User's Manual

Model EJA Series
PROFIBUS PA Communication Type

vigilantplant.®

YOKOGAWA ◆
Yokogawa Electric Corporation

CONTENTS

1. INTRODUCTION

This manual contains a description of the DPharp EJA Series Differential Pressure/Pressure Transmitter Fieldbus Communication Type. The Fieldbus communication type is based on the same silicon resonant sensing features as that of the BRAIN communication type, which is employed as the measurement principle, and is similar to the BRAIN communication type in terms of basic performance and operation. This manual describes only those topics that are required for operation of the Fieldbus communication type and that are not contained in the BRAIN communication type instruction manual. Refer to each of the following instruction manuals for topics common to the BRAIN communication and Fieldbus communication types.

Table 1.1 List of Individual User's Manuals

EJA110A, EJA120A, EJA130A	IM 01C21B01-01E
EJA210A, EJA220A	IM 01C21C01-01E
EJA310A, EJA430A, EJA440A	IM 01C21D01-01E
EJA510A, EJA530A	IM 01C21F01-01E
EJA118W, EJA118N, EJA118Y	IM 01C22H01-01E
EJA438W, EJA438N	IM 01C22J01-01E
EJA115	IM 01C22K01-01E

T0101.EPS

■ 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.

• 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.

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 pressure-detector 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 2.1 (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 Iokagava (Yokogawa) kontori või esindaja poole.

PL

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

SLO

Vsi predpisi in navodila za ATEX Ex sorodni pridelki so pri roki v anglišèini, nemšèini ter francošèini. Èe so Ex sorodna navodila potrebna v vašem tukejnjem jeziku, kontaktirajte vaš najbliši Yokogawa office ili predstaunika.

H

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

BG

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

RO

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

M

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

2. HANDLING CAUTION

2.1 Installation of an Explosion-Protected Instrument

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

⚠ CAUTION

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

⚠ WARNING

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

⚠ WARNING

The range setting switch must not be used in a hazardous area.

2.1.1 FM approval

a. FM Explosionproof Type

Caution for FM Explosionproof type

Note 1. EJA Series differential, gauge, and absolute pressure transmitters with optional code /FF15 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: 32V dc max.
- Current Draw: 16.5 mA dc

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 RE-QUIRED."

Note 3. Operation
- Keep strictly the "CAUTION" on the nameplate attached on the transmitter.
  CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER.
  "FACTORY SEALED, CONDUIT SEAL NOT REQUIRED."
  INSTALL IN ACCORDANCE WITH THE INSTRUCTION MANUAL IM 1C22.
- Take care not to generate mechanical sparking when accessing 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.

b. FM Intrinsically Safe Type

EJA Series differential, gauge, and absolute pressure transmitters with optional code /FS15.

• Applicable standard: FM3600, FM3610, FM3611, FM3810, ANSI/NEMA250

• FM Intrinsically Safe Approval
[Entity Model]
Class I, II & III, Division 1, Groups A, B, C, D, E, F & G, Temperature Class T4 Ta=60°C, Type 4X and Class I, Zone 0, AEx ia IIC, Temperature Class T4 Ta=60°C, Type 4X
[FISCO Model]
Class I, II & III, Division 1, Groups A, B, C, D, E, F & G, Temperature Class T4 Ta=60°C, Type 4X and Class I, Zone 0, AEx ia IIC, Temperature Class T4 Ta=60°C, Type 4X

• Nonincendive Approval
Class I, Division 2, Groups A, B, C & D Temperature Class T4 Ta=60°C, Type 4X and Class II, Division 2, Groups F & G Temperature Class T4 Ta=60°C, Type 4X and Class I, Zone 2, Group IIC, Temperature Class T4 Ta=60°C, Type 4X and Class III, Division 2, Temperature Class T4 Ta=60°C, Type 4X

• Electrical Connection: 1/2 NPT female

• Caution for FM Intrinsically safe type. (Following contents refer to "DOC. No. IFM018-A12 p.1, p.2, p.3, and p.3-1.")

■ IFM018-A12

● Installation Diagram (Intrinsically safe, Division 1 Installation)

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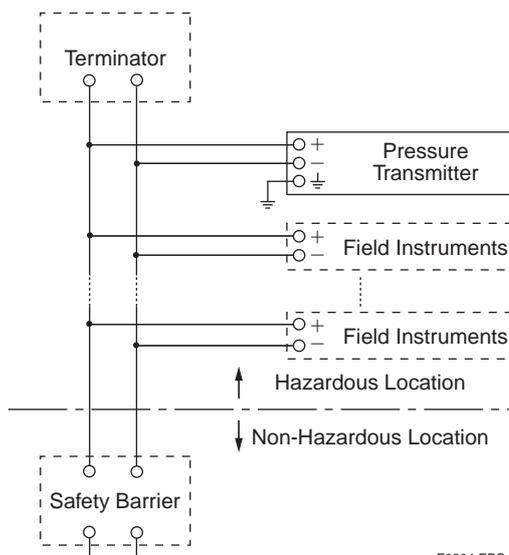
*1: Dust-tight conduit seal must be used when installed in Class II and Class III environments.

*2: Control equipment connected to the Associated Apparatus must not use or generate more than 250 Vrms or Vdc.

*3: Installation should be in accordance with ANSI/ISA RP12/6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70) Sections 504 and 505.

*4: The configuration of Associated Apparatus must be Factory Mutual Research Approved under FISCO Concept.

*5: Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.

*6: The EJA100 Series are approved for Class I, Zone 0, applications. If connecting AEx (ib) associated Apparatus or AEx ib I.S. Apparatus to the Zone 2, and is not suitable for Class I, Zone 0 or Class I, Division 1, Hazardous (Classified) Locations.

*7: No revision to drawing without prior Factory Mutual Research Approval.

*8: Terminator must be FM Approved.

Electrical Data:

• Rating 1 (Entity)
For Groups A, B, C, D, E, F, and G or Group IIC
Maximum Input Voltage Vmax: 24 V
Maximum Input Current Imax: 250 mA
Maximum Input Power Pmax: 1.2 W
Maximum Internal Capacitance C_i: 3.52 nF
Maximum Internal Inductance L_i: 0 μH

or

• Rating 2 (FISCO)
For Groups A, B, C, D, E, F, and G or Group IIC
Maximum Input Voltage Vmax: 17.5 V
Maximum Input Current Imax: 360 mA
Maximum Input Power Pmax: 2.52 W
Maximum Internal Capacitance C_i: 3.52 nF
Maximum Internal Inductance L_i: 0 μH

or

• Rating 3 (FISCO)
For Groups C, D, E, F, and G or Group IIB
Maximum Input Voltage Vmax: 17.5 V
Maximum Input Current Imax: 380 mA
Maximum Input Power Pmax: 5.32 W
Maximum Internal Capacitance C_i: 3.52 nF
Maximum Internal Inductance L_i: 0 μH

Note: In the rating 1, the output current of the barrier must be limited by a resistor "Ra" such that Io=Uo/Ra. In the rating 2 or 3, the output characteristics of the barrier must be the type of trapezoid which are certified as the FISCO model (See "FISCO Rules"). The safety barrier may include a terminator. More than one field instruments may be connected to the power supply line.

● **FISCO Rules**

The FISCO Concept allows the interconnection of intrinsincally safe apparatus to associated apparatus not specifically examined in such combination. The criterion for such interconnection is that the voltage (Ui), the current (Ii) and the power (Pi) which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage (Uo, Voc, Vt), the current (Io) and the power (Po) which can be provided by the associated apparatus (supply unit).

$$P_o \leqq P_i, \ U_o \leqq U_i, \ I_o \leqq I_i$$

In addition, the maximum unprotected residual capacitance (Ci) and inductance (Li) of each apparatus (other than the terminators) connected to the fieldbus must be less than or equal to 5 nF and 10 μH respectively.

$$C_i \leqq 5nF, \ L_i \leqq 10\mu H$$

In each I.S. fieldbus segment only one active source, normally the associated apparatus, is allowed to provide the necessary power for the fieldbus system. The allowed voltage Uo of the associated apparatus used to supply the bus is limited to the range of 14 V dc to 24 V dc. All other equipment connected to the bus cable has to be passive, meaning that the apparatus is not allowed to provide energy to the system, except to a leakage current of 50 μA for each connected device.

Supply unit

Trapezoidal or rectangular output characteristic only

$$U_o = 14...17.5 \text{ V (I.S. maximum value)}$$

Io according to spark test result or other assessment. No specification of *Lo* and *Co* is required on the certificate or label.

Cable

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance *Rc*: 15...150 /km
Inductance per unit length *Lc*: 0.4...1 mH/km
Capacitance per unit length *Cc*: 80...200 nF/km
Length of spur cable: max. 30 m (Group IIC and IIB)
Length of trunk cable: max. 1 km (Group IIC) or 5 km (Group IIB)

Terminators

At each end of the trunk cable an approved line terminator with the following parameters is suitable:

$$R = 90...102$$
$$C = 0...2.2 \ \mu F \ (0.8...1.2 \ \mu F \text{ is required in operation})$$

The resistor must be infallible according to IEC 60079-11.

System evaluations

The number of passive device like transmitters, actuators, hand held terminals connected to a single bus segment is not limited due to I.S. reasons. Furthermore, if the above rules are respected, the inductance and capacitance of the cable need not to be considered and will not impair the intrinsic safety of the installation.
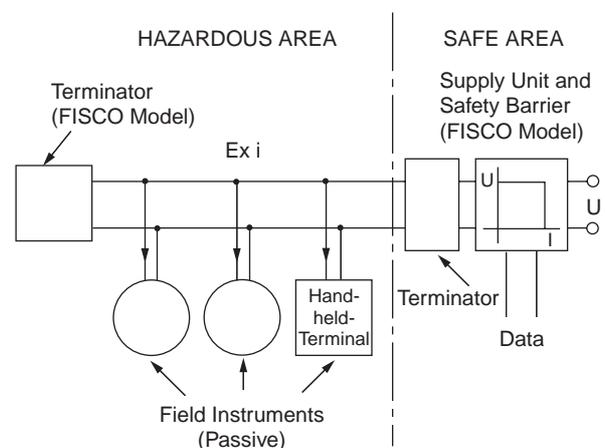
I.S. fieldbus system complying with FISCO model

2.1.2 CSA Certification

Caution for CSA Explosionproof type

Note 1. EJA Series differential, gauge, and absolute pressure transmitter with optional code /CF15 are applicable for use in hazardous locations:
- Applicable standard: C22.2 No.0, No.0.4, No.25, No.30, No.94, No.142, No.1010.1
- Certificate: 1010820
- 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   T4
- Process Temperature: 85°C   100°C   120°C
- Ambient Temperature: –40 to 80°C
- Supply Voltage: 32 V dc max.
- Current Draw: 16.5 mA dc

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 ENCLO-SURE.
  UN SCELLEMENT DOIT ÊTRE INSTALLÉ À MOINS DE 50 cm DU BÎTIER.
- When installed in Division 2, "SEALS NOT REQUIRED."

Note 3. Operation
- Keep strictly the "CAUTION" on the label attached on the transmitter.
  CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER.
  OUVRIR LE CIRCUIT AVANT D´NLEVER LE COUVERCLE.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in 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.

F0201.EPS
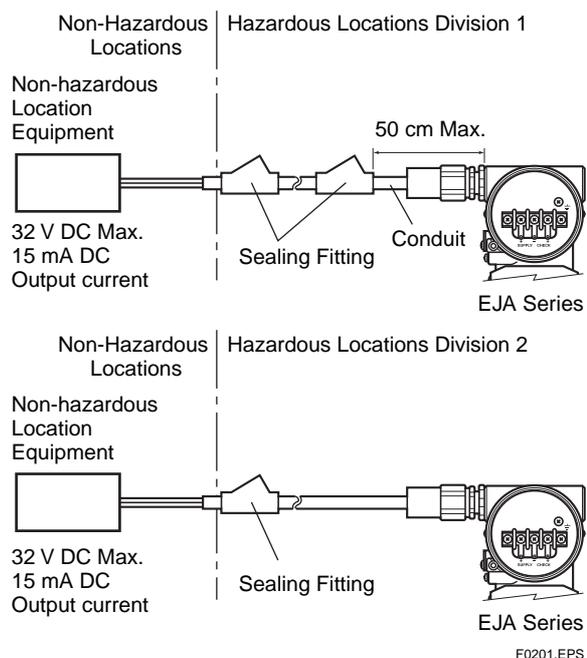
2.1.3 CENELEC ATEX (KEMA) Certification

(1) Technical Data

a. CENELEC ATEX (KEMA) Intrinsically Safe Type

Caution for CENELEC ATEX (KEMA) Intrinsically safe Type.

Note 1. EJA Series differential, gauge, and absolute pressure transmitters with optional code /KS25 for potentially explosive atmospheres:
- No. KEMA 02ATEX1344 X
- Applicable standard: EN50014:1997, EN50020:1994, EN50284:1999
- 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. Installation
- All wiring shall comply with local installation requirements. (Refer to the installation diagram)

Note 3. Maintenance and Repair
- The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void KEMA Intrinsically safe Certification.

Note 4. 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.

● **FISCO Model**
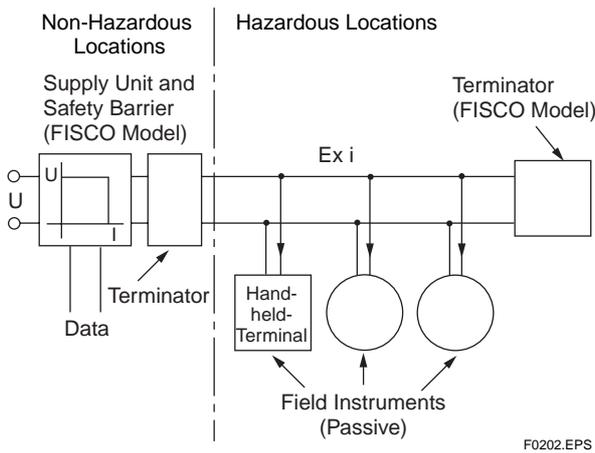
I.S. fieldbus system complying with FISCO

The criterion for such interconnection is that the voltage (U_i), the current (I_i) and the power (P_i), which intrinsically safe apparatus can receive, must be equal or greater than the voltage (U_o), the current (I_o) and the power (P_o) which can be provided by the associated apparatus (supply unit).

$$P_o \leqq P_i, \ U_o \leqq U_i, \ I_o \leqq I_i$$

In addition, the maximum unprotected residual capacitance (C_i) and inductance (L_i) of each apparatus (other than the terminators) connected to the fieldbus line must be equal or less than 5 nF and 10 μH respectively.

$$C_i \leqq 5nF, \ L_i \leqq 10\mu H$$

Supply unit

The supply unit must be certified by a notify body as FISCO model and following trapezoidal or rectangular output characteristic is used.

$$U_o = 14...17.5 \ V \ (I.S. \ maximum \ value)$$

I_o based on spark test result or other assessment. No specification of L_o and C_o is required on the certificate or label.

Cable

The cable used to interconnect the devices needs to comply with the following parameters:

Loop resistance Rc: 15...150 /km
Inductance per unit length Lc: 0.4...1 mH/km
Capacitance per unit length Cc: 80...200 nF/km
Length of spur cable: max. 30 m (IIC and IIB)
Length of trunk cable: max. 1 km (IIC) or 5 km (EEx ia IIB T4)

Terminators

The terminator must be certified by a Notified body as FISCO model and at each end of the trunk cable an approved line terminator with the following parameters is suitable:

R = 90...102
C = 0...2.2 μF (0.8...1.2 μF is required in operation)

The resistor must be infallible according to IEC 60079-11. One of the two allowed terminators might already be integrated in the associated apparatus (bus supply unit).

Number of Devices

The number of devices (max. 32) possible on a fieldbus link depends on factors such as the power consumption of each device, the type of cable used, use of repeaters, etc.

● **Entity Model**
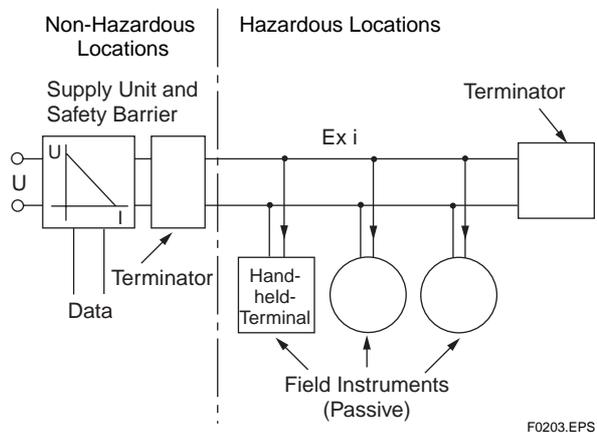
I.S. fieldbus system complying with Entity model

I.S. values Power supply-field device:
  $P_o \leqq P_i, \ U_o \leqq U_i, \ I_o \leqq I_i$
Calculation of max. allowed cable length:
  $Ccable \leqq C_o - C_i - C_i \ (Terminator)$
  $Lcable \leqq L_o - L_i$

Number of Devices

The number of devices (max. 32) possible on a fieldbus link depends on factors such as the power consumption of each device, the type of cable used, use of repeaters, etc.

b. CENELEC ATEX (KEMA) Flameproof Type

Caution for CENELEC (KEMA) Flameproof Type

Note 1. EJA Series differential, gauge, and absolute pressure transmitters with optional code /KF25 for potentially explosive atmospheres:
  • No. KEMA 02ATEX2148
  • Applicable standard: EN50014:1997, EN50018:2000
  • Type of Protection and Marking Code: EEx d IIC T6...T4

	Temperature Class:	T6	T5	T4
Maximum Process Temperature:		85°C	100°C	120°C

  • Ambient Temperature:
    –40 to 80°C(T5)
    –40 to 75°C(T4 and T6)
  • Enclosure: IP67

Note 2. Electrical Data
  • Supply voltage: 32 V dc max.
    Output current: 15 mA dc

Note 3. Installation
  • All wiring shall comply with local installation requirements.
  • 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 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.

c. CENELEC ATEX Type of Protection "n"

Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /KN25.

⚠ **WARNING**

When using a power supply not having a nonincendive circuit, please pay attention not to ignite in the surrounding flammable atmosphere. In such a case, we recommend using wiring metal conduit in order to prevent the ignition.

  • Applicable standard: EN60079-15, EN60529
  • Referential standard: IEC60079-0, IEC60079-11
  • Type of Protection and Marking Code:
    Ex nL IIC T4
  • Group: II
  • Category: 3G
  • Ambient Temperature: –40 to 60°C
  • Ambient humidity: 0 to 100%RH (No condensation)
  • Enclosure: IP67

Note 1. Electrical Data
  U_i = 32 Vdc
  C_i = 3.52 nF
  L_i = 0 µH

Note 2. Installation
  • All wiring shall comply with local installation requirements. (refer to the installation diagram)

Note 3. Maintenance and Repair
  • The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void Type of Protection "n".

[Installation Diagram]

Hazardous Location (Zone 2 only) ← ¦ → Nonhazardous Location
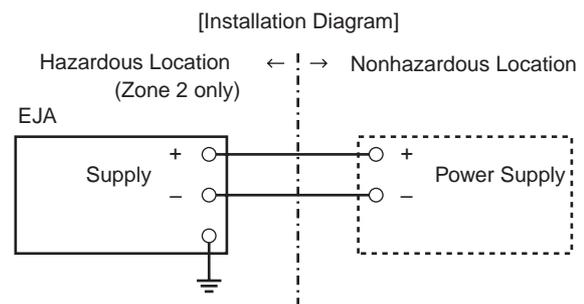
Ratings of the Power Supply as follows:
  Maximum Voltage: 32 Vdc

F0208.EPS

(2) Electrical Connection

A mark indicating the electrical connection type is stamped near the electrical connection port. These marks are as follows.

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

T0201.EPS

Location of the marking
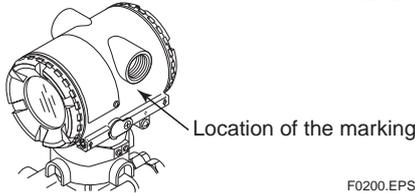
F0200.EPS

(3) Installation

⚠ **WARNING**

- All wiring shall comply with local installation requirements and the local electrical code.
- There is no need for a conduit seal in Division 1 and Division 2 hazardous locations because this product is sealed at factory.

(4) Operation

⚠ **WARNING**

- OPEN CIRCUIT BEFORE REMOVING COVER. INSTALL IN ACCORDANCE WITH THIS USER'S MANUAL
- Take care not to generate mechanical sparking when accessing the instrument and peripheral devices in a 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
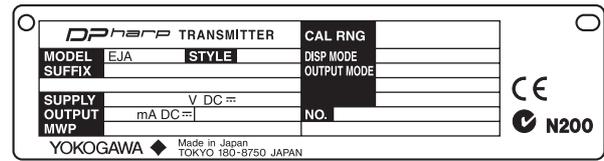
● Tag plate for intrinsically safe type

● Tag plate for flameproof type

F0298.EPS

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].
YOKOGAWA ◆ TOKYO 180-8750 JAPAN:
The manufacturer name and the address[2].

*1: The first digit in the final three numbers of the serial number appearing after "NO." on the name plate indicates the year of production. The following is an example of a serial number for a product that was produced in 2001:

12A819857 132

The year 2001

*2: "180-8750" is the zip code for the following address.

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

IM 01C22T03-00E

3. ABOUT PROFIBUS PA

3.1 Outline

PROFIBUS PA is a widely used bi-directional digital communication protocol that enables the implementation of technologically advanced process control systems. The EJA Series PROFIBUS PA communication type meets the specifications of PROFIBUS Nutzerorganisation e.V. and is interoperable with devices from Yokogawa and other manufacturers.

3.2 Internal Structure of the EJA

The EJA contains four blocks that share the following functions:

(1) Physical block
  • Manages the status of EJA hardware.

(2) Transducer block
  • Converts sensor output to pressure signals and transfers to AI function block.
  • Carries out square root extraction.

(3) AI1 function block
  • Conditions raw data from the transducer block.
  • Outputs differential pressure signals.
  • Carries out scaling and damping extraction.

(4) AI2 function block
  • Outputs static pressure signals.

3.3 Logical Structure of Each Block
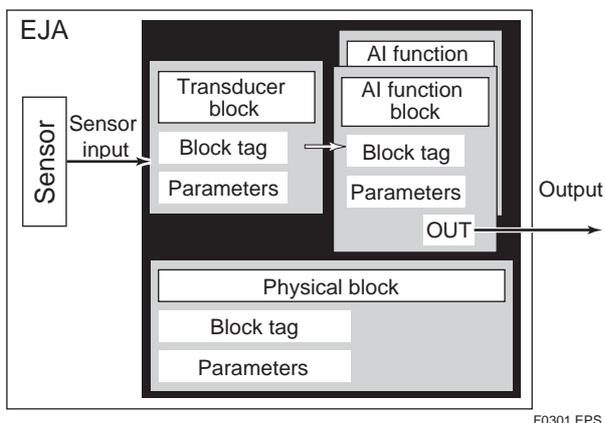
F0301.EPS

Figure 3.1 Logical Structure of Each Block

The parameters shown in Figure 3.1 must be set before starting operation.

3.4 Wiring System Configuration

The number of devices that can be connected to a single bus and the cable length vary depending on system design. When constructing systems, both the basic and overall design must be carefully considered to allow device performance to be fully exhibited.

4. GETTING STARTED

PROFIBUS PA is fully dependent upon digital communication protocol and differs in operation from conventional 4 to 20 mA transmission and the BRAIN communication protocol.
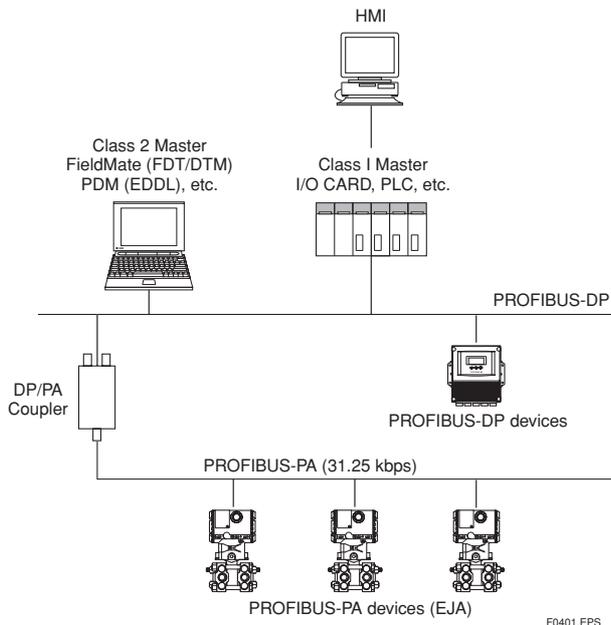
Figure 4.1 Profibus System Construction

4.1 Connection of Devices

The following are required for use with PROFIBUS PA devices:

*   **Power supply:**

    PROFIBUS PA requires a dedicated power supply. It is recommended that current capacity be well over the total value of the maximum current consumed by all devices.
    Power is supplied by a DP/PA coupler.

*   **Terminators:**

    PROFIBUS PA requires two terminators.
    A terminator shall be located at each end of the trunk cable.

*   **Field devices:**

    Connect the PROFIBUS PA communication type. Two or more EJA devices or other devices can be connected.

*   **DP/PA Couplers:**

    PROFIBUS PA requires DP/PA couplers which convert the RS-485 signals to the IEC 61158-2 signal level and power the field devices via the PROFIBUS PA.

*   **Cable:**

    Refer to Figure 4.1.

Table 4.1 PROFIBUS PA Cables and Transmissible Length

Type of cable	Cable specifications	Max. length of cable (reference value)
Type A: Individually-shielded twisted pair cable	#18AWG (0.82 mm^2)	1,900 m
Type B: Overall-shielded twisted pair cable	#22AWG (0.32 mm^2)	1,200 m
Type C: Unshielded twisted pair cable	#26AWG (0.13 mm^2)	400 m
Type D: Overall-shielded non-twisted cable	#16AWG (1.25 mm^2)	200 m

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Note: Yokogawa recommends the use of Type A. Usage of Type B and D is restricted. Yokogawa does not recommend the use of Type C.

4.2 Master Settings

To activate PROFIBUS PA, the following bus parameters must be set for the master.

Table 4.2 Bus Parameters

Symbol	Parameter	Description and Settings
Transmission rate	Transmission Rate	The transmission rate of PROFIBUS PA matches that of the segment coupler. e.g P+F: 93.75 kbps, Siemens: 45.45 kbps
T_{SL}	Slot Time	The maximum time a master station must wait for the complete reception of the first octet of a response (11 bits). e.g: 4095
min T_{SDR}	Min. Station Delay Timer	Sets the minimum time at which a slave can send the first bit of a response back.
max T_{SDR}	Max. Station Delay Time	Sets the maximum time at which a slave can send the first bit of a response back.
T_{QUI}	Quiet Time	Controls the time at which the bus electronics or software of the sender is set to receive mode after a message is sent.
T_{SET}	Setup Time	Sets the maximum allowable time for parameter setting and response by the slave.
HSA	Highest Station Address	Sets the highest station address in the network.
G	Gap update factor	Sets the number of token cycles after which the master will search for a new master.
max. retry limit	Max Retry Limit	Sets the number of retries that are performed after a receiver does not respond to a message.

T0402.EPS

4.3 Integration of GSD

A PROFIBUS PA system requires a GSD file containing device parameters such as the supported transmission rate, input data, output data, data format and data length.

The following GSD files are available for the EJA.

Table 4.3 GSD files

Profile Ident-Number	0x9701
Profile GSD file	PA139701.GSD (AIx2)
Device Specific Ident-Number	0x070D
Device Specific GSD file	YEC_070D.GSD

T0403.EPS

4.4 Engineering Tools

Engineering of the EJA PROFIBUS PA can be performed with the following two tools.

4.4.1 FieldMate for DTM

Yokogawa's FieldMate is a configuration/management tool for devices based on FDT/DTM technology. DTM is software for the adjustment, configuration, calibration and testing of devices.

For EJA configuration, the following devices and software are required.

• FieldMate FSA111 (FieldMate Advance)

• PROFIBUS card2 and COMM DTM (supplied by Softing)

• PC

• DP/PA coupler (supplied by SIEMENS or P+F)

• Terminators

• Power supply

• PROFIBUS cable

• EJA DTM

Download DTM for EJA from the following website.

https://voc.yokogawa.co.jp/PMK/Top.do

For each device, software and PC operating environment, refer to the corresponding user's manual.

For further information on EJA configuration using FieldMate, see chapter 5.

4.4.2 SIMATIC PDM for EDDL

Electronic Device Description Language (EDDL) defines field device information, and can be used independently of vendors. EDDL files can be read by engineering tools, and the software is used to conduct adjustment, configuration, calibration and tests of devices.

Necessary devices and software

• SIMATIC PDM (supplied by SIEMENS)

• PROFIBUS communication card (supplied by SIEMENS)

• PC

• DP/PA coupler (supplied by SIEMENS or P+F)

• Terminators

• Power supply

• PROFIBUS cable

• EJA EDDL

Download EDDL for EJA from the following website.

http://www.yokogawa.com/fld

For further information on the operating environment, refer to the software/device user's manual.

For information on EJA configuration using SIMATIC PDM, refer to the SIMATIC PDM user's manual.

For a list on menus, see APPENDIX 3.

Sample Hardware Setup
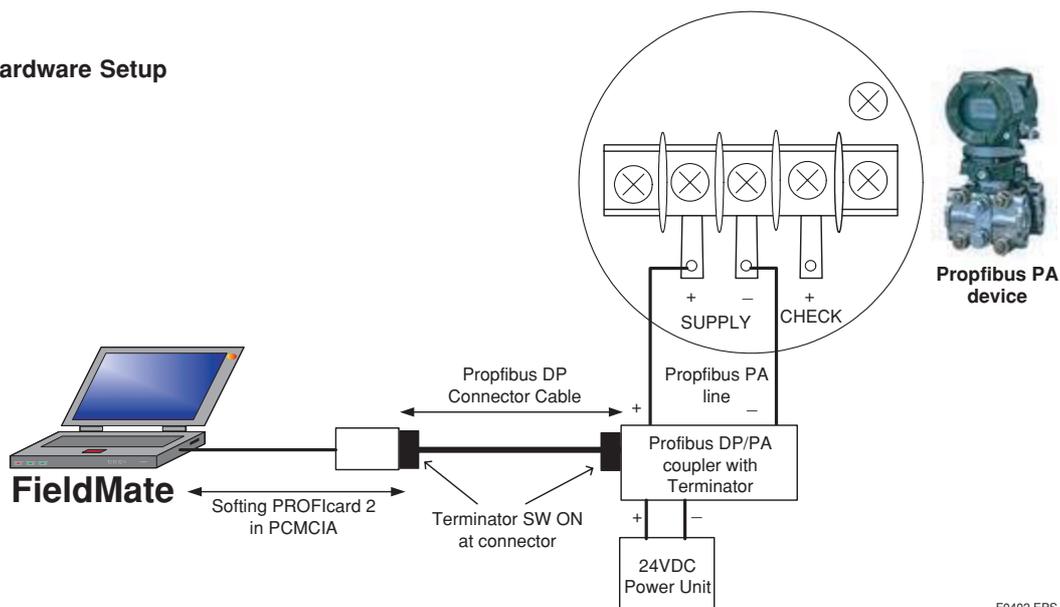
Figure 4.2 Sample Hardware Setup

4.5 Starting FDT frame application

The following section describes how to run DTM with FieldMate.
For the detailed information on FieldMate, see its User's manual.

⚠ IMPORTANT

Before running the program, log-in to Windows as an Administrator or as a user with administrative authority.

Start FieldMate

Start FieldMate as followings:

Click [Start] → [All Programs] → [YOKOGAWA FieldMate] → [FieldMate]

Select [(none)] and then click [OK]
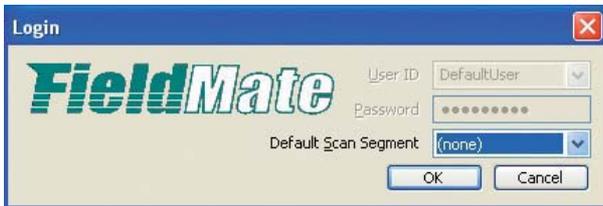
Figure 4.3 Selection of the communication protocol

Open Network Configurator

In the FieldMate window, click [Tool] → [Network Configurator]
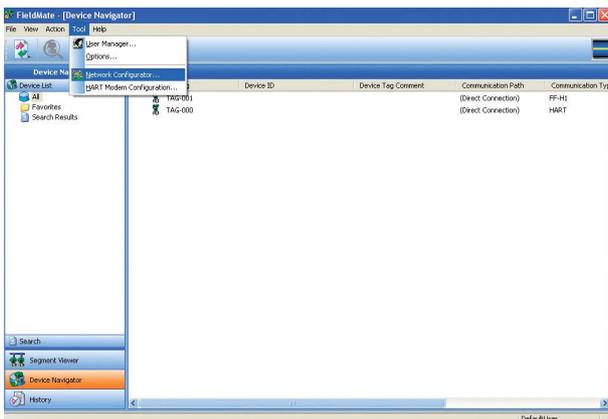
Figure 4.4 Open Network Configurator

Add Communication Path

In the Network Configurator window, click [Action] → [Add communication Path].

Enter a description of the communication path and then click [OK].
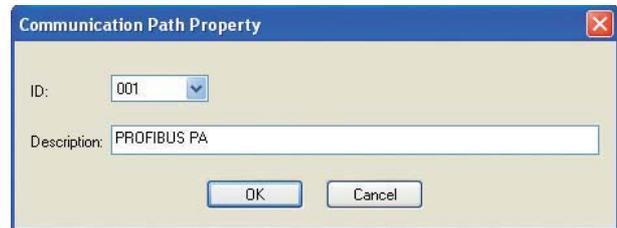
Figure 4.5 Communication Path Description

Add COMM DTM

In the Network Configurator window, click [Action] → [Add COMM DTM] → [OK].
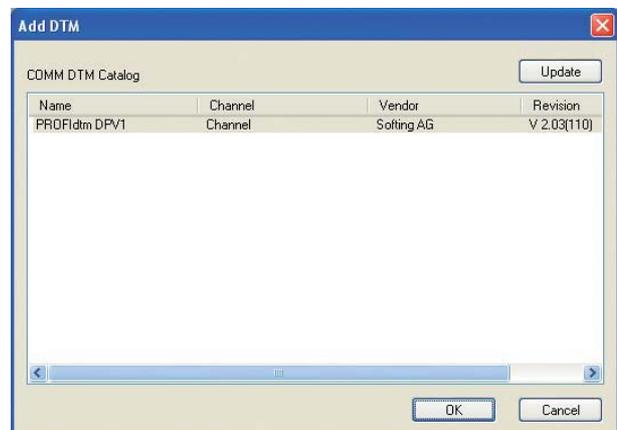
Figure 4.6 COMM DTM Catalog

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COMM DTM Configuration

In the Network Configurator window, click [Action] →
[COMM DTM Configuration].

Select the baud rate for the DP/PA coupler (or link).

Click [Defaults] to change the data to the default
setting, or enter the desired bus parameters.

Click [OK]

⚠️ **IMPORTANT**

When comm DTM is connected to the
PROFIBUS network with class I master running,
set the same busparameters of class I master.
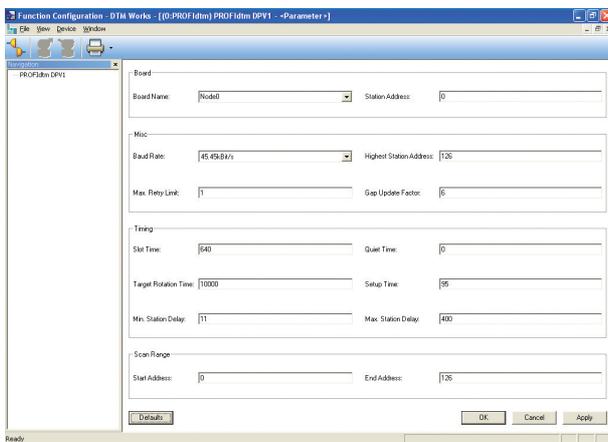
Figure 4.7 COMM DTM Configuration

Exit Function Configuration-DTM Works.

Click [×]

When queried "Do you want to exit DTM Works?",
click [Yes].
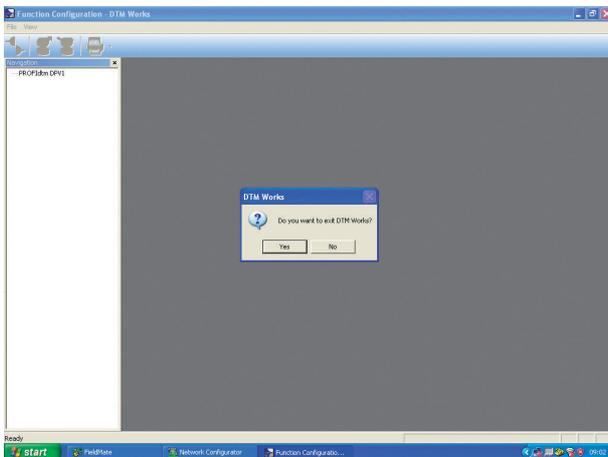
Figure 4.8 Exit Function Configuration

Running Scan List

In the Network Configurator window, click [Action] →
[Scan List] → [Scan].

When queried "DTM is disconnected. Do you want to
connect now?", click [Yes].
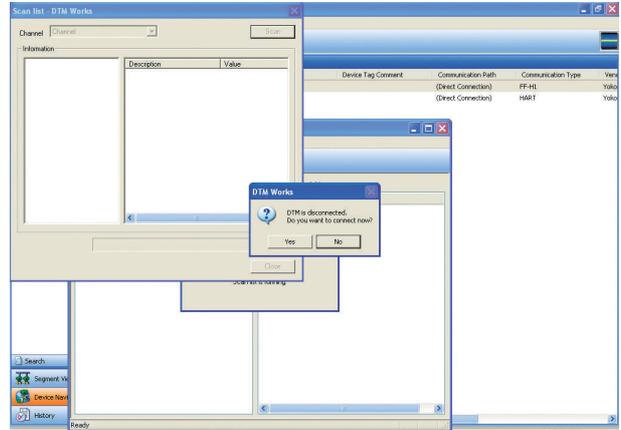
Figure 4.9 Setup Scan List

Confirm Address No.

Confirm the address no. and then click [Close].
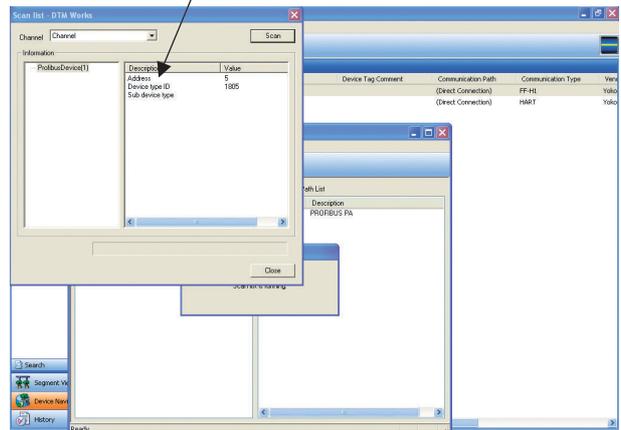
Figure 4.10 Confirm Address No.

From the Network Configurator window, click [File]
→ [Save Configuration].

Click [File] → [Exit].

New Device Maintenance Info

Click [Action] → [New Device Maintenance Info].

Select [PROFIBUS] → [Yokogawa Electric] → [EJA] → Device Revision

Click [Next].

Figure 4.11 Input Basic Information

Choose the communication path from the list and then click [Next].

Figure 4.12 Set Communication Path

Select the corresponding device DTM and then click [Next].
Confirm the information and then click [Finish].

Figure 4.13 Configuration

Register Device Maintenance Info

When queried "Do you really want to register" → click [Yes]

Figure 4.14 Register Device Maintenance Info dialog

 Enter the address no. from the scan list, (for example, address 5) in the address field and then press the Enter key.

Click [File] → [Save] and then click [File] → [Exit]
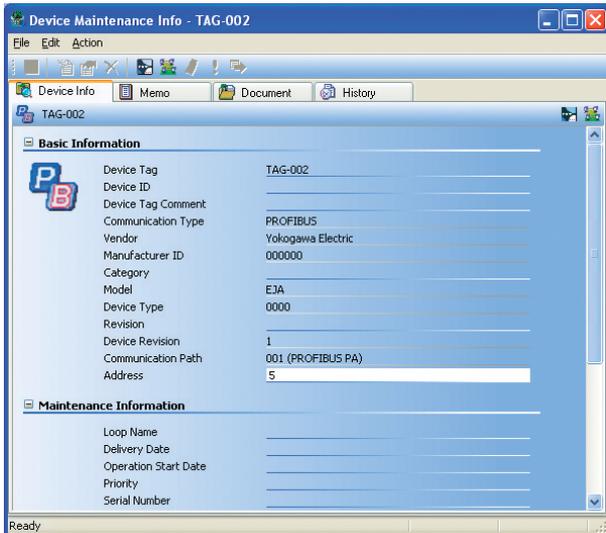
Figure 4.15 Basic Information

Starting DTM Works

In the FieldMate window Click [Action] → [DTM] → [Assigned DTM]

When queried "Do you want to load DTM parameter from database?", click [Yes].
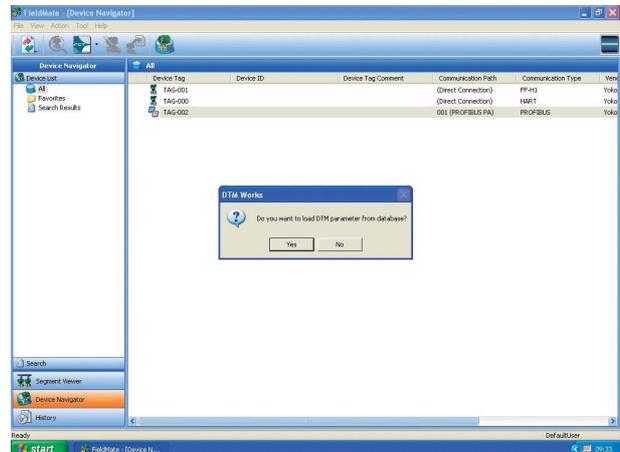
Figure 4.16 Starting DTM Works

From the DTM Works window, click [Device] → [Connect]
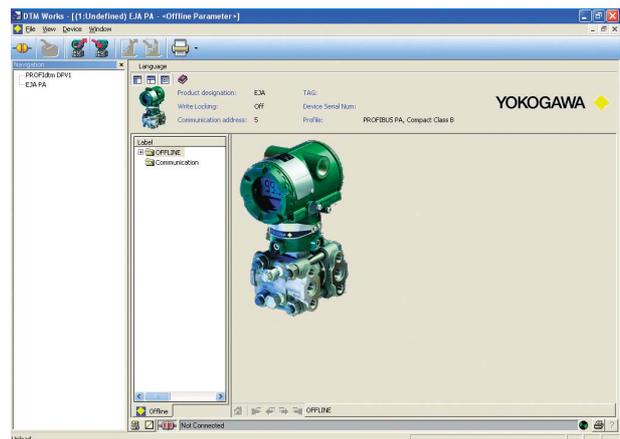
Figure 4.17 Offline view

5. CONFIGURATION

This chapter describes the basic parameters for the three block types and explains how to set and change these parameters.

5.1 Description of Basic Parameters
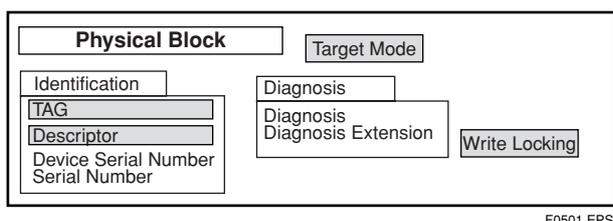
5.1.1 Physical Block Parameters

Figure 5.1 overview of Physical Block

Physical block parameters contain the characteristic data of a device such as the tag number, device name,

version, and serial number, etc. For a list of the parameters in the EJA blocks, see "APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA." in Appendix 1. The following is a list of basic parameters of the physical block.

Target Mode:
Indicates the physical block mode: Out of Service (O/S) or AUTO. In Out of Service mode, the block does not operate. Under normal circumstances, this is set to AUTO mode.

Tag:
Tag description parameter (32chars.)

Descriptor:
User-definable text (a string) to describe the device application (32chars.)

Write Locking:
Locks the software in read-only mode.

5.1.2 AI Block Parameters
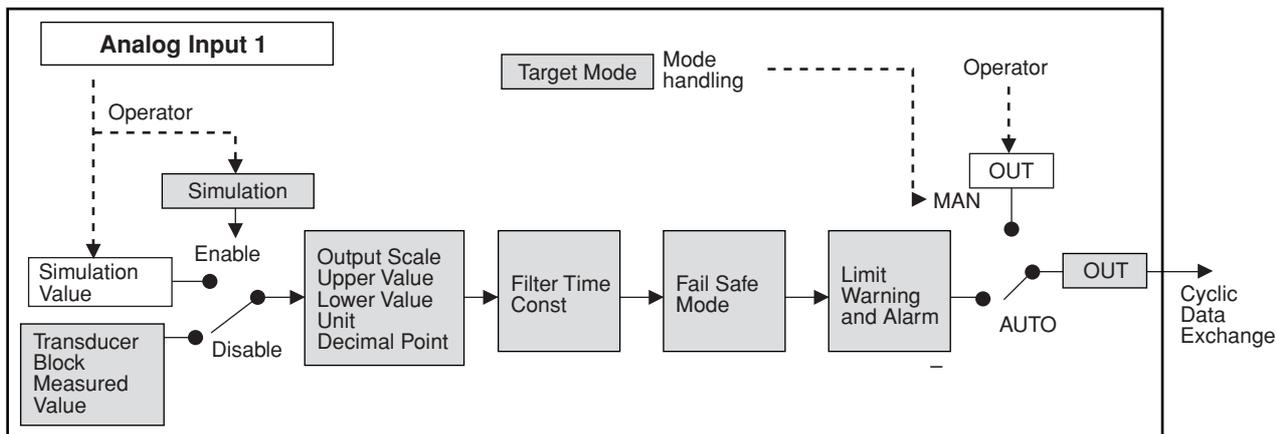
Figure 5.2 Overview of AI Block

The AI block contains all the data for final processing of measured values prior to transmission to the master system. For a list of the parameters in the EJA blocks, see "APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA". The following describes the basic parameters of the AI block.

Target Mode:

Indicates the AI block mode: Out of Service (O/S), MAN, or AUTO. Target Mode indicates what mode of operation is desired for the AI block. In Out of Service mode, the AI block does not operate. Manual mode does not allow values to be updated. AUTO mode causes the measured values to be updated. Under normal circumstance, set this to AUTO mode. AUTO mode is the factory default.

Simulation:

For commissioning and test purposes the input value from the Transducer Block in the Analog Input Function Block AI-FB can be modified. That means that the Transducer and AI-FB will be disconnected.

Output Scale:

Set the range of output (from 0% to 100%). The unit can also be set.

Filter Time Constant:

Sets the damping time constant of a single exponential filter for the PV, in seconds.

Fail Safe Mode:

This defines how the function block will operate if a fault is detected. See table 7.1.

Fail Safe Default Value:

This sets the default value for the OUT parameter, if a sensor or a sensor electric fault is detected.

Upper Limit Alarm and Upper Limit Warning:

Specifies the upper limit of alarms and warnings.

Lower Limit Alarm and Lower Limit Warning:

Specifies the lower limit of alarms and warnings.

5.1.3 Transducer Block Parameters
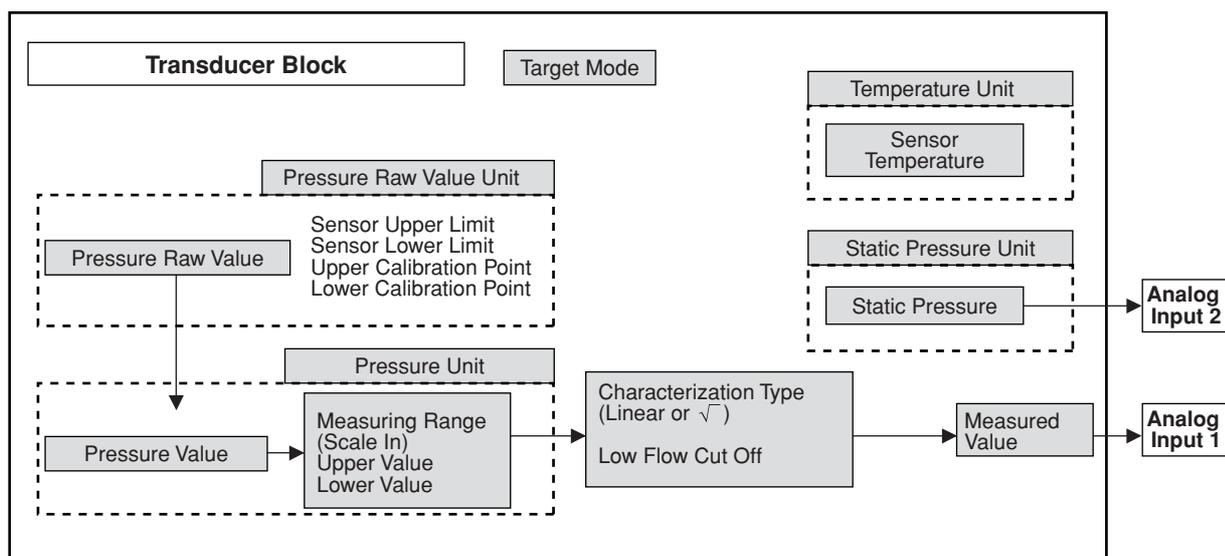
Figure 5.3 Overview of Transducer Block

The transducer block sets functions specific to the measurements EJA. For a list of the EJA block parameters, see "APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA". The following describes the basic parameters of the transducer block.

Target Mode:

Indicates the physical block mode: Out of Service(O/S) or AUTO. In Out of Service mode, the block does not operate. Under normal circumstances, set this to AUTO mode.

Pressure Raw Value Unit:

This contains the pressure unit for the calibration values.

Pressure Raw Value:

This contains the calibrated sensor value. The unit is derived from pressure raw value unit.

Sensor Upper/Lower Limit:

These contain the sensor upper/lower limit value. The unit is derived from pressure raw value unit.

Upper/Lower Calibration Point:

These contain the highest/lowest calibrated value. For calibration of the high/low limit point give the high/low measurement value (pressure) to the sensor and transfer this point as HIGH /LOW to the transmitter. The unit is derived from pressure raw value unit.

Pressure Unit:

This contains the pressure unit of the pressure value. The following units are available for the EJA.

Table 5.1 Pressure Units

Pa	GPa	MPa	kPa	mPa
µPa	hPa	bar	mbar	torr
atm	psi	psia (psi abs)	psig (psi gauge)	g/cm^2
kg/cm^2	inH$_2$O	inH$_2$O (4˚C)	inH$_2$O (68˚F)	mmH$_2$O
mmH$_2$O (4˚C)	mmH$_2$O(68˚F)	frH$_2$O	ftH$_2$O (4˚C)	ftH$_2$O (68˚F)
inHg	inHg (0˚C)	mmHg	mmHg (0˚C)	

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Pressure Value:

This contains the pressure value and status available to the function block.

Measuring Range (Scale In):

This is the input conversion of pressure into a % value using the upper and lower scale. The related unit is the pressure unit.

Characterization Type:

This sets the linearization type: Linear or Square root. If set to "Square root", the square root is extracted and the value is reflected in the measured value. "Linear" is the factory default.

Low Flow Cut off:

This is the flow percentage at which the output of the flow function is set to zero.It is used for suppressing low flow values.

Measured Value:

This is the transducer block output and input to Analog Input1.

Temperature Unit:

This contains the units of the sensor temperature.

Sensor Temperature:

This contains the sensor (capsule) temperature (e.g. sensor temperature used for measurement compensation). The related unit is the temperature unit.

Static Pressure Unit:

This parameter contains the units of the static pressure.

Static Pressure:

This parameter contains the static pressure. The related unit is the static pressure unit.

Trim PV Zero, Extenal Zero Enable:

This is for zero-point adjustment. There are two methods for adjustment, (1) using the external zero-point adjustment screw, and (2) using the parameter of the transducer block.

Display Mode, Display Cycle:

This sets the unit to be used for LCD display and the cycle of LCD display. If a low temperature environment makes it difficult to view the display, it is recommended that you set a longer display cycle.

5.2 Basic Parameter Setting and Changing

This section describes basic parameter setting and changing with FieldMate. For detailed information on FieldMate, refer to FieldMate User's manual.

5.2.1 Explanation of Screen

The DTM-Works window is shown below.
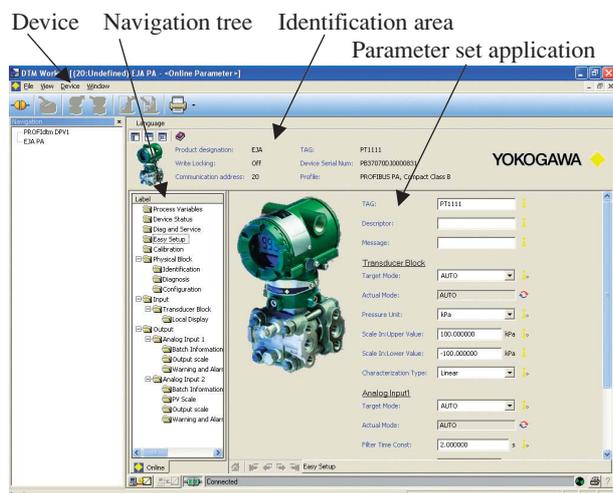
Figure 5.4 DTM Works (Online Parameter)

Identification area:

This area contains information about the device that is handled by the DTM. At online parameter, all parameters in this area must be handled as dynamic variables.

Parameter set application:

This area displays the device parameters. Parameter setting and changing are performed in this area.

Navigation tree:

The navigation tree provides an overview of the parameter settings. User can easily navigate the folders and submenus using the tree view. The tree view is similar to that of windows explorer. A sub-menu is viewed by clicking a folder with the plus sign [+]. Clicking the minus sign [–] will close the sub-menu. User can select an element by pushing the up or down arrow key. The navigation tree for online parameters is described in the following table.

Table 5.2 Navigation tree structure of online parameters

Level of node		
1st	2nd	3rd
Process Variable		
Device Status		
Diag and Service		
Easy Setup		
Calibration		
Physical Block		
	Identification	
	Diagnosis	
	Configuration	
Input	Transducer Block	
		Local Display
Output	Analog Input 1	
		Batch Information
		Output scale
		Warning and Alarm
	Analog Input 2	
		Batch Information
		PV Scale
		Output scale
		Warning and Alarm

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Device:

This menu shows the current accessible functions of the DTM.

Table 5.3 DTM context menu

DTM Function		
1st level	2nd level	Description
Connect/Disconnect		Connect/Disconnect
Parameter	Online Parameter	Online Parameterization
	Offline Parameter	Offline Parameterization
	Configuration	The Query Device is located under Configuration. The Query Device provides a list of all parameters in a designated block.
Additional Functions	Observe	This function indicates actual process conditions. All parameters must be handled as dynamic variables and updated periodically.
	Diagnosis	This function provides device diagnosis information.
	Process Trend	Trend display of process value
Upload from Device		All parameters are uploaded from device to DTM.
Download to Device		All parameters are downloaded from DTM to device.
Print	Online Parameter	Print specified parameter sets.
	Offline Parameter	
	Configuration	
	Observe	
	Diagnosis	

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Example of DTM context screen

(a) Process Variables
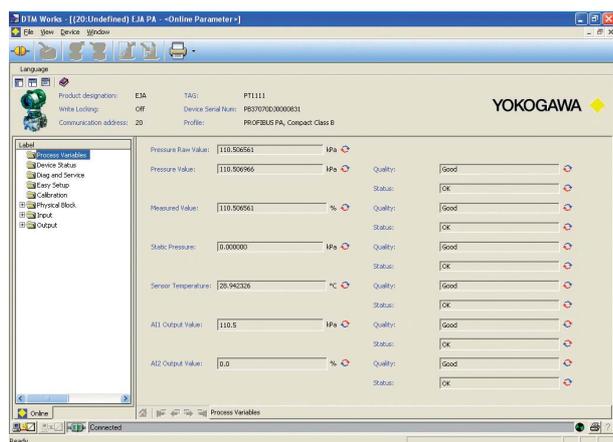
Figure 5.5 Process Variables

Note: This function is only available if an online connection to the device is established.

(b) Device Status
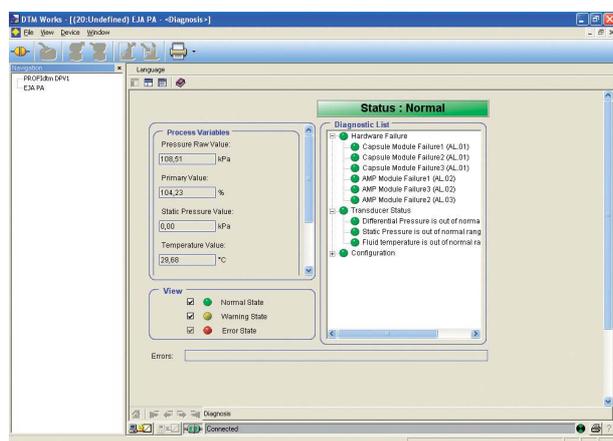
Figure 5.6 Device Status

Note: This function is only available if an online connection to the device is established.

5.3 Bus Address Setup

Every device in PROFIBUS must be assigned a unique address in the range of 0 to 126. If it is not specified at the time of order, '126' is the factory default. Do not change to '0','1' or '2' as these are used by master devices.

Note: This function is only available if an offline connection to the device is selected.

Example: Change the bus address 5 to 20

In the DTM Works window, click [Device] → [Connect]
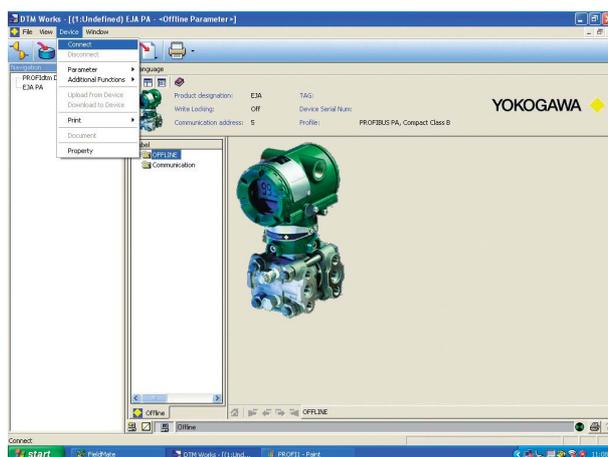
Figure 5.7 DTM Works

Right-click [PROFIdtm DPV1] of Navigation → [Additional Functions] → [Set Device Station Address]
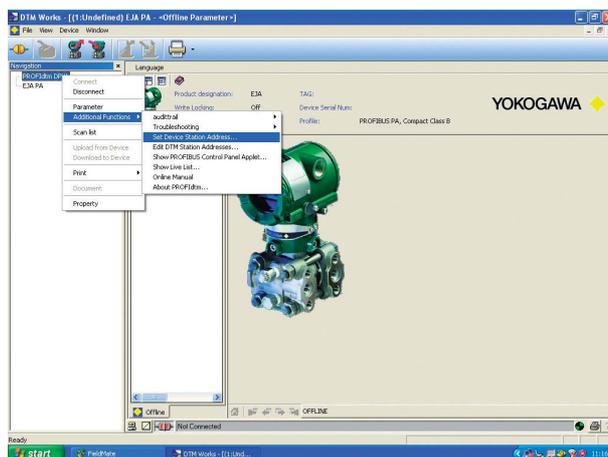
Figure 5.8 Access the Set Device Station Address

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Enter [Old Address] to 5 and [New Address] to 20 and Click [Set]

"New address successfully set" is displayed in the State field.

Click [Close]
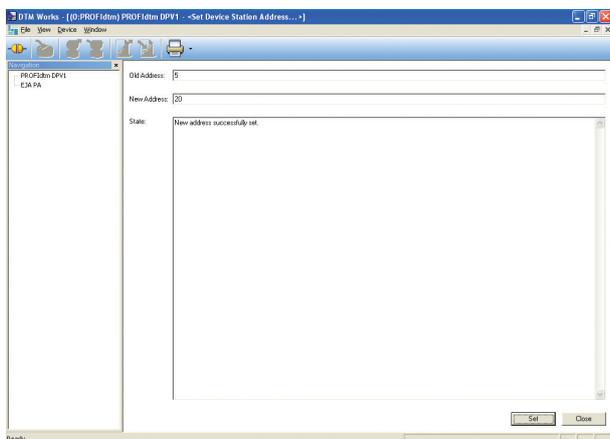
Figure 5.9 Change the address

When changing a parameter after changing the Address, save the data and close the DTM Works window.

Select Open Device Maintenance Info from the Action pull-down menu on the toolbar.

Change the address of Basic Information and return to the DTM Works window.

5.4 Easy Setup

Easy Setup tracks parameters that often need to be configured or changed.

In the DTM Works window, click [Device] → [Connect]

Click [Device] → [Parameter] → [Online parameter]

Click on [Easy Setup] folder

⚠ IMPORTANT

Do not turn power OFF immediately after parameter setting. When parameters are saved to the EEPROM, the redundant processing is executed for an improvement of reliability. Should the power be turned OFF within 60 seconds after setting of parameters, changed parameters are not saved and may return to their original values.

Note.1 The following table shows which operation modes are supported by the blocks.

Table 5.4 Operation Mode

	AI Block	Transducer Block	Physical Block
Automatic (AUTO)	Yes	Yes	Yes
Manual (MAN)	Yes	N/A	N/A
Out of Service (O/S)	Yes	Yes	Yes

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Refer to the "APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA" for details of the Write Mode for each block.

5.4.1 Tag Number (TAG)

Enter the Tag number in TAG.

Press the Enter key to confirm the data.
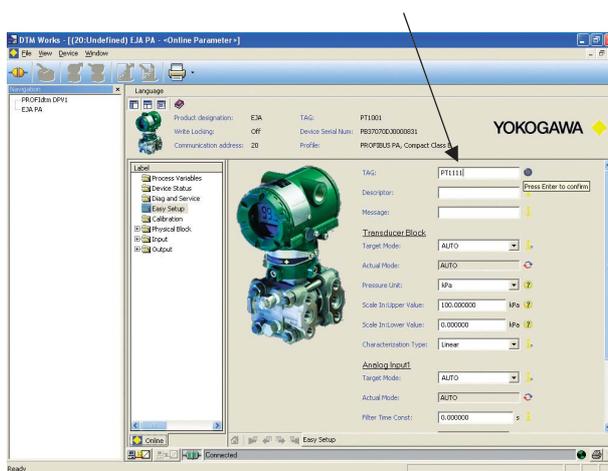
Figure 5.10 Tag Number Setup

5.4.2 Calibration Range (Scale In) and Pressure Unit

Change the Target Mode of Transducer Block to Out of Service (O/S).

AL.22 occurs when Target Mode is changed to Out of Service (O/S).
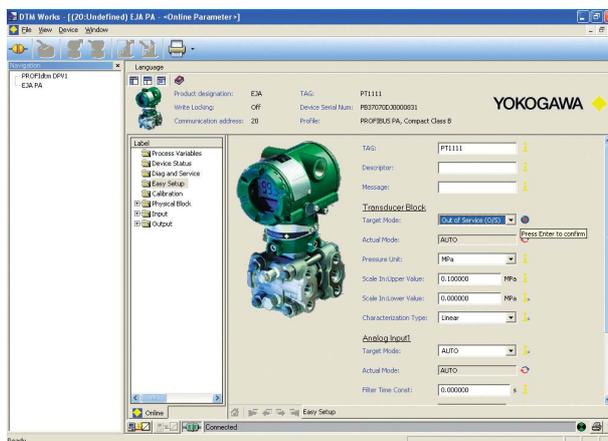
Figure 5.11 Target Mode Setup

Select the desired pressure unit.

Press the Enter key to confirm the data.

Figure 5.12 Pressure Unit Setup

Enter the desired value in Scale In (Upper/Lower Value).

Press the Enter key to confirm the data.

Figure 5.13 Scale In Setup

5.4.3 Output Mode (Characterization Type)

In Characterization Type, select Linear or Square root for the Output Mode, and press the Enter key to confirm the data.

After configuring the Transducer Block Parameter, change the Target Mode to AUTO.

5.4.4 Damping Time Constant (Filter Time Const)

Enter the desired values in the Filter Time Const, and press the Enter key to confirm the data.

Filter Time Const can not be configured when Target Mode is Out of Service (O/S).

5.4.5 Output Scale (Out Scale) and Unit

Change the Target Mode of Analog Input1 to Out of Service (O/S).

AL.23 occurs when the Target Mode is changed to Out of Service (O/S).

Select the unit for Out Scale Unit, and press the Enter key to confirm the data.

Enter the values configured in Out Scale (Upper/Lower Value), and press the Enter key to confirm the data.

After configuring the Analog Input1 parameter, change the Target Mode to AUTO.

5.5 Input Transducer Block Setup

In the DTM-Works window, double-click [Input] folder.

Click the [Transducer] folder.

5.5.1 Low Flow Cut Off

Change the Target Mode to [Out of Service (O/S)].

Enter the desired value for low flow cut off.

Press the Enter key to confirm the data.

Note:

This setting is applicable for Square root output only.
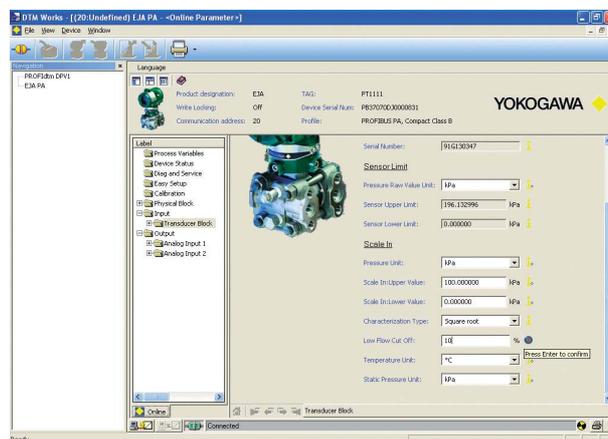
Figure 5.14 Low Flow Cut Off Setup

5.6 Output Analog Input 1 Setup

In the DTM Works window, double-click the [Output] folder.

Click the [Analog Input 1] folder.

5.6.1 Fail Safe Mode

Fail Safe Mode defines the Output Value and Status (Quality) if a device breaks down. Select Fail Safe Mode, and press the Enter key to confirm the data.

When selecting "Default Value is used as Output Value", enter the desired values for the Fail Safe Default, and press the Enter key to confirm the data.

Table 5.5 Fail Safe Mode

Fail Safe Mode	Output Value and Status(Quality)	
Default value is used as output value	Value	Fail Safe Default Value
	Status(Quality)	UNCERTAIN Substitute Value
Storing last valid output value	Value	Last stored valid OUT value
	Status(Quality)	UNCERTAIN Last Usable Value
The calculated output value is incorrect	Value	wrong calculated value
	Status(Quality)	BAD_*(* as calculated)

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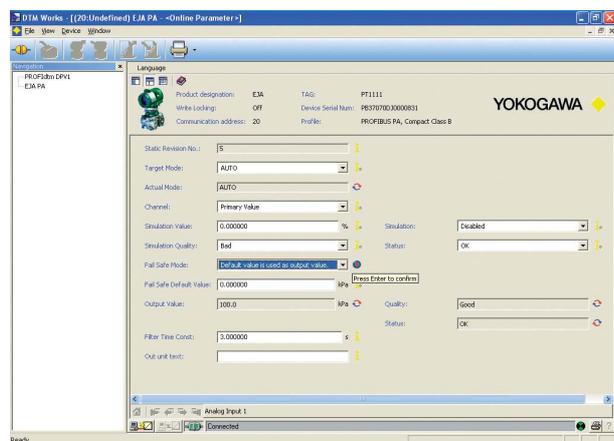
Figure 5.15 Fail Safe Mode Setup

6. CALIBRATION

6.1 Zero-point adjustment

Zero-point adjustment can be performed in two ways. Choose the optimum method in accordance with the circumstances specific to the application employed.

(a) Using FieldMate

In the DTM Works window, click [Device] → [Connect]

Click [Device] → [Parameter] → [Online Parameter]

Click the [Calibration] folder.

Perform the following procedure to set the current output value to 0%.

Change Target Mode to [Out of Service].

Change Trim Mode to [Trim enable].

Set the input pressure to zero.

Set Trim PV Zero to zero.

Change Trim Mode to [Trim disable].
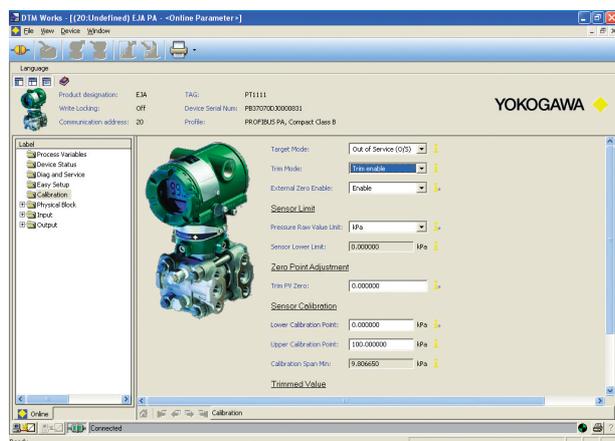
Figure 6.1 Zero-point adjustment

(b) Using the transmitter zero-adjustment screw

In the DTM Works window, click the [Calibration] folder Confirm External Zero Enable is set to [Enable].

Set the input pressure to zero.

Turn the zero-adjustment screw on the outside of the transmitter case using a screwdriver. Turning the screw clockwise causes the output value to increase while turning it counterclockwise cause the output to decrease; zero-point can be adjusted with a resolution of 0.001% of range setting.

The amount of zero-point adjustment changes according to the speed at which the zero-point screw is turned; turn it slowly for fine tuning, or quickly for rough tuning.

6.2 Sensor calibration of EJA while applying actual inputs

Sensor calibration is carried out in two steps: first the lower sensor is calibrated, then the upper sensor is calibrated. The sensor calibration is a two-point adjustment and the lower point adjustments should always be performed before the upper point adjustment in order to maintain the pitch between the zero and 100% points within the calibration range.

6.2.1 Setting procedure

Example: For the range of 0 to 110kPa

Change the Trim Mode to [Trim enable].

Apply a standard pressure of 0kPa to the transmitter.

Set the Lower Calibration Point to 0kPa.

Apply a standard pressure of 110kPa to the transmitter.

After obtaining a stable pressure, set the Upper Calibration Point to 110kPa.

Change the Trim Mode to [Trim disable].
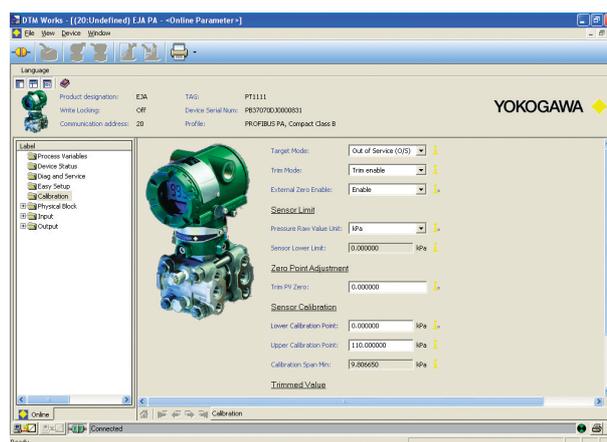
Figure 6.2 Sensor calibration while applying actual inputs

7. IN-PROCESS OPERATION

This chapter describes the in-process operation of the EJA

7.1 Mode Transition

When each block mode is changed to Out of Service (O/S), the block pauses and a block alarm is issued.

When the AI block mode is changed to MAN, the AI block suspends updating of output values. In this case alone, it is possible to write a value and status to the OUT parameter of the block for output.

7.2 Generation of Alarms

7.2.1 Indication of Alarms

When the self-diagnostics function detects a fault in the EJA, diagnostic information and an error indication are displayed by using parameter Diagnosis and Diagnosis Extension in the physical block. If an LCD indicator is installed, the error number is displayed as AL.XX. If two or more alarms are issued, the error numbers are displayed in a repeating sequence.

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Figure 7.1 Error Indication

7.2.2 Status of Each Parameter in Failure Mode

The DTM and EDDL messages when the LCD indicates an alarm are listed in the following table.

Table 7.1 Status of each parameter in failure mode

Alarm Display	Cause of Alarm	Transducer Block	AI1/AI2 Block
AL. 01	Capsule Module Failure	Pressure/Measured value. Quality =BAD-Sensor Failure	Output Value and Quality depend on Fail Safe Mode *1
		Static Pressure/sensor Temperature. Quality=BAD-Sensor Failure	
AL. 02	AMP Module Failure 1 AMP Module Failure 3	Pressure/Measured value.Quality =BAD- Device Failure	Output Value and Quality depend on Fail Safe Mode *1
		Static Pressure/sensor Temperature. Quality=BAD- Device Failure	
AL. 03	AMP Module Failure 2	Pressure/Measured value. Quality =BAD-Device Failure	Output Value and Quality depend on Fail Safe Mode *1
		Static Pressure/sensor Temperature. Quality=BAD- Device Failure	
AL. 21	Physical Block is in O/S mode	Pressure/Measured value. Quality =BAD	Output Quality=Bad-Out of Service
		Static Pressure/sensor Temperature. Quality=BAD	
AL. 22	Transducer Block is in O/S mode	Pressure/Measured value. Quality =BAD-Out of Service	Output Quality=Bad-Out of Service
		Static Pressure/sensor Temperature. Quality=BAD-Out of Service	
AL. 23	AI1 Block is in O/S mode	–	AI1 Output Quality=Bad-Out of Service
AL. 41	Differential Pressure is out of normal range	Pressure/Measured value. Quality= Uncertain- value uncertain	Output Quality=Uncertain value uncertain
		Static Pressure/sensor Temperature. Quality= Uncertain	
AL. 42	Static Pressure is out Of normal range	Pressure/Measured value. Quality = Uncertain	Output Quality= Uncertain
		Static Pressure. Quality = Uncertain-value uncertain Sensor Temperature. Quality = Uncertain	
AL. 43	Fluid temperature is out of normal range	Pressure/Measured value. Quality = Uncertain	Output Quality= Uncertain
		Static Pressure. Quality = Uncertain Sensor Temperature. Quality = Uncertain-value uncertain	
AL. 61	Data is out of LCD Display range	–	–
AL. 62	Simulation is enabled in AI1 Block	–	AI1 Output Value and Quality are Simulated
AL. 63	AI Block is in MAN mode	–	AI1 Output Value and Quality are user set value
AL. 64	Zero adjust value is out Of normal range	Pressure/Measured value. Quality =BAD: Configuration error	Output Value and Quality depend on Fail Safe Mode *1
–	AI2 Block is in O/S mode	–	AI2 Output Quality =Bad- Out of Service

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*1: Table 7.2 Fail Safe Mode

No.	Fail Safe Mode	Output Value and Status (Quality)	
0	Default value is used as output value	Value	Fail Safe Default Value
		Status (Quality)	UNCERTAIN Substitute Value
1	Storing last valid Output value	Value	Last stored valid OUT value
		Status (Quality)	UNCERTAIN Last Usable Value
2	The calculated output value is incorrect	Value	wrong calculated value
		Status (Quality)	BAD_*(* as calculated)

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7.3 Simulation

The simulation function simulates the input of the AI block and lets it operate as if the data were received from the transducer block.

When the simulation parameter is set to "enable", the applicable AI block uses the simulation value set in this parameter instead of the data from the transducer block.

Table 7.3 Simulation parameter

Parameters	Description
Simulation	Control the simulation function of this block Disabled(standard) or Enabled(simulation)
Simulation Value	Sets the value of the data to be simulated.
Simulation Quality and Status	Sets the data status(quality) to be simulated

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In simulation enabled status, an alarm (AL.62) is generated from the physical block, and other device alarms will be masked; for this reason the simulation must be disabled immediately after using this function.

⚠ **NOTE**

Fail safe mode function has a priority over simulation function. In this case, value and status setting by fail safe mode output.

The Setting procedure is as follows;

Example: Simulation Quality: Good, Status: OK,
Output Value: 50 (%)
(Scale In: 0 to 100kPa, Out Scale: 0 to 100kPa)
From the DTM-Works window, click [Device] → [Connect]

Click [Device] → [Parameter] → [Online]

Double-click on [Output] folder → Click on [Analog Input 1] folder

Change Simulation to [Enabled]

Change Simulation Value to [50] (%)

Change Simulation Quality to [Good]

Change Status to [OK]

The output value is displayed in the Output Value field.

Change Simulation to [Disabled].
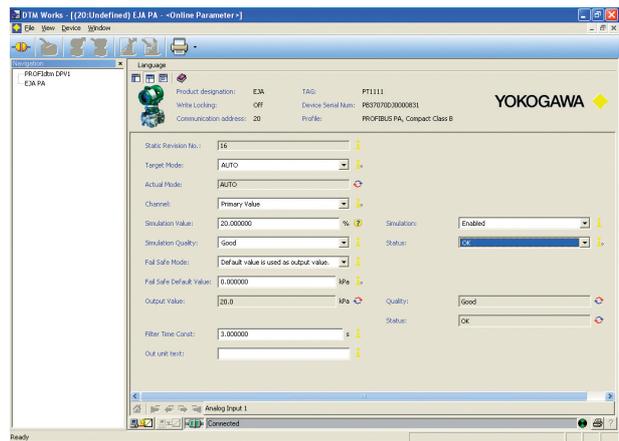
Figure 7.2 Simulation

8. DIAGNOSTIC INFORMATION

Diagnostic information and failures of EJA are indicated by using parameter Diagnosis and Diagnosis Extension in the Physical Block. Diagnosis and Diagnosis Extension are listed in Table 8.1 and 8.2 below.

Table 8.1 Contents of DIAGNOSIS

Octet	Bit	Mnemonic	Description	Remarks	Support[*1]
1	0	DIA_HW_ELECTR	Hardware failure: electronics	--	1
	1	DIA_HW_MECH	Hardware failure: mechanical	Capsule Module Failure1 (AL.01) Capsule Module Failure2 (AL.01)	1
	2	DIA_TEMP_MOTOR	Motor – temperature too high	--	0
	3	DIA_TEMP_ELECTR	Electronic temperature too high	--	0
	4	DIA_MEM_CHKSUM	Memory error	Capsule Module Failure3 (AL.01) Amp Module Failure1 (AL.02) Amp Module Failure2 (AL.03) Amp Module Failure3 (AL.02)	1
	5	DIA_MEASUREMENT	Failure in Measurement	--	0
	6	DIA_NOT_INIT	Device not initialized (No self calibration)	--	0
	7	DIA_INIT_ERR	Self calibration failed	--	0
2	0	DIA_ZERRO_ERR	Zero point error (limit position)	Zero adjustment error (AL.64)	1
	1	DIA_SUPPLY	1 DIA_SUPPLY Power supply failed (electrical, pneumatic)	--	0
	2	DIA_CONF_INVAL	Configuration not valid	--	0
	3	DIA_WARMSTART	New-start-up (warm start up) carried out.	--	0
	4	DIA_COLDSTART	Re-start-up (cold start up) carried out.	HW,SW,DL restart	1
	5	DIA_MAINTENANCE	Maintenance required	--	0
	6	DIA_CHARACT	Characterization invalid	--	0
	7	IDENT_NUMBER_Violation	Set to 1 (one), if the Ident_Number of the running cyclic data transfer and the value of Physical Block IDENT_NUMBER_SELECTOR parameter are different.	--	1
3	0-7	Reserved	Reserved for use within the PNO	--	--
4	0-6	Reserved	Reserved for use within the PNO	--	--
	7	EXTENSION_AVAILABLE	More diagnostic information is available	--	1

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*1 0: Not available for EJA

Table 8.2 Contents of DIAGNOSIS_EXTENSION

category	Display Message	Countermeasure Message	Alarm description	Octet	Bit
System Alarms	Capsule Module Failure1 (AL.01)	Replace capsule.	Capsule module failure.	4	0
	Capsule Module Failure2 (AL.01)	Replace capsule.	Capsule module failure.	4	1
	Capsule Module Failure3 (AL.01)	Replace capsule.	Capsule memory failure.	4	4
	AMP Module Failure1 (AL.02)	Replace amplifier.	Amp memory failure.	4	5
	AMP Module Failure2 (AL.03)	Replace amplifier.	Amp memory failure.	4	6
	AMP Module Failure3 (AL.02)	Replace amplifier.	Amp module failure.	4	7
Process Alarms	Differential Pressure is out of normal range. (AL.41)	Check input.	Differential pressure is out of range. Alarm is generated when the value is out of LRL-10% to URL+10%.	3	1
	Static Pressure is out of normal range. (AL.42)	Check line pressure (static pressure).	Static pressure is out of MWP (Maximum working pressure). Alarm is generated when the static pressure exceeds 110% of MWP.	3	2
	Fluid temperature is out of normal range. (AL.43)	Use heat insulation to keep temperature within range.	Process temperature is out of limit. Alarm is generated when the temperature is out of -50 to 130 degC.	3	3
Setting Alarms	Data is out of LCD Display range. (AL.61)	Check input and display conditions and modify them as needed.	Data is out of LCD display range.	2	6
	Zero adjustment error (AL.64)	Readjust zero point.	Zero adjustment value is out of range. Alarm is generated when the value is out of LRL-10% to URL+10%.	2	7
O/S Mode Alarms	Physical Block is in O/S mode. (AL.21)	--	Physical Block is in O/S mode.	1	6
	Transducer Block is in O/S mode. (AL.22)	--	Transducer Block is in O/S mode.	1	0
	AI1 Function Block is in O/S mode. (AL.23)	--	AI1 Function Block is in O/S mode.	1	3
O/S Mode Warning	AI2 Function Block is in O/S mode.	--	AI2 Function Block is in O/S mode.	1	1
Warning in FB	Simulation is enabled in AI1 or AI2 Function Block. (AL.62)	--	AI1 or AI2 Function Block is in Simulation mode.	1	5
	AI1 Function Block is in Man mode. (AL.63)	--	AI1 Function Block is in Manual mode.	1	4
	AI2 Function Block is in Man mode.	--	AI2 Function Block is in Manual mode.	1	2

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9. GENERAL SPECIFICATIONS

9.1 Standard Specifications

For items other than those described below, refer to the corresponding General Specification sheet.

Applicable Model:
EJA110A, 120A, 130A, 210A, 220A,
EJA310A, 430A, 440A, 510A, 530A,
EJA115, 118W, 118N, 118Y, 438W, 438N

Output Signal:
Digital communication signal based on PROFIBUS-PA protocol.

Supply Voltage:
9 to 32 V DC for general use, flameproof type, and nonincendive.

9 to 24 V DC for intrinsically safe type Entity model
9 to 17.5 V DC for intrinsically safe type FISCO model

Conditions of Communication Line:
Supply Voltage: 9 to 32 V DC
Current Draw: 16.5 mA (max)

Power Supply Effect:
No effect (within the supply voltage of 9 to 32 V DC)

External Zero Adjustment:
External zero is continuously adjustable with 0.01% incremental resolution of maximum span.

Functional Specifications:
Functional specifications for PROFIBUS communication conform to the PROFIBUS-PA ver 3.0.
Function Block: Two AI blocks

EMC Conformity Standards: CE , N200
EN61326, AS/NZS CISPR11

<Settings When Shipped>

Tag Number(TAG)	'PT1001' unless otherwise specified in order. (Not engraved on tag plate in such case.)[1]
Output Mode (Characterization Type)	'Linear' unless otherwise specified in order.
Calibration Range (Scale In Lower/Upper Value)	As specified in order
Unit (Pressure Unit) of Calibration Range	Selected from mmH_2O, inH_2O, ftH_2O, mmHg, inHg, Pa, hpa, kPa, MPa, g/cm^2, kg/cm^2, bar, mbar, psi, torr, atm (Only one unit can be specified.)
Output Scale (Out Scale Lower/Upper Value)	'0 to 100%' unless otherwise specified in order.
Unit of Output Scale (Out Scale : Unit)	As specified in order
Damping Time Constant (Filter Time Const)	'2 sec'
Bus Address	'0x7E(126)' unless otherwise specified in order.

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*1: Specified Tag Number is entered in the amplifier memory and also engraved on the stainless steel plate.
  - For entry in the amplifier memory: Up to 32 letters using any of alphanumereics and symbols, - and ·

  - For engraving on the stainless steel plate: Up to 16 letters using any of alphanumereics and symbols, -, ·, and /.

< Related Instruments >
The customer should prepare instrument maintenance tool, terminator, and Profibus power supply etc.

< DP/PA Coupler for CENELEC (KEMA) Intrinsically Safe Type >

Supplier	DP transmission Rate	Model
P+F	97.75kbps	KFD2-BR-Ex1.3 PA.93
SIEMENS	45.45kbps	6ES7 157-0AD82-0XA0

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9.2 Optional Specifications

For items other than those described below, refer to the appropriate user's manual.

Item	Description	Code
Factory Mutual (FM)	FM Explosionproof Approval [1] 　Explosionproof for Class I, Division 1, Groups B, C and D 　Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G 　Hazardous (classified) locations, indoors and outdoors (NEMA 4X) 　Temperature class: T6　Amb. Temp.:−40 to 60°C (−40 to 140°F)	**FF15**
	FM Intrinsically Safe Approval [1] [Entity Model] 　Cl. I, II&III, Division 1, Groups A, B, C ,D, E, F&G, Temp. Cl. T4 and Cl. I, Zone 0, 　AEx ia IIC, Temp. Cl. T4 　Groups A, B, C, D, E, F&G and Group IIC: 　　Vmax.= 24 V, Imax.= 250 mA, Pi= 1.2 W, Ci= 3.52 nF, Li= 0 μH [FISCO Model] 　Cl. I, II&III, Division 1, Groups A, B, C, D, E, F&G, Temp. Cl. T4 and Cl. I, Zone 0, 　AEx ia IIC, Temp. Cl. T4 　Groups A, B, C, D, E ,F&G and Group IIC: 　　Vmax.= 17.5 V, Imax.= 360 mA, Pi = 2.52 W, Ci = 3.52 nF, Li = 0μH 　Groups C, D, E, F&G and Group IIB: 　　Vmax.= 17.5V, Imax. = 380 mA, Pi = 5.32W, Ci = 3.52 nF, Li = 0μH Nonincendive for Cl. I, Division 2, Groups A, B, C&D, Temp. Cl. T4 　and Cl. I, Zone 2, Group IIC, Temp. Cl. T4 　and Cl. II, Division 2, Groups F&G Temp. Cl. T4 　and Cl. III, Division 2, Temp. Cl. T4 　　Vmax.= 32 V, Ci = 3.52 nF, Li = 0μH 　Enclosure: "NEMA4X", Amb. Temp.: −40 to 60°C (−40 to 140°F)	**FS15**
CENELEC ATEX	CENELEC ATEX (KEMA) Flameproof Approval [2] 　Certificate: KEMA 02ATEX2148 　II 2G EEx d IIC T4, T5 and T6, Amb. Temp.: −40 to 80°C (−40 to 176°F) for T5, 　−40 to 75°C (−40 to 167°F) for T4 and T6 　Max. process Temp.: T4; 120°C (248°F), T5; 100°C (212°F), T6; 85°C (185°F) 　Enclosure: IP67	**KF25**
	CENELEC ATEX (KEMA) Intrinsically Safe Approval [2] 　Certificate: KEMA 02ATEX1344X 　[Entity model] 　　II 1G EEx ia IIC T4, Amb. Temp.: −40 to 60°C (−40 to 140°F) 　　Ui=24.0 V, Ii=250 mA, Pi=1.2 W, Ci=1.76 nF, Li=0 μH 　[FISCO model] 　　II 1G EEx ia IIC T4, Amb. Temp.: −40 to 60°C (−40 to 140°F) 　　Ui=17.5 V, Ii=360 mA, Pi=2.52 W, Ci=1.76 nF, Li=0 μH 　　II 1G EEx ia IIB T4, Amb. Temp.: −40 to 60°C (−40 to 140°F) 　　Ui=17.5 V, Ii=380 mA, Pi=5.32 W, Ci=1.76 nF, Li=0 μH 　Enclosure: IP67	**KS25**
	CENELEC ATEX Type n Approval [2] 　II 3G Ex nL IIC T4, Amb. Temp. −40 to 60°C (−40 to 140°F), Enclosure: IP67 　Ui=32V, Ci=3.52 nF, Li=0μH	**KN25**
Canadian Standards Association (CSA)	CSA Explosionproof Approval [1] 　Certificate: 1010820 　Explosionproof for Class I, Division 1, Groups B, C and D 　Dustignitionproof for Class II/III, Division 1, Groups E, F and G 　Temp. Class: T4, T5, T6 Encl Type 4x　Amb. Temp.: −40 to 80°C (−40 to 176°F) 　Max. Process Temp.: T4; 120°C (248°F), T5; 100°C (212°F), T6; 85°C (185°F) Process Sealing Certification 　Dual seal certified by CSA to the requirement of ANSI/ISA 12.27.01 　No additional sealing required. Primary seal failure annunciation : at the zero adjust- 　ment screw	**CF15**

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[1]: Applicable for Electrical connection code 2 and 7.
[2]: Applicable for Electrical connection code 2, 4, 7 and 9.

　　　　　　　　　　　　　　　　　　　　　　　　IM 01C22T03-00E

APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA

Note: The Write Mode column indicates the mode in which the parameter is write enabled.

O/S: Write enabled in O/S mode.

MAN: Write enabled in manual mode.

AUTO: Write enabled in auto mode, manual mode, and O/S mode.

--:   Read only.

A1.1 Physical Block Parameter List (Slot=0)

Index	Parameter	Write Mode	Initial Value	Description
16	Block Object	--		Information on this block such as Profile, Profile Rev, etc.
17	Static Revision No	--	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
18	TAG	AUTO	Specified at the time of order	The user description of the intended application of the block.
19	Strategy	AUTO	0	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
20	Alert key	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
21	Target Mode	AUTO	Auto	Set the Target of block mode to Auto or O/S according to the Write Mode of the parameter to be set or changed.
22	Mode Block	--		The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode. Actual: Indicates the current operating condition. Permited: Indicates the operating condition that the block is allowed to take. Normal: Indicates the operating condition that the block will usually take.
23	Alarm Sum	--		For future use.
24	Software Revision	--	Uncertain	Revision-number of the software of the field device.
25	Hardware Revision	--	Uncertain	Revision-number of the hardware of the field device.
26	Manufacturer	--	Yokogawa	Identification code of the manufacturer of the field device.
27	Product designation	--	EJA	Manufacturer specific identification of the field device.
28	Device Serial Num	--	Serial No.	Serial number of the field device.
29	Diagnosis	--		Detailed information of the device, bitwise coded. More than one message possible at once.
30	Diagnosis Extention	--		Additional manufacturer-specific information of the device, bitwise coded.
31	Diagnosis Mask	--		Definition of supported DIAGNOSIS information-bits. 0: Not supported 1: Supported
32	Extended Diagnosis Mask	--		Definition of supported DIAGNOSIS_EXTENSION information-bits. 0: Not supported 1: Supported
33	Device Certification	--	Space	Not used for EJA

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Index	Parameter	Write Mode	Initial Value	Description
34	Write Locking	AUTO	Off	If set, no writes from anywhere are allowed, except to clear WRITE_LOCKING. on/off
35	Factory Reset	AUTO	Factory Reset	Allows a manual restart to be initiated. Factory Reset: Resetting device for default values. The bus address setting remains the same. Warm Start: Warm start of the device. All parameterization remains unchanged. Reset Address to '126': Reset the bus address only.
36	Descriptor	AUTO	Space	User definition text (a string) to describe the device within the application.
37	Message	AUTO	Space	User definable MESSAGE (a string) to describe the device within the application or in the plant.
38	Installation date	AUTO	Space	Date of installation of the device.
40	PROFIBUS Ident Number	AUTO	Manufacture Specific	Each PROFIBUS-PA device shall have an Ident_Number provided by the PNO. Manufacture specific Profile specific
41	HW Write Protection	--	Off	Not used for EJA
49	Software Description	--	Uncertain	Yokogawa internal use.
50	Set Address	AUTO	0	For Bus address set up; refer to 5.3 Bus Address set up.

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A1.2 AI Function Block Parameter List (AI1: Slot=1 AI2: Slot=2)

Index	Parameter	Write Mode	Initial Value	Description
16	Block Object	--		Information on this block such as Block Tag, DD Revision, Execution Time etc.
17	Static Revision No	--	0	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
18	TAG	AUTO	Space	The user description of the intended application of the block.
19	Strategy	AUTO	0	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
20	Alert key	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
21	Target Mode	AUTO	AUTO	Set the Target of block mode (MODE_BLK) to Auto, Man or O/S according to the Write Mode of the parameter to be set or changed.
22	Mode Block	--		The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode. Actual: Indicates the current operating condition. Permited: Indicates the operating condition that the block is allowed to take. Normal: Indicates the operating condition that the block will usually take.
23	Alarm Sum	--		For future use.
24	Batch	AUTO	0	This parameter is intended to be used in Batch applications in line with IEC 61512.
26	Output	MAN	Valiable	This parameter contains the current measurement value from Transducer Block or configuration adjusted engineering unit and the belonging state in AUTO MODE. OUT contains the value and status set by an operator in MAN MODE.
27	PV Scale	O/S	100,0	Conversion of the Process Variable into percent using the high and low scale values.
28	Out Scale	O/S	AI1:Specified at the time of order AI2:100,0,kPa,1	Scale of the Process Variable This parameter contains the values of the lower limit and upper limit effective range, the code number of the engineering unit of Process Variable and the number of digits to the right of the decimal point.
29	Characterization Type	O/S	Linear	Not used for EJA
30	Channel	O/S	AI1:Primary Value AI2:Static Pressure Value	Reference to the active Transducer Block which provides the measurement value to the Function Block.
32	Filter Time Const	AUTO	2.000	Time constant of a single exponential filter for the PV, in seconds.
33	Fail Safe Mode	AUTO	Storing last valid Output value	Defines reaction of device, if a fault is detected. Refer to table 7.2 Fail Safe Mode
34	Fail Safe Default Value	AUTO	0	Default value for the OUT parameter, if sensor or sensor electronic fault is detected. The unit of this parameter is the same as that for the OUT one.
35	Limit Hysteresis	AUTO	0.500	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm Hysterics is expressed in engineering unit.
37	Upper Limit Alarm	AUTO	IEEE: +INFINITE	The setting for high high alarm in engineering units.
39	Upper Limit Warning	AUTO	IEEE: +INFINITE	The setting for high alarm in engineering units.
41	Lower Limit Warning	AUTO	IEEE: –INFINITE	The setting of the low alarm in engineering units.
43	Lower Limit Alarm	AUTO	IEEE: –INFINITE	The setting of the low low alarm in engineering units.
46	Upper Limit Alarm	--		For future use.
47	Upper Limit Warning	--		For future use.

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Index	Parameter	Write Mode	Initial Value	Description
48	Lower Limit Warning	--		For future use.
49	Lower Limit Alarm	--		For future use.
50	Simulation	AUTO	Disbled	For commissioning and test purposes the input value from the Transducer Block in the Analog Input Function Block AI-FB can be modified. That means that the Transducer and AI-FB will be disconnected. Simulation: Enable: Disabled/Enabled
51	Out unit text	AUTO	Space	If a specific unit of OUT parameter is not in the code list the user can write the specific text in this parameter. The unit code is then equal to "textual unit definition".

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A1.3 Transducer Block Parameter List (Slot=3)

Index	Parameter	Write Mode	Initial Value	Description
16	Block Object	--		Information on this block such as Block Tag, DD Revision, Execution Time.
17	Static Revision No	--	2	The revision level of the static data associated with the function block. The revision value will be incremented each time a static parameter value in the block is changed.
18	TAG	AUTO	Space	The user description of the intended application of the block.
19	Strategy	AUTO	0	The strategy field can be used to identify a grouping of blocks. This data is not checked or processed by the block.
20	Alert key	AUTO	0	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
21	Target Mode	AUTO	AUTO	Set the Target of block mode (MODE_BLK) to Auto or O/S according to the Write Mode of the parameter to be set or changed.
22	Mode Block	--		The mode parameter is a structured parameter composed of the actual mode, the normal mode, and the permitted mode. Actual: Indicates the current operating condition. Permit: Indicates the operating condition that the block is allowed to take. Normal: Indicates the operating condition that the block will usually take.
23	Alarm Sum	--		For future use.
24	Pressure Raw Value	--	Variable	This parameter contains the raw sensor value. The uncalibrated measurement value from the sensor.
25	Sensor Upper Limit	--	Measurement span	This parameter contains the sensor upper limit value.
26	Sensor Lower Limit	--	Measurement span	This parameter contains the sensor lower limit value.
27	Upper Calibration Point	O/S	Max range	The highest calibrated value.
28	Lower Calibration Point	O/S	0	The lowest calibrated value.
29	Calibration Span Min	--	Minimum span of capsule	The minimum calibration span value allowed.
30	Pressure Raw Value Unit	O/S	Specified at the time of order	This parameter contains the engineering unit's index code for the calibration values. SENSOR_UNIT must be a subset of the interchangeable part of the Pressure unit. Pa, GPa, MPa, kPa, mPa, microPa, hPa, bar, mbar, torr, atm, psi, psia, psig, g/cm^2, kg/cm^2, inH$_2$O, inH$_2$O(4degC), inH$_2$O(68degF), mmH$_2$O, mmH$_2$O(4degC), mmH$_2$O(68degF), ftH$_2$O, ftH$_2$O(4degC), ftH$_2$O(68degF), inHg, inHg(0degC), mmHg, mmHg(0degC)
31	Trimmed Value	--	Variable	This parameter contains the sensor value after the trim processing.
32	Sensor Type	--	Resonant	The type of sensor. 126: Resonant
34	Measured Value	--	Variable	This parameter contains the measured value and status available to the AI1 Block.
35	Measured Value Unit	O/S	%	This parameter contains the engineering unit's index code for the primary value. All units which are supported in Profile are available.
36	Transmitter Type	O/S	Pressure	This parameter contains the application of the pressure device. Pressure, Flow, Level, Volume, Special
43	Sensor Temperature	--	Variable	Temperature value of transducer.
44	Temperature Unit	O/S	˚C	This parameter contains the temperature units. ˚C/˚F
45	Pressure Value	--	Variable	This parameter contains the Pressure value before scaling calibrated range.

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Index	Parameter	Write Mode	Initial Value	Description
46	Pressure Unit	O/S	Specified at the time of order	This parameter contains the pressure units of the Pressure Value. Pa, GPa, MPa, kPa, mPa, microPa, hPa, bar, mbar, torr, atm, psi, psia, psig, g/cm^2, kg/cm^2, inH_2O, $inH_2O(4°C)$, $inH_2O(68°F)$, mmH_2O, $mmH_2O(4°C)$, $mmH_2O(68°F)$, ftH_2O, $ftH_2O(4°C)$, $ftH_2O(68°C)$, inHg, inHg(0°C), mmHg, mmHg(0°C)
49	Characterization Type	O/S	Specified at the time of order	Type of linearization. Linear/Square root
50	Scale In	O/S	Specified at the time of order	This is the input conversion of the Pressure using the high and low scale.
51	Scale Out	O/S	0,100	This is the output conversion of the linearized value using the high and low scale.
52	Low Flow Cut Off	O/S	0	This is the point in percent of flow till that the output of the flow function is set to zero. This parameter is available when the Characterization Type parameter is setted to Square root.
53	Start Point Square Root Function	O/S	0	Not used for EJA
75	Static Pressure Value	--	Variable	This parameter contains the static pressure value and status available to the AI2 Block.
76	Static Pressure Unit	O/S	kPa	This parameter contains the engineering unit's index code for the static pressure value. The supported units are the same as SENSOR_UNIT.
77	Serial Number	--	Serial No.	This parameter contains the sensor serial number.
78	Trim PV Zero	O/S	0	The trim zero of primary value. Zero adjustment is executed as the current values when Trim PV Zero is set to 0 on the condition that Trim Mode is set to Enable.
79	Trim Mode	O/S	Trim disable	The mode function of trim parameter. Trim disable, Trim, enable, Trim data clear
80	External Zero Enable	O/S	Enable	The permission of external SW for trim zero. Enable/Disable
81	Model	--	Model code	The model code.
82	Display Mode	AUTO	1:Engineering Unit	This parameter is used in order to set the LCD display mode. 1:Engineering Unit 2:% 3:Eng. Unit @1/10 4:Eng. Unit @1/100 5:Eng. Unit @1/1000 6:Eng. Unit @1/10000 7:Eng. Unit @1/1000000
83	Display Cycle	AUTO	1	This parameter is used in order to set the renewal cycle of LCD display. 1-10 (sec)

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APPENDIX 2. LIST OF DTM MENU

Label for node and parameter			
Ist node	2nd node	3rd node	1st Parameter
Process Variable			
			Pressure Raw Value
			Pressure Value
			Measured Value
			Static Pressure
			Sensor Tempareture
			AI1 Output Value
			AI2 Output Value
Device status			
			Process Variables
			Diagnostic list
Diag and Service			
			AI1 Simulation Value
			AI1 Simulation Quality
			AI2 Simulation Value
			AI2 Simulation Quality
Easy Setup			
			TAG
			Descriptor
			Message
			Transducer Block
			Target Mode
			Actual Mode
			Pressure Unit
			Scale In:Upper Value
			Scale In:Lower Value
			Characterization Type
			Analog Input1
			Target Mode
			Actual Mode
			Filter Time Const
			Out Scale:Upper Value
			Out Scale:Lower Value
			Out Scale:Unit
			Out Scale:Decimal Point
Calibration			
			Target Mode
			Trim Mode
			External Zero Enable
			Sensor Limit
			Pressure Raw Value Unit
			Sensor Upper Limit
			Sensor Lower Limit
			Zero Point Adjustment
			Trim PV Zero
			Sensor Calibration
			Lower Calibration Point
			Upper Calibration Point
			Calibration Span Min
			Trimed Value
			Pressure Trimmed Value
Physical Block			
			Static Revision No.
			Target Mode
			Actual Mode
	Identification		
			TAG
			Descriptor
			Message
			Manufacture
			Product designation
			Device Serial Num
			Software Revision
			Hardware Revision
			Profile Revision
			PROFIBUS Ident Number
			Installation Date
			Software Description
	Diagnosis		
			Diagnosys
			Diagnosis Extension
	Configuration		
			Write Locking
			Factory Reset
			HW Write Protection

Label for node and parameter			
Ist node	2nd node	3rd node	1st Parameter
Input			
	Transducer Block		
			Static Revision No.
			Target Mode
			Actual Mode
			Transmitter Type
			Serial Number
			Sensor Limit
			Pressure Raw Value Unit
			Sensor Upper Limit
			Sensor Lower Limit
			Scale In
			Pressure Unit
			Scale In:Upper Value
			Scale In:Lower Value
			Characterization Type
			Low Cut Off
			Temperature Unit
			Static Pressure Unit
	Local Display		
			Display Mode
			Display Cycle
Output			
	Analog Input1		
			Static Revision No.
			Target Mode
			Actual Mode
			Channel
			Simulation Value
			Simulation Quality
			Fale Safe Mode
			Fail Safe Default Value
			Output Value
			Filter Time Const
			Out unit text
	Batch Information		
			Batch ID
			Batch Unit
			Batch Operation
			Batch Phase
	Output scale		
			Upper Value
			Lower Value
			Unit
			Decimal Point
	Warning and Alarm		
			Upper Limit Alarm
			Upper Limit Warning
			Lower Limit Warning
			Lower Limit Alarm
			Limit Hysterisis
			Upper Limit Alarm Status
			Upper Limit Warning Status
			Lower Limit Warning Status
			Lower Limit Alarm Status
	Analog Input2		
			Static Revision No.
			Target Mode
			Actual Mode
			Channel
			Simulation Value
			Simulation Quality
			Fale Safe Mode
			Fail Safe Default Value
			Output Value
			Filter Time Const
			Out unit text
	Batch Information		
			Batch ID
			Batch Unit
			Batch Operation
			Batch Phase
	PV Scale		
			Upper Value
			Lower Value
	Output scale		
			Upper Value
			Lower Value
			Unit
			Decimal Point
	Warning and Alarm		
			Upper Limit Alarm
			Upper Limit Warning
			Lower Limit Warning
			Lower Limit Alarm
			Limit Hysterisis
			Upper Limit Alarm Status
			Upper Limit Warning Status
			Lower Limit Warning Status
			Lower Limit Alarm Status

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APPENDIX 3. LIST OF PDM (EDDL) MENU

EJA
- **Easy Setup**
  - TAG
  - Descriptor
  - Message
  - Installation Date
  - **Transducer Block**
    - Target Mode
    - Actual Mode
    - Characterization Type
    - **Measuring Range - Scale In**
      - Pressure Unit
      - Lower Value
      - Upper Value
  - **Function Block 1 - Analog Input**
    - Target Mode
    - Actual Mode
    - Filter Time Const
    - **Output scale**
      - Lower Value
      - Upper Value
      - Unit
      - Decimal Point
- **Identification**
  - **Operation Unit**
    - TAG
    - Descriptor
    - Message
  - **Device**
    - Manufacturer
    - Product designation
    - Device Serial Num
    - Software Revision
    - Hardware Revision
    - Profile Revision
    - Static Revision No.
    - PROFIBUS Ident Number
    - Installation Date
    - Software Description
    - Serial Number
- **Input**
  - **Transducer Block**
    - Static Revision No.
    - Target Mode
    - Actual Mode
    - Transmitter Type
    - **Measuring Limits - Sensor Limit**
      - Pressure Raw Value Unit
      - Sensor Lower Limit
      - Sensor Upper Limit
    - **Measuring Range - Scale In**
      - Pressure Unit
      - Lower Value
      - Upper Value
    - **Characterization**
      - Characterization Type
      - Low Flow Cut Off
    - **Measured Value - Primary Value**
      - Unit
    - **Sensor Temperature**
      - Temperature Unit
    - **Static Pressure**
      - Static Pressure Unit

☐ VARIABLE
▨ MENU

Output
- **Function Block 1 - Analog Input**
  - Static Revision No.
  - Target Mode
  - Actual Mode
  - Channel
  - Unit
  - Out unit text
  - Filter Time Const
  - **Batch Information**
    - Batch ID
    - Batch Unit
    - Batch Operation
    - Batch Phase
  - **Output scale**
    - Lower Value
    - Upper Value
  - **Output Limits**
    - Lower Limit Alarm
    - Lower Limit Warning
    - Upper Limit Warning
    - Upper Limit Alarm
    - Limit Hysteresis
  - **Fail Safe Mode**
    - Fail Safe Mode
    - Fail Safe Default Value
  - **Human Interface**
    - Decimal Point
- **Function Block 2 - Analog Input**
  - Static Revision No.
  - Target Mode
  - Actual Mode
  - Channel
  - Unit
  - Out unit text
  - Filter Time Const
  - **Batch Information**
    - Batch ID
    - Batch Unit
    - Batch Operation
    - Batch Phase
  - **Process Value Scale**
    - Lower Value
    - Upper Value
  - **Output scale**
    - Lower Value
    - Upper Value
  - **Output Limits**
    - Lower Limit Alarm
    - Lower Limit Warning
    - Upper Limit Warning
    - Upper Limit Alarm
    - Limit Hysteresis
  - **Fail Safe Mode**
    - Fail Safe Mode
    - Fail Safe Default Value
  - **Human Interface**
    - Decimal Point

Sensor Calibration
- Liwer Calibration Point
- Upper Calibration Point
- Calibration Span Min
- Trim Mode
- Trim PV Zero
- External Zero Enable

Local Display
- Display Mode
- Display Cycle

Target Mode
- **Physical Block**
  - Target Mode
  - Actual Mode
- **Transducer Block**
  - Target Mode
  - Actual Mode
- **Function Block 1 - Analog Input**
  - Target Mode
  - Actual Mode
- **Function Block 2 - Analog Input**
  - Target Mode
  - Actual Mode

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REVISION RECORD

Title: Model EJA Series PROFIBUS PA Communication Type
Manual No.: IM 01C22T03-00E

Edition	Date	Page	Revised Item
1st	Nov. 2004	-	New publication
2nd	July 2006	1-2 2-3	1.1 • Add explanation for safe use of EJA. 2.1.1 • Add "b. CENELEC ATEX (KEMA) Flameproof Type."
3rd	June 2007		Full-fledged revision due to the standardization Add FieldMate operation in chapter 5, 6, 7. • Add ATEX Documentation. • Add FM approval. • Add "4.4 Engineering Tools". • Add "4.5 Starting the FDT frame application". • Add "5.4 Easy Setup". • Add "6. CALIBRATION". • Add "APPENDIX2. LIST OF DTM MENU". • Add "APPENDIX3. LIST OF PDM (EDDL) MENU".
4th	Jan. 2008	9-2	9.2 • Delete applicable standard from the table.
5th	Oct. 2008	2-9 9-1 9-2	2.9.4 • Change explosion protection marking for type n from EEX to Ex 9.1 • Add EMC conformity Standards 9.2 • Add sealing statement for CSA certification

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