Yokogawa service personnel.
F0909.ai


Large output error.
Connect the device configuration tool and check self-diagnostics.
Does the self-diagnostic indicate problem location?
YES
Refer to Alarm Message Summary in Subsection 9.5.3.
NO
Are valves opened or closed correctly?
NO
Fully close equalizing valve, and fully open high pressure and low pressure valves.
YES
Is impulse piping connected correctly?
NO
Refer to individual model user manuals and connect piping as appropriate for the measurement purpose.
YES
Is transmitter installed where there is marked variation in temperature?
YES
Provide lagging and/or cooling, or allow adequate ventilation.
NO
Were appropriate instruments used for calibration?
NO
Refer to Section 9.2 "Calibration Instruments Selection".
YES
Is output adjusted correctly?
NO
Adjust the output.
YES
Contact Yokogawa service personnel.
F0910.ai

9.5.3 Errors and Countermeasures

Table 9.3 Error Message Summary (Causes and Actions)

Integral indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart)	Action
AL. 01 CAP. ERR *2	F	Bit 26	Faults in sensor or actuator element	FC_SENSOR_FAIL	Pressure sensor failure	Recovers only when AUTO RECOVER is ON and within the range	Replace the capsule.
				FR_SENSOR_FAIL			
				FC_UNOSC_FAIL		Recovers only when AUTO RECOVER is ON and oscillation does not stop	
				FR_UNOSC_FAIL			
				CAP_T_SENSOR_FAIL	Capsule temperature sensor failure	None	
				CAP_EEPROM_FAIL	Capsule EEPROM memory failure	Recovers when returns to normal.	
				CAP_EEP_IRREGULAR		None	
AL. 02 AMP. ERR *2	F	Bit 27	Faults in electronics	AMP_EEPROM_FAIL	Amplifier EEPROM failure	Recovers when returns to normal.	Replace the amplifier.
				AMP_EEP_IRREGULAR		None	
				FC_DELTA_T_FAIL	Amplifier failure	None	
				FR_DELTA_T_FAIL			
				G_A_COMM_FAIL			
				WL_AD_FAIL			
AL. 10 PRESS	O	Bit 23	Outside sensor limits	DP_OUTSIDE_LIMIT	Pressure outside of specified range	Recovers when input pressure returns within the range.	Check the input pressure.
AL. 11 ST. PRSS				SP_OUTSIDE_LIMIT	Static pressure outside of specified range	Recovers when static pressure returns within the range.	Check the input pressure.
AL. 12 CAP. TMP				CAPT_OUTSIDE_LMIT	Capsule temperature outside of range (-50 to 130°C)	Recovers when temperature returns within the range.	Retain heat or insulate so that temperature returns within the specified range.
AL. 13 AMP.TMP				AMPT_OUTSIDE_LIMIT	Amplifier temperature outside of range (-50 to 95°C)	Recovers when temperature returns within the range.	Retain heat or insulate so that temperature returns within the specified range.

Integral indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart)	Action
AL.53 P. ADJ	C	Bit 25	Installation, calibration problem	DP_TRIM_SPAN_OUTSIDE	Pressure span adjustment variable outside of range	Recovers when span adjustment variable/point returns within the range.	Check the span adjustment variable for the Pressure.
AL.53 P. ADJ				DP_TRIM_ZERO_OUTSIDE	Pressure zero adjustment variable outside of range	Recovers when zero adjustment variable/point returns within the range.	Check the zero adjustment variable for the Pressure.
AL. 55 SP. ADJ	C	Bit 25	Installation, calibration problem	SP_TRIM_SPAN_OUTSIDE	Static pressure span adjustment variable outside of range	Recovers when span adjustment variable /point returns within the range.	Check the static pressure span adjustment variable.
AL. 55 SP. ADJ				SP_TRIM_ZERO_OUTSIDE	Static pressure zero adjustment variable outside of range	Recovers when zero adjustment variable/point returns within the range.	Check the static pressure zero adjustment variable.
AL. 79 OV. DISP				LCD_OUTSIDE_LIMIT	LCD display outside of specified range	Recovers when display value returns within the range.	Check the display setting.
AL. 30 RANGE	O	Bit 22	Environmental conditions out of device specification	DP_OUTSIDE_RANGE	Input pressure setting outside of range	Recovers when setting returns within the range.	Check the input pressure setting.
AL. 31 SP. RNG				SP_OUTSIDE_RANGE	Static pressure setting outside of range	Recovers when setting returns within the range.	Check the static pressure setting.
AL. 70 LOWBAT	M	Bit 20	Power is critical low: maintenance need short - term	CRITICAL_LOWBAT	Battery voltage is the lowest.	None	Replace the batteries.
AL. 70 LOWBAT		Bit 19	Power is low: maintenance need mid - term	WL_LOWBAT_ALM	Low remaining battery voltage	None	Replace the batteries.
AL. 60 AI OOS	C	Bit 24	O/S	AI1_OUT_OF_SERVICE	AI1 block is O/S mode.	Returns when the mode target of AI1 block is other than O/S.	Set the mode target to AUTO.
AL. 61 AI OOS				AI2_OUT_OF_SERVICE	AI2 block is O/S mode.	Returns when the mode target of AI2 block is other than O/S.	Set the mode target to AUTO.
AL. 62 AI OOS				AI3_OUT_OF_SERVICE	AI3 block is O/S mode.	Returns when the mode target of AI3 block is other than O/S.	Set the mode target to AUTO.

Integral indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Cause	Release/ recovery conditions (except restart)	Action
AL. 63 AI SIM	C	Bit 17	Simulation is active	SimulationActive (AI1)	AI1 block is simulate mode.	Returns when the simulate mode of AI1 block is set to disable. 1 (Disable)	Check the simulate mode of AI1 block.
AL. 64 AI SIM				SimulationActive (AI2)	AI2 block is simulate mode.	Returns when the simulate mode of AI2 block is set to disable. 1 (Disable)	Check the simulate mode of AI2 block.
AL. 65 AI SIM	C	Bit 17	Simulation is active	SimulationActive (AI3)	AI3 block is simulate mode.	Returns when the simulate mode of AI3 block is set to disable. 1 (Disable)	Check the simulate mode of AI3 block.

1: "Factory NAMUR category" refers to the four categories (C: Check function, M: Maintenance required, F: Failure, and O: Off specification) according to NAMUR NE107.
* NAMUR NE107 "Self-Monitoring and Diagnosis of Field Devices"
*2: When the device detects "AL01 CAP.ERR" and "AL02 AMP.ERR", the LCD display stays on regardless of the status in LCD mode.

Table 9.4 Error Message Summary (Output Actions)

Integral Indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Output actions			
					Pressure	Static Pressure	Capsule Temp Value	Amp Temp Value
AL. 01 CAP. ERR *2	F	Bit 26	Faults in sensor or actuator element	FC_SENSOR_FAIL	Output value (hold value) Output status (BAD: Sensor Failure)	Output value (hold value) Output status (BAD: Sensor Failure)	Normal action	Normal action
				FR_SENSOR_FAIL				
				FC_UNOSC_FAIL				
				FR_UNOSC_FAIL				
				CAP_T_SENSOR_FAIL	Normal action	Normal action	Output value (calculated in a normal way) Output status (BAD: Sensor Failure)	
				CAP_EEPROM_FAIL	Output value (hold value) Output status (BAD: Device Failure)	Output value (hold value) Output status (BAD: Device Failure)	Output value (calculated in a normal way) Output status (BAD: Device Failure)	Output value (calculated in a normal way) Output status (BAD: Device Failure)
				CAP_EEP_IRREGULAR				
AL. 02 AMP.ERR *2	F	Bit 27	Faults in electronics	AMP_EEPROM_FAIL	Output value (hold value) Output status (BAD: Device Failure)	Output value (hold value) Output status (BAD: Device Failure)	Output value (calculated in a normal way) Output status (BAD: Device Failure)	Output value (calculated in a normal way) Output status (BAD: Device Failure)
				AMP_EEP_IRREGULAR				
				FC_DELTA_T_FAIL	Output value (hold value) output status (BAD: Device Failure) Output value (calculated in a normal way) Output status (BAD: Device Failure)	Output value (hold value) Output status (BAD: Device Failure)	Normal action	Output value (calculated in a normal way) Output status (BAD: Device Failure)
				FR_DELTA_T_FAIL				
				G_A_COMM_FAIL			Output value (calculated in a normal way) Output status (BAD: Device Failure)	Output value (calculated in a normal way) Output status (BAD: Device Failure)
				WL_AD_FAIL				

Integral Indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Output actions			
					Pressure	Static Pressure	Capsule Temp Value	Amp Temp Value
AL. 10 PRESS	O	Bit 23	Outside sensor limits	DP_OUTSIDE_LIMIT	Output value (calculated in a normal way) Output status (UNCERTAIN: Sensor Conversion not Accurate)	Output value (calculated in a normal way) Output status (UNCERTAIN: Non Specific)	Normal action	Normal action
AL. 11 ST. PRSS				SP_OUTSIDE_LIMIT	Output value (calculated in a normal way) Output status (UNCERTAIN: Non Specific)	Output value (calculated in a normal way) Output status (UNCERTAIN: Sensor Conversion not Accurate)	Normal action	Normal action
AL. 12 CAP. TMP				CAPT_OUTSIDE_LIMIT	Output value (calculated in a normal way) Output status (UNCERTAIN: Non Specific)	Output value (calculated in a normal way) Output status (UNCERTAIN: Non Specific)	Output value (calculated in a normal way) Output status (UNCERTAIN: Sensor Conversion not Accurate)	Normal action
AL. 13 AMP.TMP				AMPT_OUTSIDE_LIMIT	Normal action	Normal action	Normal action	Output value (calculated in a normal way) Output status (UNCERTAIN: Sensor Conversion not Accurate)
AL. 53 P. ADJ	C	Bit 25	Installation, calibration problem	DP_TRIM_SPAN_ OUTSIDE	Output value (calculated in a normal way) Output status (UNCERTAIN: Range Limits Exceeded)	Normal action	Normal action	Normal action
AL. 53 P. ADJ				DP_TRIM_ZERO_ OUTSIDE	Output value (calculated in a normal way) Output status (UNCERTAIN: Range Limits Exceeded)	Normal action	Normal action	Normal action
AL. 55 SP. ADJ				SP_TRIM_SPAN_ OUTSIDE	Normal action	Output value (calculated in a normal way) Output status (UNCERTAIN: Range Limits Exceeded)	Normal action	Normal action
AL. 55 SP.ADJ				SP_TRIM_ZERO_ OUTSIDE	Normal action	Output value (calculated in a normal way) Output status (UNCERTAIN: Range Limits Exceeded)	Normal action	Normal action
AL. 79 OV. DISP				LCD_OUTSIDE_LIMIT	Normal action	Normal action	Normal action	Normal action

Integral Indicator	Factory NAMUR category	Bit	Diagnostic Status	Diagnostic Status Detail	Output actions			
					Pressure	Static Pressure	Capsule Temp Value	Amp Temp Value
AL. 30 RANGE	O	Bit 22	Environmental conditions out of device specification	DP_OUTSIDE_RANGE	Normal action	Normal action	Normal action	Normal action
AL. 31 SP. RNG				SP_OUTSIDE_RANGE	Normal action	Normal action	Normal action	Normal action
AL. 70*3 LOWBAT	M	Bit 20	Power is critical low: maintenance need short - term	CRITICAL_LOWBAT	Normal action	Normal action	Normal action	Normal action
AL. 70*3 LOWBAT		Bit 19	Power is low: maintenance need mid - term	WL_LOWBAT_ALM	Normal action	Normal action	Normal action	Normal action
AL. 60 AI OOS	C	Bit 24	O/S	AI1_OUT_OF_SERVICE	Output value (hold value) Output status (BAD: Out of Service)	Normal action	Normal action	Normal action
AL. 61 AI OOS				AI2_OUT_OF_SERVICE	Normal action	Output value (hold value) Output status (BAD: Out of Service)	Normal action	Normal action
AL. 62 AI OOS				AI3_OUT_OF_SERVICE	Normal action	Normal action	Output value (hold value) Output status (BAD: Out of Service)	Output value (hold value) Output status (BAD: Out of Service)
AL. 63 AI SIM	C	Bit 17	Simulation is active	SimulationActive (AI1)	Normal action	Normal action	Normal action	Normal action
AL. 64 AI SIM				SimulationActive (AI2)	Normal action	Normal action	Normal action	Normal action
AL. 65 AI SIM				SimulationActive (AI3)	Normal action	Normal action	Normal action	Normal action

1: "Factory NAMUR category" refers to the four categories (C: Check function, M: Maintenance required, F: Failure, and O: Off specification) according to NAMUR NE107.
* NAMUR NE107 "Self-Monitoring and Diagnosis of Field Devices"
*2: When the device detects "AL01 CAP.ERR" and "AL02 AMP.ERR", the LCD display stays on regardless of the status in LCD mode.
*3: When the ambient temperature is higher than 60°C, AL.70 may be generated despite the indication of Energy Left shows sufficiently remained. However, it does not affect the device operation. This is caused by the change of battery inner status with extremely low power consumption under high temperature environment. It is recommended to set the data updating period to 15 seconds or shorter.

10. Parameter Summary

Table 10.1 Parameter

<table>
<tr><th>Object ID</th><th>Attribute ID</th><th>Label</th><th>Description</th><th>Default value</th><th>Handling</th></tr>
<tr><td rowspan="12">1.
UAPMO
block</td><td>1</td><td>Version Revision</td><td>Indicates the application revision of EJX This revision when the application software is downloaded.</td><td>---</td><td>R</td></tr>
<tr><td>10</td><td>Static Revision</td><td>Indicates the revision level of the fixed parameters of UAP Used, for example, to check whether parameters have been change.</td><td>0</td><td>R</td></tr>
<tr><td>64</td><td>Identification Number</td><td>Indicates the vender ID, model ID, and revision of the device.</td><td>---</td><td>R</td></tr>
<tr><td>65</td><td>CTS Version</td><td>Indicates the version of the communication stack test system (CTS).</td><td>0</td><td>R</td></tr>
<tr><td>66</td><td>ITS Version</td><td>Indicates the version of the inter operability test system (ITS).</td><td>0</td><td>R</td></tr>
<tr><td>67</td><td>Diagnostic Status</td><td>Indicates the diagnostic results of the device based on the NAMUR NE107*1 model.
Setting Enable diagnostic status configuration in UAP Option to Enable allows turning OFF and ON the display of the diagnostic results for each summary, and changing Categorize For Categorize at the time of shipment, refer to tables 8.3 and 10.2.</td><td>---</td><td>R</td></tr>
<tr><td>68</td><td>UAP Option</td><td>Allows setting the Diagnostic Status and write protection of UAP.
Software write protect
1: On, 0: Off
Enable hardware write protect
1: Enable, 0: Disable (default)
Enable diagnostic status configuration
1: Enable, 0: Disable (default)
The following table shows the relationship between the hardware write protection and software write protection.
<table>
<tr><th>Enable hardware write protect</th><th>Hardware write protect</th><th>Software write protect</th><th>Write protect</th></tr>
<tr><td>Disable</td><td>Off or On</td><td>Off</td><td>No (Writable)</td></tr>
<tr><td>Disable</td><td>Off or On</td><td>On</td><td>Yes (Unwritable)</td></tr>
<tr><td>Enable</td><td>Off</td><td>Off or On</td><td>No (Writable)</td></tr>
<tr><td>Enable</td><td>On</td><td>Off or On</td><td>Yes (Unwritable)</td></tr>
</table></td><td>0</td><td>W</td></tr>
<tr><td>69</td><td>Diagnostic Switch</td><td>Allows setting On/Off for each summary of Diagnostic Status when Enable diagnostic status configuration in UAP Option is set to Enable.</td><td>On</td><td>W</td></tr>
<tr><td>70</td><td>Diagnostic Configuration</td><td>Allows Categorize for each summary of Diagnostic Status when Enable diagnostic status configuration in UAP Option is set to Enable.</td><td>Refer to Table 10.2.</td><td>W</td></tr>
<tr><td>102</td><td>Diagnostic Status Detail[2]</td><td>Detailed information on Diagnostic Status. For Categorize at the time of shipment, refer to Table 10.2.</td><td>Refer to Table 10.2.</td><td>R</td></tr>
<tr><td>103</td><td>Energy Left</td><td>Indicates the number of days of remaining battery life assuming ambient temperature condition as 23 degrees Celsius.
The unit is day.</td><td>---</td><td>R</td></tr>
<tr><td>104</td><td>Reset Energy Left</td><td>Initialize the remaining battery life (Energy Left) and reset it as new batteries.
Perform the battery replacement.
0 = Continue (Cancel)
1 = Reset (Initialization)</td><td>0 (reading value is always 0)</td><td>W</td></tr>
</table>

Object ID	Attribute ID	Label	Description	Default value	Handling
1. UAPMO block (continued)	105	Power Supply Status	Indicates the predicted battery level and the power supply method. 0 = external power supply 1 = battery level 75% or more 2 = battery level 25% ~ 75% 3 = battery level 25% or less		R
	106	EHType	Available to write note into this parameter.	---	W
	107	Power Supply Voltage	Indicates the measured power supply voltage (V).	---	R
	110	Hardware Write Protect	Allows recognizing the status of the hardware write protection switch. (Switch Off, Switch On)		R
	111	Radio Silence	Repeats a cycle of a 1-hour pause and 6-minute search if the instrument cannot join the network after a time specified in Radio Silence has elapsed. When 0 is set, the Radio Silence is invalid.	28800	W
	112	Simulation Active Alert	The On/Off or priority for Simulation Active Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	113	Soft Update incomplete Alert	The On/Off or priority for Soft Update incomplete Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15 Not available for EJX.	1. TRUE 2. 15	W
	114	Power low Alert	The On/Off or priority for Power low Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	115	Power Critical low Alert	The On/Off or priority for Power Critical low Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	116	Fault prediction Alert	The On/Off or priority for Fault prediction Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15 Not available for EJX.	1. TRUE 2. 15	W
	117	Environmental conditions Alert	The On/Off or priority for Environmental conditions Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	118	Outside sensor limits Alert	The On/Off or priority for Outside sensor limits Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	119	Out of service Alert	The On/Off or priority for Out of service Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	120	Callibration problem Alert	The On/Off or priority for callibration problem Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W

Object ID	Attribute ID	Label	Description	Default value	Handling
1. UAPMO block (continued)	121	Faults Sensor or actuator Alert	The On/Off or priority for Faults Sensor or actuator Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15	1. TRUE 2. 15	W
	122	Faults Electronics Alert	The On/Off or priority for Faults Electronics Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 1	1. TRUE 2. 15	W
	123	Faults process influence Alert	The On/Off or priority for Faults process influence Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15 Not available for EJX.	1. TRUE 2. 15	W
	124	Faults non-compliance Alert	The On/Off or priority for Faults non-compliance Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15 Not available for EJX.	1. TRUE 2. 15	W
	125	Other faults Alert	The On/Off or priority for Other faults Alert can be set. 1. On/Off setting 0 = FALSE, 255 =TRUE 2. Alert report priority: 0 to 15 Not available for EJX.	1. TRUE 2. 15	W
2. UDO block	2	DESCRIPTION	Indicates the version and model information of the downloaded data.	---	R
	3	STATE	Indicates the status of UAP block. 0 Idle 1 Downloading 3 Applying 4 DLComplete 6 DLError	---	R
	5	MAX_BLOCK_ SIZE	Maximum block size. This value is smaller than the maximum data size of APDU.	---	R
	14	LAST_BLOCK_ DOWNLOADED	Indicates the last downloaded block number. 0 means that no block has been downloaded.	---	R
	16	ERROR_CODE	Indicates the error codes for DLError. 0 = noError 1 = Timeout 2 = ClientAbort 64 = Apply failure	---	R
3. CO block	1	REVISION	Indicates the revision number such as COMM_ ENDPOINT, etc.	---	R
	2	COMM_ ENDPOINT	Indicates the Endpoint information. The following shows the components. 1. Network address of remote endpoint 2. Transport layer port at remote endpoint 3. Object ID at remote endpoint 4. Stale data limit 5. Data publication period 6. Ideal publication phase 7. PublishAutoRetransmit 8. Configuration status	---	W
	3	COMM_ CONTRACT	Indicates the Contract information. The following shows the components. 1. ContractID 2. Contract_Status 3. Actual_Phase	---	R

Object ID	Attribute ID	Label	Description	Default value	Handling
3. CO block (continued)	4	PUB_ITEM_MAX	Maximum PUB_ITEM value	---	R
	5	PUB_ITEM_NUM	PUB_ITEM number	---	R
	6	PUB_ITEM	Indicates the PUB_ITEM information. The following shows the components 1. ObjectID 2. AttributeID 3. AttributeIndex 4. Size	---	W
4. TRANSDUCER block	1	Tag Description	Memo field available to write anything.	Transducer	W
	2	Auto Recovery	Allows specifying the action when the cause of a sensor failure is removed. OFF (=0): AL continues to be indicated even after the cause of the sensor error is removed, and the BURN OUT state is not released. ON (=1): The AL indication for sensor failure disappears and normal action is resumed when the cause of the sensor failure is removed.	ON	W
	3	Model	Indicates the model name of the transmitter.	---	R
	4	Sensor Serial Number	Indicates the device number of the transmitter.	---	R
	6	Measurement Mode	Measurement mode selects continuous mode or intermittent mode. When the update time is set to 0.5 second in intermittent mode, the mode is automatically switched to continuous mode. When the update time is set to 0.5 second, the computation process is in continuous mode, regardless of the measurement mode. When 0 is set, measurement period is set to 30 seconds regardless of measurement setting.	intermittent mode	W
	7	Wireless Status	Indicate the communication status. 1. Indicates the initial idle status or join status. (idle status, join status) 2. Indicates whether Contract(Pub) is established. (not establishment, establishment) 3. Indicates whether Contract(R/W) is established. (not establishment, establishment)	1. idle status 2. not estabilishment 3. not esabilishment	R
	8	Display Selection	Select PV Value displaying on the LCD indicator. 1. Indicates display status of PV Value of AI1 (displayed, not displayed) 2. Indicates display status of PV Value of AI2 (displayed, not displayed) 3. Indicates display status of PV Value of AI3 (displayed, not displayed)	1. displayed 2. not displayed 3. not displayed	W
	9	LCD Mode	Select the display mode on the LCD indicator. 1. Indicates the ON mode. (OFF, ON) 2. Indicates the bar graph display. (bar graph not displayed, bar graph displayed)	1. OFF 2. bar graph not displayed	W
	10	Special Cmd	Special function parameter. 0 = initialize value at READ (None) 1 = Squawk status 2 = deep sleep status To start from deep sleep mode, either remove and insert the battery pack, or use the provisioning device tool or the device configuration tool via infrared communication.	0	W

Object ID	Attribute ID	Label	Description	Default value	Handling
4. TRANSDUCER block (continued)	11	Special Order ID	Displays the special order number, if applicable.	---	R
	12	Unit Sel1	Selects whether to automatically apply the unit to the word for the parameter for which the unit display is selected, or apply the characters that are written to Display Unit1. (Auto, Custom)	Auto	W
	13	Display Unit11	When Custom is selected in Unit Sel1, set the display unit using 6 characters or less.	NULL	W
	14	LCD Intermittetnt Time	Set the time to turn off display on the LCD indicator. When 0 is set, it is diplayed in continuous mode. Unit: second	60 seconds	W
	15	XD Filter	Set the damping time to Tranceducer value in the AI1 ans AI2 blocks. Unit: second When Measurement mode is set to continuous mode, it is valid.	2 seconds	W
	16	Measurement Rate	Indicates the cycle to publish the measurement value and status	0	R
5. AI1 block	1	Process Value	AL1 is a pressure output object. Indicates the primary analog value (or corresponding process value) and status used to execute this function. Allows updating data by specifying this for the Concentrator object. 1. Value: output value of AI object 2. Status: Specify output status of AI object.	1. Value = --- 2. Status = ---	W
	2	Block Mode	A universal parameter to indicate the block's operation status. Each O/S, Auto, and Man can select from. 1. Target : Specify AI object mode. 2. Actual : Indicates current mode of AI object. 3. Permitted : Indicates the mode selected by Target of AI object. 4. Normal : Indicate normal status mode of AI object.	1. Target=Auto 2. Actual=Auto 3. Permitted= Auto 4. Normal=Auto	W
	3	Concentrator OID	Indicates the Concentrator object value that corresponds to the data update of the PV value.	3	R
	4	Scale	Allows specifying the upper or lower limit for the PV scaling, unit code, etc. 1. EU at 100% : Indicate the upper limit of the PV value. 2. EU at 0% : Indicate the lower limit of the PV value. 3. Units Index : Indicate the setting unit used for the PV value. 4. Decimal : Indicate the digit number below the decimal point displayed in the LCD indicator.	1. EU at 100% = 100 2. EU at 0% = 0 3. Units Index = % 4. Decimal = 2	W
	26	Tag Description	A universal parameter to store the comment that describes the tag	AI1: Differential Pressure	W
	27	Process Value Filter Time	Allows adjusting the time constant for filtering the PV value. Setting unit: Second. This is enabled for the Continuous mode.*2	0 second	W
	28	Simulate Switch	A simulation function switch for the AI object test (Disable, Enable)	1 (Disable)	W
	29	Transducer Value	When Simulate Switch is set to Disable, this value is used as the input value for the AI object. Refer to Figure 10.1.	Disable	R
	30	Simulate Value	When Simulate Switch is set to Enable, this value is used as the input value for the AI object. The input value can be changed.	---	W
	51	Upper Limit	Indicates the upper limit (URL) for the pressure.	---	R

Object ID	Attribute ID	Label	Description	Default value	Handling
5. AI1 block (continued)	52	Lower Limit	Indicates the lower limit (LRL) for the pressure.	---	R
	53	PV Range	Sets the measurement range. 1. EU at 100% : Indicates input value of the upper limit. 2. EU at 0% : Indicates input value of the lower limit. 3. Units Index : Indicates the units of the measurement range. 4. Decimal : Indicates the digit number below the decimal point.	EU at 100% = 100 EU at 0% = 0 Units Index = kPa (1133) Decimal = 2	W
	54	Linearization Type	Select either No Linearization or Square root as a setting of the output range. 0 = No Linearization : Provides an output value scaled according to the PV Range and Scale range settings. (To use Direct with FF, set the same value for PV Range and Scale.) 10 = Square root : Provides a square root output computed for the value scaled according to the PV Range and Scale range settings.	0	W
	55	Flow Constant	Indicates the flow coefficient, which shows the correlation between the flow rate value and square root value of the differential pressure.	1.0	W
	56	Lower Cutoff	Specifies the low cut value. The unit is subject to Scale.Units Index.	10	W
	57	Cal Cmd	Specifies the calibration method. 0 = CAL_NONE : Initial state in which calibration is not performed 1 = CAL_LOW : Applies an actual input and adjusts the lower limit using the value specified in Calibration Lowest Point. 2 = CAL_HIGH : Applies an actual input and adjusts the higher limit using the value specified in Calibration Highest Point. 5 = CAL_CLEAR : Clears the adjustment variable.	0 (reading value is always 0)	W
	58	Cal Status	Indicates the calibration status. 0 = CAL_NONE : Start-up and default value 1 = CAL_SUCCESS : Indicates that calibration was successful. 7 = CAL_BAD_TRIM_POINT : Indicates this status when the adjustment variable is outside of range.	---	R
	59	Calibration Highest Point	Specifies the higher limit adjustment variable for adjustment between two points.	---	W
	60	Calibration Lowest Point	Specifies the lower limit adjustment variable for the adjustment between two points.	---	W
	61	Calibration Minimum Span	Indicates the minimum span of the adjustment variable.	---	R
	104	External Zero Trim	Allows performing external zero adjustment. (Trim on, Trim off)	Trim on	W
	105	Low Cut Mode	Specifies the low cut mode. (Linear, Zero)	Linear	W
	106	H/L Swap	Allows performing reverse connection of the impulse line. (NORMAL, REVERSE : reverse connection) Used when the lower pressure side and higher pressure side of the impulse line were connected wrongly when installing the pressure transmitter.	Normal	W

Object ID	Attribute ID	Label	Description	Default value	Handling
5. AI1 block (continued)	107	T Zero Cmp	Parameter to select the temperature zero shift compensation mode 0 = OFF : Does not perform temperature zero shift compensation. 1 = ON : Performs temperature zero shift compensation.	Off	w
	108	Temp Zero	Parameter to set the temperature gradient value for the temperature zero shift compensation	0	w
	109	Temp Select	Parameter to select the temperature (amplifier-side / capsule-side) used for the temperature zero shift compensation. 0 = AMP TEMP : the value of the amplifier-side temperature sensor is used. 1 = CAP TEMP : the value of the capsule-side temperature sensor is used.	1	w
6. AI2 block	1	Process Value	AI2 is a static pressure output object. Indicates the primary analog value (or corresponding process value) and status used to execute this function. Allows updating data by specifying this for the Concentrator object. 1. Value: output value of AI object 2. Status: Specify output status of AI object.	---	W
	2	Block Mode	A universal parameter to indicate the block's operation status. O/S, Auto, and Man can be selected. 1. Target : Specify AI object mode. 2. Actual : Indicates current mode of AI object. 3. Permitted : Indicates the mode selected by Target of AI object. 4. Normal : Indicate normal status mode of AI object.	1.Target = O/S 2.Actual = O/S 3.Permitted = O/S 4.Normal = O/S	W
	3	Concentrator OID	Indicates the Concentrator object value that corresponds to the data update of the PV value.	3	R
	4	Scale	Allows specifying the upper or lower limit for the PV scaling, unit code, etc. 1. EU at 100% : Indicate the upper limit of the PV value. 2. EU at 0% : Indicate the lower limit of the PV value. 3. Units Index : Indicate the setting unit used for the PV value. 4. Decimal : Indicate the digit number below the decimal point displayed in the LCD indicator.	1. EU at 100% = 100 2. EU at 0% = 0 3. Units Index = % 4. Decimal = 2	W
	26	Tag Description	A universal parameter to store the comment that describes the tag.	AI2: Static Pressure	W
	27	Process Value Filter Time	Allows adjusting the time constant for filtering the PV value. Setting unit: Second. This is enabled for the Continuous mode.*2	0 second	W
	28	Simulate Switch	A simulation function switch for the AI object test (Disable, Enable)	Disable	W
	29	Transducer Value	When Simulate Switch is set to Disable, this value is used as the input value for the AI object.	---	R
	30	Simulate Value	When Simulate Switch is set to Enable, this value is used as the input value for the AI object. The input value can be changed.	---	W
	51	Upper Limit	Indicates the upper limit (URL) for the pressure.	---	R
	52	Lower Limit	Indicates the lower limit (LRL) for the pressure.	---	R

Object ID	Attribute ID	Label	Description	Default value	Handling
6. AI2 block (continued)	53	PV Range	Sets the measurement range. 1. EU at 100% : Indicates input value of the upper limit. 2. EU at 0% : Indicates input value of the lower limit. 3. Units Index : Indicates the units of the measurement range. 4. Decimal : Indicates the digit number below the decimal point.	1. EU at 100% = 25000.000000 EU at 0% = 0 Units Index = kPa Decimal = 2	W
	54	Linearization Type	Select either No Linearization or Square root as a setting of the output range. 0 = No Linearization : Provides an output value scaled according to the PV Range and Scale range settings. (To use Direct with FF, set the same value for PV Range and Scale.)	0	W
	55	Flow Constant	Indicates the flow coefficient, which shows the correlation between the flow rate value and square root value of the pressure.	1.0	W
	56	Lower Cutoff	Specifies the low cut value. The unit is subject to Scale.Units Index.	10	W
	57	Cal Cmd	Specifies the calibration method. 0 = CAL_NONE : Initial state in which calibration is not performed 1 = CAL_LOW : Applies an actual input and adjusts the lower limit using the value specified in Calibration Lowest Point. 2 = CAL_HIGH : Applies an actual input and adjusts the higher limit using the value specified in Calibration Highest Point. 5 = CAL_CLEAR : Clears the adjustment variable.	0 (reading value is always 0)	W
	58	Cal Status	Indicates the calibration status. 0 = CAL_NONE : Start-up and default value 1 = CAL_SUCCESS : Indicates that calibration was successful. 7 = CAL_BAD_TRIM_POINT : Indicates this status when the adjustment variable is outside of range.		R
	59	Calibration Highest Point	Specifies the higher limit adjustment variable for adjustment between two points.	---	W
	60	Calibration Lowest Point	Specifies the lower limit adjustment variable for the adjustment between two points.	---	W
	61	Calibration Minimum Span	Indicates the minimum span of the adjustment variable. 108 = Gauge pressure 109 = Absolute pressure	---	R
	102	Static Process Type	Selects the gauge pressure or the absolute pressure.	Abs	W
	103	SP Select	Parameter to select the High-side pressure or the Low-side pressure as the static pressure output. 0 = High : Displays the H-side pressure as the static pressure 1 = Low : Displays the L-side pressure as the static pressure	High	W
7. AI3 block	1	Process Value	AI3 is a temperature pressure output object. Indicates the primary analog value (or corresponding process value) and status used to execute this function. Allows updating data by specifying this for the Concentrator object. 1. Value: output value of AI object 2. Status: Specify output status of AI object.	1. Value = --- 2. Status = ---	W

Object ID	Attribute ID	Label	Description	Default value	Handling
7. AI3 block (continued)	2	Block Mode	A universal parameter to indicate the block's operation status. O/S, Auto, and Man can be selected. 1. Target : Specify AI object mode. 2. Actual : Indicates current mode of AI object. 3. Permitted : Indicates the mode selected by Target of AI object. 4. Normal : Indicate normal status mode of AI object.	1. Target = Auto 2. Actual = Auto 3. Permitted = O/S+Auto +Man 4. Normal = Auto	W
	3	Concentrator OID	Indicates the Concentrator object value that corresponds to the data update of the PV value.	3	R
	4	Scale	Allows specifying the upper or lower limit for the PV scaling, unit code, etc. 1. EU at 100% : Indicate the upper limit of the PV value. 2. EU at 0% : Indicate the lower limit of the PV value. 3. Units Index : Indicate the setting unit used for the PV value. 4. Decimal : Indicate the digit number below the decimal point displayed in the LCD indicator.	1. EU at 100% = 100 2. EU at 0% = 0 3. Units Index = % 4. Decimal = 2	W
	26	Tag Description	A universal parameter to store the comment that describes the tag	AI3: Capsule temperature	W
	27	Process Value Filter Time	Allows adjusting the time constant for filtering the PV value. Setting unit: Second. This is enabled for the Continuous mode.	0 second	W
	28	Simulate Switch	A simulation function switch for the AI object test (Disable, Enable)	Disable	W
	29	Transducer Value	When Simulate Switch is set to Disable, this value is used as the input value for the AI object.	---	R
	30	Simulate Value	When Simulate Switch is set to Enable, this value is used as the input value for the AI object. The input value can be changed.	---	W
	53	Sensor Range	Parameter to nondimensionalize the sensor output value. K and deg C are selectable for the temperature unit. 1. EU at 100% : Indicates input value of the upper limit. 2. EU at 0% : Indicates input value of the lower limit. 3. Units Index : Indicates the units of the measurement range. 4. Decimal : Indicates the digit number below the decimal point.	1. EU at 100% = 130 2. EU at 0% = -50 3. Units Index = deg C 4. Decimal = 0	W
	102	Tertiary Value Select	Specifies either the capsule temperature or amplifier temperature as the output value. (CAP, AMP)	CAP	W

(Note) Handling: R=Read only, W=Read & Write
(Note) "Factory NAMUR category" refers to the four categories (C: Check function, M: Maintenance required, F: Failure, and O: Off specification) according to NAMUR NE107*.

*1: NAMUR NE107 "Self-Monitoring and Diagnosis of Field Devices"
*2: It is valid for not only continuous mode but also intermittent mode.

Table 10.2 Diagnostic Status Detail[0]

Bit	Diagnostic Status Detail	Description	Diagnostic Status assignment bit	NAMUR
DiagnosticDetail_1				
31	FC_SENSOR_FAIL	C sensor frequency error	Bit26	F
30	FR_SENSOR_FAIL	R sensor frequency error	Bit26	F
29	CAP_T_SENSOR_FAIL	Capsule temperature sensor failure	Bit26	F
28	CAP_EEPROM_FAIL	Capsule EEPROM failure	Bit26	F
27	CAP_EEP_IRREGULAR	CAP EEPROM version not correct	Bit26	F
25	AMP_EEPROM_FAIL	Amplifier EEPROM failure	Bit27	F
24	AMP_EEP_IRREGULAR	AMP EEPROM version not correct	Bit27	F
22	G_A_COMM_FAIL	G/A failure	Bit27	F
21	FC_UNOSC_FAIL	C sensor oscillation stop failure	Bit26	F
20	FC_DELTA_T_FAIL	C-side deltaT circuit failure	Bit27	F
19	FR_DELTA_T_FAIL	R-side deltaT circuit failure	Bit27	F
18	WL_AD_FAIL	Battery voltage not detected (AMP failure)	Bit27	F
17	FR_UNOSC_FAIL	R sensor oscillation stop failure	Bit26	F
15	DP_OUTSIDE_LIMIT	Pressure outside of specified range	Bit23	O
14	SP_OUTSIDE_LIMIT	Static pressure outside of specified range	Bit23	O
13	CAPT_OUTSIDE_LIMIT	Capsule temperature outside of specified range	Bit23	O
12	AMPT_OUTSIDE_LIMIT	Amplifier temperature outside of specified range	Bit23	O
7	DP_OUTSIDE_RANGE	Input pressure setting outside of range	Bit22	O
6	SP_OUTSIDE_RANGE	Static pressure setting outside of range	Bit22	O
DiagnosticDetail_2				
31	AI1_OUT_OF_SERVICE	AI1 O/S mode	Bit24	C
30	AI2_OUT_OF_SERVICE	AI2 O/S mode	Bit24	C
29	AI3_OUT_OF_SERVICE	AI3 O/S mode	Bit24	C
28	AI1_SIMULATION_ACTIVE	AI1 simulation mode	Bit17	C
27	AI2_SIMULATION_ACTIVE	AI2 simulation mode	Bit17	C
26	AI3_SIMULATION_ACTIVE	AI3 simulation mode	Bit17	C
20	DP_TRIM_SPAN_OUTSIDE	Pressure span adjustment variable outside of range	Bit25	C
19	DP_TRIM_ZERO_OUTSIDE	Pressure zero adjustment variable outside of range	Bit25	C
15	SP_TRIM_SPAN_OUTSIDE	Static pressure span adjustment variable outside of range	Bit25	C
14	SP_TRIM_ZERO_OUTSIDE	Static pressure zero adjustment variable outside of range	Bit25	C
13	WL_LOWBAT_ALM	Detection of a decrease in the battery voltage	Bit19	M
12	CRITICAL_LOWBAT	Detection of an extreme decrease in the battery voltage	Bit20	M
8	LCD_OUTSIDE_LIMIT	LCD display outside of specified range	Bit25	C

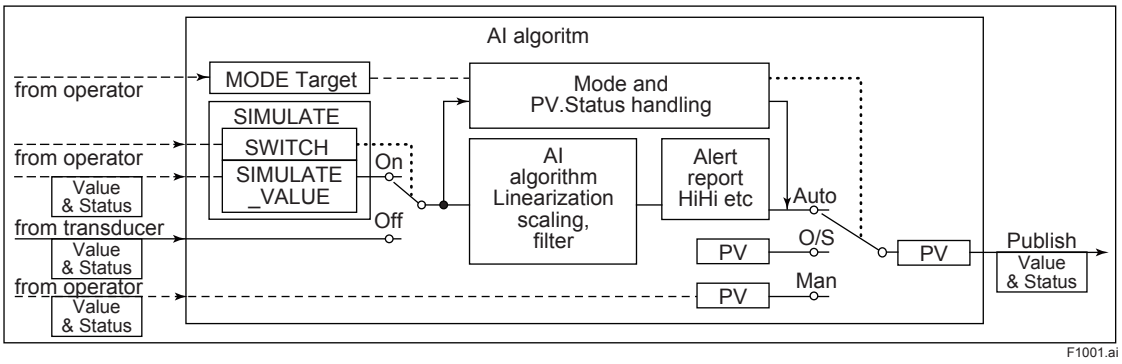


Figure 10.1 Example schema of analog input object

11. General Specifications

11.1 Standard Specifications

Communication protocol:

ISA100.11a protocol

Data rate:

250 kbps

Frequency:

2400 - 2483.5 MHz license free ISM band

Radio security:

AES 128 bit codified

RF Transmitter power:

Max. 11.6 dBm (fixed)

Antenna:

+2 dBi Omni directional monopole type

Span and range limits:

EJX110B

Measurement Span/Range		kPa	inH_2O(/D1)	mbar(/D3)	mmH_2O(/D4)
F	Span	0.1 to 5	0.4 to 20	1 to 50	10 to 500
	Range	-5 to 5	-20 to 20	-50 to 50	-500 to 500
L	Span	0.1 to 10	0.4 to 40	1 to 100	10 to 1000
	Range	-10 to 10	-40 to 40	-100 to 100	-1000 to 1000
M	Span	0.5 to 100	2 to 400	5 to 1000	50 to 10000
	Range	-100 to 100	-400 to 400	-1000 to 1000	-10000 to 10000
H	Span	2.5 to 500	10 to 2000	25 to 5000	0.025 to 5 kgf/cm^2
	Range	-500 to 500	-2000 to 2000	-5000 to 5000	-5 to 5 kgf/cm^2
V	Span	0.07 to 14 MPa	10 to 2000 psi	0.7 to 140 bar	0.7 to 140 kgf/cm^2
	Range	-0.5 to 14 MPa	-71 to 2000 psi	-5 to 140 bar	-5 to 140 kgf/cm^2

EJX310B

Measurement Span/Range		kPa abs	psi abs(/D1)	mbar abs (/D3)	mmHg abs (/D4)
L	Span	0.5 to 10	0.15 to 2.95 inHg	5 to 100	3.8 to 75
	Range	0 to 10	0 to 2.95 inHg	0 to 100	0 to 75
M	Span	1.3 to 130	0.39 to 38 inHg	13 to 1300	9.8 to 970
	Range	0 to 130	0 to 38 inHg	0 to 1300	0 to 970
A	Span	0.0175 to 3.5 MPa	2.5 to 500	0.175 to 35 bar	0.175 to 35 kgf/cm^2
	Range	0 to 3.5 MPa	0 to 500	0 to 35 bar	0 to 35 kgf/cm^2
B	Span	0.08 to 16 MPa	12 to 2300	0.8 to 160 bar	0.8 to 160 kgf/cm^2
	Range	0 to 16 MPa	0 to 2300	0 to 160 bar	0 to 160 kgf/cm^2

EJX430B

Measurement Span/Range		MPa	psi(/D1)	bar(/D3)	kgf/cm^2(/D4)
H	Span	2.5 to 500 kPa	10 to 2000 inH_2O	0.025 to 5	0.025 to 5
	Range	-100 to 500 kPa	-400 to 2000 inH_2O	-1 to 5	-1 to 5
A	Span	0.0175 to 3.5	2.5 to 500	0.175 to 35	0.175 to 35
	Range	-0.1 to 3.5	-14.5 to 500	-1 to 35	-1 to 35
B	Span	0.08 to 16	12 to 2300	0.8 to 160	0.8 to 160
	Range	-0.1 to 16	-14.5 to 2300	-1 to 160	-1 to 160

Performance specifications:

Refer to GS01C27B01-01EN.

Update Time

Measurement mode	Differential pressure	Pressure
Continuous	100 ms	100 ms
Intermittent	0.5 to 3600 s selectable	0.5 to 3600 s selectable

The transmitter shifts to the countinuous mode when the update time is set to 0.5 second.

Power Supply Specifications

Battery:

Use the dedicated battery pack.
Rated voltage: 7.2 V
Rated capacity: 19 Ah

Output:

ISA100.11a protocol

Output mode (EJX110B):

linear or square root

Ambient Temperature Limits:

-40 to 85°C (-40 to 185°F)
-30 to 80°C (-22 to 176°F) LCD visible range

Process Temperature Limits:

-40 to 120°C (-40 to 248°F)
-40 to 100°C (-40 to 212°F)
– EJX310B with capsule code L
0 to 120°C (32 to 248°F)
– With option code /HD

Ambient Humidity Limits:

0 to 100% RH

Working Pressure Limits (Silicone oil)

Maximum Pressure Limits:

EJX110B

Capsule	Pressure
F, L	16 MPa (2300 psi)
M, H, V	25 MPa (3600 psi)*

* 16 MPa for wetted parts material code H, M, T, A, D, and B, or option code /HD.

EJX310B

Capsule	Pressure
L	10 kPa abs (2.95 inHg abs)
M	130 kPa abs (38 inHg abs)
A	3.5 MPa abs (500 psia)
B	16 MPa abs (2300 psia)

EJX430B

Capsule	Pressure
H	500 kPa (2000 inH_2O)
A	3.5 MPa (500 psi)
B	16 MPa (2300 psi)

Zero Adjustment Limits:

Zero can be fully elevated or suppressed, within the lower and upper range limits of the capsule.

External Zero Adjustment:

External zero is continuously adjustable with 0.01% incremental resolution of span. Re-range can be done locally using the digital indicator with rangesetting switch.

Integral Indicator (LCD display):

5-digit numerical display, 6-digit unit display and bar graph.
The indicator is configurable to display one or up to three of the following variables periodically.;
Differential pressure, static pressure, temperature.

EMC Conformity Standards

EN61326-1 Class A, Table 2 (For use in industrial locations), EN61326-2-3

Immunity influence during the test

Differential pressure/ pressure: Output shift is specified within ±1% of 1/10 Max span.
Static pressure: Output shift is specified within ±5% of 1 MPa span.

R&TTE Conformity Standards CE

ETSI EN 300 328, ETSI EN 301 489-1, ETSI EN 301 489-17, EN61010-1, EN61010-2-030, EN62311

• Indoor/Outdoor use

Regulation Conformity of the Wireless Module

• FCC Approval
• IC Approval

Safety Requirement Standards

EN61010-1, EN61010-2-030

• Altitude of installation site:
Max. 2,000 m above sea level
• Installation category: I
(Anticipated transient overvoltage 330 V)
• Pollution degree: 2
• Indoor/Outdoor use

Degrees of Protection

IP66/IP67, NEMA4X

Connections:

Refer to “MODEL AND SUFFIX CODES.”

Wetted Parts Materials:

Diaphragm, Cover Flange, Process Connector, Capsule Gasket, and Vent/Drain Plug

Refer to “MODEL AND SUFFIX CODES.”

Process Connector Gasket

PTFE Teflon
Fluorinated rubber for option code N2 and N3

Non-wetted Parts Materials:

Bolting

ASTM-B7 carbon steel, 316L SST stainless steel, or ASTM grade 660 stainless steel

Housing

Low copper cast aluminum alloy with polyurethane, mint-green paint (Munsell 5.6BG 3.3/2.9 or its equivalent)

Name plate and tag

316 SST tag plate wired onto transmitter

Weight:

4.9 kg (10.8 lb) *
- Wetted parts material code: S (except for measurement span code F and option code /HD)

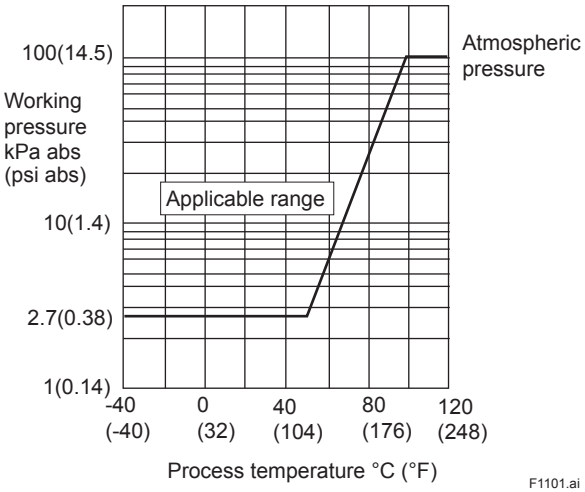
5.8kg (12.8 lb) *
- Wetted parts material code: S (with measurement span code F or option code /HD)
- Wetted parts material code: H, M, T, A, B, D

* The weight does not include that of battery pack, mounting bracket, and process connector.

Minimum Pressure Limit:

See graph below

EJX110B and EJX430B



EJX310B

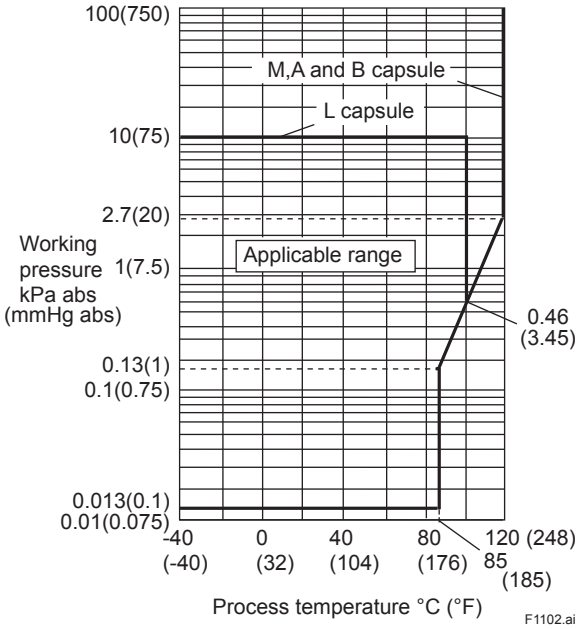


Figure 1. Working pressure and Process Temperature

11.2 Model and Suffix Codes

Model EJX110B

Model	Suffix Codes	Description
EJX110B	. . . . .	Differential pressure transmitter
Output signal	**-L**	Wireless communication (ISA100.11a protocol)
Measurement span (capsule)	**F**	0.1 to 5 kPa (0.4 to 20 inH_2O) (For wetted parts material code S)
	L	0.1 to 10 kPa (0.4 to 40 inH_2O) (For wetted parts material code M, H, T, A, D and B)
	M	0.5 to 100 kPa (2 to 400 inH_2O)
	H	2.5 to 500 kPa (10 to 2000 inH_2O)
	V	0.07 to 14 MPa (10 to 2000 psi)
Wetted parts material *1	☐	Refer to "Wetted Parts Materials" Table 1.
Process connections	**0**	without process connector (Rc1/4 female on the cover flanges)
	1	with Rc1/4 female process connector
	2	with Rc1/2 female process connector
	3	with 1/4 NPT female process connector
	4	with 1/2 NPT female process connector
	► **5**	without process connector (1/4 NPT female on the cover flanges)
Bolts and nuts material	**J**	ASTM-B7 carbon steel
	G	316L SST stainless steel
	C	ASTM grade 660 stainless steel
Installation	**-7**	Vertical piping, left side high pressure, and process connection downside
	-8	Horizontal piping and right side high pressure
	► **-9**	Horizontal piping and left side high pressure
	-B	Bottom Process Connection, left side high pressure*2
	-U	Universal flange*2
Amplifier housing	**8**	Cast aluminum alloy with detachable antenna (2 dBi)*4
	9	Cast aluminum alloy without antenna (N connector)*3*4
Electrical connection	**J**	No electrical connection, battery-powered type (battery case only; battery cells not included)
Integral indicator	► **D**	Digital indicator
Mounting bracket	► **B**	304 SST 2-inch pipe mounting, flat type (for horizontal piping)
	D	304 SST or SCS13A 2-inch pipe mounting, L type (for vertical piping)
	K	316 SST or SCS14A 2-inch pipe mounting, L type (for vertical piping)
	M	316 SST or SCS14A 2-inch pipe mounting (for bottom process connection type)
	N	None
Optional codes		/ ☐ Optional specification

The "►" marks indicate the most typical selection for each specification.

*1: ⚠ Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the diaphragm itself can be damaged and that material from the broken diaphragm and the fill fluid can contaminate the user's process fluids.
Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above). Contact Yokogawa for detailed information of the wetted parts material.

*2: Applicable for wetted parts material code S.

*3: Order the antenna separately from accessary option.

*4: Remote antenna cables can be attached. Order separately from accessary option.

Table 1. Wetted Parts Materials

Wetted parts material code	Cover flange and process connector	Capsule	Capsule gasket	Vent/Drain plug
S	ASTM CF-8M *1	Hastelloy C-276 *2 (Diaphragm) F316L SST, 316L SST (Others)	Teflon-coated 316L SST	316 SST
H	ASTM CF-8M *1	Hastelloy C-276 *2	PTFE Teflon	316 SST
M	ASTM CF-8M *1	Monel	PTFE Teflon	316 SST
T	ASTM CF-8M *1	Tantalum	PTFE Teflon	316 SST
A	Hastelloy C-276 equivalent *3	Hastelloy C-276 *2	PTFE Teflon	Hastelloy C-276 *2
D	Hastelloy C-276 equivalent *3	Tantalum	PTFE Teflon	Hastelloy C-276 *2
B	Monel equivalent *4	Monel	PTFE Teflon	Monel

*1: Cast version of 316 SST. Equivalent to SCS14A.
*2: Hastelloy C-276 or ASTM N10276.
*3: Indicated material is equivalent to ASTM CW-12MW.
*4: Indicated material is equivalent to ASTM M35-2.

Model EJX310B

Model	Suffix Codes	Description
EJX310B	. . . . .	Absolute pressure transmitter
Output signal	**-L**	Wireless communication (ISA100.11a protocol)
Measurement span (capsule)	**L**	0.5 to 10 kPa abs (0.15 to 2.95 inHg abs)
	M	1.3 to 130 kPa abs (0.39 to 38 inHg abs)
	A	0.0175 to 3.5 MPa abs (2.5 to 500 psia)
	B	0.08 to 16 MPa abs (12 to 2300 psia)
Wetted parts material *1	**S**	Refer to “Wetted Parts Materials” Table 2.
Process connections	**0**	without process connector (Rc1/4 female on the cover flanges)
	1	with Rc1/4 female process connector
	2	with Rc1/2 female process connector
	3	with 1/4 NPT female process connector
	4	with 1/2 NPT female process connector
►	**5**	without process connector (1/4 NPT female on the cover flanges)
Bolts and nuts material	**J**	ASTM-B7 carbon steel
	G	316L SST stainless steel
	C	ASTM grade 660 stainless steel
Installation	**-3**	Vertical piping, right side high pressure, and process connection down side
	-7	Vertical piping, left side high pressure, and process connection down side
	-8	Horizontal piping and right side high pressure
►	**-9**	Horizontal piping and left side high pressure
	-B	Bottom Process Connection, left side high pressure
	-U	Universal flange
Amplifier housing	**8**	Cast aluminum alloy with detachable antenna (2 dBi)*3
	9	Cast aluminum alloy without antenna (N connector)*2*3
Electrical connection	**J**	No electrical connection, battery-powered type (battery case only; battery cells not included)
Integral indicator	**D**	Digital indicator
Mounting bracket ►	**B**	304 SST 2-inch pipe mounting, flat type (for horizontal piping)
	D	304 SST or SCS13A 2-inch pipe mounting, L type (for vertical piping)
	K	316 SST or SCS14A 2-inch pipe mounting, L type (for vertical piping)
	M	316 SST or SCS14A 2-inch pipe mounting (for bottom process connection type)
	N	None
Optional codes		/ ☐ Optional specification

The “►” marks indicate the most typical selection for each specification.

*1: ⚠ Users must consider the characteristics of selected wetted parts material and influence of process fluids. Specifying inappropriate materials has the potential to cause serious damage to human body and plant facilities resulted from an unexpected leak of the corrosive process fluids.

*2: Order the antenna separately from accessary option.

*3: Remote antenna cables can be attached. Order separately from accessary option.

Table 2. Wetted Parts Materials

Wetted parts material code	Cover flange and process connector	Capsule	Capsule gasket	Vent/Drain plug
S	ASTM CF-8M *1	Hastelloy C-276 *2 (Diaphragm) 316L SST (Others)	Teflon-coated 316L SST	316 SST

*1: Cast version of 316 SST. Equivalent to SCS14A.

*2: Hastelloy C-276 or ASTM N10276.

Model EJX430B

Model	Suffix Codes	Description
EJX430B	. . . . .	Gauge pressure transmitter
Output signal	**-L**	Wireless communication (ISA100.11a protocol)
Measurement span (capsule)	**H**.	2.5 to 500 kPa (10 to 2000 inH_2O)
	A.	0.0175 to 3.5 MPa (2.5 to 500 psi)
	B.	0.08 to 16 MPa (12 to 2300 psi)
Wetted parts material *1	☐	Refer to “Wetted Parts Materials” Table 3.
Process connections	**0**	without process connector (Rc1/4 female on the cover flanges)
	1	with Rc1/4 female process connector
	2	with Rc1/2 female process connector
	3	with 1/4 NPT female process connector
	4	with 1/2 NPT female process connector
	► **5**	without process connector (1/4 NPT female on the cover flanges)
Bolts and nuts materia	**J**	ASTM-B7 carbon steel
	G.	316L SST stainless steel
	C.	ASTM grade 660 stainless steel
Installation	**-3**	Vertical piping, right side high pressure, and process connection down side
	-7	Vertical piping, left side high pressure, and process connection down side
	-8	Horizontal piping and right side high pressure
	► **-9**	Horizontal piping and left side high pressure
	-B	Bottom Process Connection, left side high pressure*2
	-U	Universal flange*2
Amplifier housing	**8**	Cast aluminum alloy with detachable antenna (2 dBi)*4
	9	Cast aluminum alloy without antenna (N connector)*3*4
Electrical connection	**J**	No electrical connection, battery-powered type (battery case only; battery cells not included)
Integral indicator	**D**.	Digital indicator
Mounting bracket	► **B**.	304 SST 2-inch pipe mounting, flat type (for horizontal piping)
	D.	304 SST or SCS13A 2-inch pipe mounting, L type (for vertical piping)
	K.	316 SST or SCS14A 2-inch pipe mounting, L type (for vertical piping)
	M	316 SST or SCS14A 2-inch pipe mounting (for bottom process connection type)
	N.	None
Optional Codes		/ ☐ Optional specification

The “►” marks indicate the most typical selection for each specification.

*1: ⚠ Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the diaphragm itself can be damaged and that material from the broken diaphragm and the fill fluid can contaminate the user’s process fluids.
Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above). Contact Yokogawa for detailed information of the wetted parts material.

*2: Applicable for Wetted parts material code S.

*3: Order the antenna separately from accessary option.

*4: Remote antenna cables can be attached. Order separately from accessary option.

Table 3. Wetted Parts Materials

Wetted parts material code	Cover flange and process connector	Capsule	Capsule gasket	Vent/Drain plug
S	ASTM CF-8M *1	Hastelloy C-276 *2 (Diaphragm) 316L SST (Others)	Teflon-coated 316L SST	316 SST
H	ASTM CF-8M *1	Hastelloy C-276 *2	PTFE Teflon	316 SST
M	ASTM CF-8M *1	Monel	PTFE Teflon	316 SST
T	ASTM CF-8M *1	Tantalum	PTFE Teflon	316 SST
A	Hastelloy C-276 equivalent *3	Hastelloy C-276 *2	PTFE Teflon	Hastelloy C-276 *2
D	Hastelloy C-276 equivalent *3	Tantalum	PTFE Teflon	Hastelloy C-276 *2
B	Monel equivalent *4	Monel	PTFE Teflon	Monel

*1: Cast version of 316 SST. Equivalent to SCS14A.

*2: Hastelloy C-276 or ASTM N10276.

*3: Indicated material is equivalent to ASTM CW-12MW.

*4: Indicated material is equivalent to ASTM M35-2.

11.3 Optional Specifications

■ OPTIONAL SPECIFICATIONS (For Explosion Protected type)

Item	Description	Code
Factory Mutual (FM)	FM Intrinsically safe Approval	**FS17**
ATEX	ATEX Intrinsically safe Approval	**KS27**
Canadian Standards Association (CSA)	CSA Intrinsically safe Approval	**CS17**
IECEx	IECEx Intrinsically safe Approval	**SS27**

■ OPTIONAL SPECIFICATIONS

Item		Description		Code
Painting	Color change	Amplifier cover only		**P□**
	Coating change	Anti-corrosion coating *1		**X2**
Oil-prohibited use*2		Degrease cleansing treatment		**K1**
		Degrease cleansing treatment and with fluorinated oilfilled capsule. Operating temperature -20 to 80°C (-4 to 176°F)		**K2**
Oil-prohibited use with dehydrating treatment*2		Degrease cleansing treatment and dehydrating treatment		**K5**
		Degrease cleansing treatment and dehydrating treatment with fluorinated oilfilled capsule. Operating temperature -20 to 80°C (-4 to 176°F)		**K6**
Capsule fill fluid		Fluorinated oil filled in capsule Operating temperature -20 to 80°C (-4 to 176°F)		**K3**
Calibration units*3		P calibration (psi unit)	(See Table for Span and Range Limits.)	**D1**
		bar calibration (bar unit)		**D3**
		M calibration (kgf/cm^2 unit)		**D4**
Long vent*4		Total length: 119 mm (standard: 34 mm); Total length when combining with option code K1, K2, K5, and K6: 130 mm. Material: 316 SST		**U1**
Gold-plated capsule gasket*5		Gold-plated 316L SST capsule gasket. Without drain and vent plugs.		**GS**
Gold-plated diaphragm*6		Surface of isolating diaphragms are gold plated, effective for hydrogen permeation.		**A1**
130 Pa abs calibration*7		Minimum input puressure at calibration testing: 130 Pa abs (1 mmHg abs)		**S1**
Body option*8		Without drain and vent plugs.		**N1**
		N1 and Process connection, based on IEC61518 with female thread on both sides of cover flange, with blind kidney flanges on back.		**N2**
		N2 and Material certificate for cover flange, diaphragm, capsule body, and blind kidney flange.		**N3**
European Pressure Directive*9		PED 2014/68/EU Category III, Module H, Type of Equipment: Pressure Accessory-Vessel, Type of Fluid: Liquid and Gas, Group of Fluid: 1 and 2.		**PE3**
Material certificate*10		Cover flange*11		**M01**
		Cover flange, Process connector*12		**M11**
Pressure test/ Leak test certificate		Test Pressure: 16 MPa (2300 psi)*13	Nitrogen(N_2) Gas*18 Retention time: one minute	**T12**
		Test Pressure: 25 MPa (3600 psi)*14		**T13**
		Test Pressure: 3.5 MPa (500 psi)*15		**T01**
		Test Pressure: 500 kPa (2000 inH_2O)*16		**T11**
		Test Pressure: 50 kPa (200 inH_2O)*17		**T04**
High Damping Capsule*19		High viscosity oil filled Lower limit of process temperature: 0°C Applicable for EJX110B with measurement span code M or H and wetted parts material code S.		**HD**

*1: Not applicable with color change option.
*2: Applicable for Wetted parts material code S, H, M, and T.
*3: The unit of MWP (Max. working pressure) on the name plate of the housing is the same unit as specified by Option code D1, D3, and D4.
*4: Applicable for vertical impulse piping type (Installation code -7) and Wetted parts material code S, H, M, and T.
*5: Applicable for wetted parts material code S; process connection code 0 and 5; and installation code -8 and -9. Not applicable for option code U1, N2, N3 and M11. No PTFE is used for wetted parts.

*6: Applicable for wetted parts material code S.
Overpressure effects for EJX110B M, H, and V capsules: ±0.06% of URL.
*7: Applicable only for EJX310B M and A capsules whose upper range value is set as smaller than 53.3 kPa abs.
*8: Applicable for Wetted parts material code S, H, M, and T; Process connection code 3, 4, and 5; Installation code -9; and Mounting bracket code N. Process connection faces on the other side of zero adjustment screw.
*9: Applicable for M, H and V capsules of EJX110B with wetted parts material code S.
*10: Material traceability certification, per EN 10204 3.1B.
*11: Applicable for Process connections code 0 and 5.
*12: Applicable for Process connections code 1, 2, 3, and 4.
*13: Applicable for Capsule code L of EJX110B, Capsule code B of EJX430B and EJX310B, and all the capsules of EJX110B with wetted parts maerial code H, M, T, A, D, and B.
*14: Applicable for Capsule code M, H, and V of EJX110B with wetted parts material code S.
*15: Applicable for Capsule code A of EJX430B and EJX310B.
*16: Applicable for Capsule code H of EJX430B.
*17: Applicable for Capsule code L and M of EJX310B.
*18: Pure nitrogen gas is used for oil-prohibited use (Option code K1, K2, K5, and K6).
*19: Not applicable for option code /K2, /K3, /K6, and /PE3.

■ OPTIONAL ACCESSORIES

Product	Part number	Specification
Battery pack assembly	F9915NQ*1	Battery case, Lithium-thionyl chloride batteries 2 pieces
Batteries*2	F9915NR	Lithium-thionyl chloride batteries, 2 pieces
Battery case	F9915NK*3	Battery case only
Remote antenna cable	F9915KU	3 m with mounting bracket
	F9915KV	13 m (3 m+10 m), with arrester and mounting bracket
Antenna	F9915KW	2 dBi standard antenna
	F9915KY	6 dBi high gain antenna*4

*1: If you need F9915MA, please purchase F9915NQ. F9915NQ is a set of F9915MA and instruction manual.
*2: Alternatively, Tadiran SL-2780/S or TL-5930/S batteries can be purchased from your local distributor.
*3: If you need F9915NS, please purchase F9915NK. F9915NK is a set of F9915NS and instruction manual.
*4: Use of high gain antenna is limited by local regulation of radio and telecommunication law. Consult Yokogawa for details.

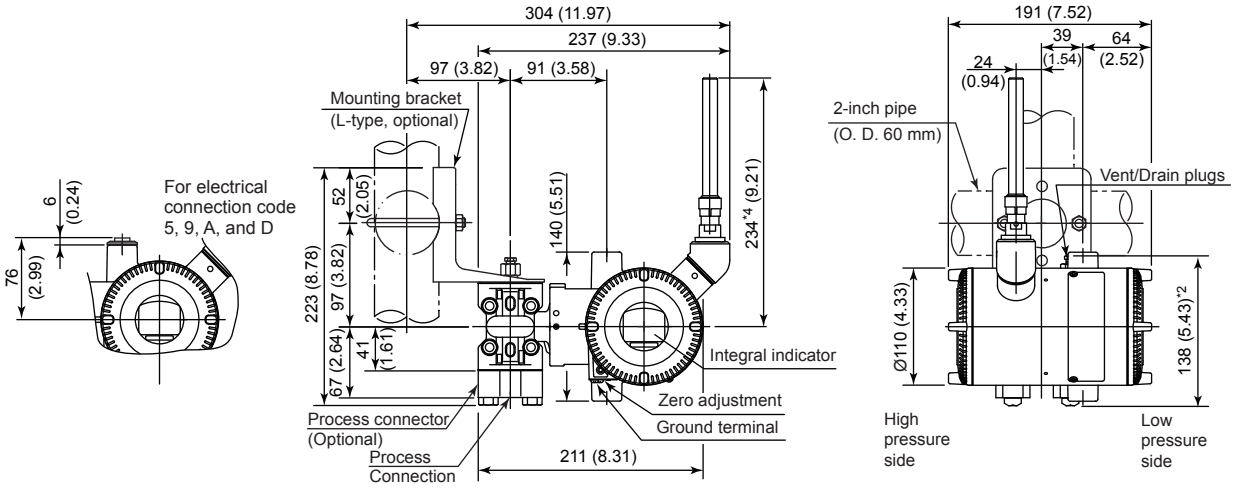
11.4 Dimensions

[EJX110B]

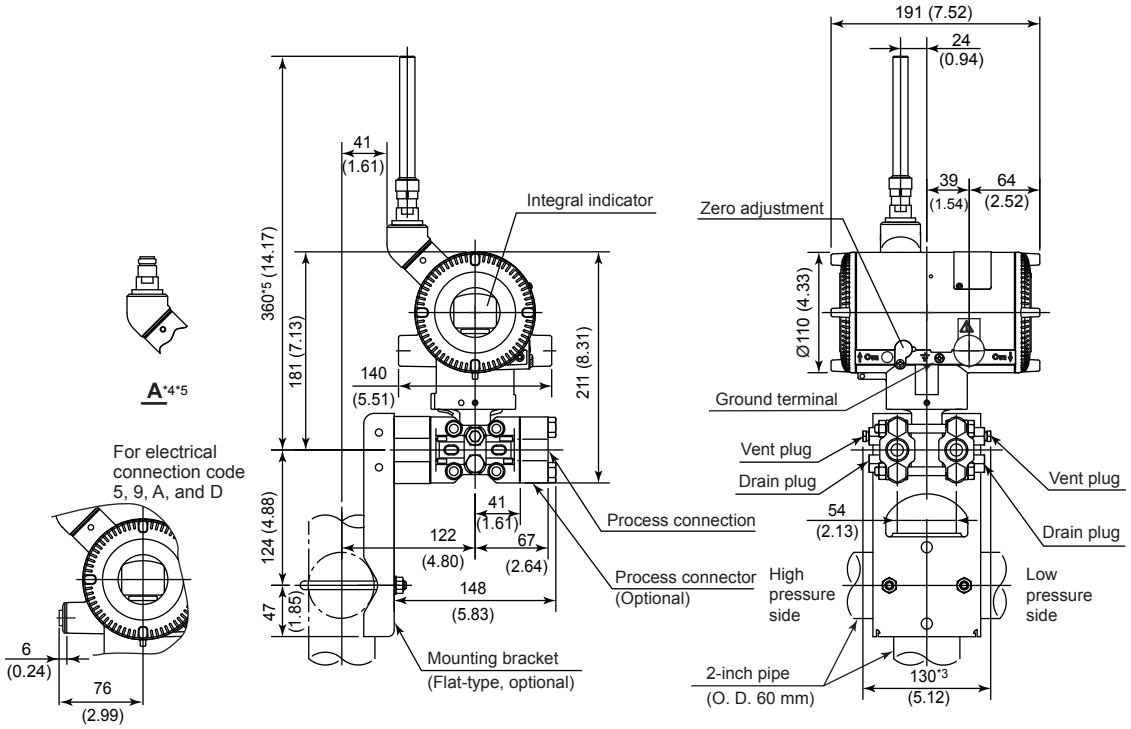
Unit: mm (approx. inch)

Wetted Parts Material Code S (Except for Measurement Span Code F and Option Code /HD)

● Vertical impulse piping type (Installation code -7 and Amplifier housing code 8)



● Horizontal impulse piping type (Installation code -9 and Amplifier housing code 8) *1



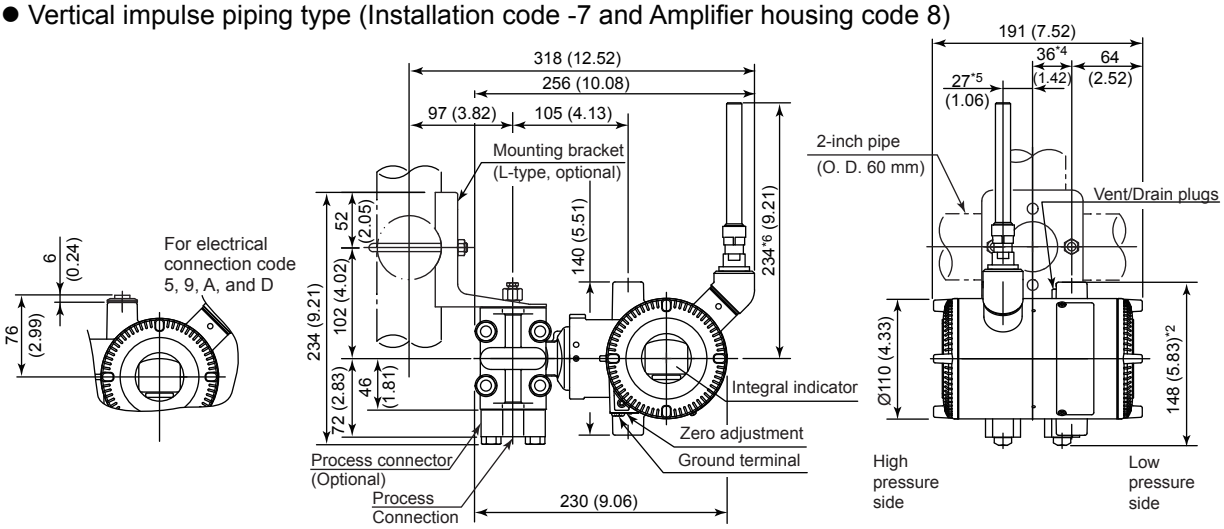
*1: When installation code -8 is selected, high and low pressure side on above figure are reversed.
(i.e. High pressure side is on the right side.)
*2: When option code K1, K2, K5, or K6 is selected, add 15 mm (0.59 inch) to the value in the figure.
*3: When option code K1, K2, K5, or K6 is selected, add 30 mm (1.18 inch) to the value in the figure.
*4: When amplifier housing code 9 is selected, the value is 114 mm (4.49 inch). In this case, the figure is shown as A.
*5: When amplifier housing code 9 is selected, the value is 240 mm (9.45 inch). In this case, the figure is shown as A.

F1103.ai

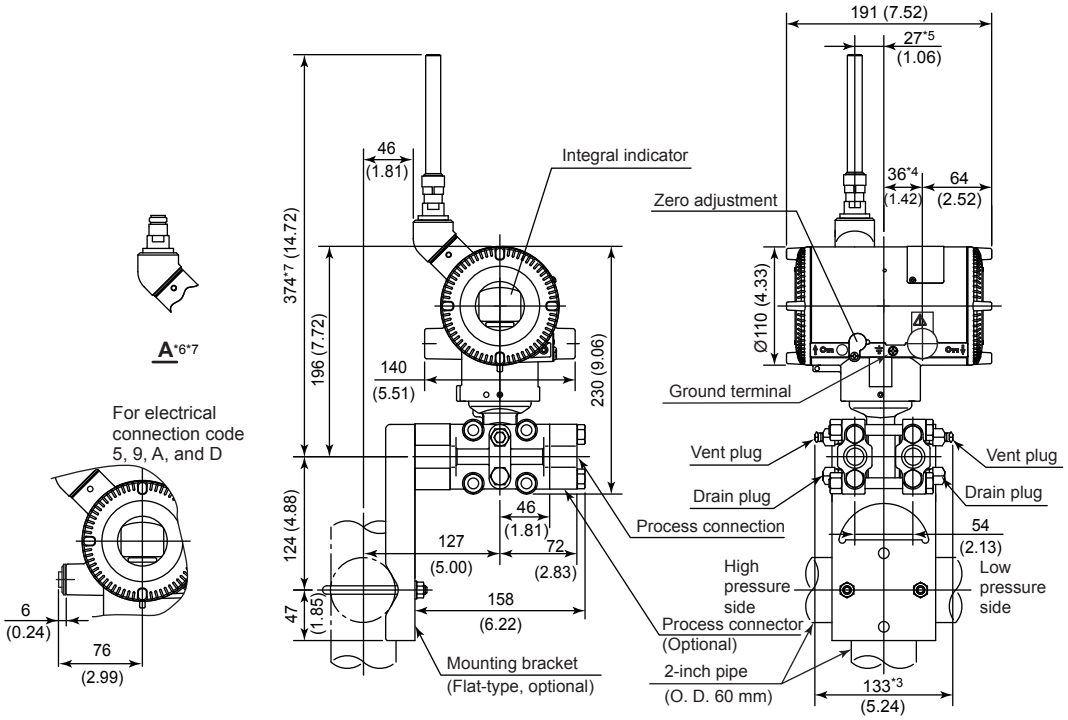
Unit: mm (approx. inch)

Wetted Parts Material Code: H, M, T, A, B, D, Measurement Span Code F or Option Code /HD

● Vertical impulse piping type (Installation code -7 and Amplifier housing code 8)



● Horizontal impulse piping type (Installation code -9 and Amplifier housing code 8) *1



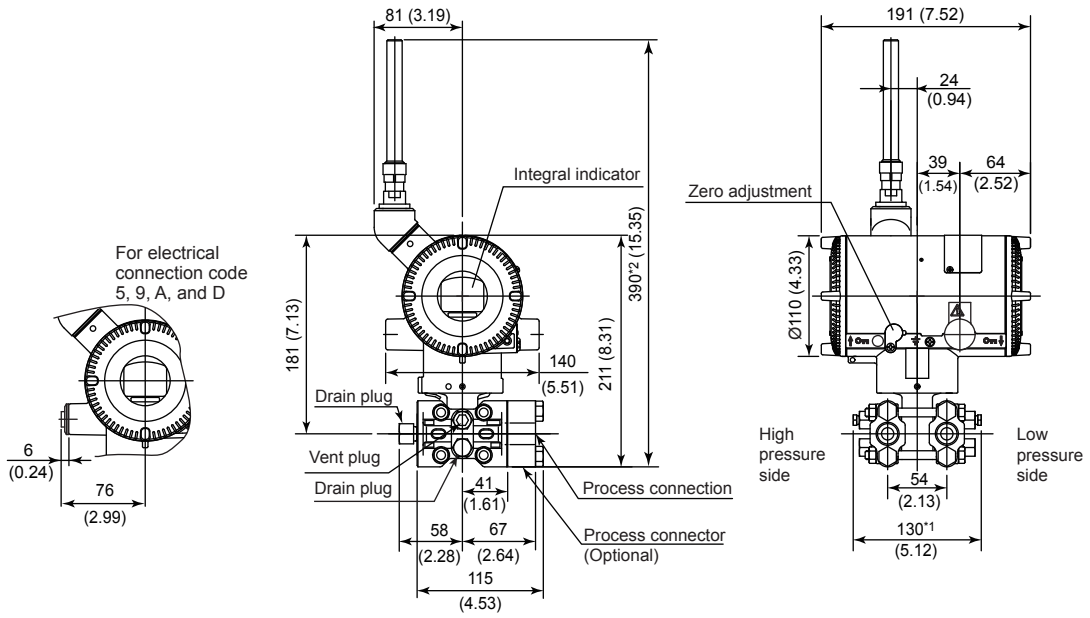
*1: When installation code -8 is selected, high and low pressure side on above figure are reversed.
(i.e. High pressure side is on the right side.)
*2: When option code K1, K2, K5, or K6 is selected, add 15 mm (0.59 inch) to the value in the figure.
*3: When option code K1, K2, K5, or K6 is selected, add 30 mm (1.18 inch) to the value in the figure.
*4: 42 mm (1.65 inch) for right side high pressure.
*5: 21 mm (0.83 inch) for right side high pressure.
*6: When amplifier housing code 9 is selected, the value is 114 mm (4.49 inch). In this case, the figure is shown as A.
*7: When amplifier housing code 9 is selected, the value is 254 mm (10.00 inch). In this case, the figure is shown as A.

F1104.ai

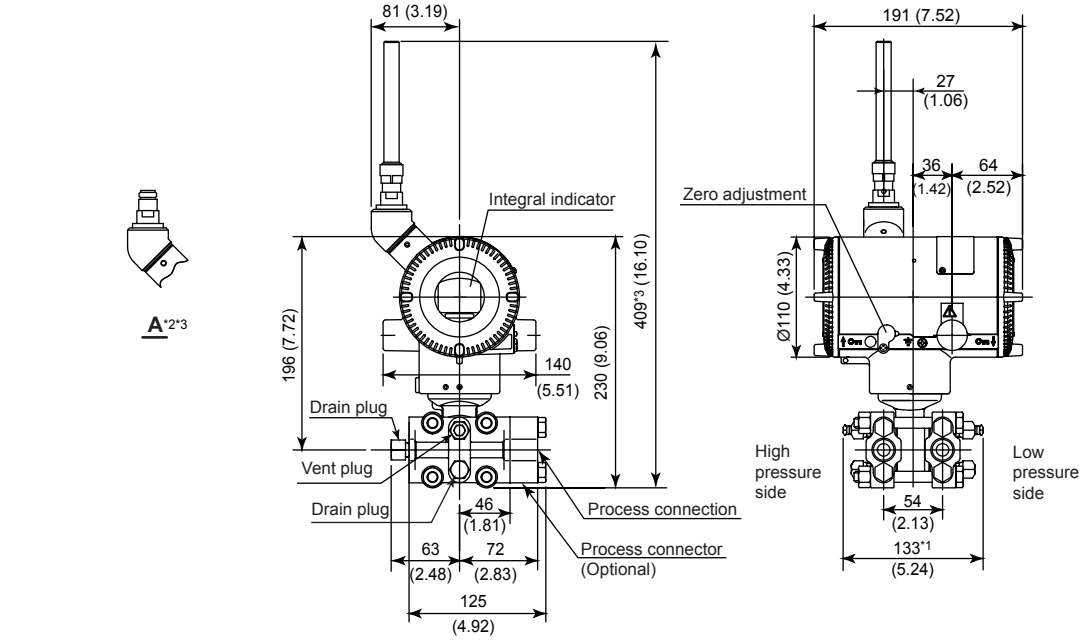
Unit: mm (approx. inch)

● Universal flange type (Installation code -U and Amplifier housing code 8)

Measurement span code M, H and V



Measurement span code F

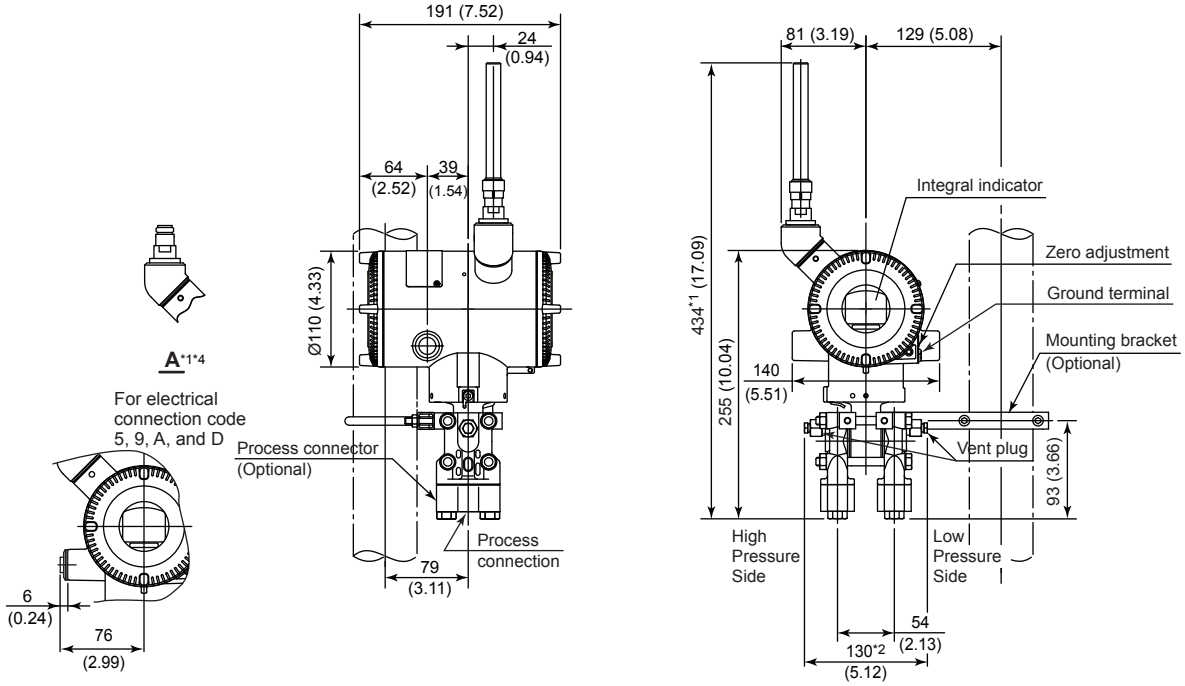


*1: When option code K1, K2, K5, or K6 is selected, add 30 mm (1.18 inch) to the value in the figure..
*2: When amplifier housing code 9 is selected, the value is 270 mm (10.63 inch). In this case, the figure is shown as A.
*3: When amplifier housing code 9 is selected, the value is 289 mm (11.38 inch). In this case, the figure is shown as A.

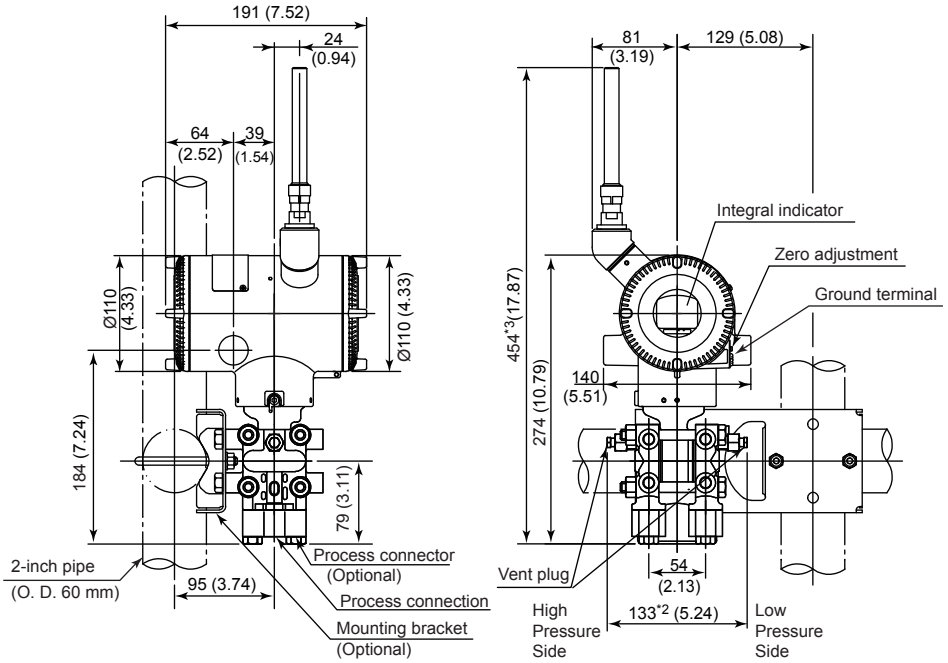
F1105-01.ai

Unit: mm (approx. inch)

● Bottom process connection type (Installation code -B and Amplifier housing code 8)
Measurement span code M, H and V, except for option code /HD



Measurement span code F or option code /HD



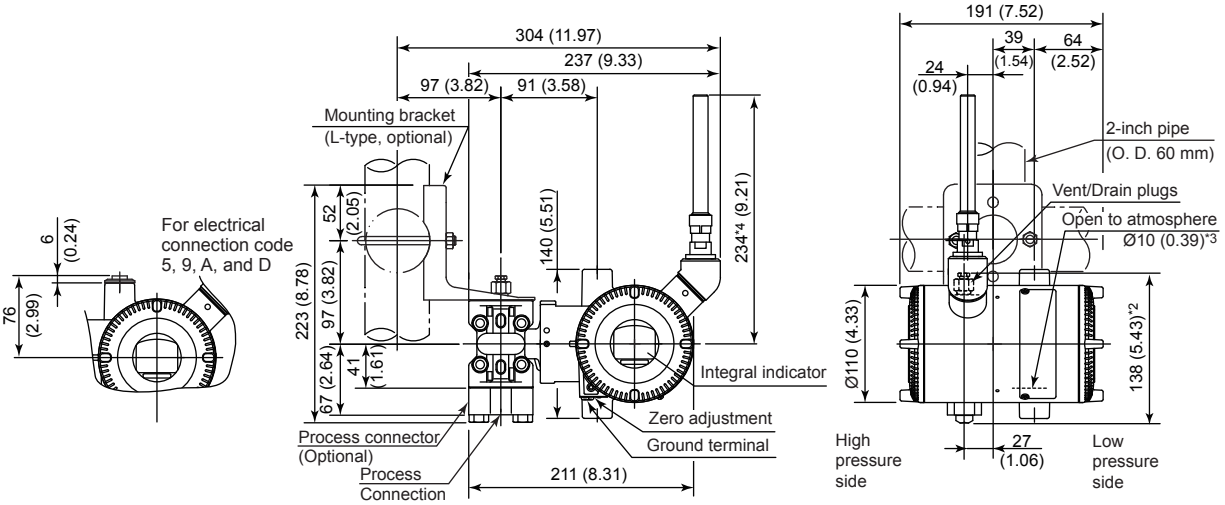
*1: When amplifier housing code 9 is selected, the value is 314 mm (12.36 inch). In this case, the figure is shown as A.
*2: When option code K1, K2, K5 or K6 is selected, add 30 mm (1.18 inch) to the value in the figure.
*3: When amplifier housing code 9 is selected, the value is 334 mm (13.15 inch). In this case, the figure is shown as A.

F1105-02.ai

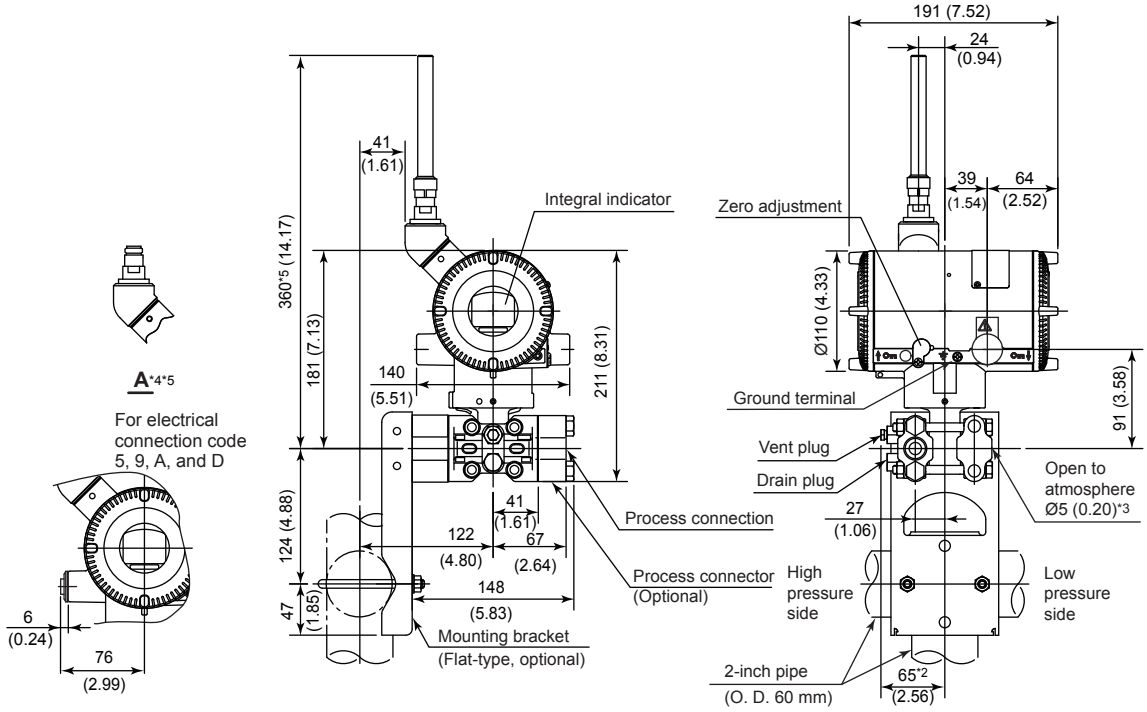
Unit: mm (approx. inch)

[EJX310B and EJX430B]
Wetted parts material code: S

● Vertical impulse piping type (Installation code -7 and Amplifier housing code 8) *1



● Horizontal impulse piping type (Installation code -9 and Amplifier housing code 8) *1



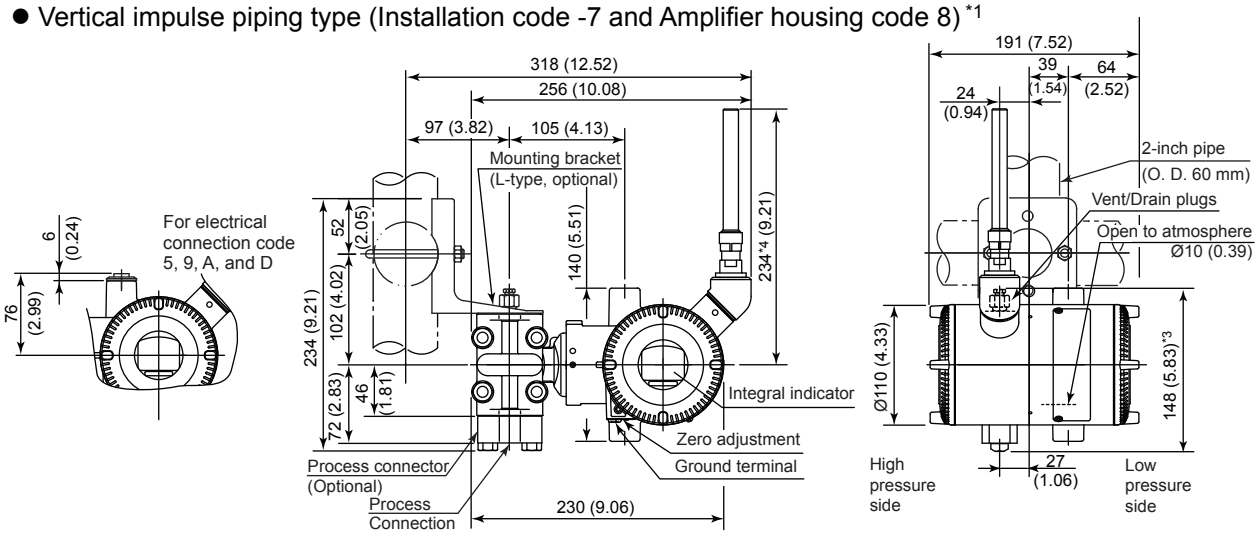
*1: When installation code -3 and -8 is selected, high and low pressure side on above figure are reversed.
(i.e. High pressure side is on the right side.)
*2: When option code K1, K2, K5, or K6 is selected, add 15 mm (0.59 inch) to the value in the figure.
*3: Applicable for EJX430B.
*4: When amplifier housing code 9 is selected, the value is 114 mm (4.49 inch). In this case, the figure is shown as A.
*5: When amplifier housing code 9 is selected, the value is 240 mm (9.45 inch). In this case, the figure is shown as A.

F1106.ai

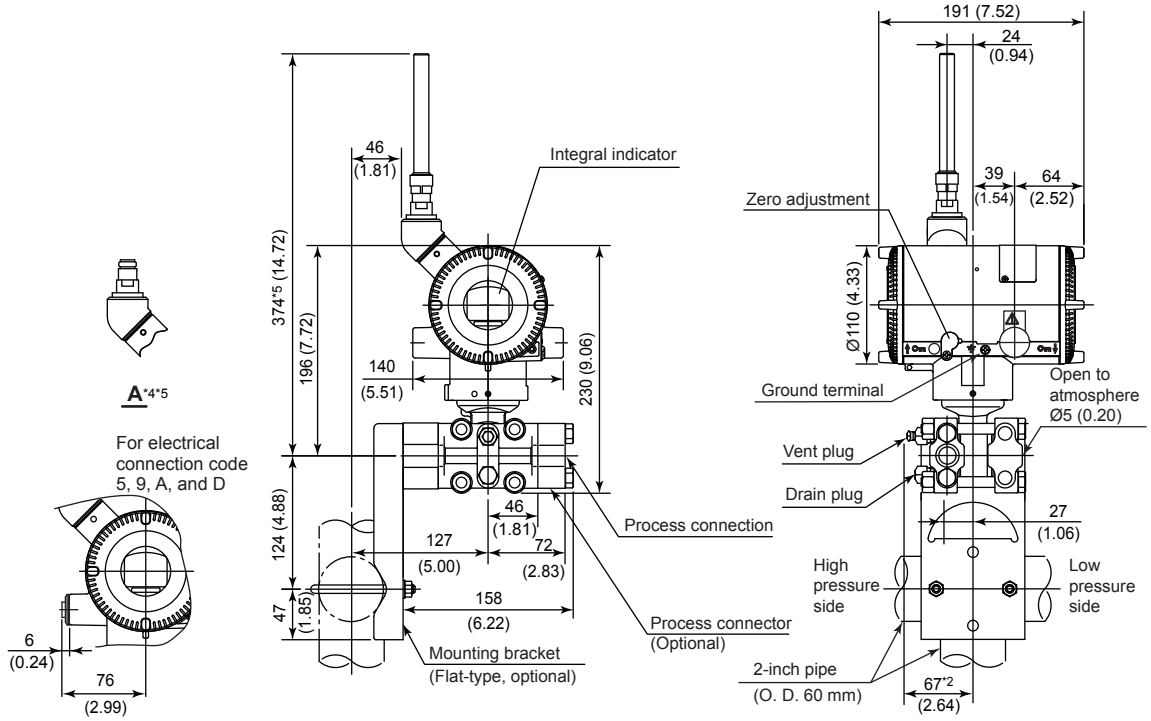
Unit: mm (approx. inch)

Wetted parts material code: H, M, T, A, B, and D*3

● Vertical impulse piping type (Installation code -7 and Amplifier housing code 8) *1



● Horizontal impulse piping type (Installation code -9 and Amplifier housing code 8) *1

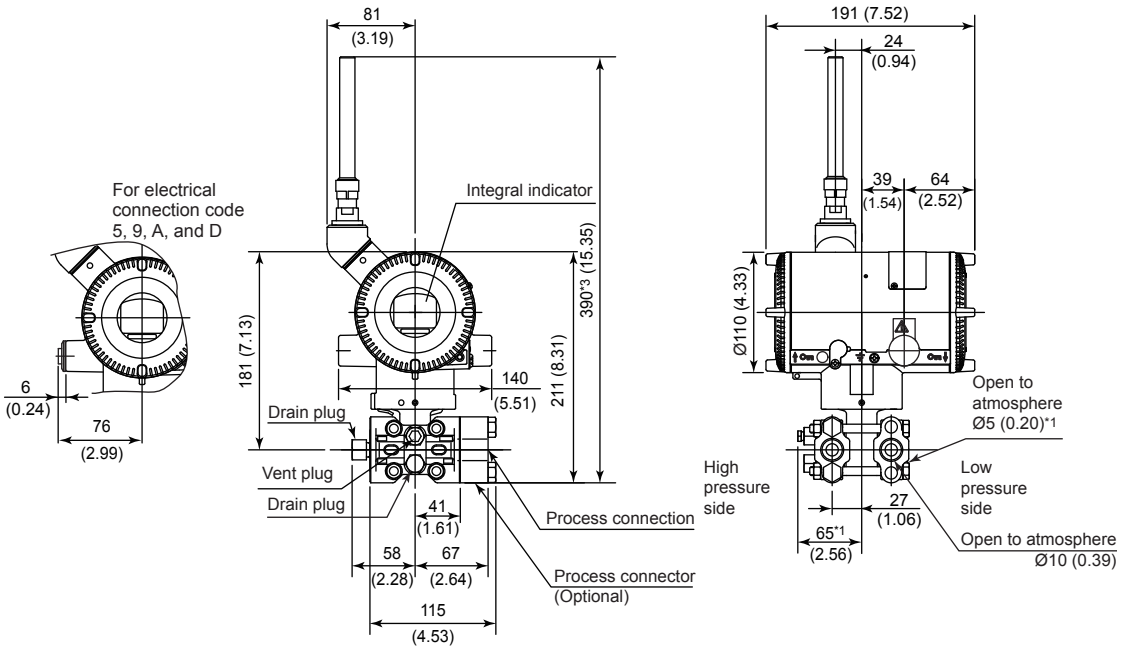


*1: When installation code -3 and -8 is selected, high and low pressure side on above figure are reversed.
(i.e. High pressure side is on the right side.)
*2: When option code K1, K2, K5, or K6 is selected, add 15 mm (0.59 inch) to the value in the figure.
*3: Applicable for EJX430B.
*4: When amplifier housing code 9 is selected, the value is 114 mm (4.49 inch). In this case, the figure is shown as A.
*5: When amplifier housing code 9 is selected, the value is 254 mm (10.00 inch). In this case, the figure is shown as A.

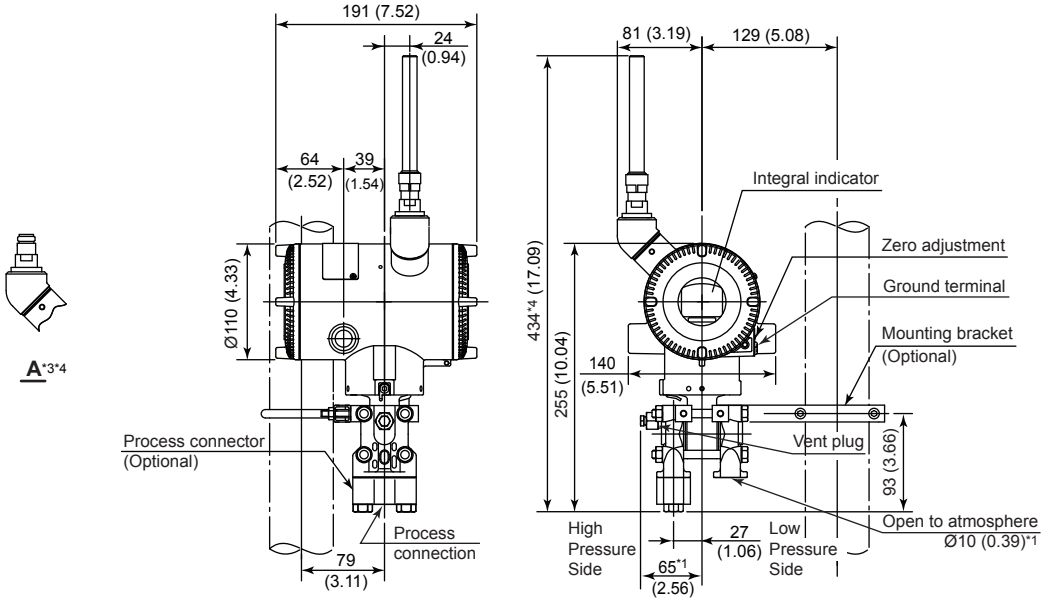
F1107.ai

Unit: mm (approx. inch)

● Universal flange type (Installation code -U and Amplifier housing code 8)



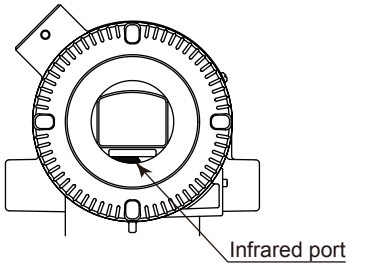
● Bottom process connection type (Installation code -B and Amplifier housing code 8)



*1: Applicable for EJX430B.
*2: When option code K1, K2, K5, or K6 is selected, add 15 mm (0.59 inch) to the value in the figure.
*3: When amplifier housing code 9 is selected, the value is 270 mm (10.63 inch). In this case, the figure is shown as A.
*4: When amplifier housing code 9 is selected, the value is 314 mm (12.36 inch). In this case, the figure is shown as A.

F1108.ai

● Infrared Configuration



F1109.ai

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Revision Information

- Title : EJX110B, EJX310B and EJX430B
  Differential Pressure and Pressure Transmitters
- Manual No. : IM 01C27B01-01EN

Edition	Date	Page	Revised Item
1st	May 2009	—	New publication
2nd	Aug. 2010	—	Release of ISA100.11a protocol
3rd	Oct. 2010	2-5 2-6 11-6	2.8.3 Add description of CENELEC ATEX (KEMA) Certification) 2.8.4 Add description of IECEx Certification 11.3 Add option code /KS27 and /SS27.
4th	Apr. 2011	—	• Adapted to device configuration tool with infrared communication function. • Part number change Battery pack: F9915MA → F9915NQ Delete F9915MX Battery: A1133EB → F9915NR Delete battery case part number
5th	Dec. 2011	9-7	9.4.8 Add battery case part number of F9915NK.
6th	Aug. 2012	—	Release of amplifier housing code 8 and 9.
7th	Oct. 2012	— 2-5, 2-6 11-2	Release of ATEX/IECEx intrinsic safe for amplifier housing code 8 and 9. 2.8.3, 2.8.4 Change the descriptions and the installation diagram. 11.1 Delete the limitation use for France.
8th	June 2013	—	Release of CSA intrinsic safe for amplifier housing code 8 and 9.
9th	Jan. 2014	—	Release of FM intrinsic safe for amplifier housing code 8 and 9.
10th	July 2015	11-2 11-4, 11-6, 11-7 11-9	Revise descriptions for EMC conformity standards. Change of the material for mounting bracket D and K. Add notes to the table of optional accessories.
11th	Oct. 2015	2-1, 2-2, 4-2, 5-2, 7-2 9-5, 11-1, 11-2, 11-8, 11-9, 11-10 to 11-13 11-4, 11-13 11-10 to 16	L bracket change. Add /HD. Add Bottom process connection for measurement code F. Correct dimensions.
12th	May 2017	— — 1-1, 1-2, 2-10 1-2 1-2 1-5 2-8,11-8 2-6 11-9	Change due to YFGW710 discontinuation Change due to “Amplifier Code 7” discontinuation Change due to RoHS Addition of Patent Making Addition of Product Disposal information Addition of China RoHS Revision of PED descriptions Revision of the applicable standard for ATEX Deletion of F9915KX due to RoHS