User's Manual

# Model EJA510A and EJA530A Absolute Pressure and Gauge Pressure Transmitters [Style: S2]

IM 01C21F01-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 01C21F01-01E
9th Edition

# Model EJA510A and EJA530A
# Absolute Pressure and Gauge Pressure Transmitters
# [Style: S2]

IM 01C21F01-01E 9th Edition

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**Absolute and Gauge Pressure Transmitter ..... CMPL 01C21F01-01E**
**Revision Information**

# 1. Introduction

Thank you for purchasing the DPharp electronic pressure transmitter.

The DPharp Pressure Transmitters are precisely calibrated at the factory before shipment. To ensure correct and efficient use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

## ■ Regarding This Manual

- This manual should be passed on to the end user.
- The contents of this manual are subject to change without prior notice.
- All rights reserved. No part of this manual may be reproduced in any form without Yokogawa's written permission.
- Yokogawa makes no warranty of any kind with regard to this manual, including, but not limited to, implied warranty of merchantability and fitness for a particular purpose.
- If any question arises or errors are found, or if any information is missing from this manual, please inform the nearest Yokogawa sales office.
- The specifications covered by this manual are limited to those for the standard type under the specified model number break-down and do not cover custom-made instruments.
- Please note that changes in the specifications, construction, or component parts of the instrument may not immediately be reflected in this manual at the time of change, provided that postponement of revisions will not cause difficulty to the user from a functional or performance standpoint.
- Yokogawa assumes no 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.

**NOTE**

For FOUNDATION Fieldbus™, PROFIBUS PA and HART protocol versions, please refer to IM 01C22T02-01E, IM 01C22T03-00E and IM 01C22T01-01E respectively, in addition to this manual.

- The following safety symbol marks are used in this manual:

**WARNING**

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

**CAUTION**

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

**IMPORTANT**

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

**NOTE**

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

⎓ Direct current

## 1.1 For Safe Use of Product

For the protection and safety of the operator and the instrument or the system including the instrument, please be sure to follow the instructions on safety described in this manual when handling this instrument. In case the instrument is handled in contradiction to these instructions, Yokogawa does not guarantee safety. Please give your attention to the followings.

### (a) Installation

- The instrument must be installed by an expert engineer or a skilled personnel. The procedures described about INSTALLATION are not permitted for operators.
- In case of high process temperature, care should be taken not to burn yourself because the surface of body and case reaches a high temperature.
- The instrument installed in the process is under pressure. Never loosen the process connector bolts to avoid the dangerous spouting of process fluid.
- During draining condensate from the pressuredetector section, take appropriate care to avoid contact with the skin, eyes or body, or inhalation of vapors, if the accumulated process fluid may be toxic or otherwise harmful.
- When removing the instrument from hazardous processes, avoid contact with the fluid and the interior of the meter.
- All installation shall comply with local installation requirement and local electrical code.

### (b) Wiring

- The instrument must be installed by an expert engineer or a skilled personnel. The procedures described about WIRING are not permitted for operators.
- Please confirm that voltages between the power supply and the instrument before connecting the power cables and that the cables are not powered before connecting.

### (c) Operation

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

### (d) Maintenance

- Please do not carry out except being written to a maintenance descriptions. When these procedures are needed, please contact nearest YOKOGAWA office.
- Care should be taken to prevent the build up of drift, dust or other material on the display glass and name plate. In case of its maintenance, soft and dry cloth is used.

### (e) Explosion Protected Type Instrument

- Users of explosion proof instruments should refer first to section 2.9 (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.

### (f) Modification

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

## 1.2 Warranty

- The warranty shall cover the period noted on the quotation presented to the purchaser at the time of purchase. Problems occurred during the warranty period shall basically be repaired free of charge.
- In case of problems, the customer should contact the Yokogawa representative from which the 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.
- Responsible party for repair cost for the problems shall be determined by Yokogawa based on our investigation.
- 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.
  - Failure or damage due to improper handling, use or storage which is out of design conditions.
  - 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.

## 1.3 ATEX Documentation

This procedure 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 ję zyku, 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 lil l-eqreb rappreżentan jew uffiċċju ta' Yokogawa.

# 2. Handling Cautions

This chapter describes important cautions regarding how to handle the transmitter. Read carefully before using the transmitter.

The EJA-A Series pressure transmitters are thoroughly tested at the factory before shipment. When the transmitter is delivered, 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 was ordered without the mounting bracket, the transmitter mounting hardware is not included. After checking the transmitter, repack it in the way it was delivered until installation.

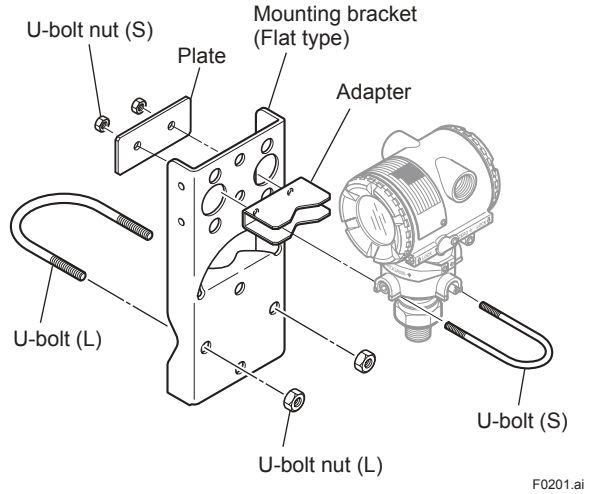



**Figure 2.1 Transmitter Mounting Hardware**

## 2.1 Model and Specifications Check

The model name and specifications are indicated on the name plate attached to the case. If the reverse operating mode was ordered (reverse signal), 'REVERSE' will be inscribed in field *1.

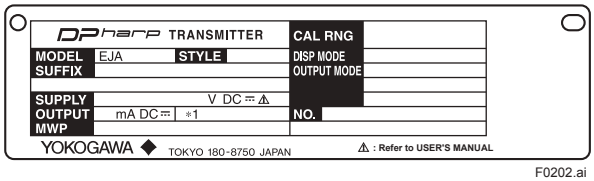



**Figure 2.2 Name Plate**

## 2.2 Unpacking

When moving the transmitter to the installation site, keep it in its original packaging. Then, unpack the transmitter there to avoid damage on the way.

## 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 water.
- It suffers minimum vibration and shock.
- It has an ambient temperature and relative humidity within the following ranges.

Ambient temperature:
-40 to 85°C without integral indicator
-30 to 80°C with integral indicator
Relative humidity:
5% to 100% R.H. (at 40°C)
Preferred temperature and humidity:
approx. 25°C and 65% R.H.

(b) When storing the transmitter, repack it as nearly as possible to the way it was packed when delivered from the factory.

(c) If storing a transmitter that has been used, thoroughly clean the chambers inside the body, so that no measured fluid remains in it. Also make sure before storing that the transmitter assemblies are securely mounted.

## 2.4 Selecting the Installation Location

The transmitter is designed to withstand severe environmental conditions. However, to ensure stable and accurate operation for years, observe the following precautions when selecting an installation location.

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

(b) Ambient Atmosphere
Avoid installing the transmitter in a corrosive atmosphere. If the transmitter must be installed in a corrosive atmosphere, there must be adequate ventilation as well as measures to prevent intrusion or stagnation of rain water in conduits.

(c) Shock and Vibration
Select an installation site suffering minimum shock and vibration (although the transmitter is designed to be relatively resistant to shock and vibration).

(d) Installation of Explosion-protected Transmitters
Explosion-protected transmitters can be installed in hazardous areas according to the types of gases for which they are certified.
See Subsection 2.9 “Installation of Explosion Protected Type Transmitters.”

## 2.5 Pressure Connection

**WARNING**

- Instrument installed in the process is under pressure. Never loosen the process connector bolts to avoid the dangerous spouting of process fluid.
- During draining condensate from the capsule assembly, take appropriate care to avoid contact with the skin, eyes or body, or inhalation of vapors, if the accumulated process fluid may be toxic or otherwise harmful.

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

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

## 2.6 Waterproofing of Cable Conduit Connections

Apply a non-hardening sealant to the threads to waterproof the transmitter cable conduit connections. (See Figure 6.7, 6.8 and 6.9.)

## 2.7 Restrictions on Use of Radio Transceiver

**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 for such effects, bring the transceiver in use slowly from a distance of several meters from the transmitter, and observe the measurement loop for noise effects. Thereafter, always use the transceiver outside the area affected by noise.

## 2.8 Insulation Resistance and Dielectric Strength Test

Since the transmitter has undergone insulation resistance and dielectric strength tests at the factory before shipment, normally these tests are not required. However, if required, observe the following precautions in the test procedures.

(a) Do not perform such tests more frequently than is absolutely necessary. Even test voltages that do not cause visible damage to the insulation may degrade the insulation and reduce safety margins.
(b) Never apply a voltage exceeding 500 V DC (100 V DC with an internal lightning protector) for the insulation resistance test, nor a voltage exceeding 500 V AC (100 V AC with an internal lightning protector) for the dielectric strength test.
(c) Before conducting these tests, disconnect all signal lines from the transmitter terminals. Perform the tests in the following procedure:

**• Insulation Resistance Test**

1) Short-circuit the + and – SUPPLY terminals in the terminal box.
2) Turn OFF the insulation tester. Then connect the insulation tester plus (+) lead wire to the shorted SUPPLY terminals and the minus (–) leadwire to the grounding terminal.
3) Turn ON the insulation tester power and measure the insulation resistance. The voltage should be applied short as possible to verify that the insulation resistance is at least 20 MΩ.

4) After completing the test and being very careful not to touch exposed conductors disconnect the insulation tester and connect a 100 kΩ resistor between the grounding terminal and the short-circuiting SUPPLY terminals. Leave this resistor connected at least one second to discharge any static potential. Do not touch the terminals while it is discharging.

**• Dielectric Strength Test**

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

## 2.9 Installation of Explosion Protected Type

In this section, further requirements and differences and for explosionproof type instrument are described. For explosionproof type instrument, the description in this chapter is prior to other description in this users manual.

For the intrinsically safe equipment and explosionproof equipment, in case the instrument is not restored to its original condition after any repair or modification undertaken by the customer, intrinsically safe construction or explosionproof construction is damaged and may cause dangerous condition. Please contact Yokogawa for any repair or modification required to the instrument.

**NOTE**

For FOUNDATION Fieldbus and PROFIBUS PA explosion protected type, please refer to IM 01C22T02-01E and IM 01C22T03-00E respectively.

**CAUTION**

This instrument is tested and certified as intrinsically safe type or explosionproof type. Please note that the construction of the instrument, installation, external wiring, maintenance or repair is strictly restricted, and non-observance or negligence of this restriction would result in dangerous condition.

**WARNING**

To preserve the safety of explosionproof equipment requires great care during mounting, wiring, and piping. Safety requirements also place restrictions on maintenance and repair activities. Please read the following sections very carefully.

### 2.9.1 FM Approval

#### a. FM Intrinsically Safe Type

Caution for FM intrinsically safe type. (Following contents refer "DOC. No. IFM012-A12 P.1 and 2.")

Note 1. Model EJA Series pressure transmitters with optional code /FS1 are applicable for use in hazardous locations.

- Applicable Standard: FM3600, FM3610, FM3611, FM3810, ANSI/NEMA250
- 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 Hazardous Locations.
- Nonincendive for Class I, Division 2, Groups A, B, C & D. Class II, Division 2, Groups E, F & G and Class III, Division 1 Hazardous Locations.
- Outdoor hazardous locations, NEMA 4X.
- Temperature Class: T4
- Ambient temperature: –40 to 60°C

Note 2. Entity Parameters

- Intrinsically Safe Apparatus Parameters [Groups A, B, C, D, E, F and G]

| | |
|---|---|
| Vmax = 30 V | Ci = 22.5 nF |
| Imax = 165 mA | Li = 730 µH |
| Pmax = 0.9 W | |

* Associated Apparatus Parameters
(FM approved barriers)

| | |
|---|---|
| Voc ≤ 30 V | Ca > 22.5 nF |
| Isc ≤ 165 mA | La > 730 µH |
| Pmax ≤ 0.9W | |

- Intrinsically Safe Apparatus Parameters
[Groups C, D, E, F and G]

| | |
|---|---|
| Vmax = 30 V | Ci = 22.5 nF |
| Imax = 225 mA | Li = 730 µH |
| Pmax = 0.9 W | |

* Associated Apparatus Parameters
(FM approved barriers)

| | |
|---|---|
| Voc ≤ 30 V | Ca > 22.5 nF |
| Isc ≤ 225 mA | La > 730 µH |
| Pmax ≤ 0.9 W | |

- Entity Installation Requirements
Vmax ≥ Voc or Vt, Imax ≥ Isc or It,
Pmax (IS Apparatus) ≥ Pmax (Barrier)
Ca ≥ Ci + Ccable, La ≥ Li + Lcable

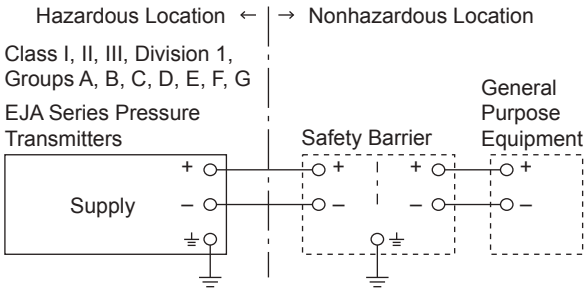
Note 3. Installation

- Barrier must be installed in an enclosure that meets the requirements of ANSI/ISA S82.01.
- Control equipment connected to barrier must not use or generate more than 250 V rms or V dc.
- Installation should be in accordance with ANSI/ISA RP12.6 “Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations” and the National Electric Code (ANSI/NFPA 70).
- The configuration of associated apparatus must be FMRC Approved.
- Dust-tight conduit seal must be used when installed in a Class II, III, Group E, F and G environments.
- Associated apparatus manufacturer’s installation drawing must be followed when installing this apparatus.
- The maximum power delivered from the barrier must not exceed 0.9 W.
- Note a warning label worded “SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY,” and “INSTALL IN ACCORDANCE WITH DOC. No. IFM012-A12 P.1 and 2.”

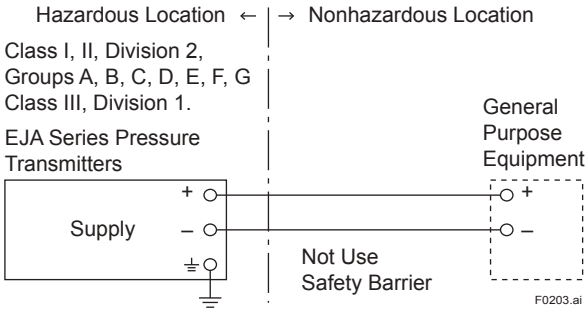
Note 4. Maintenance and Repair

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

[Intrinsically Safe]




[Nonincendive]




### b. FM Explosionproof Type

Caution for FM explosionproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /FF1 are applicable for use in hazardous locations.

- Applicable Standard: FM3600, FM3615, FM3810, ANSI/NEMA250
- Explosionproof for Class I, Division 1, Groups B, C and D.
- Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G.
- Outdoor hazardous locations, NEMA 4X.
- Temperature Class: T6
- Ambient Temperature: –40 to 60°C
- Supply Voltage: 42 V dc max.
- Output signal: 4 to 20 mA

Note 2. Wiring
- All wiring shall comply with National Electrical Code ANSI/NEPA70 and Local Electrical Codes.
- When installed in Division 1, “FACTORY SEALED, CONDUIT SEAL NOT REQUIRED.”

Note 3. Operation
- Keep the “CAUTION” nameplate attached to the transmitter.
  CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER. SEAL ALL CONDUITS WITHIN 18 INCHES. WHEN INSTALLED IN DIV.1, “FACTORY SEALED, CONDUIT SEAL NOT REQUIRED.” INSTALL IN ACCORDANCE WITH THE INSTRUCTION MANUAL IM 1C22.
- Take care not to generate mechanical sparking when accessing to the instrument and peripheral devices in a hazardous location.

Note 4. Maintenance and Repair
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void Factory Mutual Explosionproof Approval.

**c. FM Intrinsically Safe Type/FM Explosionproof Type**

Model EJA Series pressure transmitters with optional code /FU1 can be selected the type of protection (FM Intrinsically Safe or FM Explosionproof) for use in hazardous locations.

Note 1. For the installation of this transmitter, once a particular type of protection is selected, any other type of protection cannot be used. The installation must be in accordance with the description about the type of protection in this instruction manual.

Note 2. In order to avoid confusion, unnecessary marking is crossed out on the label other than the selected type of protection when the transmitter is installed.

### 2.9.2 CSA Certification

**a. CSA Intrinsically Safe Type**

Caution for CSA Intrinsically safe type.
(Following contents refer to “DOC No. ICS003-A12 P.1-1 and P.1-2.”)

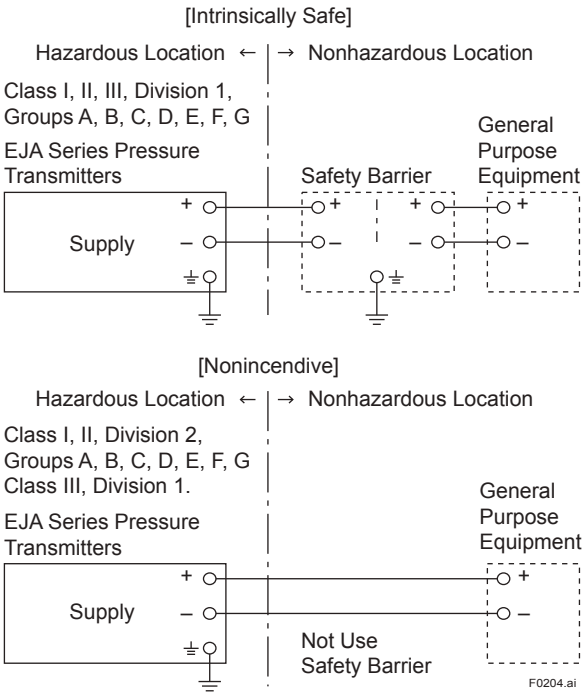
Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /CS1 are applicable for use in hazardous locations

Certificate: 1053843
- Applicable Standard: C22.2 No.0, No.0.4, No.25, No.30, No.94, No.142, No.157, No.213
- 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 Hazardous Locations.
- Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division 2, Groups F & G, and Class III, Hazardous Locations. (not use Safety Barrier)
- Encl. “Type 4X”
- Temperature Class: T4
- Ambient temperature: –40* to 60°C
  * –15°C when /HE is specified.
- Process Temperature: 120°C max.

Note 2. Entity Parameters
- Intrinsically safe ratings are as follows:
  Maximum Input Voltage (Vmax) = 30 V
  Maximum Input Current (Imax) = 165 mA
  Maximum Input Power (Pmax) = 0.9 W
  Maximum Internal Capacitance (Ci) = 22.5nF
  Maximum Internal Inductance (Li) = 730 µH

* Associated apparatus (CSA certified barriers)
  Maximum output voltage (Voc) ≤ 30 V
  Maximum output current (Isc) ≤ 165 mA
  Maximum output power (Pmax) ≤ 0.9 W

Note 3. Installation
- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation and Yokogawa Corporation of America is prohibited and will void Canadian Standards Intrinsically safe and nonincendive Certification.




### b. CSA Explosionproof Type

Caution for CSA explosionproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /CF1 are applicable for use in hazardous locations:

Certificate: 1089598

- Applicable Standard: C22.2 No.0, No.0.4, No.25, No.30, No.94, No.142
- Explosionproof for Class I, Division 1, Groups B, C and D.
- Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G.
- Encl "Type 4X"
- Temperature Class: T6, T5, and T4
- Process Temperature: 85°C (T6),100°C (T5), and 120°C (T4)
- Ambient Temperature: –40* to 80°C
  * –15°C when /HE is specified.
- Supply Voltage: 42 V dc max.
- Output Signal: 4 to 20 mA

Note 2. Wiring

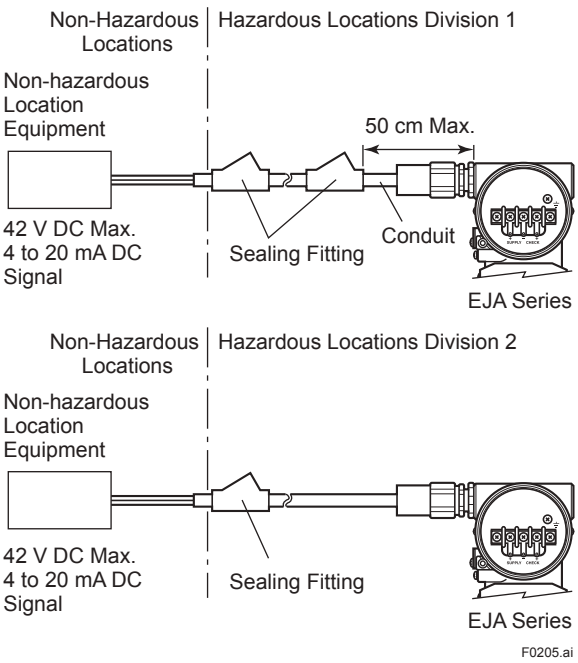
- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- In hazardous location, wiring shall be in conduit as shown in the figure.
  CAUTION: SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE.
  UN SCELLEMENT DOIT ÊTRE INSTALLÉ À MOINS DE 50 cm DU BîTIER.
- When installed in Division 2, "SEALS NOT REQUIRED."

Note 3. Operation

- Keep the "CAUTION" label attached to the transmitter.
  CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER.
  OUVRIR LE CIRCUIT AVANT D´NLEVER LE COUVERCLE.
- Take care not to generate mechanical sparking when accessing to the instrument and peripheral devices in a hazardous location.

Note 4. Maintenance and Repair

- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation and Yokogawa Corporation of America is prohibited and will void Canadian Standards Explosionproof Certification.




### c. CSA Intrinsically Safe Type/CSA Explosionproof Type

Model EJA Series pressure transmitters with optional code /CU1 can be selected the type of protection (CSA Intrinsically Safe or CSA Explosionproof) for use in hazardous locations.

Note 1. For the installation of this transmitter, once a particular type of protection is selected, any other type of protection cannot be used. The installation must be in accordance with the description about the type of protection in this instruction manual.

Note 2. In order to avoid confusion, unnecessary marking is crossed out on the label other than the selected type of protection when the transmitter is installed.

### 2.9.3 IECEx Certification

Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /SU2 can be selected the type of protection (IECEx Intrinsically Safe/type n or flameproof) for use in hazardous locations.

Note 1. For the installation of this transmitter, once a particular type of protection is selected, any other type of protection cannot be used. The installation must be in accordance with the description about the type of protection in this instruction manual.

Note 2. In order to avoid confusion, unnecessary marking is crossed out on the label other than the selected type of protection when the transmitter is installed.

#### a. IECEx Intrinsically Safe Type / type n

Caution for IECEx Intrinsically safe and type n.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /SU2 are applicable for use in hazardous locations.

- No. IECEx KEM 06.0007X
- Applicable Standard: IEC 60079-0:2004, IEC 60079-11:1999, IEC 60079-15:2005, IEC 60079-26:2004
- Type of Protection and Marking Code: Ex ia IIC T4, Ex nL IIC T4
- Ambient Temperature: –40 to 60°C
- Max. Process Temp.: 120°C
- Enclosure: IP67

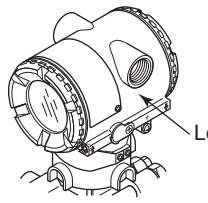
Note 2. Entity Parameters

- Intrinsically safe ratings are as follows:
  Maximum Input Voltage (Ui) = 30 V
  Maximum Input Current (Ii) = 165 mA
  Maximum Input Power (Pi) = 0.9 W
  Maximum Internal Capacitance (Ci) = 22.5nF
  Maximum Internal Inductance (Li) = 730 µH
- Type “n” ratings are as follows:
  Maximum Input Voltage (Ui) = 30 V
  Maximum Internal Capacitance (Ci) = 22.5nF
  Maximum Internal Inductance (Li) = 730 µH
- Installation Requirements
  Uo ≤ Ui, Io ≤ Ii, Po ≤ Pi,
  Co ≥ Ci + Ccable, Lo ≥ Li + Lcable
  Uo, Io, Po, Co, and Lo are parameters of barrier.

Note 3. Installation

- In any safety barreir used output current must be limited by a resistor 'R' such that Io=Uo/R.
- The safety barrier must be IECEx certified.
- Input voltage of the safety barrier must be less than 250 Vrms/Vdc.
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation and will void IECEx Intrinsically safe and type n certification.
- The cable entry devices and blanking elements for type n shall be of a certified type providing a level of ingress protection of at least IP54, suitable for the conditions of use and correctly installed.
- Electrical Connection:
  The type of electrical connection is stamped near the electrical connection port according to the following marking.

| Screw Size | Marking |
|---|---|
| ISO M20 × 1.5 female | ⚠ M |
| ANSI 1/2 NPT female | ⚠ A |

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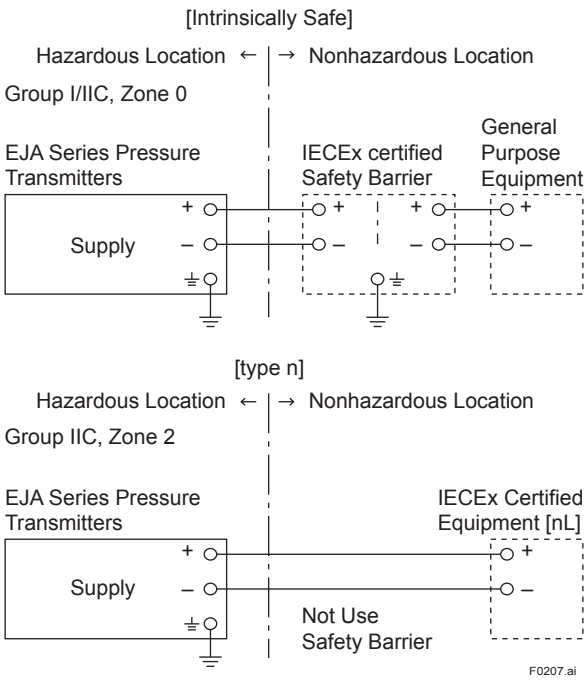
Note 4. Operation

- WARNING:
  WHEN AMBIENT TEMPERATURE ≥ 55°C, USE THE HEAT-RESISTING CABLES ≥ 90°C.

Note 5. Special Conditions for Safe Use

- WARNING:
  IN THE CASE WHERE THE ENCLOSURE OF THE PRESSURE TRANSMITTER IS MADE OF ALUMINUM, IF IT IS MOUNTED IN AN AREA WHERE THE USE OF ZONE 0 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.




**b. IECEx Flameproof Type**

Caution for IECEx flameproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /SU2 are applicable for use in hazardous locations:

- No. IECEx KEM 06.0005
- Applicable Standard: IEC60079-0:2004, IEC60079-1:2003
- Type of Protection and Marking Code: Ex d IIC T6...T4
- Enclosure: IP67
- Maximum Process Temperature: 120°C (T4), 100°C (T5), 85°C (T6)
- Ambient Temperature: –40 to 75°C (T4), –40 to 80°C (T5), –40 to 75°C (T6)
- Supply Voltage: 42 V dc max.
- Output Signal: 4 to 20 mA dc

Note 2. Wiring

- In hazardous locations, the cable entry devices shall be of a certified flameproof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements. (The plug attached is certificated as the flame proof IP67 as a part of this apparatus.)
- In case of ANSI 1/2 NPT plug, ANSI hexagonal wrench should be applied to screw in.

Note 3. Operation

- WARNING:
  AFTER DE-ENERGIZING, DELAY 10 MINUTES BEFORE OPENING.
- WARNING:
  WHEN AMBIENT TEMPERATURE ≥ 70°C, USE THE HEAT-RESISTING CABLES ≥ 90°C.
- Take care not to generate mechanical sparking when accessing to the instrument and peripheral devices in a hazardous location.

Note 4. Maintenance and Repair

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

### 2.9.4 ATEX Certification

**(1) Technical Data**

**a. ATEX Intrinsically Safe Type**

Caution for ATEX Intrinsically safe type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /KS2 for potentially explosive atmospheres:

- No. KEMA 02ATEX1030 X
- Applicable Standard: EN 50014:1997, EN 50020:1994, EN 50284:1999
- Type of Protection and Marking code: EEx ia IIC T4
- Temperature Class: T4
- Enclosure: IP67
- Process Temperature: 120°C max.
- Ambient Temperature: –40 to 60°C

Note 2. Electrical Data

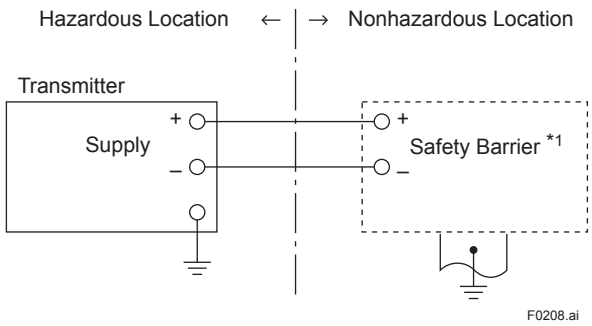
- In type of explosion protection intrinsic safety EEx ia IIC only for connection to a certified intrinsically safe circuit with following maximum values:
  Ui = 30 V
  Ii = 165 mA
  Pi = 0.9 W
  Effective internal capacitance; Ci = 22.5 nF
  Effective internal inductance; Li = 730 µH

Note 3. Installation
- All wiring shall comply with local installation requirements. (Refer to the installation diagram)

Note 4. Maintenance and Repair
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void KEMA Intrinsically safe Certification.

Note 5. Special Conditions for Safe Use
- In the case where the enclosure of the Pressure Transmitter is made of aluminium, 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.

[Installation Diagram]




*1: In any safety barriers used the output current must be limited by a resistor "R" such that Imaxout-Uz/R.

### b. ATEX Flameproof Type

Caution for ATEX flameproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /KF21 for potentially explosive atmospheres:
- No. KEMA 02ATEX2148
- Applicable Standard: EN 60079-0:2006, EN 60079-1:2004
- Type of Protection and Marking Code: Ex d IIC T6...T4
- Temperature Class: T6, T5, and T4
- Enclosure: IP67
- Maximum Process Temperature: 85°C (T6), 100°C (T5), and 120°C (T4)
- Ambient Temperature: T4 and T6; –40* to 75°C, T5; –40* to 80°C

  * –15°C when /HE is specified.

Note 2. Electrical Data
- Supply voltage: 42 V dc max.
- Output signal: 4 to 20 mA

Note 3. Installation
- All wiring shall comply with local installation requirement.
- The cable entry devices shall be of a certified flameproof type, suitable for the conditions of use.

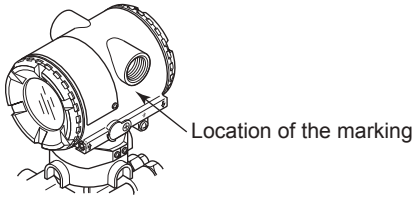
Note 4. Operation
- Keep the "CAUTION" label to the transmitter. CAUTION: AFTER DE-ENERGIZING, DELAY 10 MINUTES BEFORE OPENING. WHEN THE AMBIENT TEMP.≥70°C, USE HEAT-RESISTING CABLES ≥ 90°C.
- Take care not to generate mechanical sparking when accessing to the instrument and peripheral devices in a hazardous location.

Note 5. Maintenance and Repair
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void KEMA Flameproof Certification.

### (2) Electrical Connection

The type of electrical connection is stamped near the electrical connection port according to the following marking.

| Screw Size | Marking |
|---|---|
| ISO M20 × 1.5 female | ⚠ M |
| ANSI 1/2 NPT female | ⚠ A |



### (3) Installation

**WARNING**

- All wiring shall comply with local installation requirement and local electrical code.
- There is no need of the conduit seal for both of Division 1 and Division 2 hazardous locations because this product is sealed at factory.
- In case of ANSI 1/2 NPT plug, ANSI hexagonal wrench should be applied to screw in.

### (4) Operation

**WARNING**

- OPEN CIRCUIT BEFORE REMOVING COVER. INSTALL IN ACCORDANCE WITH THIS USER'S MANUAL
- Take care not to generate mechanical sparking when access to the instrument and peripheral devices in hazardous locations.

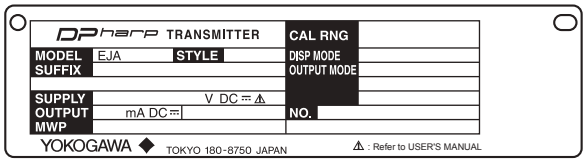
### (5) Maintenance and Repair

**WARNING**

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

### (6) Name Plate

● Name plate




● Tag plate for flameproof type

● 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.
DISP MODE: Specified display mode.
OUTPUT MODE: Specified output mode.
NO.: Serial number and year of production*1.
TOKYO 180-8750 JAPAN:
The manufacturer name and the address*2.

*1: The third figure from the last shows the last one figure of the year of production. For example, the production year of the product engraved in "NO." column on the name plate as follows is 2001.

12A819857 132

The year 2001

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

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

## 2.10 EMC Conformity Standards

EN 61326-1 Class A, Table 2 (For use in industrial locations)

EN 61326-2-3

EN 61326-2-5 (for Fieldbus)

**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.

**NOTE**

YOKOGAWA recommends customer to apply the Metal Conduit Wiring or to use the twisted pair Shield Cable for signal wiring to conform the requirement of EMC Regulation, when customer installs the EJA Series Transmitters to the plant.

## 2.11 PED (Pressure Equipment Directive)

### (1) General

- EJA series of pressure transmitters are categorized as pressure accessories under the vessel section of this directive 97/23/EC, which corresponds to Article 3, Paragraph 3 of PED, denoted as Sound Engineering Practice (SEP)..
- EJA130A, EJA440A, EJA510A, and EJA530A 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 3, 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 | PS*1 (bar) | V(L) | PS-V (bar-L) | Category*2 |
|---|---|---|---|---|
| EJA110A | 160 | 0.01 | 1.6 | Article 3, paragraph 3 (SEP) |
| EJA120A | 0.5 | 0.01 | 0.005 | Article 3, paragraph 3 (SEP) |
| EJA130A | 420 | 0.01 | 4.2 | Article 3, paragraph 3 (SEP) |
| EJA130A With code /PE3 | 420 | 0.01 | 4.2 | III |
| EJA310A | 160 | 0.01 | 1.6 | Article 3, paragraph 3 (SEP) |
| EJA430A | 160 | 0.01 | 1.6 | Article 3, paragraph 3 (SEP) |
| EJA440A | 500 | 0.01 | 50 | Article 3, paragraph 3 (SEP) |
| EJA440A With code /PE3 | 500 | 0.01 | 50 | III |
| EJA510A | 500 | 0.01 | 50 | Article 3, paragraph 3 (SEP) |
| EJA510A With code /PE3 | 500 | 0.01 | 50 | III |
| EJA530A | 500 | 0.01 | 50 | Article 3, paragraph 3 (SEP) |
| EJA530A With code /PE3 | 500 | 0.01 | 50 | 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 97/23/EC

### (3) Operation

**CAUTION**

- The temperature and pressure of fluid should be applied under the normal operating condition.
- The ambient temperature should be applied under the normal operating condition.
- Please pay attention to prevent the excessive pressure like water hammer, etc. When water hammer is to be occurred, please take measures to prevent the pressure from exceeding PS by setting the safety valve, etc. at the system and the like.
- When external fire is to be occurred, please take safety measures at the device or system not to influence the transmitters.

## 2.12 Low Voltage Directive

Applicable standard: EN 61010-1

**(1) Pollution Degree 2**

"Pollution degree" describes the degree to which a soild, 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 condenstaion must be expected.

**(2) Installation Category I**

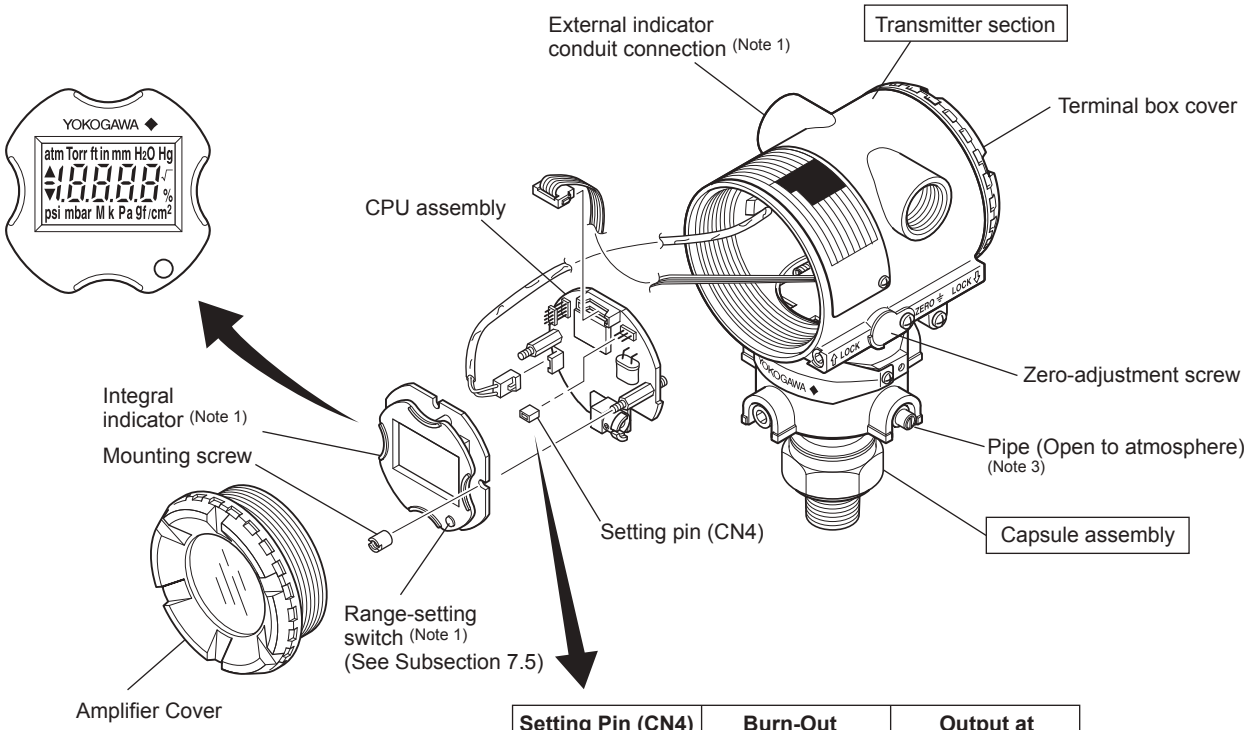
"Overvoltage category (Installation category)" describes a number which defines a transient overvoltage condition. It implies the regulattion for impulse withstand voltage. "I" applies to electrical equipment which is supplied from the circuit when appropriate transient overvoltage control means (interfaces)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

**(3) Altitude of installation site:**

Max. 2,000 m above sea level

**(4) Indoor/Outdoor use**

# 3. Component Names




| Setting Pin (CN4) Position (Note 2) | Burn-Out Direction | Output at Burn-Out |
|---|---|---|
| H / L | HIGH | 110% or higher |
| H / L | LOW | –5% or lower |

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Note 1: See Subsection 10.2, “Model and Suffix Codes,” for details.
Note 2: Insert the pin (CN4) as shown in the figure above to set the burn-out direction. The pin is set to the H side for delivery (unless option code /C1 is specified in the order).
The setting can be confirmed by calling up parameter D52 using the BRAIN TERMINAL. Refer to Subsection 8.3.3 (8).
Note 3: Applied to Model EJA530A with Measurement span code A, B, and C.

**Figure 3.1 Component Names**

**Table 3.1 Display Symbol**

| Display Symbol | Meaning of Display Symbol |
|---|---|
| ▲ | The output signal being zero-adjusted is increasing. |
| ▼ | The output signal being zero-adjusted is decreasing. |
| %, Pa, kPa, MPa, kgf/cm$^2$, gf/cm$^2$, mbar, bar, atm, mmHg, mm$H_2O$, in$H_2O$, inHg, ft$H_2O$, psi, Torr | Select one of these sixteen available engineering units for the display. |

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# 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 10.1 “Standard Specifications.”

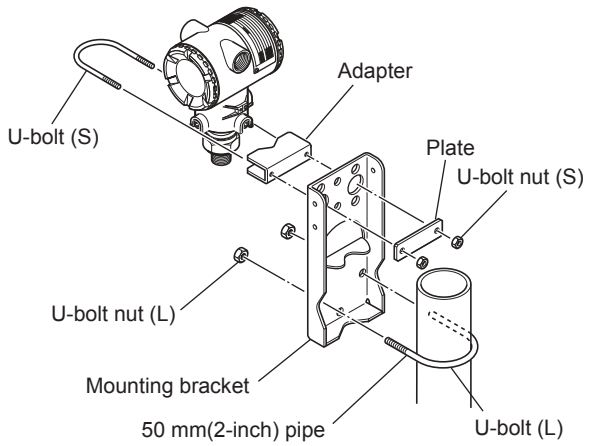
**IMPORTANT**

- 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.

## 4.2 Mounting

- The impulse piping connection port of the transmitter is covered with a plastic cap to protect against dust. This cap must be removed before connecting the piping. (Be careful not to damage the threads when removing these caps. Never insert a screw driver or other tool between the cap and the port threads to remove the cap.)
- The transmitter can be mounted on a nominal 50 mm (2-inch) pipe using the mounting bracket supplied, as shown in Figure 4.1.
- The user should prepare the mating gasket for the transmitters with Process connection code 8 and 9. See Figure 4.2.

Vertical pipe mounting




Horizontal pipe mounting

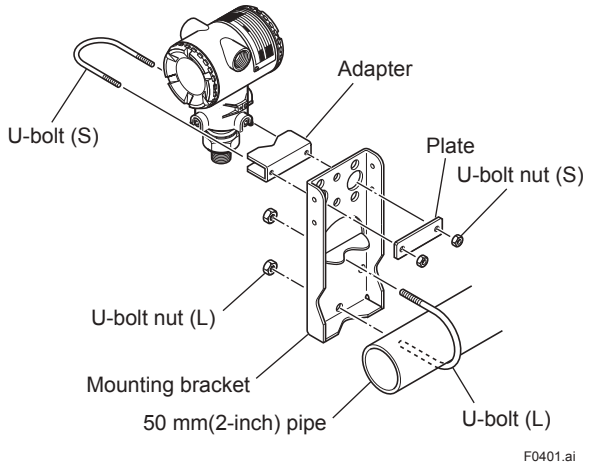



**Figure 4.1 Transmitter Mounting**

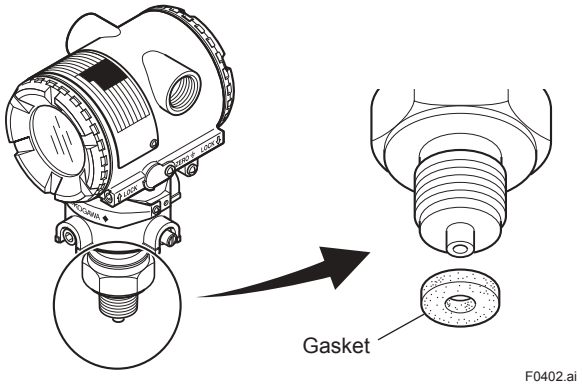



**Figure 4.2 Gasketing**

**IMPORTANT**

Tighten the hexagonal nut part of the capsule assembly. See Figure 4.3.

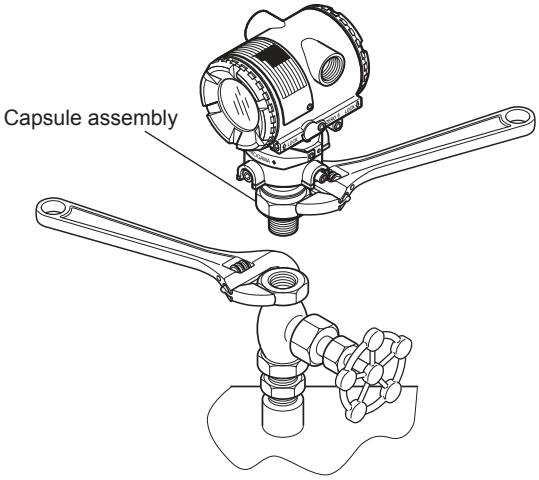



**Figure 4.3 Tightening Transmitter**

## 4.3 Rotating Transmitter Section

The DPharp transmitter section can be rotated in 90° segments.

1) Remove the two Allen screws that fasten the transmitter section and capsule assembly, using the Allen wrench. Also, remove the pipe for the model EJA530A with Measurement span code A, B, and C, using the slotted screwdriver.
2) Rotate the transmitter section slowly in 90° segments.
3) Tighten the two Allen screws to a torque of 5 N·m, and replace the pipe if applied.

**IMPORTANT**

Do not rotate the transmitter section more than 180°.

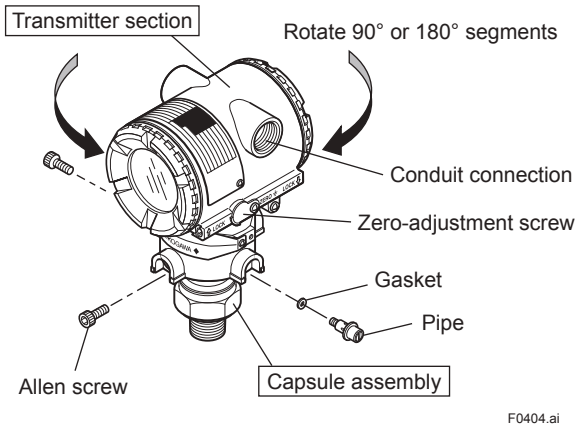



**Figure 4.4 Rotating Transmitter Section**

## 4.4 Changing the Direction of Integral Indicator

**IMPORTANT**

Always turn OFF power, release pressure and remove a transmitter to non-hazardous area before disassembling and reassembling an indicator.

An integral indicator can be installed in the following three directions. Follow the instructions in section 9.4 for removing and attaching the integral indicator.

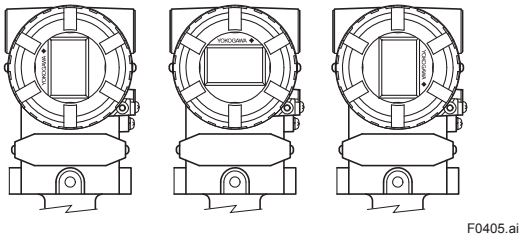



**Figure 4.5 Integral Indicator Direction**

# 5. Installing Impulse Piping

## 5.1 Impulse Piping Installation Precautions

### 5.1.1 Connecting Impulse Piping to the Transmitter

**IMPORTANT**

The transmitter can be installed in horizontal impulse piping configuration, tilting the transmitter's position up to 90°. When tilting, observe that the zero-adjustment screw and the pipe (for Model EJA530A with Measurement span code A, B, and C) are positioned downwards, as shown in Figure 5.1.

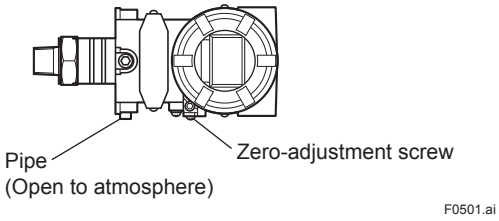



**Figure 5.1 Horizontal Impulse Piping Connection**

### 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 5.2 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.

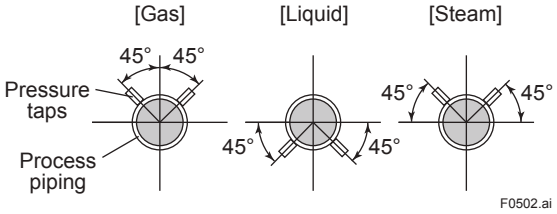



**Figure 5.2 Process Pressure Tap Angle (For Horizontal Piping)**

#### (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) 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.

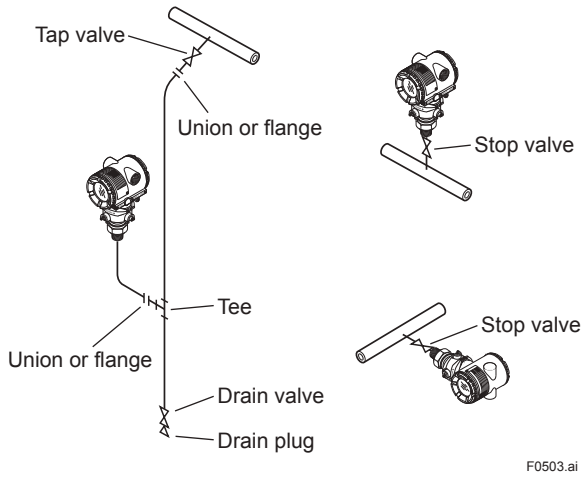



**Figure 5.3 Impulse Piping Connection Examples**

## 5.2 Impulse Piping Connection Examples

Figure 5.3 shows examples of typical impulse piping connections. Before connecting the transmitter to the process, study the transmitter installation location, the process piping layout, and the characteristics of the process fluid (corrosiveness, toxicity, flammability, etc.), in order to make appropriate changes and additions to the connection configurations.

Note the following points when referring to these piping examples.

- If the impulse piping 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.

# 6. Wiring

## 6.1 Wiring Precautions

**IMPORTANT**

- Lay wiring as far as possible from electrical noise sources such as large capacity transformers, motors, and power supplies.
- Remove electrical connection dust cap before wiring.
- All threaded parts must be treated with waterproofing sealant. (A non-hardening silicone group sealant is recommended.)
- To prevent noise pickup, do not pass signal and power cables through the same ducts.
- Explosion-protected instruments must be wired in accordance with specific requirements (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosionprotected features.
- The terminal box cover is locked by an Allen head bolt (a shrouding bolt) on CENELEC and IECEx flameproof type transmitters. When the shrouding bolt is driven clockwise by an Allen wrench, it is going in and cover lock is released, and then the cover can be opened by hand. See Subsection 9.4 “Disassembly and Reassembly” for details.

## 6.2 Selecting the Wiring Materials

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

## 6.3 Connections of External Wiring to Terminal Box

### 6.3.1 Power Supply Wiring Connection

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

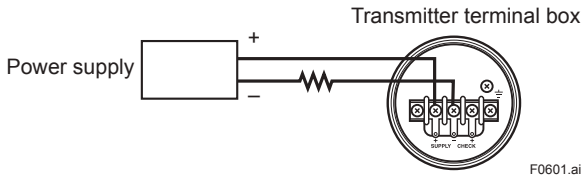



**Figure 6.1 Power Supply Wiring Connection**

### 6.3.2 External Indicator Connection

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

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

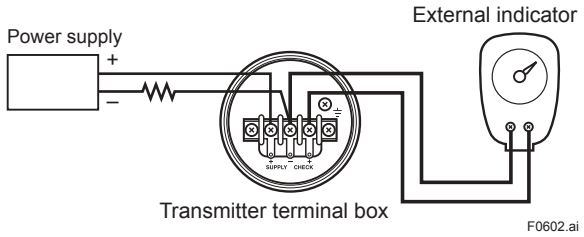



**Figure 6.2 External Indicator Connection**

### 6.3.3 BRAIN TERMINAL BT200 Connection

Connect the BT200 to the SUPPLY + and – terminals (Use hooks). The communication line requires a reception resistor of 250 to 600Ω in series.

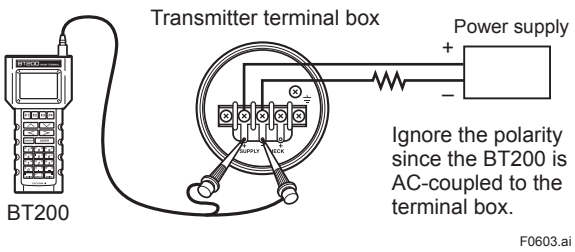



**Figure 6.3 BT200 Connection**

### 6.3.4 Check Meter Connection

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

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

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

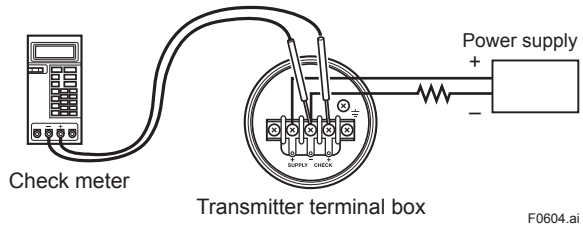



**Figure 6.4 Check Meter Connection**

## 6.4 Wiring

### 6.4.1 Loop Configuration

Since the DPharp uses a two-wire transmission system, signal wiring is also used as power wiring.

DC power is required for the transmitter loop. The transmitter and distributor are connected as shown below.

For details of the power supply voltage and load resistance, see Section 6.6; for communications line requirements, see Subsection 8.1.2.

#### (1) General-use Type and Flameproof Type

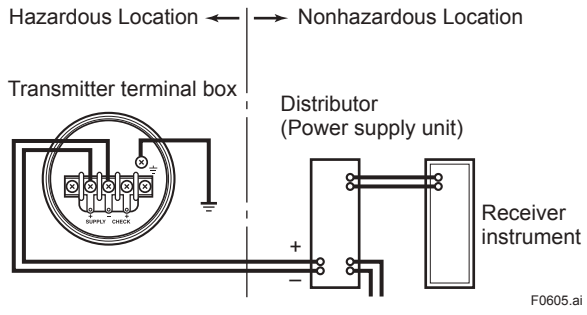



**Figure 6.5 Connection between Transmitter and Distributor**

#### (2) Intrinsically Safe Type

For intrinsically safe type, a safety barrier must be included in the loop.

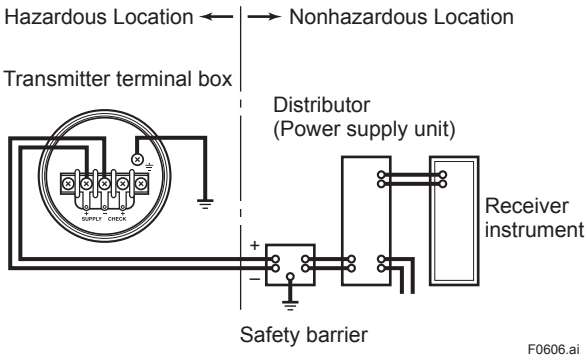



**Figure 6.6 Connection between Transmitter and Distributor**

### 6.4.2 Wiring Installation

#### (1) General-use Type and Intrinsically Safe Type

Make cable wiring using metallic conduit or waterproof glands.

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

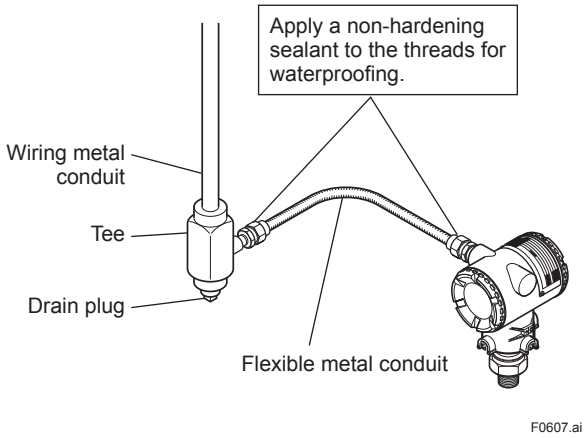



**Figure 6.7 Typical Wiring Using Flexible Metal Conduit**

### (2) Flameproof Type

Wire cables through a flameproof packing adapter, or using a flameproof metal conduit.

■ Wiring cable through flameproof packing adapter.

- Apply a nonhardening sealant to the terminal box connection port and to the threads on the flameproof packing adapter for waterproofing.

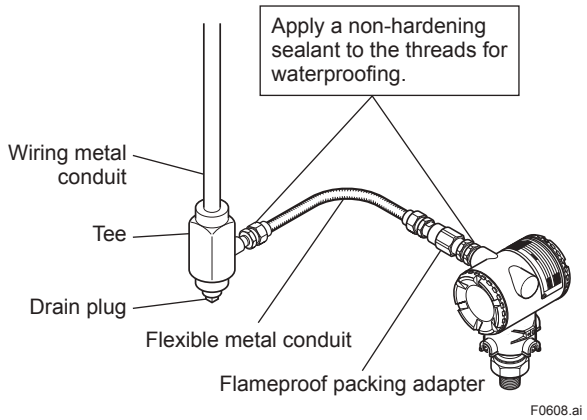



**Figure 6.8 Typical Cable Wiring Using Flameproof Packing Adapter**

■ Flameproof metal conduit wiring

- A seal fitting must be installed near the terminal box connection port for a sealed construction.
- Apply a non-hardening sealant to the threads of the terminal box connection port, flexible metal conduit and seal fitting for waterproofing.

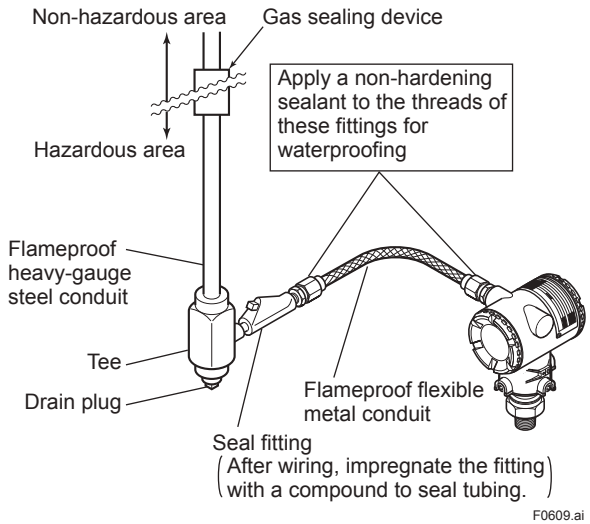



**Figure 6.9 Typical Wiring Using Flameproof Metal Conduit**

## 6.5 Grounding

Grounding is always required for the proper operation of transmitters. Follow the domestic electrical requirements as regulated in each country. For a transmitter with built-in lightning protector, grounding should satisfy ground resistance of 10Ω or less.

Ground terminals are located on the inside and outside of the terminal box. Either of these terminals may be used.

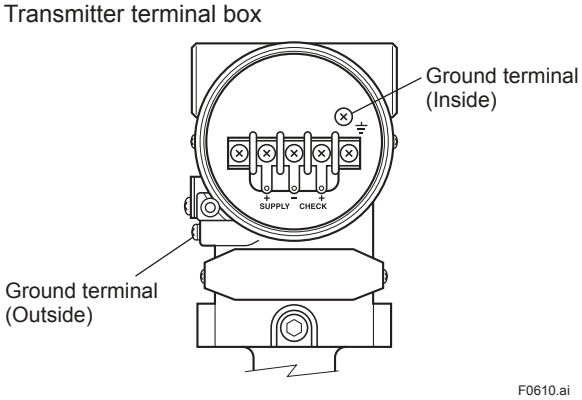



**Figure 6.10 Ground Terminals**

## 6.6 Power Supply Voltage and Load Resistance

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

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

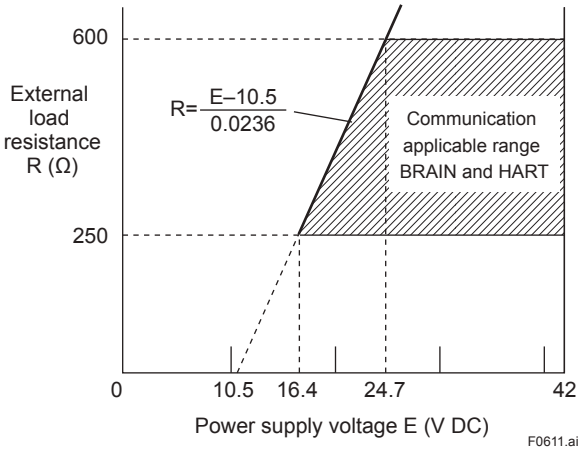



**Figure 6.11 Relationship between Power Supply Voltage and External Load Resistance**

# 7. Operation

## 7.1 Preparation for Starting Operation

This section describes the operation procedure for measuring a pressure as shown in Figure 7.1.

**NOTE**

Confirm that the process pressure tap valve, drain valve, and stop valve are closed.

(a) Introduce a process fluid into the impulse piping and then to the transmitter in the following procedure:
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) Turn ON power and connect the BT200.

(c) Using the BT200, confirm that the transmitter is operating properly. Check parameter values or change the setpoints as necessary. See Chapter 8 for BT200 operation.

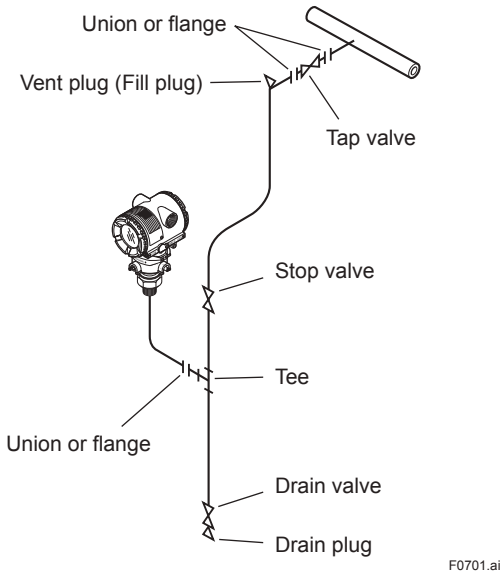
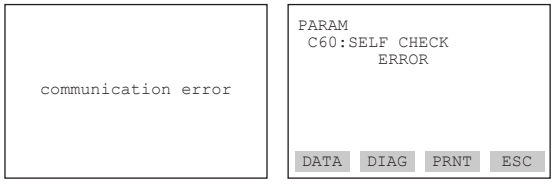



**Figure 7.1 Liquid Flow Measurement (Gauge Pressure Transmitters)**

### ■ Confirming that Transmitter is Operating Properly

**Using the BT200**

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



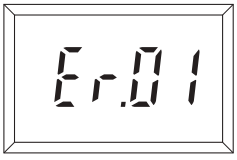

Communication error (Faulty wiring)

Self-diagnostic error (Faulty transmitter)

F0702.ai

**Using the integral indicator**

- If the wiring system is faulty, the display stays blank.
- If the transmitter is faulty, an error code will appear on the display according to the nature of the error.




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

F0703.ai

**NOTE**

If any of the error indications above appears on the display of the integral indicator or BT200, refer to Subsection 8.5.2 for corrective action.

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

The following parameters are the minimum settings required for operation. The transmitter has been shipped with these parameters. To confirm or change the values, see Subsection 8.3.3.

- Measuring range … See Subsection 8.3.3 (2)
- Operation mode … See Subsection 8.3.3 (7)

## 7.2 Zero Point Adjustment

Adjust the zero point after operating preparation is completed.

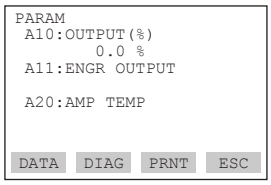
**IMPORTANT**

Do not turn off the power to the transmitter immediately after a zero adjustment. Powering off within 30 seconds after a zero adjustment will return the adjustment back to the previous settings.

The zero point adjustment can be made in either way: using the zero-adjustment screw of the transmitter or the BT200 operation.

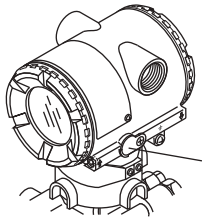
For output signal checking, display the parameter **A10: OUTPUT (%)** in the BT200.

- BT200




Output signal (%) display

- Zero-adjustment Screw




F0704.ai

After reviewing this parameter you are prepared to adjust the zero point. When making the zero adjustment on a pressure transmitter, the process pressure value does not have to be set to the low limit of the measurement range (0%). In such case, adjust the transmitter output signal to the actual measured value obtained from a high-accuracy pressure measuring instrument.

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

For pressure measurement using gauge pressure transmitters, follow the step below before zero point adjustment.

1) Close the tap valve (main valve).
2) Loosen the fill plug so that the pressure applied to the transmitter is only the head of the seal liquid.
3) Adjust the zero point at this status.
4) After the adjustment, close the fill plug and then gradually open the tap valve.

#### ■ Using the Transmitter Zero-adjustment Screw

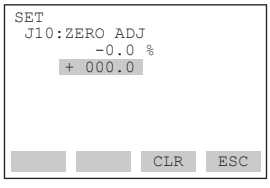
Before adjusting a screw, check that the parameter **J20: EXT ZERO ADJ** displays **ENABLE**. See Subsection 8.3.3 (11) for the setting procedure.

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. Since the degree of zero adjustments varies with the screw turning speed, turn the screw slowly for fine adjustment and quickly for coarse adjustment.

#### ■ Using the BT200

Zero point can be adjusted by simple key operation of the BT200.

Select parameter **J10: ZERO ADJ**, and press the ENTER key twice. The zero point will be adjusted automatically to the output signal 0% (4 mA DC). Confirm that the setting value displayed for the parameter is '0.0%' before pressing the ENTER key. See Subsection 8.3.3 (11) for BT200 operating procedures.




A display when parameter J10 is selected.
Press ENTER key twice for 0% output 4 mA DC.

F0705.ai

### 7.2.2 When you cannot obtain Low Range Value from actual measured value of 0%;

Convert the actual measured value obtained by a digital manometer or a glass gauge into %.

**[Example]**

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

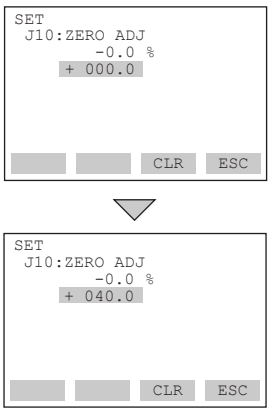
$$\text{Actual measured value} = \frac{130-50}{250-50} \times 100 = 40.0\%$$

#### ■ Using the Transmitter Zero-Adjustment Screw

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

#### ■ Using the BT200

Select the parameter **J10: ZERO ADJ**. Change the set point (%) displayed for the parameter to the actual measured value (%), and press the ENTER key twice. See Subsection 8.3.3 (11) for operation details.




Display at J10

Change setting to the actually measured value (40.0%). Press ENTER key twice for 40% output 10.4 mA DC.

F0706.ai

## 7.3 Starting Operation

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

1) Confirm the operating status. If the output signal exhibits wide fluctuations (hunting) due to periodic variation in the process pressure, use BT200 to dampen the transmitter output signal. Confirm the hunting using a receiving instrument or the integral indicator, and set the optimum damping time constant. See Subsection 8.3.3 (3), “Damping Time Constant Setup.”
2) After confirming the operating status, perform the following.

**IMPORTANT**

- Remove the BT200 from the terminal box, and confirm that none of the terminal screws are loosened.
- Close the terminal box cover and the amplifier cover. Screw each cover in tightly until it will not turn further.
- Two covers are required to be locked on the CENELEC and IECEx Flameproof type transmitters. An Allen head bolts (shrouding bolts) are provided under edge of the each cover for locking. When a shrouding bolts are driven counterclockwise by an Allen wrench, it is coming out and locks up a cover. (See page 9-4) After locking, the covers should be confirmed not to be opened by hand.
- Tighten the zero-adjustment cover mounting screw to fix the cover in position.

## 7.4 Shutting Down Operation

Shut down the transmitter operation as follows.

1) Turn off the power.
2) Close the stop valve.
3) Close the tap valve.

**NOTE**

Whenever shutting down the transmitter for a long period, remove any process fluid from the transmitter pressure-detector section.

## 7.5 Setting the Range Using the Range-setting Switch

With actual pressure being applied to the transmitter, the range-setting switch (push-button) located on the optional /E integral indicator plate and the external zero-adjustment screw allow users to change (re-range) the low- and high-limit values for the measurement range (LRV and HRV) without using BT200. However, other changes in the display settings (scale range and engineering unit) for the integral indicator requires BT200.

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

**[Example]**

Rerange LRV to 0 and HRV to 3 MPa.

1) Connect the transmitter and apparatus as shown in Figure 9.1 and warm up for at least five minutes.
2) Press the range-setting push-button. The integral indicator then displays “LSET.”
3) Apply a pressure of 0 kPa (atmospheric pressure) to the transmitter. (Note 1)
4) Turn the external zero-adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
5) Adjust the output signal to 0% (1 V DC) by rotating the external zero-adjustment screw. Doing so completes the LRV setting.
6) Press the range-setting push-button. The integral indicator then displays “HSET.”
7) Apply a pressure of 3 MPa to the transmitter. (Note 1)
8) Turn the external zero-adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
9) Adjust the output signal to 100% (5 V DC) by rotating the external zero-adjustment screw. Doing so completes the HRV setting.
10) Press the range-setting push-button. The transmitter then switches back to the normal operation mode with the measurement range of 0 to 3 MPa.

Note 1: Wait until the pressure inside the pressure-detector section has stabilized before proceeding to the next step.
Note 2: If the pressure applied to the transmitter exceeds the previous LRV (or HRV), the integral indicator may display error number “Er.07” (In this case, the output signal percent and “Er.07” are displayed alternately every two seconds).
Although “Er.07” is displayed, you may proceed to the next step. However, should any other error number be displayed, take the appropriate measure in reference to Subsection 8.5.2, “Errors and Countermeasures.”

### IMPORTANT

- Do not turn off the power to the transmitter immediately after completion of the change in the LRV and/or HRV setting(s). Note that powering off within thirty seconds after setting will cause a return to the previous settings.
- Changing LRV automatically changes HRV to the following value.

HRV =
previous HRV + (new LRV – previous LRV)

- If the range-setting push-button and external zero-adjustment screw are not touched during a range-change operation, the transmitter automatically switches back to the normal operation mode.

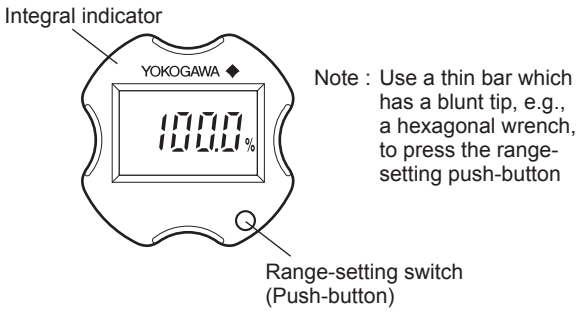



**Figure 7.2 Range-setting Switch**

# 8. BRAIN TERMINAL BT200 Operation

The DPharp is equipped with BRAIN communications capabilities, so that range changes, Tag No. setup, monitoring of self-diagnostic results, and zero point adjustment can be handled by remote control via BT200 BRAIN TERMINAL or CENTUM CS console. This section describes procedures for setting parameters using the BT200. For details concerning the BT200, see IM 01C00A11-01E, “BT200 User’s Manual.”

## 8.1 BT200 Operation Precautions

### 8.1.1 Connecting the BT200

The transmitter and the BT200 can be connected either to the BT200 connection hooks in the transmitter terminal box or to a relaying terminal board.

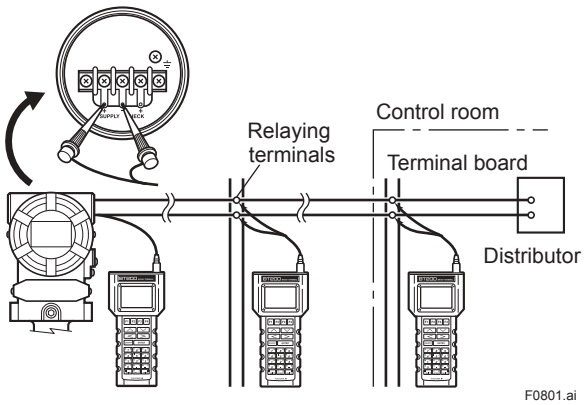



**Figure 8.1 Connecting the BT200**

- **Note for Connecting the BT200**

**IMPORTANT**

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

### 8.1.2 Conditions of Communication Line

- **Communication Line Requirements**

[Protocol specification] Yokogawa original protocol
[Modulation] Burst modulation
0: 2400Hz
1: Signal without carrier
[Baud rate] 1200bps
[Communication signal]
host to device: +/- 0.5V (load resistance 250Ω)
device to host: +/- 2mA

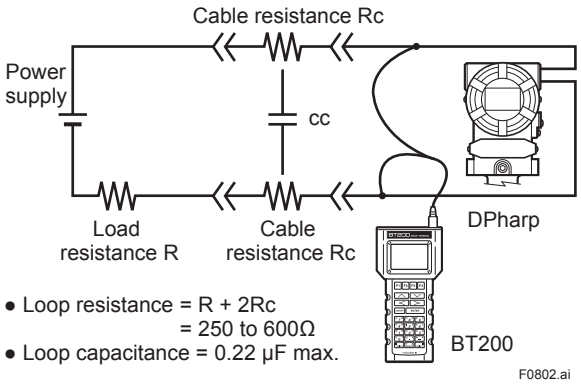



**Figure 8.2 Conditions of Communication Line**

# 8.2 BT200 Operating Procedures

## 8.2.1 Key Layout and Screen Display

Figure 8.3 shows the arrangement of the operating keys on the BT200 keypad, and Figure 8.4 shows the BT200 screen component.

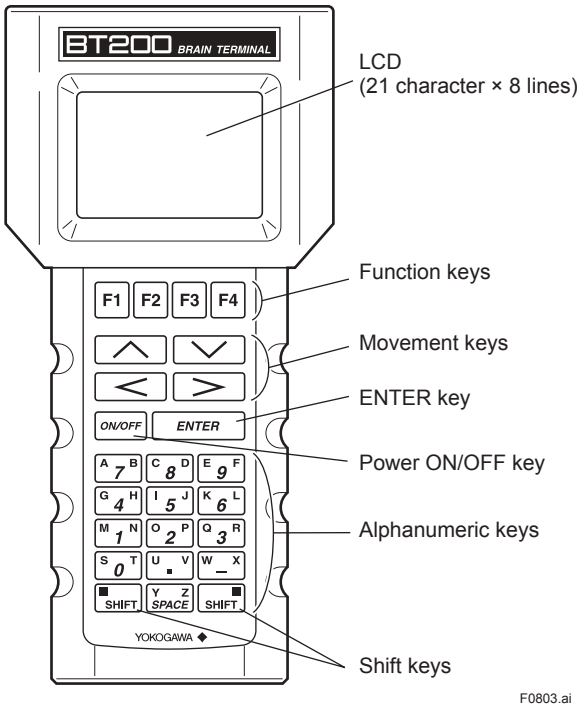



**Figure 8.3 BT200 Key Layout**

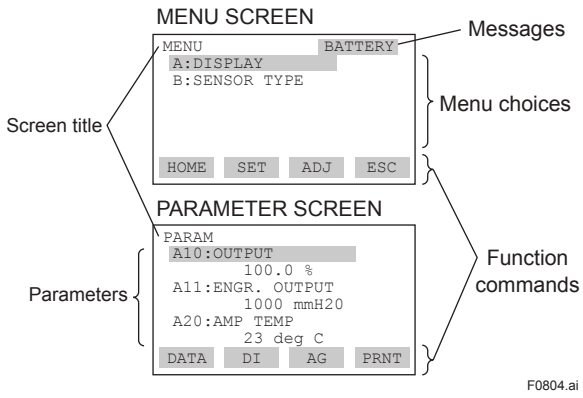
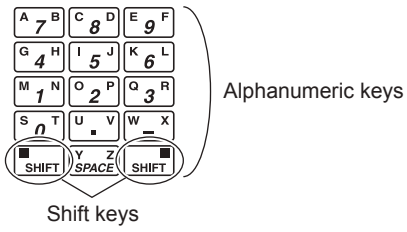



**Figure 8.4 BT200 Screen Component**

## 8.2.2 Operating Key Functions

### (1) Alphanumeric Keys and Shift Keys

You can use the alphanumeric keys in conjunction with the shift keys to enter symbols, as well as alphanumeric keys.




#### a. Entering Digits, Symbols, and Spaces (0 to 9, ., 2, ␣)

Simply press the alphanumeric keys.

| Entry | Key-in Sequence |
|---|---|
| –4 | [W _ X] [G 4 H] |
| 0.3 | [S 0 T] [U . V] [Q 3 R] |
| 1 ␣ –9 | [M 1 N] [Y Z SPACE] [W _ X] [E 9 F] |

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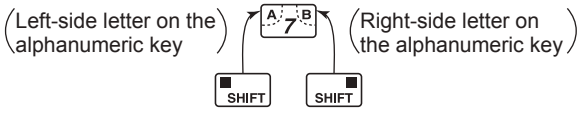
#### b. Entering Letters (A through Z)

Press an alphanumeric key following a shift key to enter the letter shown on that side which the shift key represents. You must press the shift key before entering each letter.




| Entry | Key-in Sequence |
|---|---|
| W | [SHIFT] [W _ X] |
| IC | [SHIFT] [I 5 J] [SHIFT] [C 8 D] |
| J. B | [SHIFT] [I 5 J] [U . V] [SHIFT] [A 7 B] |

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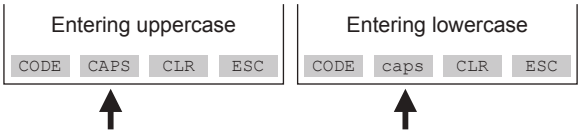
Use the function key [F2] CAPS to select between uppercase and lowercase (for letters only). The case toggles between uppercase and lowercase each time you press [F2] CAPS.




| Entry | Key-in Sequence |
|---|---|
| Boy | to lower case: [SHIFT] [A 7 B] (B) [F2] [SHIFT] [O 2 P] (o) [SHIFT] [Y Z SPACE] (y) |

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Use the function key [F1] CODE to enter symbols. The following symbols will appear in sequence, one at a time, at the cursor each time you press [F1] CODE:

/ . − , + * ) ( ’ & % $ # ” !

To enter characters next to these symbols, press [>] to move the cursor.

| Entry | Key-in Sequence |
|---|---|
| l/m | symbol command → F2 SHIFT K 6 L F1 > SHIFT M 1 N<br>( l ) ( / ) ( m ) |

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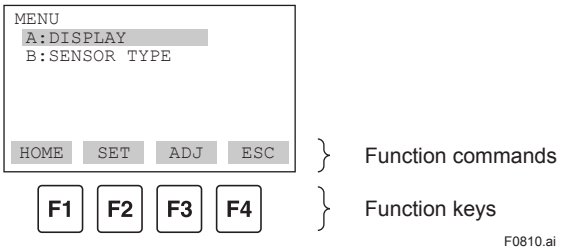
### (2) Function Keys

The functions of the function keys depend on the function commands on display.

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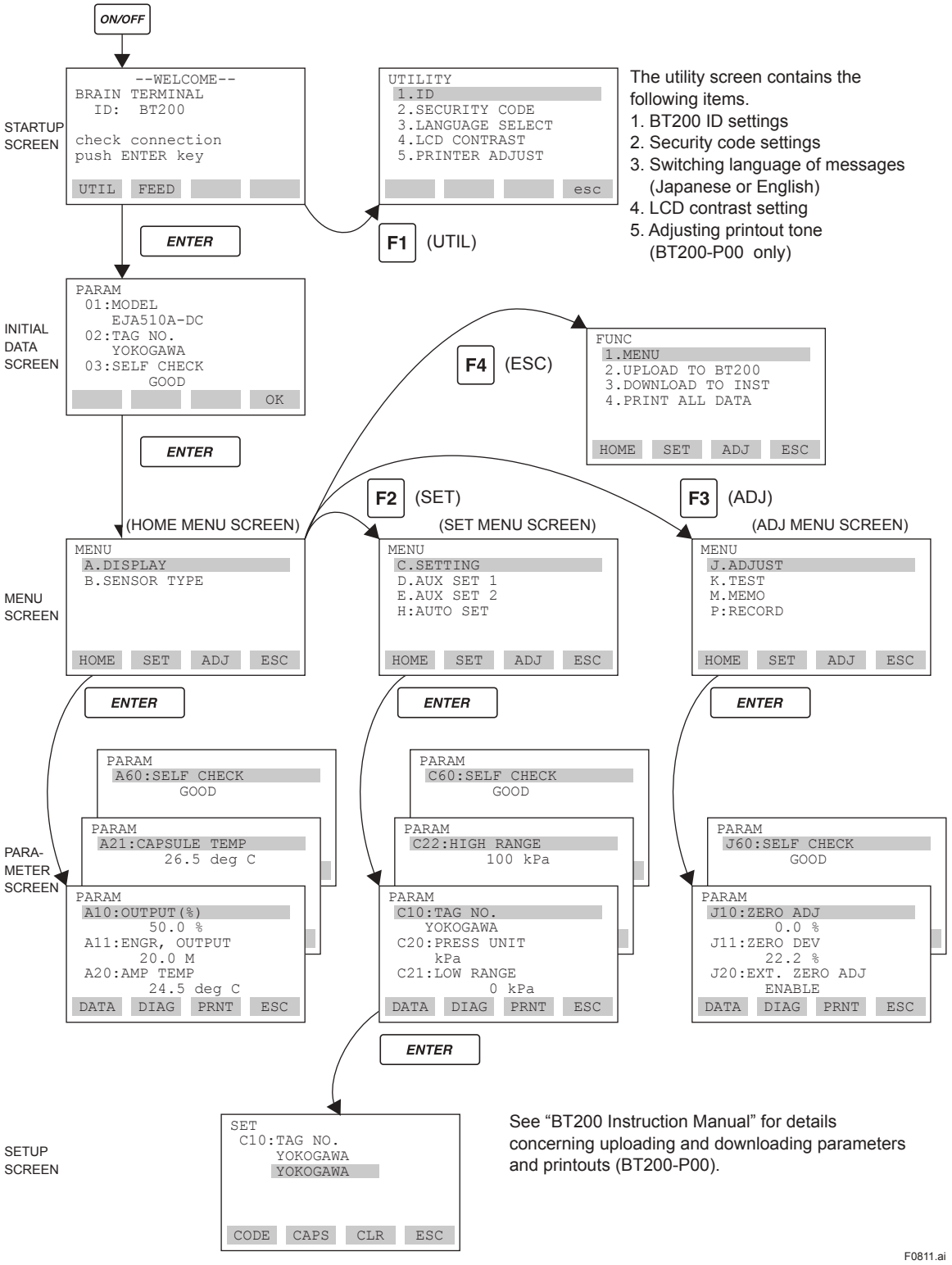
### Function Command List

| Command | Function |
|---|---|
| ADJ | Displays the ADJ menu |
| CAPS/caps | Selects uppercase or lowercase |
| CODE | Selects symbols |
| CLR | Erases input data or deletes all data |
| DATA | Updates parameter data |
| DEL | Deletes one character |
| DIAG | Calls the self-check panel |
| ESC | Returns to the most recent display |
| HOME | Displays the menu panel |
| NO | Quits setup and returns to the previous display |
| OK | Proceeds to the next panel |
| PARM | Enters the parameter number setup mode |
| SET | Displays the SET menu |
| SLOT | Returns to the slot selection panel |
| UTIL | Calls the utility panel |
| *COPY | Prints out parameters on display |
| *FEED | Paper feed |
| *LIST | Lists all parameters in the menu |
| *PON/ POFF | Automatic printout mode on or off |
| *PRNT | Changes to the print mode |
| *GO | Starts printing |
| *STOP | Cancels printing |

* Available on BT200-P00 (with printer).

## 8.2.3 Calling Up Menu Addresses Using the Operating Keys




The utility screen contains the following items.
1. BT200 ID settings
2. Security code settings
3. Switching language of messages (Japanese or English)
4. LCD contrast setting
5. Adjusting printout tone (BT200-P00 only)

See “BT200 Instruction Manual” for details concerning uploading and downloading parameters and printouts (BT200-P00).

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# 8.3 Setting Parameters Using the BT200

## 8.3.1 Parameter Summary

Instruments to which applicable:

F: Differential pressure transmitters EJA110A, EJA120A, and EJA130A
P: Pressure transmitters EJA310A, EJA430A, EJA440A, EJA510A, and EJA530A
L: Liquid level transmitters EJA210A and EJA220A

| No. | Item | Description | Rewritability | Remarks | Default Value | Applicability | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | F | P | L |
| 01 | MODEL | Model+capsule type | – | | | ○ | ○ | ○ |
| 02 | TAG NO. | Tag number | – | 16 alphanumerics | | ○ | ○ | ○ |
| 03 | SELF CHECK | Self-diagnostic result | – | GOOD/ERROR | | ○ | ○ | ○ |
| A | DISPLAY | Measured data display | – | Menu name | | ○ | ○ | ○ |
| A10 | OUTPUT (%) | Output (in %) | – | –5 to 110%*3 | | ○ | ○ | ○ |
| A11 | ENGR. OUTPUT | Output (in engineering units) | – | –19999 to 19999 | | ○ | ○ | ○ |
| A20 | AMP TEMP | Amplifier temperature | – | Unit specified in D30 | | ○ | ○ | ○ |
| A21 | CAPSULE TEMP | Capsule temperature | – | Unit specified in D30 | | ○ | ○ | ○ |
| A30 | STATIC PRESS | Static pressure | – | Unit specified in D31*1 | | ○ | – | ○ |
| A40 | INPUT | Input (indicated as the value after zeroing) | – | –32000 to 32000 | | ○ | ○ | ○ |
| A60 | SELF CHECK | Self-diagnostic messages | – | GOOD/ERROR, CAP MODULE FAULT, AMP MODULE FAULT, OUT OF RANGE, OUT OF SP RANGE*1, OVER TEMP (CAP), OVER TEMP (AMP), OVER OUTPUT, OVER DISPLAY, ILLEGAL LRV, ILLEGAL HRV, ILLEGAL SPAN, and ZERO ADJ OVER | | ○ | ○ | ○ |
| B | SENSOR TYPE | Sensor type | – | Menu name | | ○ | ○ | ○ |
| B10 | MODEL | Model+span | – | 16 uppercase alphanumerics | | ○ | ○ | ○ |
| B11 | STYLE NO. | Style number | – | | | ○ | ○ | ○ |
| B20 | LRL | Lower range-limit | – | –32000 to 32000 | | ○ | ○ | ○ |
| B21 | URL | Upper range-limit | – | –32000 to 32000 | | ○ | ○ | ○ |
| B30 | MIN SPAN | Minimum span | – | –32000 to 32000 | | ○ | ○ | ○ |
| B40 | MAX STAT.P. | Maximum static pressure*6 | – | | | ○ | – | ○ |
| B60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| C | SETTING | Setting data | – | Menu name | | ○ | ○ | ○ |
| C10 | TAG. NO. | Tag number | ○ | 16 alphanumerics | As specified when ordered. | ○ | ○ | ○ |
| C20 | PRESS UNIT | Measurement range units | ○ | Selected from $mmH_2O$, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, $gf/cm^2$, $kgf/cm^2$, $inH_2O$, inHg, $ftH_2O$, psi, or atm | As specified when ordered. | ○ | ○ | ○ |
| C21 | LOW RANGE | Measurement range, lower range value | ○ | –32000 to 32000(but within measurement range) | As specified when ordered. | ○ | ○ | ○ |
| C22 | HIGH RANGE | Measurement range, higher range value | ○ | –32000 to 32000(but within measurement range) | As specified when ordered. | ○ | ○ | ○ |
| C30 | AMP DAMPING | Damping time constant | ○ | Selected from 0.2*2, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, 32.0, or 64.0 sec. | 2.0 s | ○ | ○ | ○ |
| C40 | OUTPUT MODE | Output mode and integral indicator mode | ○ | Selected from OUT:LIN; DSP: LIN, OUT:LIN; DSP:SQR, OUT:SQR; DSP:SQR | As specified when ordered. If not specified, OUT: LIN; DSP: LIN. | ○ | – | – |
| C60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |

| No. | Item | Description | Rewritability | Remarks | Default Value | Applicability | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | F | P | L |
| D | AUX SET 1 | Auxiliary setting data 1 | – | Menu name | | ○ | ○ | ○ |
| D10 | LOW CUT | Low cut | ○ | 0.0 to 20.0% | 10.0% | ○ | ○ | ○ |
| D11 | LOW CUT MODE | Low cut mode | ○ | LINEAR/ZERO | LINEAR | ○ | ○ | ○ |
| D15 | OUT LIMIT(L) | Lower output range-limit | ○ | –5.0 to 110.0% | –5.0%*7 | ○ | ○ | ○ |
| D16 | OUT LIMIT(H) | Upper output range-limit | ○ | –5.0 to 110.0% | 110.0% | ○ | ○ | ○ |
| D20 | DISP SELECT | Display selection | ○ | NORMAL %/USER SET, USER & %/INP PRES, PRES & % | As specified when ordered. | ○ | ○ | ○ |
| D21 | DISP UNIT | Engineering unit for display | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| D22 | DISP LRV | Engineering range, lower range value | ○ | –19999 to 19999 | As specified when ordered. | ○ | ○ | ○ |
| D23 | DISP HRV | Engineering range, higher range value | ○ | –19999 to 19999 | As specified when ordered. | ○ | ○ | ○ |
| D30 | TEMP UNIT | Temperature setting units | ○ | deg C/deg F | deg C | ○ | ○ | ○ |
| D31 | STAT. P. UNIT | Static pressure setting units | ○ | Selected from $mmH_2O$, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, $gf/cm^2$, $kgf/cm^2$, $inH_2O$, inHg, $ftH_2O$, psi, or atm | As specified when ordered. If not specified, MPa. | ○ | – | ○ |
| D40 | REV OUTPUT | Output reversal | ○ | NORMAL/REVERSE | If not specified, NORMAL. | ○ | ○ | ○ |
| D45 | H/L SWAP | Impulse piping accessing direction | ○ | NORMAL/REVERSE*4 | NORMAL | ○ | – | – |
| D52 | BURN OUT | CPU error | – | HIGH/LOW, –5 to 110%*3 | HIGH | ○ | ○ | ○ |
| D53 | ERROR OUT | Hardware error | ○ | HOLD/HIGH/LOW, –5 to 110%*3 | HIGH | ○ | ○ | ○ |
| D60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| E | AUX SET 2 | Auxiliary setting data 2 | – | Menu name | | ○ | ○ | ○ |
| E10 | DFS MODE | DFS mode | ○ | OFF/ON*5 | ON | ○ | ○ | – |
| E14 | TEMP SELECT | Reference temperature sensor | ○ | AMP. TEMP/CAP. TEMP*5 | CAP. TEMP | ○ | ○ | – |
| E15 | TEMP ZERO | Zero shift conpensation setup | ○ | ±10.00*5 | 0.00 | ○ | ○ | – |
| E30 | BI DIRE MODE | Bidirectional mode | ○ | OFF/ON | OFF | ○ | – | – |
| E50 | AUTO RECOVER | Auto-recover from sensor error | ○ | OFF/ON | ON | ○ | ○ | ○ |
| E60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| H | AUTO SET | Automatic setup | – | Menu name | | ○ | ○ | ○ |
| H10 | AUTO LRV | Automatic measurement range lower range value setup | ○ | –32000 to 32000 | Displays the same data as C21. | ○ | ○ | ○ |
| H11 | AUTO HRV | Automatic measurement range higher range value setup | ○ | –32000 to 32000 | Displays the same data as C22. | ○ | ○ | ○ |
| H60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| J | ADJUST | Adjustment data | – | Menu name | | ○ | ○ | ○ |
| J10 | ZERO ADJ | Automatic zero adjustment | ○ | –5 to 110.0%*3 | | ○ | ○ | ○ |
| J11 | ZERO DEV. | Manual zero adjustment | ○ | | | ○ | ○ | ○ |
| J15 | SPAN ADJ | Manual span adjustment | ○ | –10.00 to 10.00% | 0.00% | ○ | ○ | ○ |
| J20 | EXT. ZERO ADJ | External zero-adjustment screw permission | ○ | ENABLE/INHIBIT | | ○ | ○ | ○ |
| J30 | AOUTPUT 4mA | 4mA adjustment | ○ | –10.00 to 10.00% | 0.00% | ○ | ○ | ○ |
| J31 | OUTPUT 20mA | 20mA adjustment | ○ | –10.00 to 10.00% | 0.00% | ○ | ○ | ○ |
| J60 | ASELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| K | TEST | Tests | – | Menu name | | ○ | ○ | ○ |
| K10 | OUTPUT in % | Test output % setting | ○ | –5 to 110.0%*3 Displays 'ACTIVE' while executing | | ○ | ○ | ○ |
| K60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |

| No. | Item | Description | Rewritability | Remarks | Default Value | Applicability | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | F | P | L |
| M | MEMO | Memo | – | Menu name | | ○ | ○ | ○ |
| M10 | MEMO 1 | Memo | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| M20 | MEMO 2 | Memo | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| M30 | MEMO 3 | Memo | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| M40 | MEMO 4 | Memo | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| M50 | MEMO 5 | Memo | ○ | 8 uppercase alphanumerics | | ○ | ○ | ○ |
| M60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |
| P | RECORD | History of the errors | – | | | ○ | ○ | ○ |
| P10 | ERROR REC 1 | Last error | ○ | Display the error | | ○ | ○ | ○ |
| P11 | ERROR REC 2 | One time before | ○ | Display the error | | ○ | ○ | ○ |
| P12 | ERROR REC 3 | Two time before | ○ | Display the error | | ○ | ○ | ○ |
| P13 | ERROR REC 4 | Three time before | ○ | Display the error | | ○ | ○ | ○ |
| P60 | SELF CHECK | Self-diagnostic messages | – | Same as A60 | | ○ | ○ | ○ |

*1: In case of Model EJA120A, static pressure cannot be measured. The display is always 0 MPa, but this is not a measured value.
*2: When Optional code /F1 is specified, substitute the value with 0.1.
*3: When Optional code /F1 is specified, substitute the value –5 with –2.5.
*4: Not applicable for Model EJA115.
*5: Applicable only for Model EJA118W, EJA118N, EJA118Y, EJA438W, and EJA438N.
*6: See MWP(max. working pressure) on the nameplate. B40 shows an approximate value of maximum pressure for the capsule.
*7: Unless otherwise specified by order. When optional code /F1 is specified, substitute the value –5 with –2.5.

### 8.3.2 Parameter Usage and Selection

Before describing the procedure for setting parameters, we present the following table showing how the parameters are used and in what case.

**IMPORTANT**

If the transmitter is turned off within 30 seconds after parameters have been set, the set data will not be stored and the terminal returns to previous settings.

**Table 8.1 Parameter Usage and Selection**

| Setup Item | Description |
|---|---|
| Tag No. setup<br>P. 8-9 | Sets the Tag No. (using 16 alphanumeric characters).<br>Note: Up to 8 alphanumerics (upper case letters) can be used in the BT100. |
| Calibration range setup<br>P. 8-9 | Sets the calibration range for 4 to 20 mA DC. Sets three data items: range unit, input value at 4 mA DC (LRV), and input value at 20 mA DC (HRV).<br>Note: LRV and HRV can be specified with range value specifications up to 5 digits (excluding any decimal point) within the range of –32000 to 32000. |
| Damping time constant setup<br>P. 8-10 | Adjusts the output response speed for 4 to 20 mA DC.<br>Can be set in 9 increments from 0.2 to 64 s. |
| Output signal low cut mode setup<br>P. 8-11 | Used mainly to stabilize output near 0% if output signal is the square root mode.<br>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. |
| Change the output limits<br>P. 8-11 | Change the range of normal output. |
| Integral indicator scale range and unit setup<br>P. 8-11 | Sets the following 5 types of integral indicator scale ranges and units:<br>% scale indicator, user set scale indicator, alternate indication of user set scale and % scale, input pressure display, alternate indication of input pressure and % scale<br>When using the user set scale, 4 types of data can be set:<br>user set scale setting, unit (BT200 only), display value at 4 mA DC (LRV), and display value at 20 mA DC (HRV).<br>Note: LRV and HRV can be specified with range value specifications up to 5 digits (excluding any decimal point) within the range of –19999 to 19999. |
| Unit setup for displayed temperature<br>P. 8-13 | Sets a unit for temperatures displayed on the BT200. |
| Operation mode (normal/ reverse signal) setup<br>P. 8-13 | Reverses the direction for 4 to 20 mA DC output relative to input.<br>Reverse mode is used for applications in which safety requires that output be driven toward 20 mA if input is lost. |
| Output status display/setup when a CPU failure<br>P. 8-13 | Displays the status of 4 to 20 mA DC output when a CPU failure. The parameter of the standard unit is fixed to the high limit value. |
| Output status setup when a hardware error occurs<br>P. 8-13 | Sets the status of the 4 to 20 mA DC output when an abnormal status is detected with the capsule or the amplifier as the result of self-diagnosis. One of the following statuses; last held, high limit, and low limit values, can be selected. |
| Range change (while applying actual inputs)<br>P. 8-14 | Range for 4 to 20 mA DC signal is set with actual input applied. Sets 20 mA DC output precisely with respect to user's reference instrument output. Note that DPharp is calibrated with high accuracy before shipment, so span should be set using the normal range setup. |
| Zero point adjustment<br>P. 8-14 | Adjusts zero point. This can be done either using the external zero-adjustment screw on the transmitteror using the BT200. |
| Span adjustment<br>P. 8-16 | Adjust the characterization curve. All the transmitters are calibrated at factory and this adjustment is normally not necessary for most cases. Use for specific purposes. |
| Test output (fixed current output) setup<br>P. 8-17 | Used for loop checks.<br>Output can be set freely from –5% to 110% in 1% steps. |
| User memo fields<br>P. 8-17 | Allows user to enter up to 5 items of any desired text in up to 8 uppercase alphanumeric characters per item. |

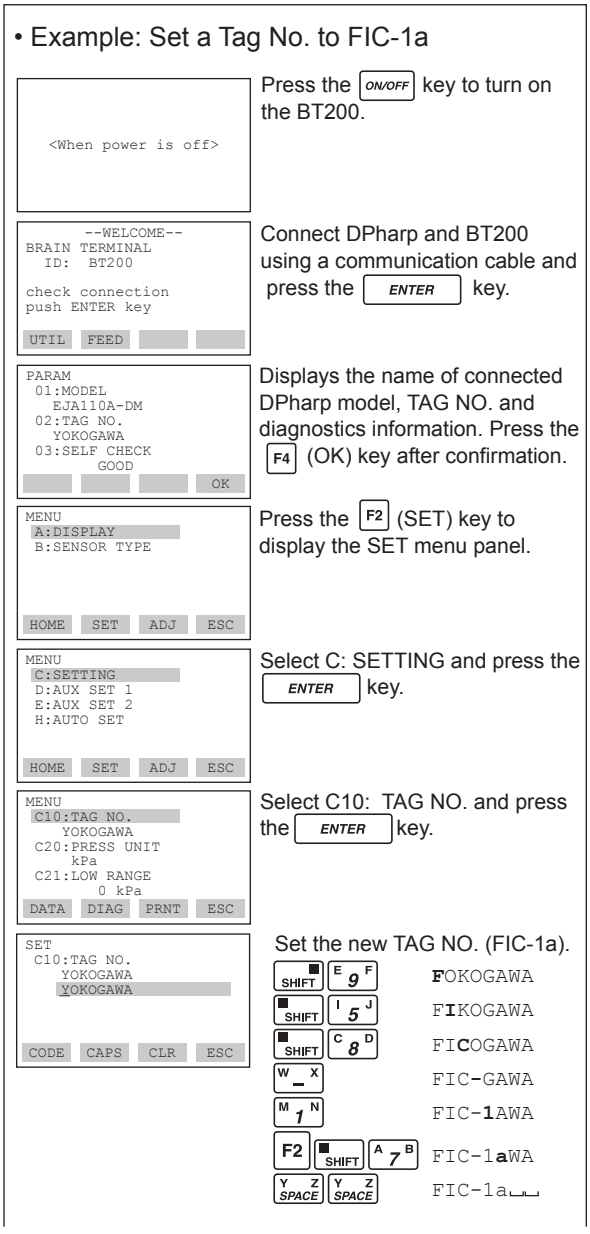
### 8.3.3 Setting Parameters

Set or change the parameters as necessary. After completing these, do not fail to use the “DIAG” key to confirm that “GOOD” is displayed for the self-diagnostic result at **_60: SELF CHECK**.

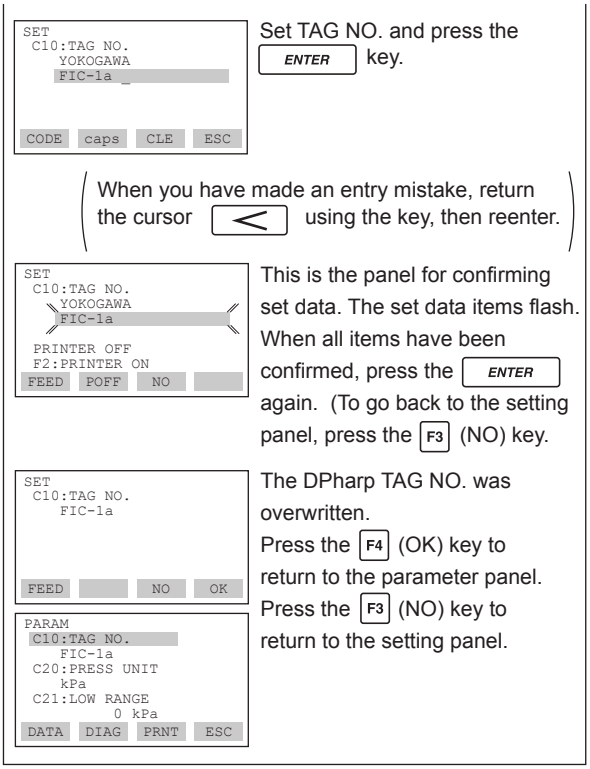
#### (1) Tag No. Setup (C10: TAG NO)

Use the procedure below to change the Tag No. Up to 16 alphanumeric characters can be entered.

• Example: Set a Tag No. to FIC-1a




F0812-1.ai



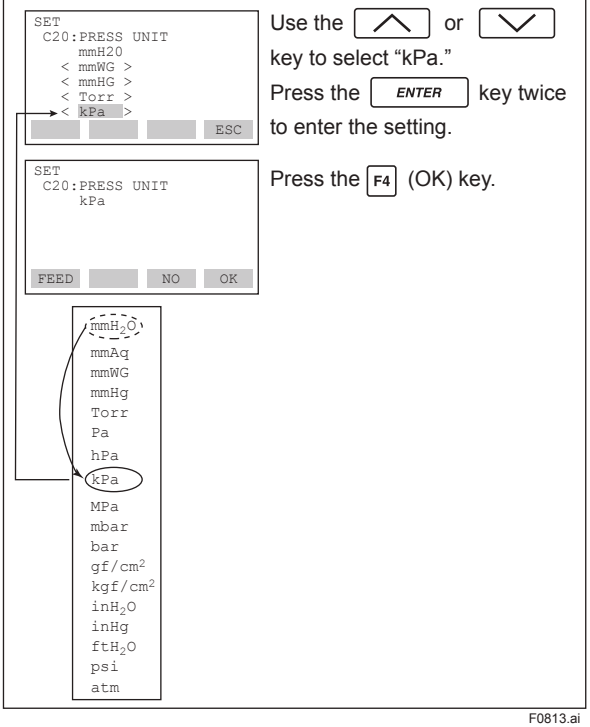

F0812-2.ai

#### (2) Calibration Range Setup

#### a. Setting Calibration Range Unit (C20: PRESS UNIT)

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

• Example: Change the unit from **mmH$_2$O** to **kPa**.



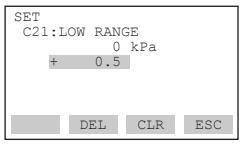

F0813.ai

### b. Setting Calibration Range Lower Range Value and Higher Range Value (C21: LOW RANGE, C22: HIGH RANGE)

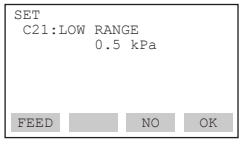
These range values are set as specified in the order before the instrument is shipped. Follow the procedure below to change the range.

- The measurement span is determined by the high and low range limit values. In this instrument, changing the low range value also automatically changes the high range value, keeping the span constant.

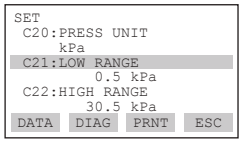
• Example 1: With present settings of 0 to 30 kPa, set the lower range value to 0.5 kPa.




Set **0.5**.
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.



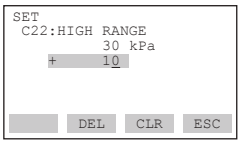

The higher range value is changed while the span remains constant.

(Span = Higher range value – Lower range value )

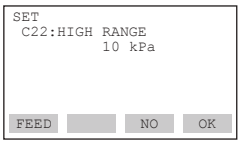
F0814.ai

- Note, however, that changing the higher range value does not cause the lower range value to change. Thus, changing the higher range value also changes the span.
- Calibration range can be specified with range value specifications up to 5 digits (excluding any decimal point) for low or high range limits within the range of −32000 to 32000.

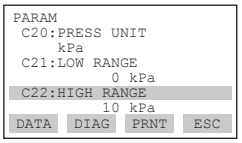
• Example 2: With present settings of 0 to 30 kPa, set the Higher range value to10 kPa.




Set **10**.
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.



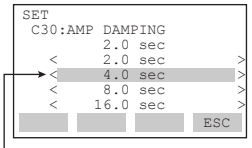

The low range value is not changed, so the span changes.

F0815.ai

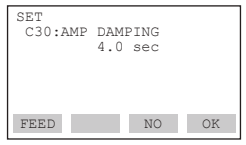
### (3) Damping Time Constant Setup (C30: AMP DAMPING)

When the instrument is shipped, the damping time constant is set at 2.0 seconds. Follow the procedure below to change the time constant.

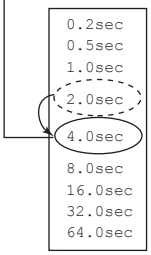
• Example: Change from 2.0 sec to 4.0 sec.




Use the ^ or v key to select **4.0 sec**.
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.



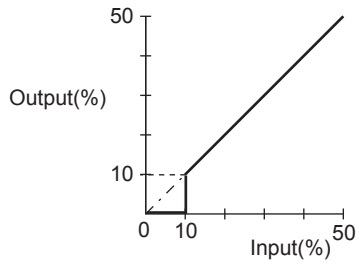

F0816.ai

Note: The damping time constant set here is the damping time constant for the amplifier assembly. The damping time constant for the entire transmitter is the sum of the values for the amplifier assembly and for the capsule assembly. For the capsule assembly damping time constant (fixed), see the “General Specifications” found at the end of this manual. (See Chapter 10.)

### (4) Output Signal Low Cut Mode Setup (D10: LOW CUT, D11: LOW CUT MODE)

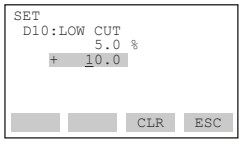
Low cut mode can be used to stabilize the output signal near the zero point. The low cut point can be set in a range from 0 to 20% of output. (Hysteresis of cut point: ±1%)

- LOW CUT at 10%

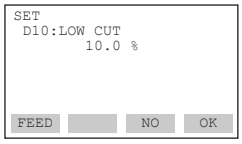



F0817.ai

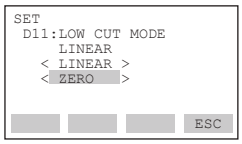
• Example: Change the low cut setting range from 5% to 10%, and the low cut mode from LINEAR to ZERO.



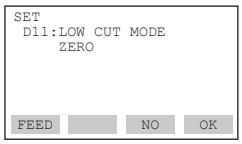

Set "10."
Press the ENTER key twice to enter the setting.



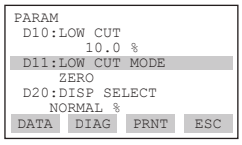

Press the F4 (OK) key.
Next, the [D11: LOW CUT MODE] setting panel is displayed.




Use the ^ or v key to select ZERO.
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.




F0818.ai

### (5) Change Output Limits (D15: OUT LIMIT(L), D16: OUT LIMIT(H))

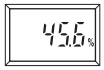
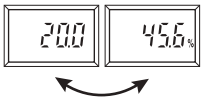
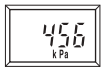
The range of normal output is preset at factory from -5.0 to 110.0% unless otherwise specified, and the output is limited with these upper and lower values. This output range can be changed, for example, to meet the requirements of NAMUR, etc. within the settable range. Set the lower limit with **D15: OUT LIMIT(L)** and upper limit with **D16: OUT LIMIT(H)**.

Settable range: −5.0 to 110.0 (%)

Lower limit < Upper limit

### (6) Integral Indicator Scale Setup

The following 5 displays are available for integral indicators.

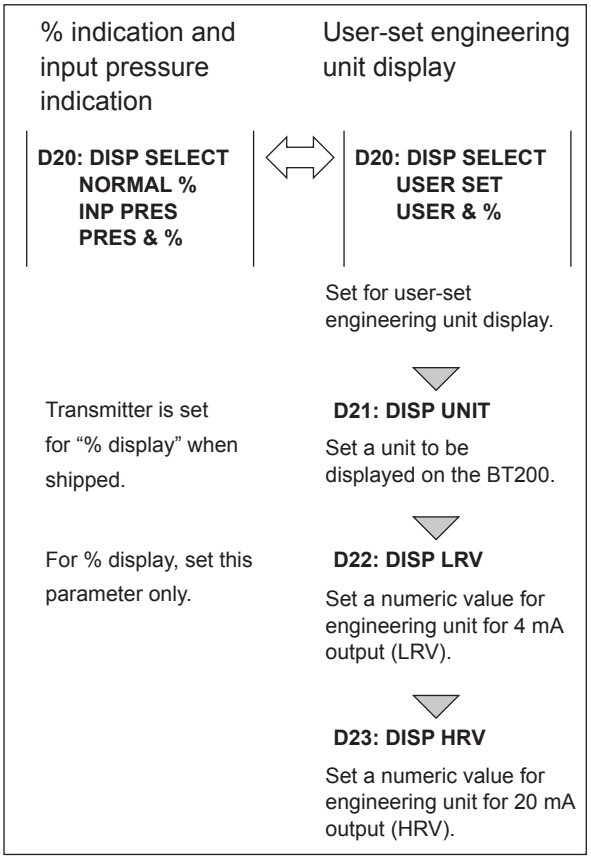
| D20: DISP SELECT and Display | Description and Related parameters |
|---|---|
| NORMAL %<br>  | Indicates –5 to 110% range depending on the Measurement range (C21, C22).<br>A10:OUTPUT (%)<br>45.6 % |
| USER SET<br> | Indicates values depending on the Engineering range (D22, D23).(Note 1) Units set using Engineering unit (D21) are not indicated.<br>A11:ENGR.OUTPUT<br>20.0 M |
| USER & %<br>  | Indicates user set and % alternately in 3 second intervals.<br>A10:OUTPUT (%)<br>45.6 %<br>A11:ENGR. OUTPUT<br>20.0 M |
| INP PRES<br>  | Indicates input pressure.(Note 2) Indication limits –19999 to 19999.<br>A40:INPUT<br>456 kPa |
| PRES & %<br> | Indicates input pressure and % alternately in 3 second intervals.<br>A10:OUTPUT (%)<br>45.6 %<br>A40:INPUT<br>456 kPa |

F0819.ai

Note 1: Scale range can be specified with range limit specifications up to 5 digits (excluding any decimal point) for low or high range limits within the range of –19999 to 19999.
The range with decimals is available to the third decimal place.

Note 2: It indicates the value after zeroing.

See (a.) through (c.) for each setting procedure.



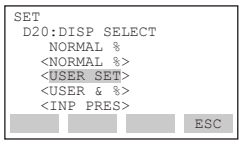

F0820.ai

### a. Display Selection (D20: DISP SELECT)

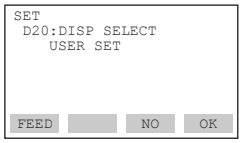
Follow the instructions given to the below to change the range of integral indication scales.

When **USER SET** is selected, the user set values of integral indication and **A11: ENGR. OUTPUT** parameter are indicated.

• Example: Set the integral indicator scale to engineering units display.




Use the ^ or v key to select "USER SET."
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.

The "%" disappears from the integral indicator display.

F0821.ai

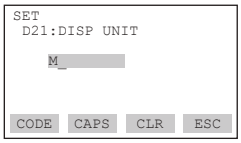
### b. Setting User-set Engineering Unit (D21: DISP UNIT)

This parameter allows entry of the engineering units to be displayed on the BT200. When the instrument is shipped, this is set as specified in the order.

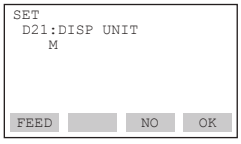
Follow the procedure below to change this setting.

This parameter need not be set for % display.

• Example: Set an engineering unit **M**.




Set "M."
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.

F0822.ai

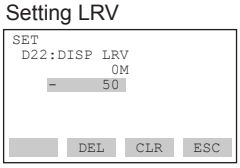
### c. Lower and Higher Range Value Setup in Engineering Unit (D22: DISP LRV, D23: DISP HRV)

These parameter items are used to set the lower and higher range values for the engineering unit display.

When the instrument is shipped, these are set as specified in the order. Follow the procedure below to change these settings. Note that these parameters need not be set for % display.

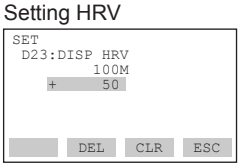
• Example: Set lower range value (LRV) to **–50** and higher range value (HRV) to **50**.

Setting LRV

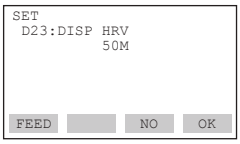



Set "–50."
Press the ENTER key twice to enter the setting.

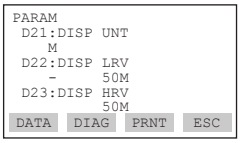
Setting HRV




Set "50."
Press the ENTER key twice to enter the setting.




Press the F4 (OK) key.

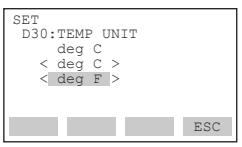



F0823.ai

### (7) Unit Setup for Displayed Temperature (D30: TEMP UNIT)

When the instrument is shipped, the temperature units are set to **degC**. Follow the procedure below to change this setting. Note that changing the unit here changes the unit for **A20: AMP TEMP** (amplifier temperature) and **A21: CAPSULE TEMP** (capsule temperature).

• Example: Change the unit for the temperature display.



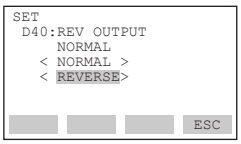

Use the ∧ or ∨ key to select "deg F."
Press the ENTER key twice to enter the setting.

F0824.ai

### (8) Operation Mode Setup (D40: REV OUTPUT)

This parameter allows the direction of the 4 to 20 mA output to be reversed with respect to input. Follow the procedure below to make this change.

• Example: Change 4 to 20 mA output to 20 to 4 mA output.




Use the ∧ or ∨ key to select REVERSE.
Press the ENTER key twice to enter the setting.

F0825.ai

### (9) Output Status Display/Setup when a CPU Failure (D52: BURN OUT)

This parameter displays the status of 4 to 20 mA DC output if a CPU failure occurs. In case of a failure, communication is disabled.

Setting of HIGH or LOW is enabled. This is done with the pin (CN4) on the CPU assembly. See Chapter 3 for details.

Standard specifications

The parameter is set to HIGH. If a failure, the transmitter outputs the signal of 110% or higher. The parameter **D53: ERROR OUT** is set to HIGH from the factory.

Optional code/C1

The parameter is set to LOW. If a failure, output which is −5% or lower is generated. The parameter **D53: ERROR OUT** is set to LOW from the factory.

• Example: Standard specifications

pin (CN4) position: H

• Example: Optional code/C1

pin (CN4) position: L

F0826.ai

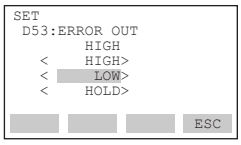
### (10) Output Status Setup when a Hardware Error Occurs (D53: ERROR OUT)

This parameter allows the setting of the output status when a hardware error occurs. The following three selections are available.

(a) HOLD; Outputs the last value held before the error occurred.
(b) HIGH; Outputs an output of 110% when an error has occurred.
(c) LOW; Outputs an output of −5% when an error has occurred.

Note: A hardware error means CAP MODULE FAULT of Er.01 or AMP MODULE FAULT of Er. 02 which are shown in 8.5.2 “Errors and Countermeasures.”)

• Example: Set the output status to LOW when a hardware error occurs.




Use the ^ or v key to select “LOW.”
Press the ENTER key twice to enter the setting.

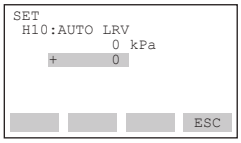
F0827.ai

### (11) Range Change while Applying Actual Inputs (H10: AUTO LRV, H11: AUTO HRV)

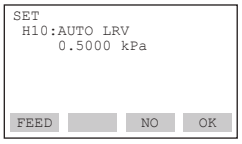
This feature allows the lower and higher range values to be set up automatically with the actual input applied. If the lower and higher range values are set, **C21: LOW RANGE** and **C22: HIGH RANGE** are changed at this same time.

Follow the procedure in the figure below.
The measurement span is determined by the higher and lower range values. Changing the lower range value results in the higher range value changing auto-matically, keeping the span constant.

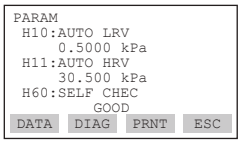
• Example 1: When changing the lower range value to 0.5 kPa for the present setting of 0 to 30 kPa, take the following action with input pressure of 0.5 kPa applied.




Press the ENTER key twice.
The lower range value is changed to 0.5 kPa.




Press the F4 (OK) key.

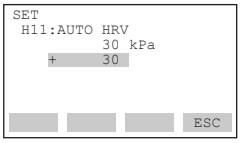



The higher range value is changed keeping the span constant.
Parameters **C21** and **C22** are changed at the same time.

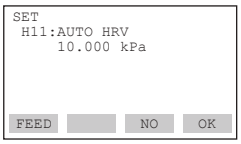
F0828.ai

Note that changing the higher range value does not cause the lower range value to change but does change the span.

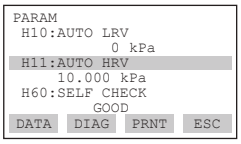
• Example 2: When the higher range value is to be changed to 10 kPa with the present setting of 0 to 30 kPa, take the following action with an input pressure of 10 kPa applied.




Press the ENTER key twice.
The higher range value is changed to 10 kPa.




Press the F4 (OK) key.




The lower range value is not changed, so the span changes.
Parameter **C22** is changed at the same time.

F0829.ai

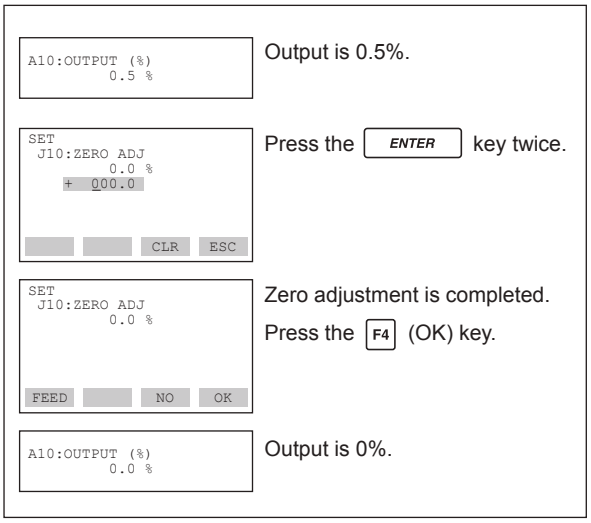
### (12) Zero Point Adjustment (J10: ZERO ADJ, J11: ZERO DEV, J20: EXT ZERO ADJ)

The DPharp supports several adjustment methods.

Select the method best suited for the conditions of your application.
Note that output signal can be checked by displaying parameter **A10:OUTPUT (%)** on the BT200.

| Adjustment Method | Description |
|---|---|
| **Using the BT200** | **Set the present input to 0%.** Adjust for 0% output at input level of 0%. |
| | **Adjust output to the reference value obtained using other means.** If the input level cannot easily be made 0% (because of tank level, etc.), adjust output to the reference value obtained using other means, such as a sight glass. |
| **Using the external zero-adjustment screw P.8-14** | Adjust zero point using the zero-adjustment screw on the transmitter. This permits zero adjustment without using the BT200. Accurately adjust the output current to 4 mA DC or other target output value using an ammeter that accurately reads output currents. |

(a) Follow the procedure below when setting the present output to 0% (4 mA).




F0830.ai

(b) In tank level measurement, if the actual level cannot be brought to zero for zero adjustment, then the output can be adjusted to correspond to the actual level obtained using another measuring instrument such as a glass gauge.

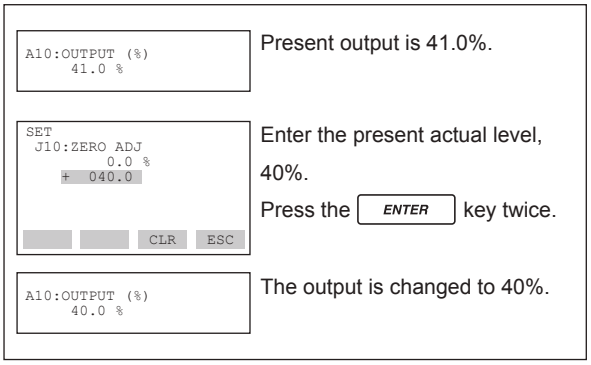
**[Example]**

Measurement range: 50 to 250 kPa, Actual value: 130 kPa.

$$\text{Actual value(\%)} = \frac{\text{Actual value} - \text{Measurement range lower range value}}{\text{Measurement range higher range value} - \text{Measurement range lower range value}} \times 100$$

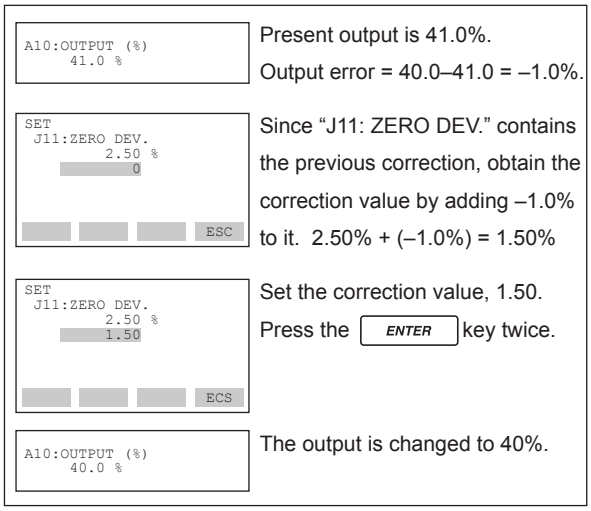
$$= \frac{130-50}{250-50} \times 100 = 40.0\%$$

(b)-1 Follow the procedure below to use **J10: ZERO ADJ**.




F0831.ai

(b)-2 Follow the procedure below to use **J11: ZERO DEV**.

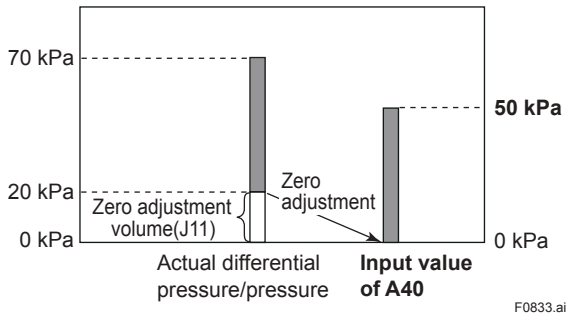



F0832.ai

When the zero point is adjusted, the displayed value of A40 is as follows.

**[Example]**

When the zero point is shifted by 20 kPa for the actual pressure, the parameter of A40 indicates 50 kPa.




F0833.ai

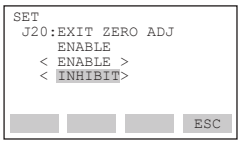
(c) Zero Point Adjustment Using the External Zero Adjustment Screw

- Enabling/inhibiting of zero point adjustment using the external zero-adjustment screw on the transmitter (J20: EXT ZERO ADJ)

Follow the procedure below to enable or inhibit zero point adjustment from the zero-adjustment screw on the transmitter.

This is set to "ENABLE" when the instrument is shipped.

• Example: Inhibiting zero adjustment by the external zero-adjustment screw




Use the [^] or [v] key to select "INHIBIT."
Press the [ENTER] key twice to enter the setting.

F0834.ai

- Zero point adjustment using external zero-adjustment screw on the transmitter

Turn the zero-adjustment screw on the outside of the transmitter case using a slotted screwdriver. Turn the screw to the right to increase the zero point or to the left to decrease the zero output; the zero adjusts in increments of 0.01% of the range setting. Note that the amount of adjustment to the zero point changes according to the speed at which the screw is turned. To make fine adjustments, turn the screw slowly; to make coarse adjustments, turn the screw quickly.

Note: When a zero point adjustment has been made, do not turn off the transmitter less than 30 seconds after adjustment.

### (13) Span Adjustment

Each DPharp EJA series transmitter is factory characterized according to the specification. Mounting position effects or zero shifts caused by static pressure are typically compensated by a zero adjustment.

A span adjustment is a function to correct the slope error from a zero point in characterizing 100% point (HRV). This function can be used when span drifts may be caused or characterization to the specific pressure standard is required.

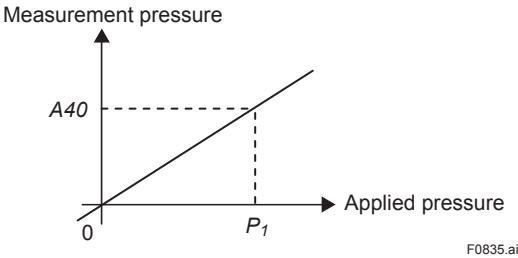
Therefore, the zero point adjustment should always be performed before the upper point adjustment in order to maintain the pitch between zero and 100% points within the calibration range.

You can manually perform the trimming procedure by using J15: SPAN ADJ.

- Span adjustment value
  The span adjustment value is calculated as follows.

$$\textit{Span adjustment value}\ (\%) = \frac{P_1 - A40}{P_1} \times 100$$

$P_1$: Actual differential pressure/pressure value
$A40$: Input (indicated as the value after zeroing)




F0835.ai

• Example: For the range of 0 to 30 kPa.
A40: INPUT = 30.15 kPa
J15: SPAN ADJ = 0.15 %

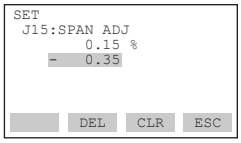
Suppose that a standard pressure of 30 kPa is applied and the value of the parameter of A40:INPUT is 30.15 kPa. Firstly, obtain the slope error for the span as follows;

$$\text{Span adjustment value}\ (\%) = \frac{P_1 - A40}{P_1} \times 100$$

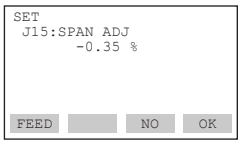
$$= \frac{30.00 - 30.15}{30.00} \times 100 = -0.5\ (\%)$$

Add −0.5% to 0.15% of the current value to calculate the accumulated span adjustment value.

0.15 + (−0.50) = –0.35




Set **−0.35**.
Press [ENTER] key twice.




Press the [F4] (OK) key.

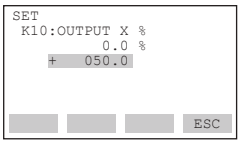
Note: Enter 0.00 to J15: SPAN ADJ to reset the span adjustment to the initial value at the shipment.

F0836.ai

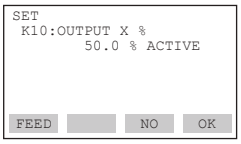
### (14) Test Output Setup (K10: OUTPUT X%)

This feature can be used to output a fixed current from 3.2 mA (−5%) to 21.6 mA (110%) for loop checks.

• Example: Output 12 mA (50%) fixed current.




Set “50.0%.”
Press the ENTER key twice to output a fixed current at 50%.




“Active” is displayed while this is being executed.
Press the F4 (OK) key to cancel the fixed current output.

F0837.ai

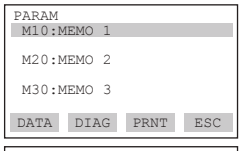
**IMPORTANT**

1. Test output is held for approximately 10 minutes, and then released automatically after the time has elapsed. Even if the BT200 power supply is turned off or the communication cable is disconnected during test output, it is held for approximately 10 minutes.
2. Press the [F4] (OK) key to release test output immediately.

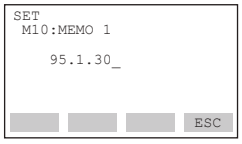
### (15) User Memo Fields (M: MEMO)

This feature provides 5 user memo fields, each holding up to 8 alphanumeric characters. Up to 5 items such as inspection date, inspector, and other information can be saved in these fields.

• Example: Save an inspection date of January 30, 1995.




Set “95.1.30” in the order of year, month, and day.
Press the ENTER key twice to enter the setting.




F0838.ai

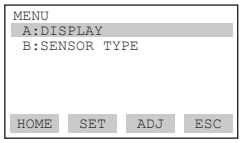
## 8.4 Displaying Data Using the BT200

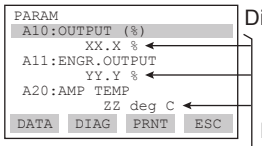
### 8.4.1 Displaying Measured Data

The BT200 can be used to display measured data.

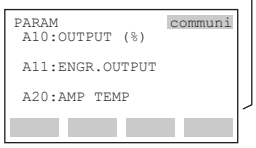
The measured data is updated automatically every 7 seconds. In addition, the display can be updated to the present data value at any time by pressing the [F1] (DATA) key. For parameters associated with the display of measured data, see Subsection 8.3.1, “Parameter Summary.”

• Example: Display output.




Display “A10: OUTPUT (%).”



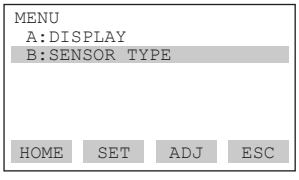

Data is updated automatically at 7-second intervals.

F0839.ai

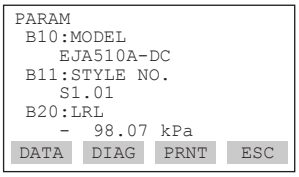
### 8.4.2 Display Transmitter Model and Specifications

The BT200 can be used to display the model and specifications of the transmitter.

• Example: View transmitter model name.




Press ENTER .




For the associated parameters, see Subsection 8.3.1, Parameter Summary.

F0840.ai

# 8.5 Self-Diagnostics

## 8.5.1 Checking for Problems

### (1) Identifying Problems with BT200

The following four areas can be checked.

(a) Whether connections are good.
(b) Whether BT200 was properly operated.
(c) Whether settings were properly entered.
(d) History of the errors.

See examples below.

• Example 1: Connection errors

```
      --WELCOME--
BRAIN TERMINAL
  ID:  BT200

check connection
push ENTER key
UTIL  FEED
```

Press the ON/OFF key.
When the panel shown on the left appears, press the ENTER key.

```
communication error
                  ESC
```

Since communications will be unsuccessful if there is a problem in the connection to the BT200, the display at the left will appear.
Recheck the connection.
Press the F4 (OK) key.

F0841.ai

• Example 2: Setting entry errors

```
PARAM
 01:MODEL
   EJA510A-DC
 02:TAG NO.
   YOKOGAWA
 03:SELF CHECK
      ERROR
                  OK
```

The initial data panel shows the result of current transmitter diagnostics.

```
PARAM
 C20:PRESS UNIT
     kPa
 C21:LOW RANGE
        600 kPa
 C22:HIGH RANGE
        600 kPa
DATA  DIAG  PRNT  ESC
```

Press the F2 (DIAG) key in the parameter panel to go to the diagnostics panel (C60: SELF CHECK).

```
DIAG
 C60:SELF CHECK
       ERROR
  <    ERROR    >
  <  ILLEGAL LRV >

FEED        PRNT  ESC
```

An error message is displayed when an error occurs in the diagnostics panel.

F0842.ai

• Example 3: Checking the history of the errors

```
MENU
 J:ADJUST
 K:TEST
 M:MEMO
 P:RECORD

HOME  SET  ADJ  ESC
```

Connect the BT200 to the transmitter, and call item “P.”

```
PARAM
 P10:ERROR REC 1
       ERROR
 P11:ERROR REC 2
       ERROR
 P12:ERROR REC 3
       GOOD
DATA  DIAG  PRNT  ESC
```

P10: “ERROR REC 1” displays the last error.
P11: “ERROR REC 2” displays the error one time before the last error occurred.
P12: “ERROR REC 3” displays the error two times before the last error occurred.
P13: “ERROR REC 4” displays the error three times before the last error occurred.

The history of up to four errors can be stored. When the 5th error has occurred, it is stored in “P10”. The error stored in “P13” will be deleted, and then, the error in “P12” will be copied to “P13”. In this sequence, the history of the most previously occurred error will be removed from memory.
“GOOD” will be displayed if there was no previous error.

```
SET
 P10:ERROR REC 1
       ERROR
  <    ERROR    >
  <  ILLEGAL LRV >
  <  ILLEGAL HRV >

                  ESC
```

Select P10: ERROR REC1 and press the ENTER key to display the error message.

<(a) SETUP PANEL>

For the details of the messages listed below, see Table 8.5.1 Error Message Summary.

| | | |
|---|---|---|
| CAP MODULE FAULT | OVER TEMP (CAP) | ILLEGAL LRV |
| AMP MODULE FAULT | OVER TEMP (AMP) | ILLEGAL HRV |
| OUT OF RANGE | OVER OUTPUT | ILLEGAL SPAN |
| OUT OF SP RANGE | OVER DISPLAY | ZERO ADJ OVER |

Note 1: Press the ENTER key twice in the setting panel (panel 1) to clear all error message (P10 to P13) information.
Note 2: After two hours from when an error occurs, the error message of that error will be recorded. Therefore, if you switch off the transmitter within two hours from when the error occurs, there is no history of that error stored in the transmitter, and this function is meaningless.

F0843.ai

### (2) Checking with Integral Indicator

**NOTE**

If an error is detected in the self-diagnostic, an error number is displayed on the integral indicator. If there is more than one error, the error number changes at two-second intervals. See Table 8.2 regarding the error numbers.

F0844.ai

**Figure 8.5 Identifying Problems Using the Integral Indicator**

### 8.5.2 Errors and Countermeasures

The table below shows a summary of error messages.

**Table 8.2 Error Message Summary**

| Integral Indicator Display | BT200 Display | Cause | Output Operation during Error | Countermeasure |
|---|---|---|---|---|
| None | GOOD | | | |
| --- | ERROR | | | |
| Er.01 | CAP MODULE FAULT | Capsule problem.*1 | Outputs the signal (Hold, High, or Low) set with parameter D53. | Replace the capsule when error keeps appearing even after restart.*2 |
| Er.02 | AMP MODULE FAULT | Amplifier problem. | Outputs the signal (Hold, High, or Low) set with parameter D53. | Replace amplifier. |
| Er.03 | OUT OF RANGE | Input is outside measurement range limit of capsule. | Outputs high range limit value or low range limit value. | Check input. |
| Er.04 | OUT OF SP RANGE | Static pressure exceeds specified range.*3 | Displays present output. | Check line pressure (static pressure). |
| Er.05 | OVER TEMP (CAP) | Capsule temperature is outside range (–50 to 130°C). | Displays present output. | Use heat insulation or make lagging to keep temperature within range. |
| Er.06 | OVER TEMP (AMP) | Amplifier temperature is outside range (–50 to 95°C). | Displays present output. | Use heat insulation or make lagging to keep temperature within range. |
| Er.07 | OVER OUTPUT | Output is outside high or low range limit value. | Outputs high or low range limit value. | Check input and range setting, and change them as needed. |
| Er.08 | OVER DISPLAY | Displayed value is outside high or low range limit value. | Displays high or low range limit value. | Check input and display conditions and modify them as needed. |
| Er.09 | ILLEGAL LRV | LRV is outside setting range. | Holds output immediately before error occurrence. | Check LRV and modify as needed. |
| Er.10 | ILLEGAL HRV | HRV is outside setting range. | Holds output immediately before error occurrence. | Check HRV and modify as needed. |
| Er.11 | ILLEGAL SPAN | SPAN is outside setting range. | Holds output immediately before error occurrence. | Check SPAN and change as needed. |
| Er.12 | ZERO ADJ OVER | Zero adjustment is too large. | Displays present output. | Readjust zero point |

*1: This error code appears at a capsule problem or when an illegal overpressure is applied to the pressure sensor.
*2: If the normal pressure is regained, the Er.01 will disappear according to the setting of the parameter of E**50: AUTO RECOVER**. When the **E50: AUTO RECOVER** is set to **ON**(defalut setting), the Er.01 will disappear automatically. When the **E50: AUTO RECOVER** is set to **OFF**, restart the transmitter to cancel Er.01. If no error code appears then, perform necessary adjustment such as zero-adjustment to continue the operation. If the error code still exists, replace the capsule assembly.
*3: For Model EJA120A, static pressure cannot be measured. The display is always 0 MPa, but this is not a measured value.

# 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 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.

Since the transmitters are precision instruments, carefully and thoroughly read the following sections for proper handling during maintenance.

**IMPORTANT**

- As a rule, maintenance of this transmitter should be implemented in a maintenance service shop where the necessary tools are provided.
- The CPU assembly contains sensitive parts that may be damaged by static electricity. Exercise care so as not to directly touch the electronic parts or circuit patterns on the board, for example, by preventing static electrification by using grounded wrist straps when handling the assembly. Also take precautions such as placing a removed CPU assembly into a bag with an antistatic coating.

## 9.2 Calibration Instruments Selection

Table 9.1 shows the instruments required for calibration. Select instruments that will enable the transmitter to be calibrated or adjusted to the required accuracy. The calibration instruments should be handled carefully so as to maintain the specified accuracy.

## 9.3 Calibration

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

1) Connect the instruments as shown in Figure 9.1 and warm up the instruments for at least five minutes.

**IMPORTANT**

- To adjust the transmitter for highest accuracy, make adjustments with the power supply voltage and load resistance including leadwire resistances set close to the conditions under which the transmitter is installed.
- If the measurement range 0% point is 0 kPa or shifted in the positive direction (suppressed zero), the reference pressure should be applied as shown in the figure. If the measurement range 0% point is shifted in the negative direction (elevated zero), the reference pressure should be applied using a vacuum pump.
- Do not perform the calibration procedure until the transmitter is at room temperature.

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

**Table 9.1 Instruments Required for Calibration**

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

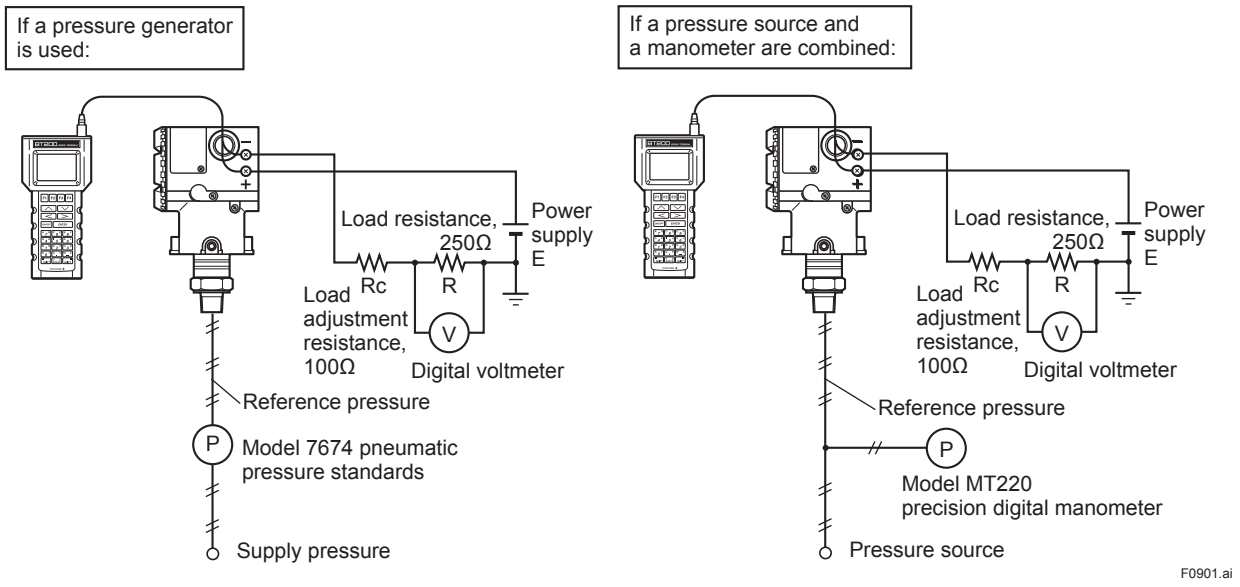



**Figure 9.1 Instrument Connections**

## 9.4 Disassembly and Reassembly

**CAUTION**

**Precautions for CENELEC and IECEx Flameproof Type Transmitters**

- Flameproof type transmitters must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
- On the flameproof type transmitters the two covers are locked, each by an Allen head bolt (shrouding bolt). When a shrouding bolt is driven clockwise by an Allen wrench, it is going in and cover lock is released, and then the cover can be opened by hand.

When a cover is closed it should be locked by a shrouding bolt without fail. Tighten the shrouding bolt to a torque of 0.7 N·m.

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

Always turn OFF power and shut off and release pressures before disassembly. Use proper tools for all operations. Table 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 | 2 | JIS B4648<br>One each, nominal 3 and 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 | |

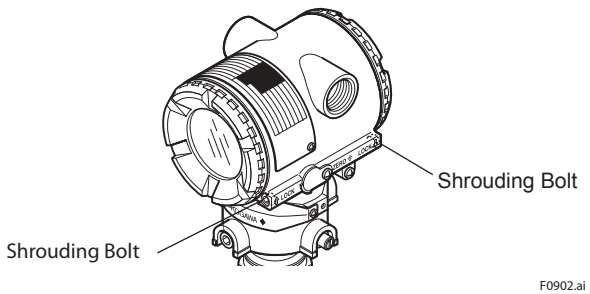



**Figure 9.2 Shrouding Bolts**

### 9.4.1 Replacing the Integral Indicator

**CAUTION**

**Cautions for Flameproof Type Transmitters**

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

This subsection describes the procedure for replacing an integral indicator. (See Figure 9.4)

#### ■ Removing the Integral Indicator

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

#### ■ Attaching the Integral Indicator

Integral indicator can be installed in the following three directions.

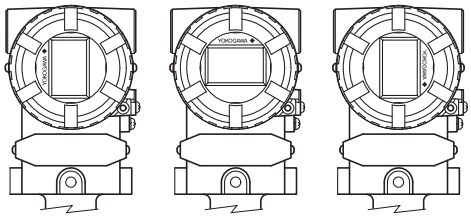



**Figure 9.3 Installation Direction of Indicator**

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

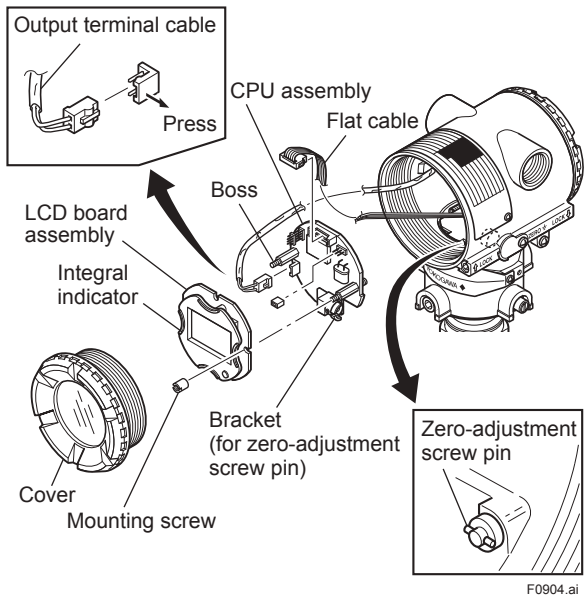



**Figure 9.4 Removing and Attaching LCD Board Assembly and CPU Assembly**

### 9.4.2 Replacing the CPU Board Assembly

This subsection describes the procedure for replacing the CPU assembly. (See Figure 9.4)

#### ■ Removing the CPU Assembly

1) Remove the cover. If an integral indicator is mounted, refer to Subsection 9.4.1 and remove the indicator.
2) Turn the zero-adjustment screw to the position (where the screw head slot is horizontal) as shown in Figure 9.4.
3) Disconnect the output terminal cable (cable with brown connector at the end). When doing this, lightly press the side of the CPU assembly connector and pull the cable connector to disengage.
4) Use a socket driver (width across flats, 5.5mm) to loosen the two bosses.
5) Carefully pull the CPU assembly straight forward to remove it.
6) Disconnect the flat cable (cable with black 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 black connector) between the CPU assembly and the capsule.
2) Connect the output terminal cable (with brown connector).

**NOTE**

Make certain that the cables are free of pinching between the case and the CPU assembly edge.

3) Align and engage the zero-adjustment screw pin with the groove on the bracket on the CPU assembly. Then insert the CPU board assembly straight onto the post in the amplifier case.
4) Tighten the two bosses. If the transmitter is equipped with an integral indicator, refer to Subsection 9.4.1 to mount the indicator.

**NOTE**

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

5) Replace the cover.

### 9.4.3 Cleaning and Replacing the Capsule Assembly

This subsection describes the procedures for cleaning and replacing the capsule assembly. (See Figure 9.5.)

**CAUTION**

**Cautions for Flameproof Type Transmitters**

Users are prohibited by law from modifying the construction of a flameproof 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 measurement range. When doing so, be sure to observe the following.

- The replacement capsule assembly must have the same part number as the one being replaced.
- The section connecting the transmitter and capsule assembly is a critical element in preservation of flameproof performance, and must be checked to verify that it is free of dents, scratches, and other defects.
- After completing maintenance, be sure to securely tighten the Allen screws that fasten the transmitter section and pressure-detector section together.

#### ■ Removing the Capsule Assembly

**IMPORTANT**

Exercise care as follows when cleaning the capsule assembly.

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

1) Remove the CPU assembly as shown in Subsection 9.4.2.
2) Remove the two Allen screws and the pipe (shown in Figure 9.5) for the model EJA530A with Measurement span code A, B, and C, which connect the transmitter section and capsule assembly.
3) Separate the transmitter section and capsule assembly.
4) Clean the capsule assembly or replace with a new one.

#### ■ Reassembling the Capsule Assembly

1) Insert the capsule assembly to the transmitter section. For the model EJA530A with Measurement span code A, B, and C with the pipe (shown in Figure 9.5), insert the capsule assembly in a way that the direction of the pipe screw thread matches to that of the zero-adjustment screw of the transmitter section.
2) Tighten the two Allen screws to a torque of 5 N·m and the pipe with gasket if applied.
3) Install the CPU assembly according to Subsection 9.4.2.
4) After completing reassembly, adjust the zero point and check the parameters.

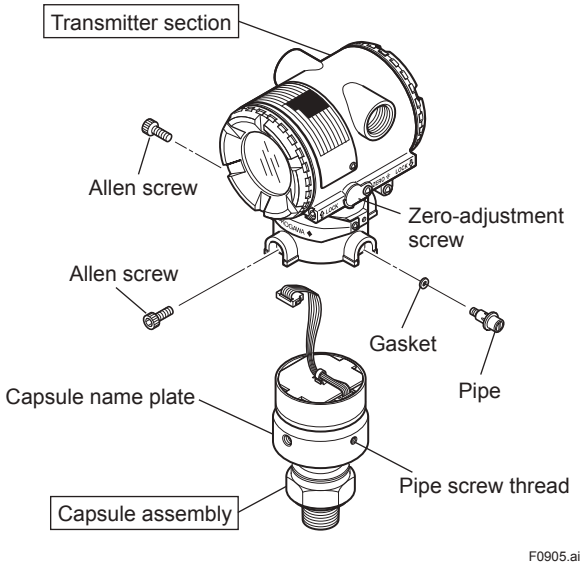



**Figure 9.5 Removing and Mounting the Capsule Assembly**

## 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; see Section 8.5 for information on using this function.

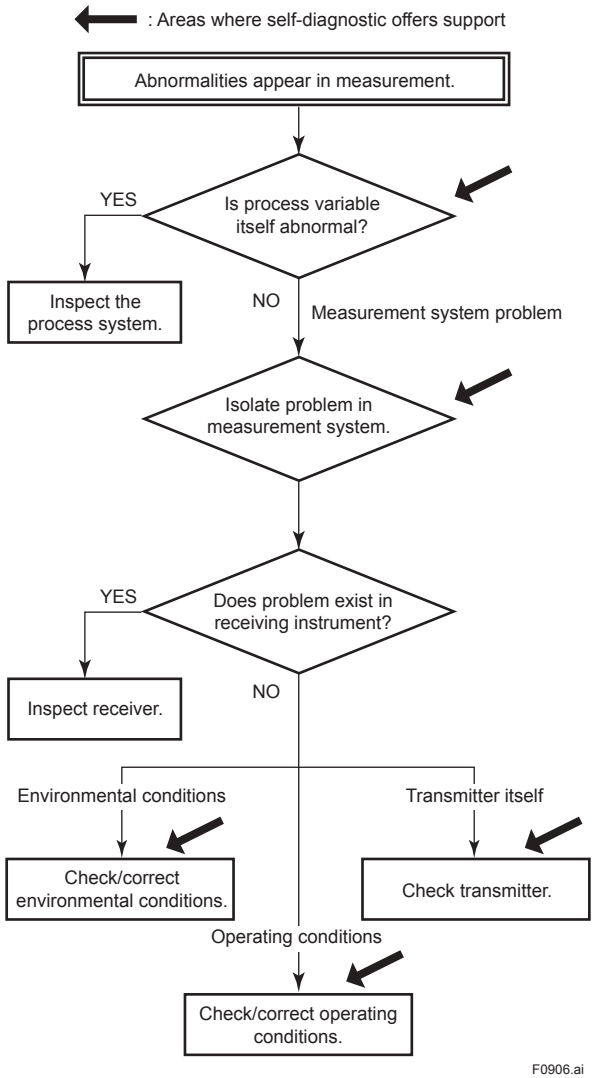
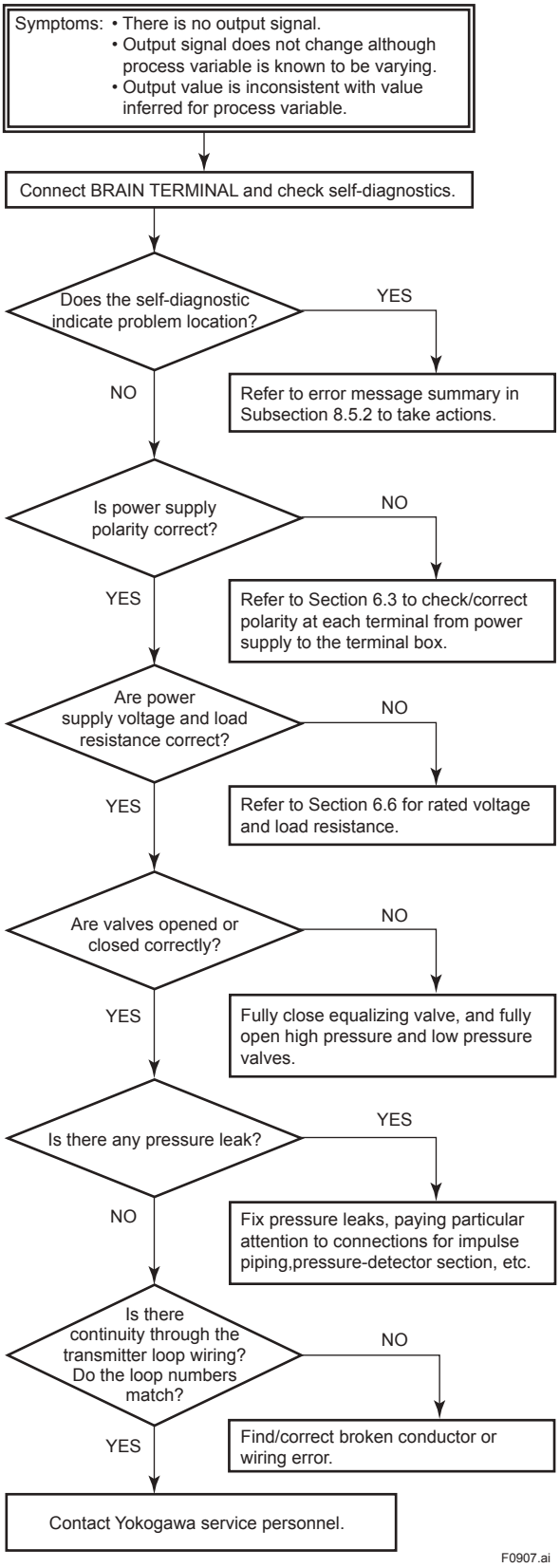
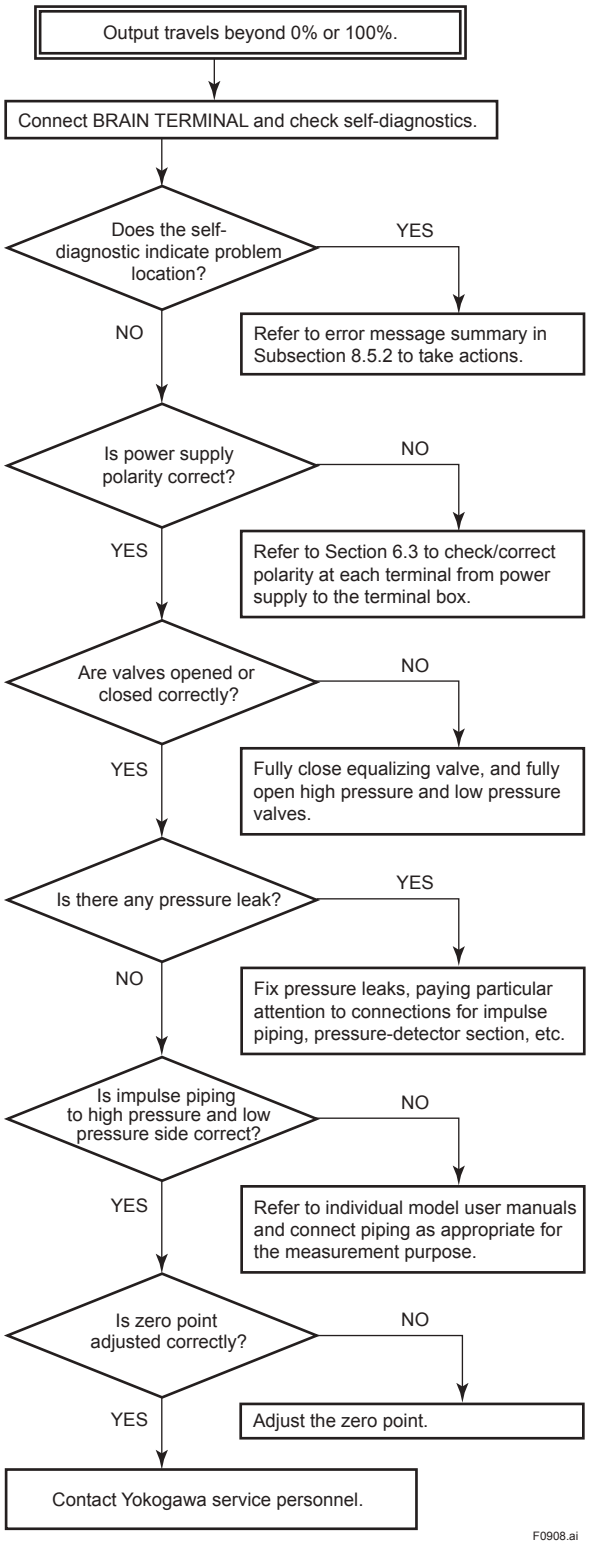
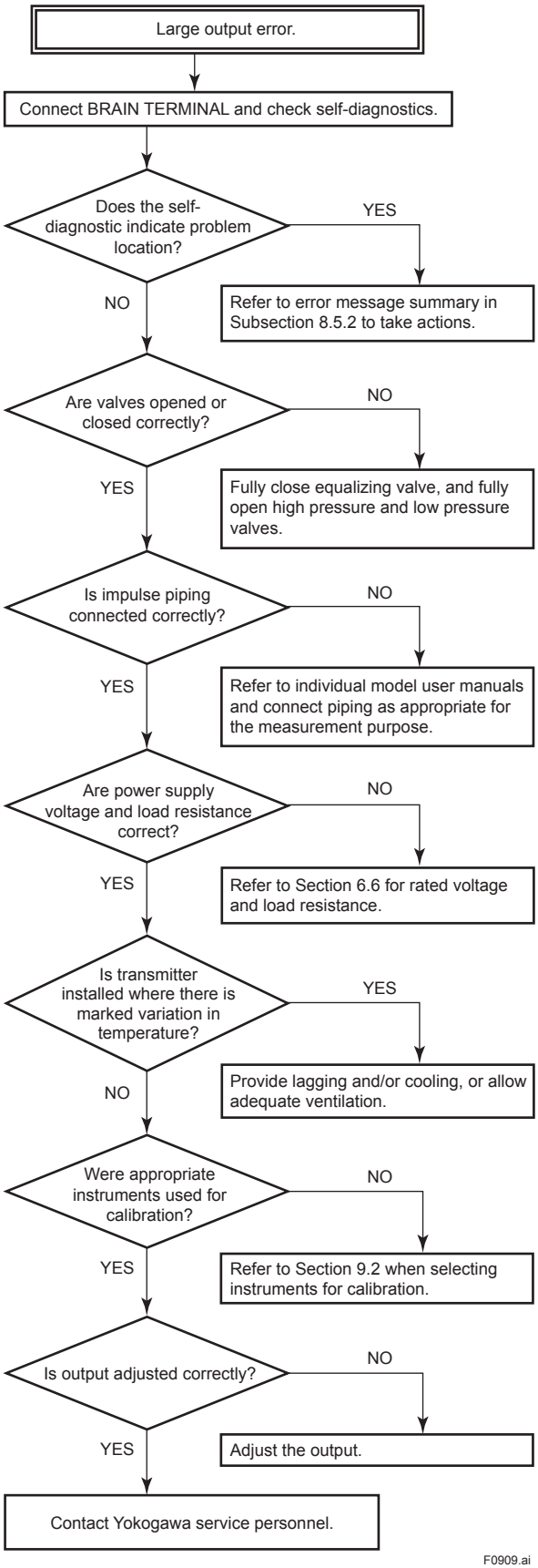



**Figure 9.6 Basic Flow and Self-Diagnostics**

### 9.5.2 Troubleshooting Flow Charts




Output travels beyond 0% or 100%.
Connect BRAIN TERMINAL and check self-diagnostics.
Does the self-diagnostic indicate problem location?
YES
Refer to error message summary in Subsection 8.5.2 to take actions.
NO
Is power supply polarity correct?
NO
Refer to Section 6.3 to check/correct polarity at each terminal from power supply to the terminal box.
YES
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.
F0908.ai


Large output error.
Connect BRAIN TERMINAL and check self-diagnostics.
Does the self-diagnostic indicate problem location?
YES
Refer to error message summary in Subsection 8.5.2 to take actions.
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
Are power supply voltage and load resistance correct?
NO
Refer to Section 6.6 for rated voltage and load resistance.
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 when selecting instruments for calibration.
YES
Is output adjusted correctly?
NO
Adjust the output.
YES
Contact Yokogawa service personnel.
F0909.ai

# 10. General Specifications

## 10.1 Standard Specifications

Refer to IM 01C22T02-01E for FOUNDATION Fieldbus communication type and IM 01C22T03-00E for PROFIBUS PA communication type marked with "◊".

### ● Performance Specifications

See General Specifications sheet, GS 01C21F01-00E.

### ● Functional Specifications

**Span & Range Limits**

**EJA510A and EJA530A:**

| Measurement Span and Range | | MPa | psi (/D1) | bar (/D3) | kgf/cm$^2$ (/D4) |
|---|---|---|---|---|---|
| A | Span | 10 to 200 kPa | 1.45 to 29 | 0.1 to 2 | 0.1 to 2 |
| | Range | 0 to 200 kPa | 0 to 29 | 0 to 2 | 0 to 2 |
| B | Span | 0.1 to 2 | 14.5 to 290 | 1 to 20 | 1 to 20 |
| | Range | 0 to 2 | 0 to 290 | 0 to 20 | 0 to 20 |
| C | Span | 0.5 to 10 | 72.5 to 1450 | 5 to 100 | 5 to 100 |
| | Range | 0 to 10 | 0 to 1450 | 0 to 100 | 0 to 100 |
| D | Span | 5 to 50 | 720 to 7200 | 50 to 500 | 50 to 500 |
| | Range | 0 to 50 | 0 to 7200 | 0 to 500 | 0 to 500 |

Values in absolute for EJA510A.

**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. Span may be adjusted locally using the digital indicator with range switch.

**Output "◊":**

Two wire 4 to 20 mA DC output with digital communications, linear or square root programmable. BRAIN or HART FSK protocol are superimposed on the 4 to 20 mA signal.

**Failure Alarm:**

Output status at CPU failure and hardware error;

Up-scale:
110%, 21.6 mA DC or more(standard)
Down-scale:
-5%, 3.2 mA DC or less
-2.5%, 3.6 mA DC or less(Optional code /F1)
Note: Applicable for Output signal code D and E

**Damping Time Constant (1st order):**

The sum of the amplifier and capsule damping time constant must be used for the overall time constant. Amp damping time constant is adjustable from 0.2 to 64 seconds.

| Capsule (Silicone Oil) | A, B, C, and D |
|---|---|
| Time Constant (approx. sec) | 0.2 |

**Ambient Temperature Limits:**

* Safety approval codes may affect limits.
–40 to 85°C (–40 to 185°F)
–30 to 80°C (–22 to 176°F) with LCD Display

**Process Temperature Limits:**

* Safety approval codes may affect limits.
–40 to 120°C (–40 to 248°F)

**Maximum Overpressure:**

| | Capsule | |
|---|---|---|
| Capsule | EJA510A | EJA530A |
| A | 4 MPa abs{580 psia} | 4 MPa {580 psig} |
| B | 4 MPa abs{580 psia} | 4 MPa {580 psig} |
| C | 20 MPa abs{2900 psia} | 20 MPa {2900 psig} |
| D | 60 MPa abs{8500 psia} | 60 MPa {8500 psig} |

**Working Pressure Limits (Silicone Oil)**

**Maximum Pressure Limit:**

| | Capsule | |
|---|---|---|
| Capsule | EJA510A | EJA530A |
| A | 200 kPa abs{29 psia} | 200 kPa {29 psig} |
| B | 2 MPa abs{290 psia} | 2 MPa {290 psig} |
| C | 10 MPa abs{1450 psia} | 10 MPa {1450 psig} |
| D | 50 MPa abs{7200 psia} | 50 MPa {7200 psig} |

**Minimum Pressure Limit:**

EJA510A: 0.013 kPa abs
EJA530A: Lower limit of measurement range

## ● Installation

**Supply & Load Requirements "◊":**

* Safety approvals can affect electrical requirements.
See Section 6.6, 'Power Supply Voltage and Load Resistance.'

**Supply Voltage "◊":**

10.5 to 42 V DC for general use and flameproof type
10.5 to 32 V DC for lightning protector (Optional code /A)
10.5 to 30 V DC for intrinsically safe, Type n, nonincendive, or non-sparking type
Minimum voltage limited at 16.4 V DC for digital communications, BRAIN and HART

**EMC Conformity Standards:**

EN 61326-1 Class A, Table 2 (For use in industrial locations)
EN 61326-2-3
EN 61326-2-5 (for Fieldbus)
**Immunity influence during the test**
Differential pressure/pressure: Output shift is specified within ±1% of 1/10 Max span.

**Communication Requirements "◊":**

**BRAIN**
**Communication Distance;**
Up to 2 km (1.25 miles) when using CEV polyethylene-insulated PVC-sheathed cables.
Communication distance varies depending on type of cable used.
**Load Capacitance;**
0.22 µF or less (see note)
**Load Inductance;**
3.3 mH or less (see note)
**Input Impedance of communicating device;**
10 kΩ or more at 2.4 kHz.
Note: For general-use and Flameproof type. For Intrinsically safe type, please refer to 'Optional Specifications.'

**HART**
**Communication Distance;**
Up to 1.5 km (1 mile) when using multiple twisted pair cables. Communication distance varies depending on type of cable used.
Use the following formula to determine cable length for specific applications:

$$L = \frac{65 \times 10^6}{(R \times C)} - \frac{(C_f + 10{,}000)}{C}$$

Where:
L = length in meters or feet
R = resistance in Ω (including barrier resistance)
C = cable capacitance in pF/m or pF/ft
$C_f$ = maximum shunt capacitance of receiving devices in pF/m or pF/ft

## ● Physical Specifications

**Wetted Parts Materials:**

**Diaphragm and Process connector;**
See 'Model and Suffix Codes'

**Non-wetted Parts Materials:**

**Housing;**
Low copper cast-aluminum alloy with polyurethane paint (Munsell 0.6GY3.1/2.0)
**Degrees of Protection**
IP67, NEMA4X
**Cover O-rings;**
Buna-N, Fluoro-rubber (option)
**Data plate and tag;**
SUS304 or SUS316(optional)
**Fill Fluid;**
Silicone or Fluorinated oil (optional)
**Weight:**
1.6 kg (3.5 lb) without integral indicator and mounting bracket.
**Connections:**
See 'Model and Suffix Codes.'

**< Settings When Shipped > "◊"**

| | |
|---|---|
| Tag Number | As specified in order *1 |
| Output Mode | 'Linear' |
| Display Mode | 'Linear' |
| Operation Mode | 'Normal' unless otherwise specified in order |
| Damping Time Constant | '2 sec.' |
| Calibration Range Lower Range Value | As specified in order |
| Calibration Range Higher Range Value | As specified in order |
| Calibration Range Units | Selected from $mmH_2O$, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, $gf/cm^2$, $kgf/cm^2$, $inH_2O$, inHg, $ftH_2O$, psi or atm. (Only one unit can be specified) |

*1: If Tag No. is no more than 16 alphanumeric characters (including - and ·), it will be written into the tag plate and amplifier memory settings.

# 10.2 Model and Suffix Codes

## ● Model EJA510A and EJA530A

| Model | Suffix Codes | Description |
|---|---|---|
| **EJA510A** | . . . . . | Absolute pressure transmitter |
| **EJA530A** | . . . . . | Gauge pressure transmitter |
| Output Signal | **-D** . . . . . | 4 to 20 mA DC with digital communication (BRAIN protocol) |
| | **-E** . . . . . | 4 to 20 mA DC with digital communication (HART protocol, see IM 01C22T01-01E) |
| | **-F** . . . . . | Digital communication (FOUNDATION Fieldbus protocol, see IM 01C22T02-01E) |
| | **-G** . . . . . | Digital communication (PROFIBUS PA protocol, see 01C22T03-00E) |
| Measurement span (capsule) | **A** . . . . . | 10 to 200 kPa {0.1 to 2 kgf/cm$^2$} |
| | **B** . . . . . | 0.1 to 2 MPa {1 to 20 kgf/cm$^2$} |
| | **C** . . . . . | 0.5 to 10 MPa {5 to 100 kgf/cm$^2$} |
| | **D** . . . . . | 5 to 50 MPa {50 to 500 kgf/cm$^2$} |
| Wetted parts material | | [Process Connection] [Diaphragm] |
| | **S** . . . . . | SUS316L Hastelloy C-276 |
| | **H** . . . . . | Hastelloy C-276 Hastelloy C-276 |
| Process connection | **4** . . . . . | 1/2 NPT female |
| | **7** . . . . . | 1/2 NPT male |
| | **8** . . . . . | G 1/2 DIN 16 288 male |
| | **9** . . . . . | M20 × 1.5 DIN 16 288 male |
| — | **N** . . . . . | Always N |
| — | **-0** . . . . . | Always 0 |
| Electrical connection | **0** . . . . . | G1/2 female, one electrical connection |
| | **2** . . . . . | 1/2 NPT female, two electrical connections without blind plug |
| | **3** . . . . . | Pg 13.5 female, two electrical connections without blind plug |
| | **4** . . . . . | M20 female, two electrical connections without blind plug |
| | **5** . . . . . | G1/2 female, two electrical connections and a blind plug |
| | **7** . . . . . | 1/2 NPT female, two electrical connections and a blind plug |
| | **8** . . . . . | Pg 13.5 female, two electrical connections and a blind plug |
| | **9** . . . . . | M20 female, two electrical connections and a blind plug |
| | **A** . . . . . | G1/2 female, two electrical connections and a SUS316 blind plug |
| | **C** . . . . . | 1/2 NPT female, two electrical connections and a SUS316 blind plug |
| | **D** . . . . . | M20 female, two electrical connections and a SUS316 blind plug |
| Integral indicator | **D** . . . . . | Digital indicator |
| | **E** . . . . . | Digital indicator with the range setting switch |
| | **N** . . . . . | (None) |
| Mounting bracket | **E** . . . . . | SECC Carbon steel 2-inch pipe mounting |
| | **F** . . . . . | SUS304 2-inch pipe mounting |
| | **L** . . . . . | SUS316 2-inch pipe mounting |
| | **N** . . . . . | (None) |
| Optional codes | | /☐ Optional specification |

## 10.3 Optional Specifications

For FOUNDATION Fieldbus explosion protected type, see IM 01C22T02-01E.

For PROFIBUS PA explosion protected type, see IM 01C22T03-00E.

| Item | Description | Code |
|---|---|---|
| Factory Mutual (FM) | FM Explosionproof Approval *1<br>Explosionproof for Class I, Division 1, Groups B, C and D<br>Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G<br>Hazardous (classified) locations, indoors and outdoors (NEMA 4X)<br>Temperature class: T6<br>Amb. Temp.: –40 to 60°C (–40 to 140°F) | **FF1** |
| | FM Intrinsically safe Approval *1<br>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 Hazardous Locations.<br>Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division. 2, Groups E, F & G, and Class III, Division 1 Hazardous Locations.<br>Enclosure: “NEMA 4X”, Temp. Class: T4, Amb. Temp.: –40 to 60°C (–40 to 140°F)<br>Intrinsically Safe Apparatus Parameters<br>[Groups A, B, C, D, E, F and G]<br>Vmax=30 V, Imax=165 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 µH<br>[Groups C, D, E, F and G]<br>Vmax=30 V, Imax=225 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 µH | **FS1** |
| | Combined FF1 and FS1 *1 | **FU1** |
| ATEX | ATEX Flameproof Approval *2<br>Certificate: KEMA 02ATEX2148<br>II 2G Exd IIC T4, T5, T6<br>Amb. Temp.: T5; –40 to 80°C (–40 to 176°F), T4 and T6; –40 to 75°C (–40 to 167°F)<br>Max. process Temp.: T4; 120°C (248°F), T5; 100°C (212°F), T6; 85°C (185°F) | **KF21** |
| | ATEX Intrinsically safe Approval *2<br>Certificate: KEMA 02ATEX1030X<br>II 1G EEx ia IIC T4, Amb. Temp.: –40 to 60°C (–40 to 140°F)<br>Ui=30 V, Ii=165 mA, Pi=0.9 W, Ci=22.5 nF, Li=730 µH | **KS2** |
| Canadian Standards Association (CSA) | CSA Explosionproof Approval *1<br>Certificate: 1089598<br>Explosionproof for Class I, Division 1, Groups B, C and D<br>Dustignitionproof for Class II/III, Division 1, Groups E, F and G<br>Division2 ‘SEALS NOT REQUIRED’ , Temp. Class: T4, T5, T6 Encl Type 4x<br>Max. Process Temp.: T4; 120°C (248°F), T5; 100°C (212°F), T6; 85°C (185°F)<br>Amb. Temp.: –40 to 80°C (–40 to 176°F)<br>Process Sealing Certification<br>Dual seal certified by CSA to the requirement of ANSI/ISA 12.27.01<br>No additional sealing required. Primary seal failure annunciation : at the zero-adjustment screw | **CF1** |
| | CSA Intrinsically safe Approval *1<br>Certificate: 1053843<br>Intrinsically Safe for Class I, Groups A, B, C and D Class II and III, Groups E, F and G<br>Nonincendive for Class I, Division 2, Groups A, B, C and D Class II, Division 2, Groups F and G and Class III (not use Safety Barrier)<br>Encl Type 4x, Temp. Class: T4, Amb. Temp.: –40 to 60°C (–40 to 140°F)<br>Vmax=30 V, Imax=165 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 µH<br>Process Sealing Certification<br>Dual seal certified by CSA to the requirement of ANSI/ISA 12.27.01<br>No additional sealing required. Primary seal failure annunciation : at the zero-adjustment screw | **CS1** |
| | Combined CF1 and CS1 *1 | **CU1** |

| Item | Description | Code |
|---|---|---|
| IECEx Scheme | IECEx Intrinsically safe, type n and Flameproof Approval *3<br>Intrinsically safe and type n<br>Certificate: IECEx KEM 06.0007X<br>Ex ia IIC T4, Ex nL IIC T4 Enclosure: IP67<br>Amb. Temp.: –40 to 60°C (–40 to 140°F), Max. Process Temp.: 120°C (248°F)<br>Electrical Parameters:<br>[Ex ia] Ui=30 V, Ii=165 mA, Pi=0.9 W, Ci=22.5 nF, Li=730 µH<br>[Ex nL] Ui=30 V, Ci=22.5 nF, Li=730 µH<br>Flameproof<br>Certificate: IECEx KEM 06.0005<br>Ex d IIC T6...T4 Enclosure: IP67<br>Max.Process Temp.: T4;120°C (248°F), T5;100°C (212°F), T6; 85°C (185°F)<br>Amb.Temp.: –40 to 75°C (–40 to 167°F) for T4, –40 to 80°C (–40 to 176°F) for T5, –40 to 75°C (–40 to 167°F) for T6 | **SU2** |

*1: Applicable for Electrical connection code 2 and 7 (1/2 NPT female).
*2: Applicable for Electrical connection code 2, 4, 7 and 9 (1/2 NPT and M20 female).
*3: Applicable for Electrical connection code 2, 4 and 7 (1/2 NPT and M20 female).

| Item | | Description | | Code |
|---|---|---|---|---|
| Painting | Color change | Amplifier cover only | | **P□** |
| | | Amplifier cover and terminal cover, Munsell 7.5 R4/14 | | **PR** |
| | Coating change | Epoxy resin-baked coating | | **X1** |
| 316 SST exterior parts | | Exterior parts on the amprifier housing (name plates, tag plate, zero-adjustment screw, stopper screw) will become 316 or 316L SST. | | **HC** |
| Fluoro-rubber O-ring | | All O-rings of amplifier housing. Lower limit of ambient temperature : –15°C (5°F) | | **HE** |
| Lightning protector | | Transmitter power supply voltag: 10.5 to 32 V DC (10.5 to 30 V DC for intrinsically safe type, 9 to 32 V DC for FOUNDATION Fieldbus and PROFIBUS PA communication type.)<br>Allowable current: Max. 6000 A (1×40 µs), Repeating 1000 A (1×40 µs) 100 times | | **A** |
| Oil-prohibited use | | Degrease cleansing treatment | | **K1** |
| | | Degrease cleansing treatment with fluorinated oil filled capsule.<br>Operating temperature –20 to 80 °C | | **K2** |
| Calibration units | | P calibration (psi unit ) | (See Table for Span and Range Limits.) | **D1** |
| | | bar calibration (bar unit ) | | **D3** |
| | | M calibration (kgf/cm$^2$ unit ) | | **D4** |
| Fast response *2 | | Update time: 0.125 sec or less, see GS for response time | | **F1** |
| Failure alarm down-scale *1 | | Output status at CPU failure and hardware error is –5%, 3.2 mA or less. | | **C1** |
| NAMUR NE43 compliant *1 | | Output signal limits: 3.8 mA to 20.5 mA | Failure alarm down-scale: output status at CPU failure and hardware error is –5%, 3.2 mA or less. | **C2** |
| | | | Failure alarm up-scale: output status at CPU failure and hardware error is 110%, 21.6 mA or more. | **C3** |
| Data configuration at factory | | Description into “Descriptor” parameter of HART protocol | | **CA** |
| Stainless steel amplifier housing | | Amplifier housing material: SCS14A stainless steel (equivalent to SUS316 cast stainless steel or ASTM CF-8M) | | **E1** |
| Stainless steel tag plate | | SUS 304 stainless steel tag plate wired onto transmitter | | **N4** |
| High Accuracy type | | High Accuracy (Applicable for Model EJA530A) | | **HAC** |
| European Pressure Equipment Directive | | PED 97/23/EC<br>CATEGORY: III, Module: H, Type of Equipment: Pressure Accessory - Vessel, Type of Fluid: Liquid and Gas, Group of Fluid: 1 and 2 | | **PE3** |
| Mill Certificate | | Process connector | | **M15** |
| Pressure test/Leak test Certificate | | Test Pressure: 200 kPa{2 kgf/cm$^2$} | Nitrogen($N_2$) Gas Retention time: 10 minutes | **T05** |
| | | Test Pressure: 2 MPa{20 kgf/cm$^2$} | | **T06** |
| | | Test Pressure: 10 MPa{100 kgf/cm$^2$} | | **T07** |
| | | Test Pressure: 50 MPa{500 kgf/cm$^2$} | | **T08** |

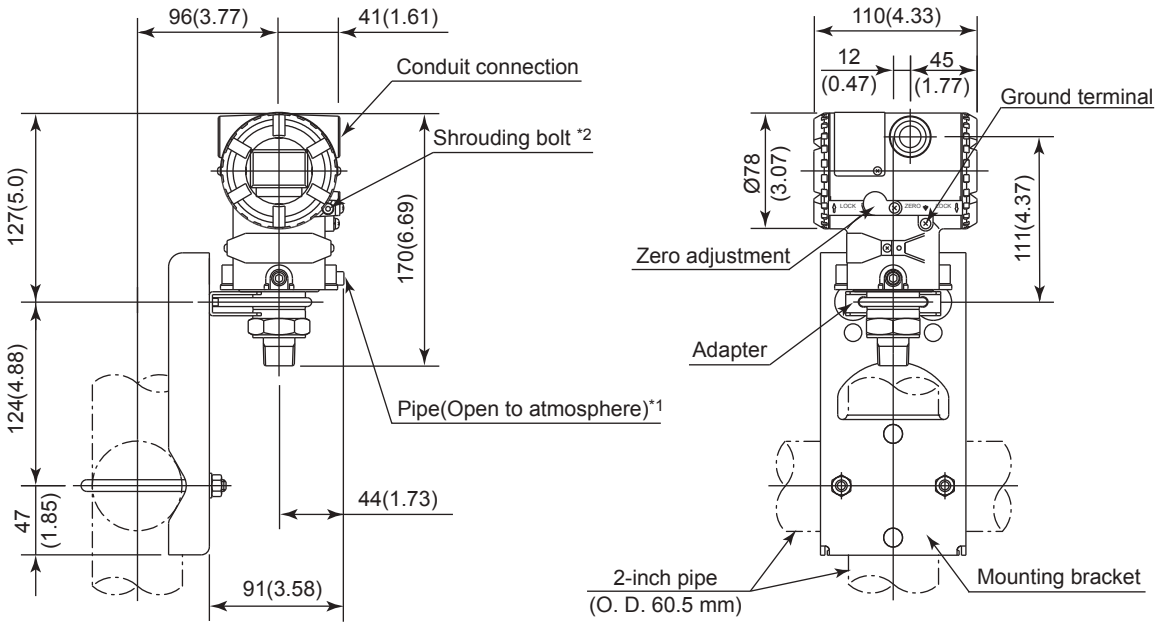
*1: Applicable for Output signal code D and E. The hardware error indicates faulty amplifier or capsule. When combining with Optional code F1, output status for down-scale is –2.5%, 3.6 mA DC or less.
*2: Applicable for Output signal code D and E. Write protection switch is attached for Output code E.

# 10.4 Dimensions

## ● Model EJA510A and EJA530A [Style: S2]

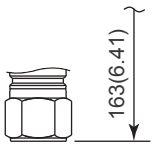
Unit: mm (approx. inch)

◆ With Process Connection code 7

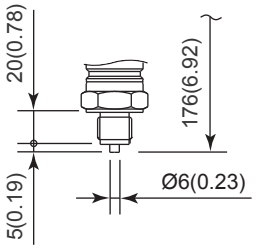



*1: Applied to Model EJA530A with Measurement span code A, B, and C.
*2: Applicable only for ATEX and IECEx Flameproof type.

◆ For Process Connection code 4




◆ For Process Connection code 8 and 9

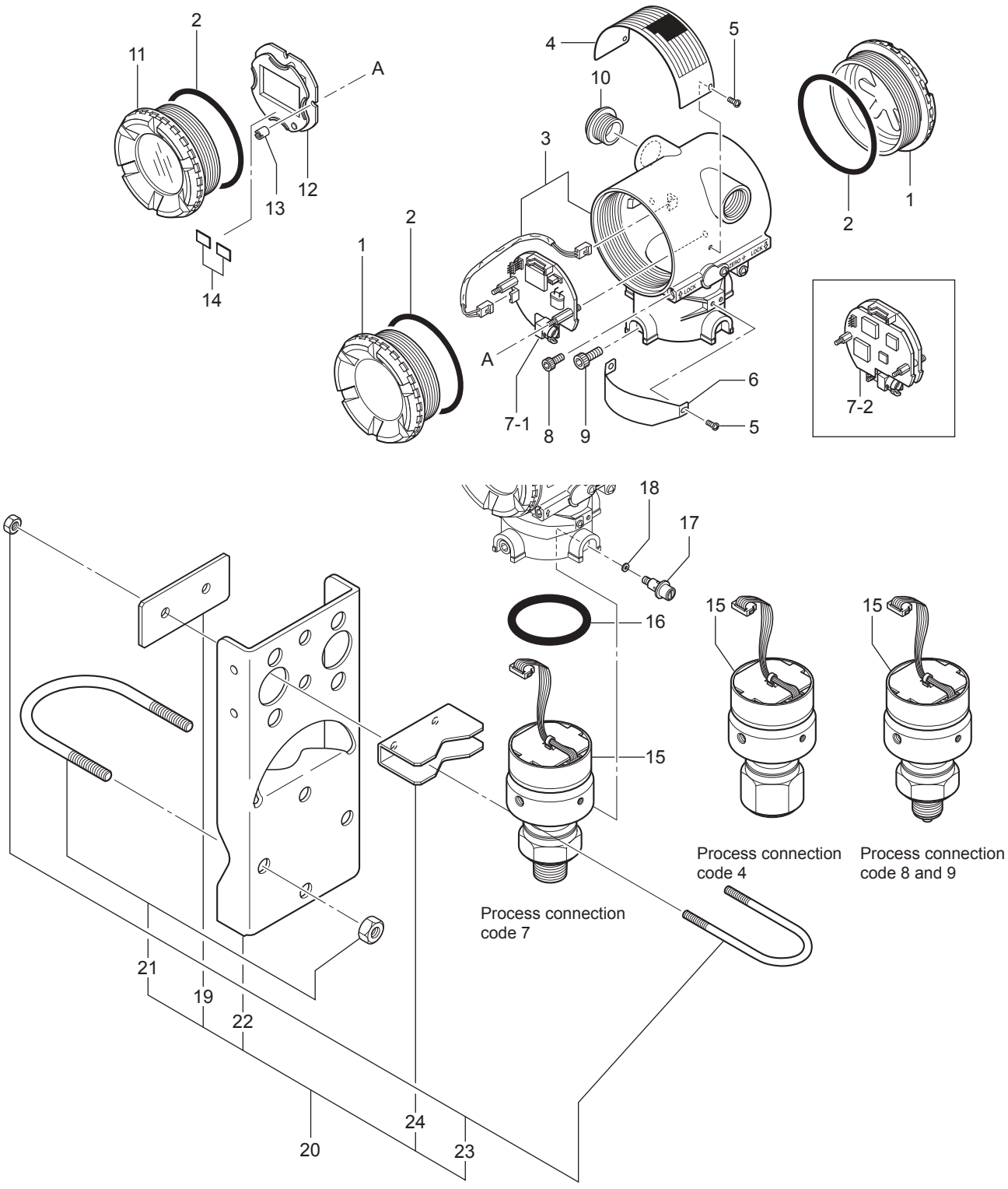



F1001.ai

# Customer Maintenance Parts List

## Model EJA510A and EJA530A Absolute and Gauge Pressure Transmitter

DPharp

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**CMPL 01C21F01-01E**
6th Edition: Oct. 2008 (YK)

| Item | Part No. | Qty | Description |
|---|---|---|---|
| 1 | Bellow | 2 | Cover |
| | F9341RA | | Cast-aluminum alloy |
| | F9341RJ | | SCS14A stainless steel |
| 2 | F9341JP | 2 | O-ring |
| 3 | Below | 1 | Case Assembly (Note 1) |
| | F9341AA | | Cast-aluminum alloy for G1/2 |
| | F9341AC | | Cast-aluminum alloy for G1/2 (two electrical connections) |
| | F9341AE | | Cast-aluminum alloy for 1/2 NPT (two electrical connections) |
| | F9341AH | | Cast-aluminum alloy for M20 (two electrical connections) |
| | F9341AJ | | Cast-aluminum alloy for Pg13.5 (two electrical connections) |
| | F9341AR | | SCS14A stainless steel for 1/2 NPT (two electrical connections) |
| 4 | F9341KA | 1 | Name Plate |
| 5 | Bellow | 4 | Screw |
| | F9900RG | | For cast-aluminum alloy case assembly |
| | F9900RR | | For SCS14A stainless steel case assembly |
| 6 | F9341KL | 1 | Tag Plate |
| 7-1 | Below | 1 | CPU Assembly |
| | F9342AB | | For BRAIN protocol version |
| | F9342AL | | For HART protocol version |
| | F9342AF | | For BRAIN protocol version (Optional code /F1) |
| | F9342AM | | For HART protocol version with write protection switch (Optional code /F1) |
| 7-2 | F9342BF | 1 | For FOUNDATION Fieldbus protocol version |
| | F9342BG | | For FOUNDATION Fieldbus protocol version with PID/LM function (Optional code /LC1) |
| 8 | F9900RP | 2 | Cap Screw |
| 9 | Y9612YU | 2 | Screw |
| 10 | Below | 1 | Plug |
| | F9340NW | | For Pg13.5 |
| | F9340NX | | For M20 |
| | G9330DK | | For G1/2 |
| | G9612EB | | For 1/2 NPT |
| 11 | Bellow | 1 | Cover Assembly (For integral indicator) |
| | F9341FM | | Cast-aluminum alloy |
| | F9341FJ | | SCS14A stainless steel |
| 12 | Below | 1 | LCD Board Assembly (For integral indicator) |
| | F9342BL | | Without range-setting switch (For integral indicator) |
| | F9342BM | | With range-setting switch (For integral indicator) |
| 13 | F9342MK | 2 | Mounting Screw (For integral indicator) |
| 14 | F9300PB | 2 | Label (For integral indicator) |
| 15 | — | 1 | Capsule Assembly (See Table 1.)(Note 2) |
| 16 | F9300AJ | 1 | O-ring |
| 17 | Below | 1 | Pipe (for EJA530A with Measurement Span code A, B, and C) |
| | F9385XK | | Polypropylene resin |
| | F9385XM | | SUS316 Stainless Steel (Optional code /E1) |
| 18 | F9385XL | 1 | O-ring (for EJA530A with Measurement Span code A, B, and C) |
| 19 | F9385XZ | 1 | Plate, SUS304 Stainless Steel |
| 20 | Below | 1 | Bracket Assembly |
| | F9385XV | | SECC carbon steel |
| | F9385XT | | SECC carbon steel (for epoxy resin-baked coating) |
| | F9385XU | | SUS304 stainless steel |
| 21 | D0117XL-A | 1 | U-bolt/Nut Assembly (L), SUS304 Stainless Steel |
| 22 | Below | 1 | Bracket |
| | F9270AX | | SECC carbon steel |
| | F9300TN | | SECC carbon steel (for epoxy resin-baked coating) |
| | F9300TE | | SUS304 Stainless Steel |
| 23 | F9385XW | 1 | U-bolt/Nut Assembly (S), SUS304 Stainless Steel |
| 24 | F9385XY | 1 | Adapter, SUS304 Stainless Steel |

(Note 1) Applicable for BRAIN and HART protocol versions (Output signal code D and E).
For FOUNDATION Fieldbus protocol version (Output signal code F), consult Yokogawa local office.
(Note 2) In case of Degrease cleansing treatment (Optional code /K1), consult Yokogawa local office.

**Table 1. Capsule Assembly Part Number (Item 15)**

| Process connection | Capsule Code | EJA510A | | | | EJA530A | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | S(*1) | S, /K2(*2) | H(*1) | H, /K2(*2) | S(*1) | S, /K2(*2) | H(*1) | H, /K2(*2) |
| 1/2 NPT female | A | F9421AB | F9421AP | F9421NB | F9421NP | F9420AB | F9420AP | F9420NB | F9420NP |
| | B | F9421BB | F9421BP | F9421PB | F9421PP | F9420BB | F9420BP | F9420PB | F9420PP |
| | C | F9421CB | F9421CP | F9421QB | F9421QP | F9420CB | F9420CP | F9420QB | F9420QP |
| | D | F9421DB | F9421DP | F9421RB | F9421RP | F9420DB | F9420DP | F9420RB | F9420RP |
| 1/2 NPT male | A | F9421AD | F9421AR | F9421ND | F9421NR | F9420AD | F9420AR | F9420ND | F9420NR |
| | B | F9421BD | F9421BR | F9421PD | F9421PR | F9420BD | F9420BR | F9420PD | F9420PR |
| | C | F9421CD | F9421CR | F9421QD | F9421QR | F9420CD | F9420CR | F9420QD | F9420QR |
| | D | F9421DD | F9421DR | F9421RD | F9421RR | F9420DD | F9420DR | F9420RD | F9420RR |
| G1/2 male (DIN) | A | F9421AE | F9421AS | F9421NE | F9421NS | F9420AE | F9420AS | F9420NE | F9420NS |
| | B | F9421BE | F9421BS | F9421PE | F9421PS | F9420BE | F9420BS | F9420PE | F9420PS |
| | C | F9421CE | F9421CS | F9421QE | F9421QS | F9420CE | F9420CS | F9420QE | F9420QS |
| | D | F9421DE | F9421DS | F9421RE | F9421RS | F9420DE | F9420DS | F9420RE | F9420RS |
| M20×1.5 male | A | F9421AF | F9421AT | F9421NF | F9421NT | F9420AF | F9420AT | F9420NF | F9420NT |
| | B | F9421BF | F9421BT | F9421PF | F9421PT | F9420BF | F9420BT | F9420PF | F9420PT |
| | C | F9421CF | F9421CT | F9421QF | F9421QT | F9420CF | F9420CT | F9420QF | F9420QT |
| | D | F9421DF | F9421DT | F9421RF | F9421RT | F9420DF | F9420DT | F9420RF | F9420RT |

*1: Silicone oil filled capsule (Standard)
*2: Fluorinated oil filled capsule (for oil-prohibited use: optional code /K2)

# Revision Information

- Title : Model EJA510A and EJA530A
  Absolute Pressure and Gauge Pressure Transmitter
- Manual No. : IM 01C21F01-01E

| Edition | Date | Page | Revised Item |
|---|---|---|---|
| 1st | June 1999 | — | New publication |
| 2nd | June 2000 | CONTENTS<br>2-8<br><br><br><br>8-4<br><br>8-5<br><br>10-4<br><br><br><br>10-5<br>CMPL | Page 3 Add REVISION RECORD.<br>2.9.4 b Add maximum process temperature of –40 to 75°C for KEMA Flameproof type T6.<br>Change wating period when opening terminal cover after power off from 1 min. to 10 min.<br>Add note for using heat-resisting cables.<br>8.3.1 Add footnote *2 for amp. damping time constant when Optional code /F1 is specified.<br>Add footnote *3 for low side output status at failure alarm when Optional code /F1 is specified.<br>10.3 Change explosion protected type Optional code from /□□1 to /□□11.<br>Add maximum process temperature of –40 to 75°C for KEMA Flameproof type T6.<br>Add Optional code /F1 and /N4.<br>CMPL 1C21F1-01E 1st → 2nd<br>Page 2 Change Part No. on Item 7, CPU Assembly.<br>F9342BP → F9342AB<br>F9342BQ → F9342AL<br>Add Part No. on Item 7, CPU Assembly.<br>F9342AF for BRAIN protocol, Optional code /F1<br>F9342AM for HART protocol, Optional code /F1 |
| 3rd | Aug. 2001 | —<br>2-8<br>8-4, 8-5<br><br>10-1<br><br>10-4<br><br>10-6<br>CMPL | Style change from S1 to S2.<br>2.10 Change EMC Conformity number.<br>8.3.1 Add footnote (*4) to B40, Maximum static pressure in Parameter Summary.<br>10.1 Change Maximum Over pressure for Capsule code A from 400 kPa to 4 MPa.<br>10.3 Change explosion protected type Optional code from /□□11 to /□□1.<br>10.4 Change dimensions.<br>CMPL 1C21F1-01E 2nd → 3rd<br>Change Part No. on Item 15, Capsule Assembly and followings.<br>Item 17; F9374MS → F9385XK, F9385XM<br>Item 18; F9374MU → F9385XL<br>Item 19; F9374NZ → F9385XZ<br>Item 20; F9374MX → F9385XV, F9374NX → F9385XT, F9374MW → F9385XU<br>Item 23; F9374MY → F9385XW<br>Item 24; F9374NY → F9385XY |
| 4th | May 2002 | 1-2<br>2-7<br>10-4<br>10-5 | 1.1 Add “1.1 For Safety Using.”<br>2.9.4 Add descriptions based on ATEX directive.<br>10.3 Add Optional code K□2.<br>Add Optional code C2 and C3. |
| 5th | Apr. 2003 | 2-8<br>2-10<br>10-3<br>10-4<br>10-5<br>CMPL | 2.9.4 Add Option code KU2.<br>2.11 Add PED (Pressure Equipment Directive).<br>10.2 Add Output Signal code F.<br>10.3 Add Option code KU2.<br>Add Option code HAC and PE3.<br>CMPL 01C21F01-01E 3rd → 4th<br>Add part No. on Item 7-2, CPU Assembly for fieldbus protocol. |

| Edition | Date | Page | Revised Item |
|---|---|---|---|
| 6th | Apr. 2006 | 1-2 | 1.1 Add (e) Explosion Protected Type Instrument and (f) Modification |
| | | 1-3 | 1.3 Add “1.3 ATEX Document” |
| | | 2-6 | 2.9.3 Add “IECEx Certification” and delete “SAA Certification” |
| | | 2-11 | 2.12 Add Low Voltage Directive |
| | | 10-4, 10-5 | 10.3 Add Certificate numbers and Applicable standards |
| | | 10-5 | Add option code /SU2 and delete option code /SU1 |
| | | 10-6 | Add option code /PR |
| 7th | Jan. 2008 | 1-1 | Add direct current symbol. |
| | | 1-4 | Add 11 European languages for ATEX documentation. |
| | | 2-3+ | 2.9.1 Add applicable standard and certificate number for appovals. |
| | | 2-10 | 2.10 Add EMC caution note. |
| | | 4-2 | 4.4 Add section of changing the direction of integral indicator. |
| | | 8-14 | 8.3.3(11) Add figure for A40. |
| | | 9-4 | 9.4.1 Add figure of integral indicator direction. |
| | | 10-1+ | 10.1, 10.2 Add PROFIBUS PA communication type. |
| | | 10-4,10-5 | 10.3 Delete applicable standard from the table. |
| | | CMPL | CMPL 01C21F01-01E 4th → 5th |
| | | | Delete logo from the tag plate. |
| 8th | Oct. 2008 | 2-9 | 2.9.4 Change explosion protection marking for type n from EEx to Ex. |
| | | 2-10 | 2.10 Update EMC conformity standards. |
| | | 8-4 and 8-5 | 8.3.1 Add new parameters. |
| | | 8-6 | 8.3.2 Add items in table 8.3.1. |
| | | 8-9 and later | 8.3.3 Add (5)Change Output Limits and (13)Span Adjustment. Re-number the items. |
| | | 8-18 | 8.5.2 Modify descriptions and notes for Er.01. |
| | | 9-1 | 9.3 Add a note for calibration. |
| | | 9-5 | 9.4.3 Add a note for cleaning. |
| | | 10-3 | 10.2 Add new suffix codes. |
| | | 10-5, 10-6 | 10.3 Add sealing statement for CSA standards. Add /HC. |
| | | CMPL | CMPL 01C21F01-01E 7th → 8th |
| | | | Change Part No. of items 5 and 8. |
| 9th | July 2015 | 2-5, 2-6 | 2.9.2 Add temperature limitation for /HE. |
| | | 2-9 to 2-10 | 2.9.4 b Change /KF2 to /KF21 and modify descriptions. Delete c. Replace tag plate. |
| | | 2-11 | 2.10 Add standards. |
| | | 2-12 | 2.12 Add (3) and (4). |
| | | 8-1 | 8.1.1 Add note. 8.1.2 Add descriptions. |
| | | 10-2 | 10.1 Add information to “EMC Conformity Standards”. |
| | | 10-4 to 10-5 | 10.3 Delete codes KU2 and KF2. Add KF21. Add Codes HE and CA. |