

---

**User's  
Manual**

# **Model EJA Series Fieldbus Communication Type**

IM 01C22T02-01E

---

**vigilantplant.®**

# CONTENTS

---

<b>1. INTRODUCTION</b> .....	<b>1-1</b>
Regarding This Manual .....	1-1
1.1 For Safe Use of Product .....	1-1
1.2 Warranty .....	1-2
1.3 ATEX Documentation .....	1-3
<b>2. HANDLING CAUTION</b> .....	<b>2-1</b>
2.1 Installation of an Explosion-Protected Instrument .....	2-1
2.1.1 FM approval .....	2-1
2.1.2 CSA Certification .....	2-5
2.1.3 CENELEC ATEX (KEMA) Certification .....	2-5
2.1.4 IECEx Certification .....	2-9
<b>3. ABOUT FIELDBUS</b> .....	<b>3-1</b>
3.1 Outline .....	3-1
3.2 Internal Structure of EJA .....	3-1
3.2.1 System/network Management VFD .....	3-1
3.2.2 Function Block VFD .....	3-1
3.3 Logical Structure of Each Block .....	3-1
3.4 Wiring System Configuration .....	3-1
<b>4. GETTING STARTED</b> .....	<b>4-1</b>
4.1 Connection of Devices .....	4-1
4.2 Host Setting .....	4-2
4.3 Bus Power ON .....	4-3
4.4 Integration of DD .....	4-3
4.5 Reading the Parameters .....	4-3
4.6 Continuous Record of Values .....	4-4
4.7 Generation of Alarm .....	4-4
<b>5. CONFIGURATION</b> .....	<b>5-1</b>
5.1 Network Design .....	5-1
5.2 Network Definition .....	5-1
5.3 Definition of Combining Function Blocks .....	5-2
5.4 Setting of Tags and Addresses .....	5-3
5.5 Communication Setting .....	5-4
5.5.1 VCR Setting .....	5-4
5.5.2 Function Block Execution Control .....	5-5
5.6 Block Setting .....	5-5
5.6.1 Link Object .....	5-5
5.6.2 Trend Object .....	5-6
5.6.3 View Object .....	5-6
5.6.4 Function Block Parameters .....	5-8
5.6.5 Transducer Block Parameters .....	5-9

<b>6. IN-PROCESS OPERATION .....</b>	<b>6-1</b>
6.1 Mode Transition .....	6-1
6.2 Generation of Alarm .....	6-1
6.2.1 Indication of Alarm .....	6-1
6.2.2 Alarms and Events .....	6-1
6.3 Simulation Function .....	6-2
<b>7. DEVICE STATUS .....</b>	<b>7-1</b>
<b>8. GENERAL SPECIFICATIONS .....</b>	<b>8-1</b>
8.1 Standard Specifications .....	8-1
8.2 Optional Specifications .....	8-2
<b>APPENDIX 1. LIST OF PARAMETERS FOR EACH BLOCK OF THE EJA... A-1</b>	
A1.1 Resource Block .....	A-1
A1.2 AI Function Block .....	A-3
A1.3 Transducer Block .....	A-5
<b>APPENDIX 2. APPLICATION, SETTING AND CHANGE OF BASIC PARAMETERS .....</b>	<b>A-7</b>
A2.1 Applications and Selection of Basic Parameters .....	A-7
A2.2 Setting and Change of Basic Parameters .....	A-8
A2.3 Setting the AI1 Function Block .....	A-8
A2.4 Setting the AI2 Function Block .....	A-10
A2.5 Setting the Transducer Block .....	A-10
<b>APPENDIX 3. OPERATION OF EACH PARAMETER IN FAILURE MODE .... A-12</b>	
<b>APPENDIX 4. PID BLOCK .....</b>	<b>A-14</b>
A4.1 Function Diagram .....	A-14
A4.2 Functions of PID Block .....	A-14
A4.3 Parameters of PID Block .....	A-15
A4.4 PID Computation Details .....	A-17
A4.4.1 PV-proportional and -derivative Type PID (I-PD) Control Algorithm .....	A-17
A4.4.2 PID Control Parameters .....	A-17
A4.5 Control Output .....	A-17
A4.5.1 Velocity Type Output Action .....	A-17
A4.6 Direction of Control Action .....	A-17
A4.7 Control Action Bypass .....	A-17
A4.8 Feed-forward .....	A-18
A4.9 Block Modes .....	A-18
A4.9.1 Mode Transitions .....	A-18
A4.10 Bumpless Transfer .....	A-19
A4.11 Setpoint Limiters .....	A-19
A4.11.1 When PID Block Is in Auto Mode .....	A-19
A4.11.2 When PID Block Is in Cas or RCas Mode .....	A-19

A4.12 External-output Tracking .....	A-19
A4.13 Measured-value Tracking .....	A-19
A4.14 Initialization and Manual Fallback (IMan) .....	A-20
A4.15 Manual Fallback .....	A-20
A4.16 Auto Fallback .....	A-20
A4.17 Mode Shedding upon Computer Failure .....	A-21
A4.17.1 SHED_OPT .....	A-21
A4.18 Alarms .....	A-21
A4.18.1 Block Alarm (BLOCK_ALM) .....	A-21
A4.18.2 Process Alarms .....	A-21
A4.19 Example of Block Connections .....	A-22
A4.19.1 View Object for PID Function Block .....	A-22

## **APPENDIX 5. LINK MASTER FUNCTIONS ..... A-24**

A5.1 Link Active Scheduler .....	A-24
A5.2 Link Master .....	A-24
A5.3 Transfer of LAS .....	A-25
A5.4 LM Functions .....	A-26
A5.5 LM Parameters .....	A-27
A5.5.1 LM Parameter List .....	A-27
A5.5.2 Descriptions for LM Parameters .....	A-29
A5.6 FAQs .....	A-31

## **APPENDIX 6. SOFTWARE DOWNLOAD ..... A-32**

A6.1 Benefits of Software Download .....	A-32
A6.2 Specifications .....	A-32
A6.3 Preparations for Software Downloading .....	A-32
A6.4 Flow of Software Download .....	A-33
A6.5 Download Files .....	A-33
A6.6 Steps after Activating a Field Device .....	A-34
A6.7 Troubleshooting .....	A-35
A6.8 Resource Block's Parameters Relating to Software Download .....	A-35
A6.9 View Objects Altered by Software Download .....	A-37
A6.10 System/Network Management VFD Parameters Relating to Software Download .....	A-38
A6.11 Comments on System/Network Management VFD Parameters Relating to Software Download .....	A-39

## **REVISION RECORD**

# 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 käyttöohjeet ovat saatavilla englannin-, saksan- ja ranskankielisinä. Mikäli tarvitsette Ex -tyyppisten tuotteiden ohjeita omalla paikallisella kielellänne, 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 nevybušné schválení ATEX Ex, jsou dostupné v angličtině, němčině a francouzštině. Požadujete-li pokyny týkající se výrobků s nevybušným 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 izstrādājumu Lietošanas instrukcijas tiek piegādātas angļu, vācu un franču valodās. Ja vēlaties saņemt Ex ierīšu dokumentāciju citā valodā, Jums ir jāsazinās ar firmas Jokogava (Yokogawa) tuvāko ofisu vai pārstāvi.

EST

Kõik ATEX Ex toodete kasutamishendid 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 angleščini, nemščini ter francoščini. Če so Ex sorodna navodila potrebna v vašem tujejnem jeziku, kontaktirajte vaš najbliži Yokogawa office ili predstavnika.

H

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

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 rappreżentant jew ufficċju 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 REQUIRED."

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.

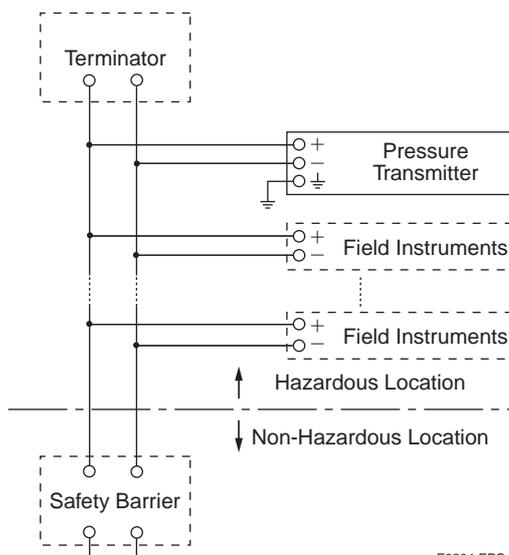
Note 4. Maintenance and Repair

- 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)**

- \*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 Ci: 3.52 nF  
 Maximum Internal Inductance Li: 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 Ci: 3.52 nF  
 Maximum Internal Inductance Li: 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 Ci: 3.52 nF  
 Maximum Internal Inductance Li: 0 μH

Note: In the rating 1, the output current of the barrier must be limited by a resistor “Ra” such that  $I_o = U_o / R_a$ . 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 intrinsically safe apparatus to associated apparatus not specifically examined in such combination. 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 and remain intrinsically safe, considering faults, must be equal or greater than the voltage ( $U_o$ ,  $V_{oc}$ ,  $V_t$ ), the current ( $I_o$ ) and the power ( $P_o$ ) which can be provided by the associated apparatus (supply unit).

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

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

$$C_i \leq 5\text{nF}, L_i \leq 10\mu\text{H}$$

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  $U_o$  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  $\mu$ A for each connected device.

### Supply unit

Trapezoidal or rectangular output characteristic only

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

$I_o$  according to 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  $R_c$ : 15...150  $\Omega$ /km

Inductance per unit length  $L_c$ : 0.4...1 mH/km

Capacitance per unit length  $C_c$ : 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:

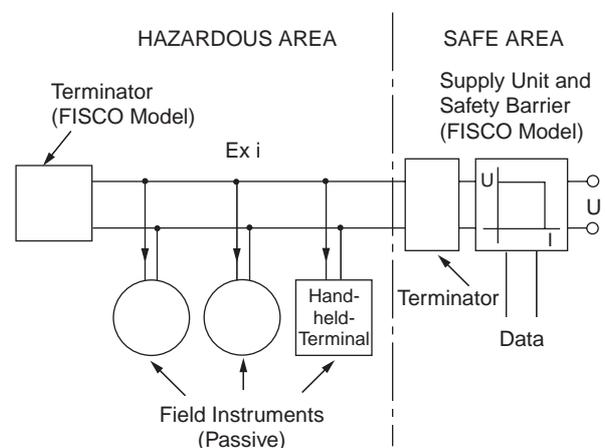
$$R = 90 \dots 102 \Omega$$

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

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

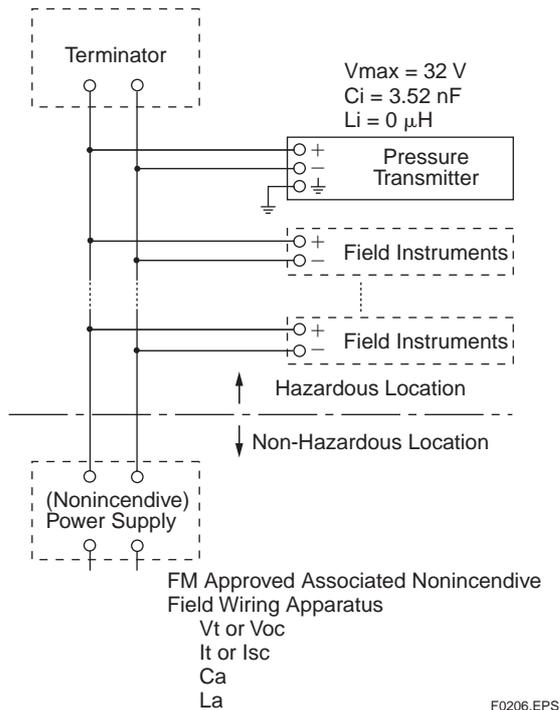
### System evaluations

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

### ● Installation Diagram (Nonincendive, Division 2 Installation)



- \*1: Dust-tight conduit seal must be used when installed in Class II and Class III environments.
- \*2: Installation should be in accordance with the National Electrical Code (ANSI/NFPA 70) Sections 504 and 505.
- \*3: The configuration of Associated Nonincendive Field Wiring Apparatus must be Factory Mutual Research Approved under FISCO Concept.
- \*4: Associated Nonincendive Field Wiring Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- \*5: No revision to drawing without prior Factory Mutual Research Approval.
- \*6: Terminator and supply unit must be FM Approved.
- \*7: If use ordinary wirings, the general purpose equipment must have nonincendive field wiring terminal approved by FM Approvals.
- \*8: The nonincendive field wiring circuit concept allows interconnection of nonincendive field wiring apparatus with associated nonincendive field wiring apparatus, using any of the wiring methods permitted for unclassified locations.
- \*9: Installation requirements;
  - $V_{max} \cong V_{oc} \text{ or } V_t$
  - $I_{max} = \text{see note 10.}$
  - $C_a \cong C_i + C_{cable}$
  - $L_a \cong L_i + L_{cable}$
- \*10: For this current controlled circuit, the parameter ( $I_{max}$ ) is not required and need not be aligned with parameter ( $I_{sc}$  or  $I_t$ ) of the barrier or associated nonincendive field wiring apparatus.

### Electrical Data:

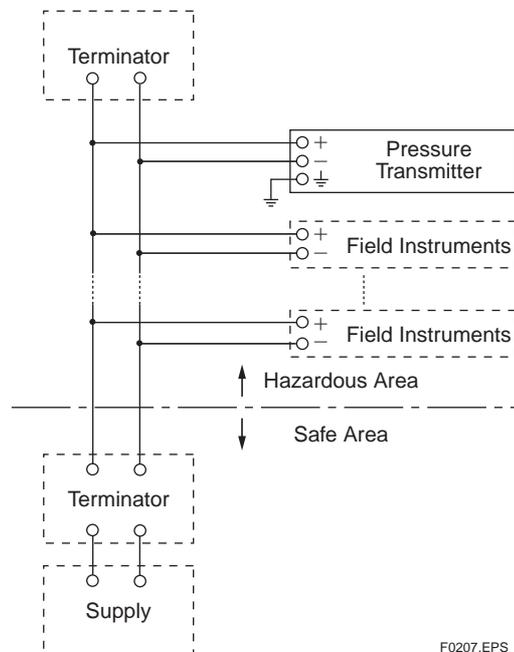
Maximum Input Voltage  $V_{max}$ : 32 V  
 Maximum Internal Capacitance  $C_i$ : 3.52 nF  
 Maximum Internal Inductance  $L_i$ : 0  $\mu$ H

### c. FM Nonincendive approval

- Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /FN15.
- Applicable standard: FM3600, FM3611, FM3810
  - Nonincendive Approval
    - Class I, Division 2, Groups A, B, C and D
    - Class II, Division 2, Groups F and G
    - Class III, Division 1 and
    - Class I, Zone 2, Group IIC in Hazardous (Classified) Locations.
    - Temperature Class: T4
    - Ambient Temperature:  $-40$  to  $60^\circ\text{C}$
    - Ambient Humidity: 0 to 100%R.H. (No condensation)
    - Enclosure: NEMA Type4X
  - Electrical Parameters:
    - $V_{max} = 32 \text{ Vdc}$
    - $C_i = 3.52 \text{ nF}$
    - $L_i = 0 \mu\text{H}$
  - Caution for FM Nonincendive type. (Following contents refer to "DOC. No. NFM012-A08 p.1 and p.2")

### ■ NFM012-A08

#### Installation Diagram:



#### Note:

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

- 2: Installation should be in accordance with National Electrical Code (ANSI/NFPA 70) Sections 504, 505 and Local Electrical Code.
- 3: The configuration of Associated Apparatus must be Factory Mutual Research Approved.
- 4: Associated Apparatus manufacturer's installation drawing must be followed when installing this equipment.
- 5: No revision to drawing without prior Factory Mutual Research Approval.
- 6: Terminator and supply unit must be FM approved.
- 7: Installation requirements;
  - $V_{max} \cong V_{oc}$  or  $V_t$
  - $C_a \cong C_i + C_{cable}$
  - $L_a \cong L_i + L_{cable}$

### 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 ENCLOSURE.  
UN SCÉLLEMENT DOIT ÊTRE INSTALLÉ À MOINS DE 50 cm DU BÂTIER.
- When installed in Division 2, "SEALS NOT REQUIRED."

Note 3. Operation

- Keep strictly the "CAUTION" on the label attached on the transmitter.

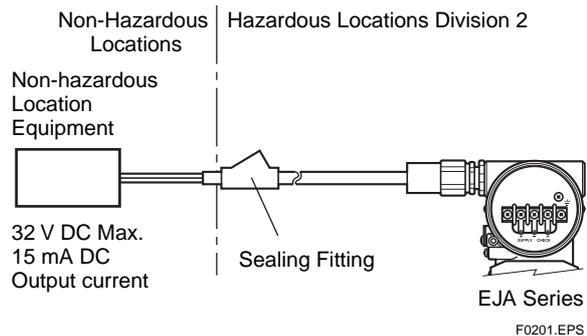
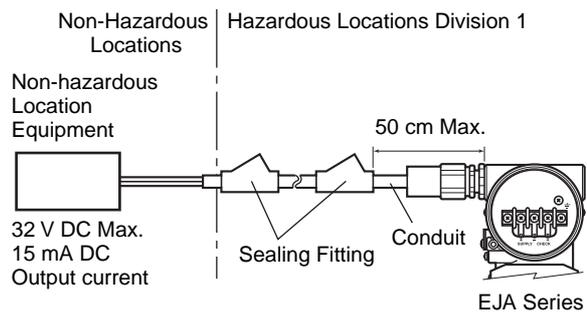
CAUTION: OPEN CIRCUIT BEFORE REMOVING COVER.

OUVRIR LE CIRCUIT AVANT D'ENLEVER 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.



### 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)

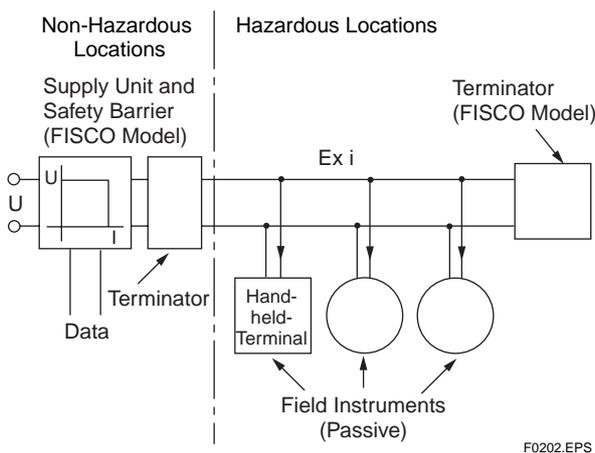
Note 3. Maintenance and Repair

- 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).

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

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.

$$C_i \leq 5\text{nF}, L_i \leq 10\mu\text{H}$$

Supply unit

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

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

$I_o$  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  $R_c$ : 15...150 Ω/km
- Inductance per unit length  $L_c$ : 0.4...1 mH/km
- Capacitance per unit length  $C_c$ : 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:

$$R = 90 \dots 102 \text{ } \Omega$$

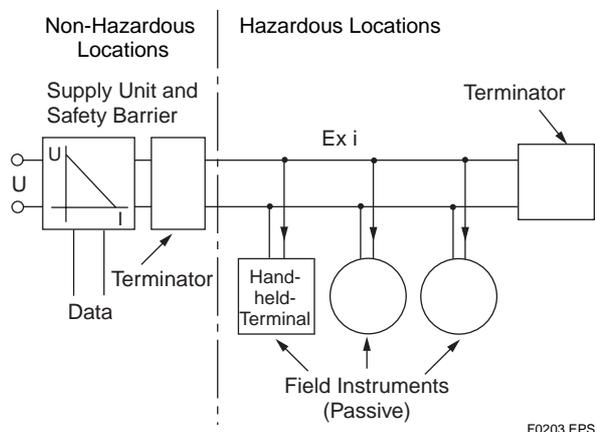
$$C = 0 \dots 2.2 \text{ } \mu\text{F (0.8...1.2 } \mu\text{F is required in operation)}$$

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:

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

Calculation of max. allowed cable length:

$$C_{\text{cable}} \leq C_o - \sum C_i - \sum C_i \text{ (Terminator)}$$

$$L_{\text{cable}} \leq L_o - \sum L_i$$

### 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.  $\geq 70^\circ\text{C}$ , USE HEAT-RESISTING CABLES  $\geq 90^\circ\text{C}$ .
- 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

$$U_i = 32 \text{ Vdc}$$

$$C_i = 3.52 \text{ nF}$$

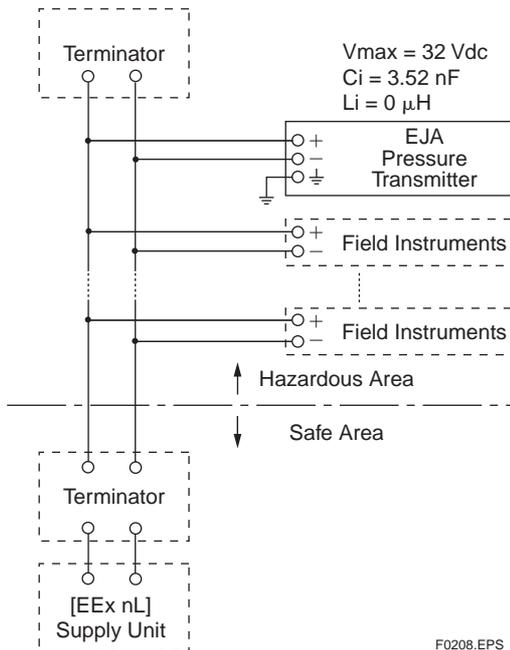
$$L_i = 0 \text{ } \mu\text{H}$$

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”.

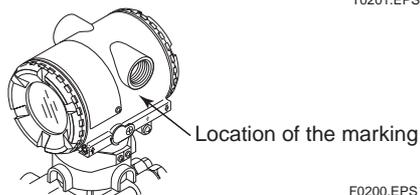


(2) Electrical Connection

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



(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.

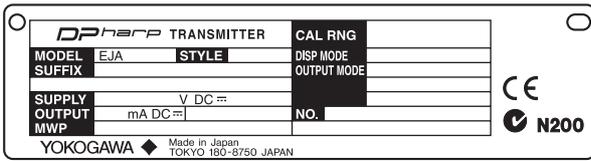
(5) Maintenance and Repair

**! 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

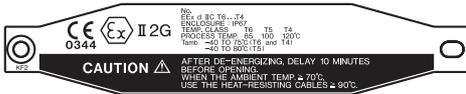
● Name plate



● 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

2.1.4 IECEx Certification

a. IECEx Flameproof Type

Caution for IECEx flameproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code / SF25 are applicable for use in hazardous locations:

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

Note 2. Wiring

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

Note 3. Operation

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

Note 4. Maintenance and Repair

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

# 3. ABOUT FIELDBUS

## 3.1 Outline

Fieldbus is a bi-directional digital communication protocol for field devices, which offers an advancement in implementation technologies for process control systems and is widely employed by numerous field devices.

EJA Series Fieldbus communication type employs the specification standardized by The Fieldbus Foundation, and provides interoperability between Yokogawa devices and those produced by other manufacturers. Fieldbus comes with software consisting of two AI function blocks, providing the means to implement a flexible instrumentation system.

For information on other features, engineering, design, construction work, startup and maintenance of Fieldbus, refer to “Fieldbus Technical Information” (TI 38K03A01-01E).

## 3.2 Internal Structure of EJA

The EJA contains two virtual field devices (VFD) that share the following functions.

### 3.2.1 System/network Management VFD

- Sets node addresses and Physical Device tags (PD Tag) necessary for communication.
- Controls the execution of function blocks.
- Manages operation parameters and communication resources (Virtual Communication Relationship: VCR).

### 3.2.2 Function Block VFD

#### (1)Resource block

- Manages the status of EJA hardware.
- Automatically informs the host of any detected faults or other problems.

#### (2)Transducer block

- Converts sensor output to pressure signals and transfers to AI function block.

#### (3)AI1 function block

- Conditions raw data from the Transducer block.
- Outputs differential pressure signals.
- Carries out scaling, damping and square root extraction.

#### (4)AI2 function block

- Outputs static pressure signals.

#### (5)PID function block

- Performs the PID control computation based on the deviation of the measured value from the setpoint.

## 3.3 Logical Structure of Each Block

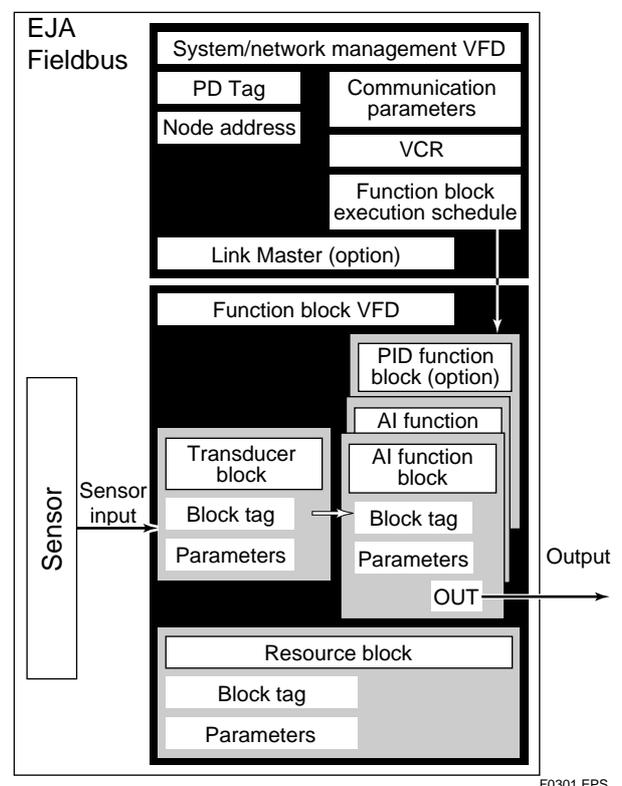


Figure 3.1 Logical Structure of Each Block

Setting of various parameters, node addresses, and PD Tags shown in Figure 3.1 is required 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 achieve optimal performance.

# 4. GETTING STARTED

Fieldbus is fully dependent upon digital communication protocol and differs in operation from conventional 4 to 20 mA transmission and the BRAIN communication protocol. It is recommended that novice users use field devices in accordance with the procedures described in this section. The procedures assume that field devices will be set up on a bench or in an instrument shop.

## 4.1 Connection of Devices

The following instruments are required for use with Fieldbus devices:

- **Power supply:**  
Fieldbus 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 (including the host). Conventional DC current cannot be used as is.
- **Terminator:**  
Fieldbus requires two terminators. Refer to the supplier for details of terminators that are attached to the host.
- **Field devices:**  
Connect Fieldbus communication type EJA. Two or more EJA devices or other devices can be connected.
- **Host:**  
Used for accessing field devices. A dedicated host (such as DCS) is used for an instrumentation line while dedicated communication tools are used for experimental purposes. For operation of the host, refer to the instruction manual for each host. No other details on the host are given in this material.
- **Cable:**  
Used for connecting devices. Refer to “Fieldbus Technical Information” (TI 38K03A01-01E) for details of instrumentation cabling. For laboratory or other experimental use, a twisted pair cable two to three meters in length with a cross section of 0.9 mm<sup>2</sup> or more and a cycle period of within 5 cm (2 inches) may be used. Termination processing depends on the type of device being deployed. For EJA, use an M4 screw terminal claw. Some hosts require a connector.

Refer to Yokogawa when making arrangements to purchase the recommended equipment.

Connect the devices as shown in Figure 4.1. Connect the terminators at both ends of the trunk, with a minimum length of the spur laid for connection.

The polarity of signal and power must be maintained.

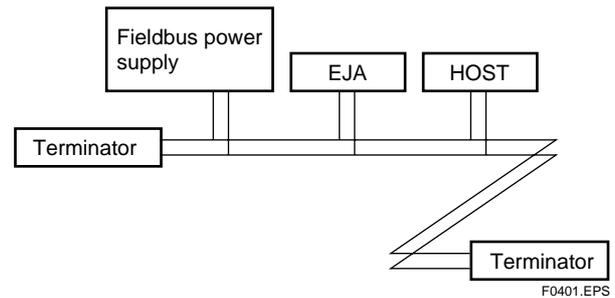


Figure 4.1 Cabling



### NOTE

No CHECK terminal is used for Fieldbus communication EJA. Do not connect the field indicator and check meter.

Before using a Fieldbus configuration tool other than the existing host, confirm it does not affect the loop functionality in which all devices are already installed in operation. Disconnect the relevant control loop from the bus if necessary.



### IMPORTANT

Connecting a Fieldbus configuration tool to a loop with its existing host may cause communication data scrambling resulting in a functional disorder or a system failure.

## 4.2 Host Setting

To activate Fieldbus, the following settings are required for the host.



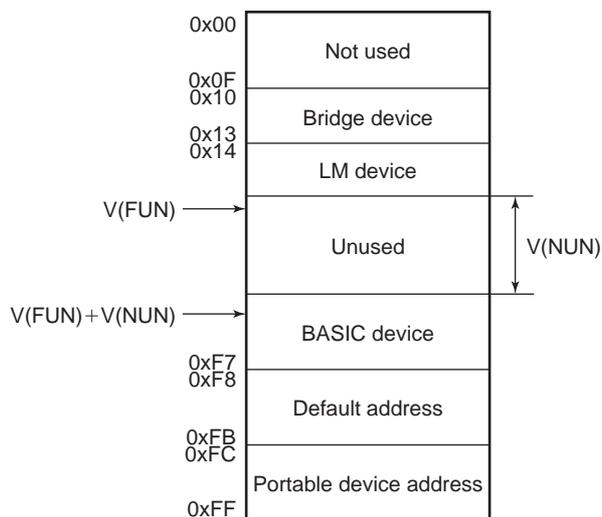
### IMPORTANT

Do not turn off the power immediately after setting. When the parameters are saved to the EEPROM, the redundant processing is executed for an improvement of reliability. If the power is turned off within 60 seconds after setting is made, the modified parameters are not saved and the settings may return to the original values.

Table 4.1 Operation Parameters

Symbol	Parameter	Description and Settings
V (ST)	Slot-Time	Indicates the time necessary for immediate reply of the device. Unit of time is in octets (256 μs). Set maximum specification for all devices. For EJA, set a value of 4 or greater.
V (MID)	Minimum-Inter-PDU-Delay	Minimum value of communication data intervals. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For EJA, set a value of 4 or greater.
V (MRD)	Maximum-Reply-Delay	The worst case time elapsed until a reply is recorded. The unit is Slot-time; set the value so that $V (MRD) \times V (ST)$ is the maximum value of the specification for all devices. For EJA, the setting must be a value of 12 or greater.
V (FUN)	First-Unpolled-Node	Indicate the address next to the address range used by the host. Set 0x15 or greater.
V (NUN)	Number-of-consecutive-Unpolled-Node	Unused address range.

T0401.EPS



Note 1: Bridge device: A linking device which brings data from one or more H1 networks.

Note 2: LM device: with bus control function (Link Master function)

Note 3: BASIC device: without bus control function

F0402.EPS

Figure 4.2 Available Address Range

### 4.3 Bus Power ON

Turn on the power of the host and the bus. Where the EJA is equipped with an LCD indicator, first all segments are lit, then the display begins to operate. If the indicator is not lit, check the polarity of the power supply.

Using the host device display function, check that the EJA is in operation on the bus.

The device information, including PD tag, Node address, and Device ID, is described on the sheet attached to the EJA. The device information is given in duplicate on this sheet.

**DEVICE INFORMATION**

Device ID : 5945430003XXXXXXXXX  
 PD Tag : PT1001  
 Device Revision : 2  
 Node Address : 0xf3  
 Serial No. : XXXXXXXXXXXXXXXXXXXX  
 Physical Location : \_\_\_\_\_

Note: \_\_\_\_\_

Our Device Description Files and Capabilities Files available at  
<http://www.yokogawa.com/fi/fieldbus/download.htm> (English) or  
<http://www.yokogawa.co.jp/Sensor/fieldbus/download.htm> (Japanese)

---

**DEVICE INFORMATION**

Device ID : 5945430003XXXXXXXXX  
 PD Tag : PT1001  
 Device Revision : 2  
 Node Address : 0xf3  
 Serial No. : XXXXXXXXXXXXXXXXXXXX  
 Physical Location : \_\_\_\_\_

Note: \_\_\_\_\_

Our Device Description Files and Capabilities Files available at  
<http://www.yokogawa.com/fi/fieldbus/download.htm> (English) or  
<http://www.yokogawa.co.jp/Sensor/fieldbus/download.htm> (Japanese)

F0403.EPS

**Figure 4.3 Device Information Sheet Attached to EJA**

If no EJA is detected, check the available address range and the polarity of the power supply. If the node address and PD tag are not specified when ordering, default value is factory set. If two or more EJAs are connected at a time with default value, only one EJA will be detected from the host as EJAs have the same initial address. Separately connect each EJA and set a different address for each.

### 4.4 Integration of DD

If the host supports DD (Device Description), the DD of the EJA needs to be installed. Check if host has the following directory under its default DD directory.

594543\0003

(594543 is the manufacturer number of Yokogawa Electric Corporation, and 0003 is the EJA device number, respectively.)

If this directory is not found, the DD of EJA has not been included. Create the above directory and copy the DD file (0m0n.ffo,0m0n.sym) (m, n is a numeral) into the directory. If you do not have the DD or capabilities files, you can download them from our web site. Visit the following web site.

<http://www.yokogawa.com/fi/fieldbus/download.htm>

Once the DD is installed in the directory, the name and attribute of all parameters of the EJA are displayed.

Off-line configuration is possible by using capabilities files.



#### NOTE

Ensure to use the suitable file for the device. EJA has two types, one with the standard function blocks and /LC1 with PID/LM function. If the different type CFF is used, some errors may occur at downloading to the device.

### 4.5 Reading the Parameters

To read EJA parameters, select the AI1 block of the EJA from the host screen and read the OUT parameter. The current selected signal is displayed. Check that MODE\_BLK of the function block and resource block is set to AUTO, and change the signal input and read the parameter again. A new designated value should be displayed.

## 4.6 Continuous Record of Values

If the host has a function of continuously records the indications, use this function to list the indications (values). Depending on the host being used, it may be necessary to set the schedule of Publish (the function that transmits the indication on a periodic basis).

## 4.7 Generation of Alarm

If the host is allowed to receive alarms, generation of an alarm can be attempted from EJA. In this case, set the reception of alarms on the host side. The example using EJA differential pressure transmitter is shown below. EJA's VCR-7 is factory-set for this purpose. For practical purposes, all alarms are placed in a disabled status; for this reason, it is recommended that you first use one of these alarms on a trial basis. Set the value of link object-3 (index 30002) as "0, 299, 0, 6, 0". Refer to section 5.6.1 Link Object for details.

Since the L0\_PRI parameter (index 4029) of the AI1 block is set to "0", try setting this value to "3". Select the Write function from the host in operation, specify an index or variable name, and write "3" to it.

The L0\_LIM parameter (index 4030) of the AI1 block determines the limit at which the lower bound alarm for the process value is given. In usual cases, a very small value is set to this limit. Set 10 (meaning 10 kPa) to the limit. Since the differential pressure is almost 0, a lower bound alarm is raised. Check that the alarm can be received at the host. When the alarm is confirmed, transmission of the alarm is suspended.

The above-mentioned items are a description of the simple procedure to be carried out until EJA is connected to Fieldbus. In order to take full advantage of the performance and functionality of the device, it is recommended that it be read together with Chapter 5, which describes how to use the EJA.

# 5. CONFIGURATION

This chapter describes how to adapt the function and performance of the EJA to suit specific applications. Because multiple devices are connected to Fieldbus, it is important to carefully consider the device requirements and settings when configuring the system. The following steps must be taken.

## (1) Network design

Determines the devices to be connected to Fieldbus and checks the capacity of the power supply.

## (2) Network definition

Determines the tag and node addresses for all devices.

## (3) Definition of combining function blocks

Determines how function blocks are combined.

## (4) Setting tags and addresses

Sets the PD Tag and node addresses for each device.

## (5) Communication setting

Sets the link between communication parameters and function blocks.

## (6) Block setting

Sets the parameters for function blocks.

The following section describes in sequence each step of this procedure. The use of a dedicated configuration tool significantly simplifies this procedure. Refer to Appendix 5 when the EJA is used as Link Master.

## 5.1 Network Design

Select the devices to be connected to the Fieldbus network. The following are essential for the operation of Fieldbus.

- **Power supply**

Fieldbus 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 (including the host). Conventional DC current cannot be used as is.

- **Terminator**

Fieldbus requires two terminators. Refer to the supplier for details of terminators that are attached to the host.

- **Field devices**

Connect the field devices necessary for instrumentation. EJA has passed the interoperability test conducted by The Fieldbus Foundation. In order to properly start Fieldbus, it is recommended that the devices used satisfy the requirements of the above test.

- **Host**

Used for accessing field devices. A minimum of one device with bus control function is needed.

- **Cable**

Used for connecting devices. Refer to “Fieldbus Technical Information” for details of instrumentation cabling. Provide a cable sufficiently long to connect all devices. For field branch cabling, use terminal boards or a connection box as required.

First, check the capacity of the power supply. The power supply capacity must be greater than the sum of the maximum current consumed by all devices to be connected to Fieldbus. The maximum current consumed (power supply voltage 9 V to 32 V) for EJA is 16.5 mA. The cable used for the spur must be of the minimum possible length.

## 5.2 Network Definition

Before connection of devices with Fieldbus, define the Fieldbus network. Allocate PD Tag and node addresses to all devices (excluding such passive devices as terminators).

The PD Tag is the same as the conventional one used for the device. Up to 32 alphanumeric characters may be used for definition. Use a hyphen as a delimiter as required.

The node address is used to specify devices for communication purposes. Because data is too long for a PD Tag, the host uses the node address in place of the PD Tag for communication. A range of 20 to 247 (or hexadecimal 14 to F7) can be set. The device (LM device) with bus control function (Link Master function) is allocated from a smaller address number (20) side, and other devices (BASIC device) without bus control function allocated from a larger address number (247) side respectively. Place the EJA in the

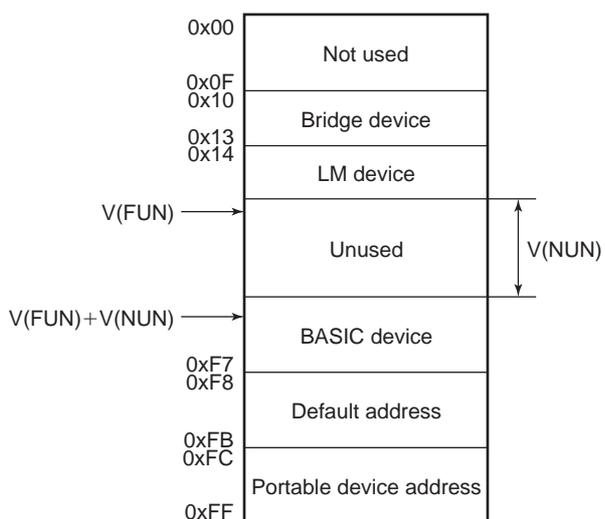
range of the BASIC device. When the EJA is used as Link Master, place the EJA in the range of LM device. Set the range of addresses to be used to the LM device. Set the following parameters.

**Table 5.1 Parameters for Setting Address Range**

Symbol	Parameters	Description
V (FUN)	First-Unpolled-Node	Indicates the address next to the address range used for the host or other LM device.
V (NUN)	Number-of-consecutive-Unpolled-Node	Unused address range

T0501.EPS

The devices within the address range written as “Unused” in Figure 5.1 cannot be used on a Fieldbus. For other address ranges, the range is periodically checked to identify when a new device is mounted. Care must be taken to keep the unused device range as narrow as possible so as to lessen the load on the Fieldbus.



F0501.EPS

**Figure 5.1 Available Range of Node Addresses**

To ensure stable operation of Fieldbus, determine the operation parameters and set them to the LM devices. While the parameters in Table 5.2 are to be set, the worst-case value of all the devices to be connected to the same Fieldbus must be used. Refer to the specification of each device for details. Table 5.2 lists EJA specification values.

**Table 5.2 Operation Parameter Values of the EJA to be Set to LM Devices**

Symbol	Parameters	Description and Settings
V (ST)	Slot-Time	Indicates the time necessary for immediate reply of thje device. Unit of time is in octets (256 μs). Set maximum specification for all devices. For EJA, set a value of 4 or greater.
V (MID)	Minimum-Inter-PDU-Delay	Minimum value of communication data intervals. Unit of time is in octets (256 μs). Set the maximum specification for all devices. For EJA, set a value of 4 or greater.
V (MRD)	Maximum-Response-Delay	The worst case time elapsed until a reply is recorded. The unit is Slot-time; set the value so that $V (MRD) \times V (ST)$ is the maximum value of the specification for all devices. For EJA, the setting must be a value of 12 or greater.

T0502.EPS

### 5.3 Definition of Combining Function Blocks

The input/output parameters for function blocks are combined. For the EJA, two AI blocks output parameter (OUT) and PID block are subject to combination. They are combined with the input of the control block as necessary. Practically, setting is written to the EJA link object with reference to “Block setting” in Section 5.6 for details. It is also possible to read values from the host at proper intervals instead of connecting the EJA block output to other blocks.

The combined blocks need to be executed synchronously with other blocks on the communications schedule. In this case, change the EJA schedule according to the following table. The values in the table are factory-settings.

**Table 5.3 Execution Schedule of the EJA Function Blocks**

Index	Parameters	Setting (Enclosed is factory-setting)
269 (SM)	MACROCYCLE_DURATION	Cycle (MACROCYCLE) period of control or measurement. Unit is 1/32 ms. (16000 = 0.5 s)
276 (SM)	FB_START_ENTRY.1	AI1 block startup time. Elapsed time from the start of MACROCYCLE specified in 1/32 ms. (0 = 0 s)
277 (SM)	FB_START_ENTRY.2	AI2 block startup time. Elapsed time from the start of MACROCYCLE specified in 1/32 ms. (8000 = 0.25 s)
278 (SM)	FB_START_ENTRY.3	Not used.
279 (SM)	FB_START_ENTRY.4	Not used.

T0503.EPS

A maximum of 100 ms is taken for execution of AI block. For scheduling of communications for combination with the next function block, the execution is so arranged as to start after a lapse of longer than 100 ms. In no case should two AI function blocks of the EJA be executed at the same time (execution time is overlapped).

Figure 5.3 shows an example of schedule based on the loop shown in Figure 5.2.

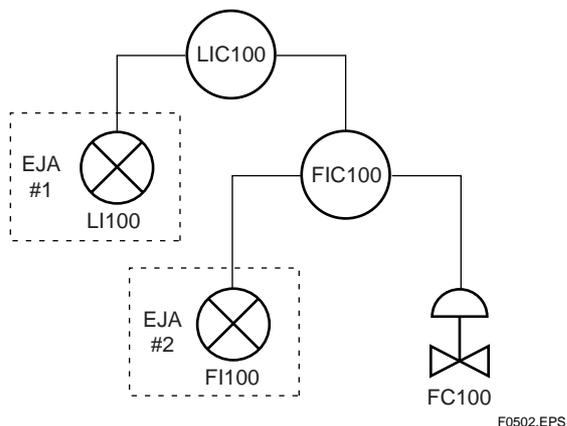


Figure 5.2 Example of Loop Connecting Function Block of Two EJA with Other Instruments

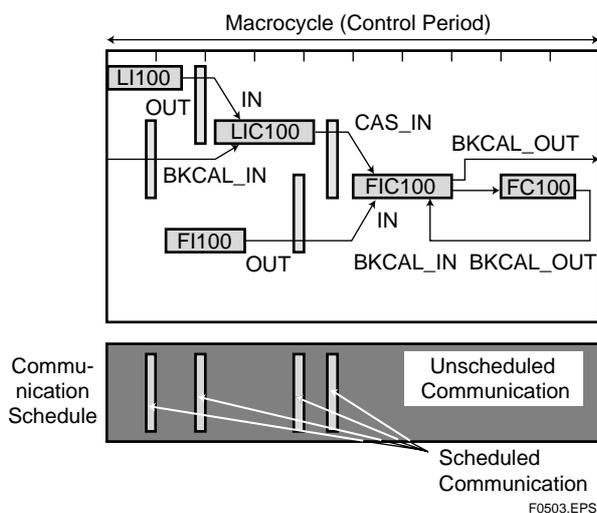


Figure 5.3 Function Block Schedule and Communication Schedule

When the control period (macrocycle) is set to more than 4 seconds, set the following interval to be more than 1% of the control period.

- Interval between “end of block execution” and “start of sending CD from LAS”
- Interval between “end of block execution” and “start of the next block execution”

## 5.4 Setting of Tags and Addresses

This section describes the steps in the procedure to set PD Tags and node addresses in the EJA. There are three states of Fieldbus devices as shown in Figure 5.4, and if the state is other than the lowest SM\_OPERATIONAL state, no function block is executed. EJA must be transferred to this state when an EJA tag or address is changed.

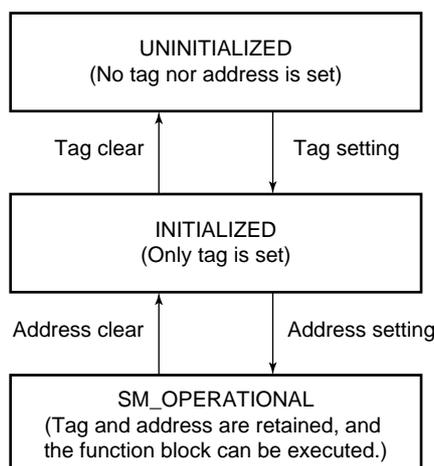


Figure 5.4 Status Transition by Setting PD Tag and Node Address

EJA has a PD Tag (PT1001) and node address (245, or hexadecimal F5) that are set upon shipment from the factory unless otherwise specified. To change only the node address, clear the address once and then set a new node address. To set the PD Tag, first clear the node address and clear the PD Tag, then set the PD Tag and node address again.

Devices whose node address have been cleared will have the default address (randomly chosen from a range of 248 to 251, or from hexadecimal F8 to FB). At the same time, it is necessary to specify the device ID in order to correctly specify the device. The device ID of the EJA is 5945430003xxxxxxx. (The xxxxxxxx at the end of the above device ID is a total of 8 alphanumeric characters.)

## 5.5 Communication Setting

To set the communication function, it is necessary to change the database residing in System/network Management VFD.

### 5.5.1 VCR Setting

Set VCR (Virtual Communication Relationship), which specifies the called party for communication and resources. EJA has 17 VCRs whose application can be changed, except for the first VCR, which is used for management.

EJA has VCRs of four types:

#### Server(QUB) VCR

A Server responds to requests from a host. This communication needs data exchange. This type of communication is called QUB (Queued User-triggered Bidirectional) VCR.

#### Source (QUU) VCR

A Source multicasts alarms or trends to other devices. This type of communication is called QUU (Queued User-triggered Unidirectional) VCR.

#### Publisher (BNU) VCR

A Publisher multicasts AI block output to another function block(s). This type of communication is called BNU (Buffered Network-triggered Unidirectional) VCR.

#### Subscriber (BNU) VCR

A Subscriber receives output of another function block(s) by PID block.

A Server VCR is capable of responding to requests from a Client (QUB) VCR after the Client successfully initiates connection to the Server. A Source VCR transmits data without established connection. A Sink (QUU) VCR on another device can receive it if the Sink is configured so. A Publisher VCR transmits data when LAS requests so. An explicit connection is established from Subscriber (BNU) VCR(s) so that a Subscriber knows the format of published data.

Each VCR has the parameters listed in Table 5.4. Parameters must be changed together for each VCR because modification for each parameter may cause inconsistent operation.

Table 5.4 VCR Static Entry

Sub-index	Parameter	Description
1	FasArTypeAndRole	Indicates the type and role of communication (VCR). The following 4 types are used for EJA. 0x32: Server (Responds to requests from host.) 0x44: Source (Transmits alarm or trend.) 0x66: Publisher (Sends AI block output to other blocks.) 0x76: Subscriber (Receives output of other blocks by PID block.)
2	FasDIILocalAddr	Sets the local address to specify VCR in EJA. A range of 20 to F7 in hexadecimal.
3	FasDIIConfiguredRemoteAddr	Sets the node address of the called party for communication and the address (DLSAP or DLCEP) used to specify VCR in that address. For DLSAP or DLCEP, a range of 20 to F7 in hexadecimal is used. Addresses in Subindex 2 and 3 need to be set to the same contents of the VCR as the called party (local and remote are reversed).
4	FasDIISDAP	Specifies the quality of communication. Usually, one of the following types is set. 0x2B: Server 0x01: Source (Alert) 0x03: Source (Trend) 0x91: Publisher/Subscriber
5	FasDIIMaxConfirmDelayOnConnect	To establish connection for communication, a maximum wait time for the called party's response is set in ms. Typical value is 60 seconds (60000).
6	FasDIIMaxConfirmDelayOnData	For request of data, a maximum wait time for the called party's response is set in ms. Typical value is 60 seconds (60000).
7	FasDIIMaxDlsduSize	Specifies maximum DL Service Data unit Size (DLSDU). Set 256 for Server and Trend VCR, and 64 for other VCRs.
8	FasDIIResidualActivitySupported	Specifies whether connection is monitored. Set TRUE (0xff) for Server. This parameter is not used for other communication.
9	FasDIITimelinessClass	Not used for EJA.
10	FasDIIPublisherTimeWindowSize	Not used for EJA.
11	FasDIIPublisherSynchronizaingDlcep	Not used for EJA.

T0504-1.EPS

Sub-index	Parameter	Description
12	FasDIISubscriberTimeWindowSize	Not used for EJA.
13	FasDIISubscriberSynchronizationDlcep	Not used for EJA.
14	FmsVfdId	Sets VFD for EJA to be used. ( 0x1: System/network management VFD 0x1234: Function block VFD )
15	FmsMaxOutstandingServiceCalling	Set 0 to Server. It is not used for other applications.
16	FmsMaxOutstandingServiceCalled	Set 1 to Server. It is not used for other applications.
17	FmsFeaturesSupported	Indicates the type of services in the application layer. In the EJA, it is automatically set according to specific applications.

T0504-2.EPS

17 VCRs are factory-set as shown in the table below.

Table 5.5 VCR List

Index (SM)	VCR Number	Factory Setting
293	1	For system management (Fixed)
294	2	Server (LocalAddr = 0xF3)
295	3	Server (LocalAddr = 0xF4)
296	4	Server (LocalAddr = 0xF7)
297	5	Trend Source (LocalAddr = 0x07, Remote Address=0x111)
298	6	Publisher for AI1 (LocalAddr = 0x20)
299	7	Alert Source (LocalAddr = 0x07, Remote Address=0x110)
300	8	Server (LocalAddr = 0xF9)
301	9	Publisher for AI2 (LocalAddr = 0x21)
302	10	Not used.
303	11	Not used.
304	12	Not used.
305	13	Not used.
306	14	Not used.
307	15	Not used.
308	16	Not used.
309	17	Not used.

T0505.EPS

### 5.5.2 Function Block Execution Control

According to the instructions given in Section 5.3, set the execution cycle of the function blocks and schedule of execution.

## 5.6 Block Setting

Set the parameter for function block VFD.

### 5.6.1 Link Object

A link object combines the data voluntarily sent by the function block with the VCR. The EJA has eleven link objects. A single link object specifies one combination. Each link object has the parameters listed in Table 5.6. Parameters must be changed together for each VCR because the modifications made to each parameter may cause inconsistent operation.

Table 5.6 Link Object Parameters

Sub-index	Parameters	Description
1	LocalIndex	Sets the index of function block parameters to be combined; set "0" for Trend and Alert.
2	VcrNumber	Sets the index of VCR to be combined. If set to "0", this link object is not used.
3	RemoteIndex	Not used in EJA. Set to "0".
4	ServiceOperation	Set one of the following. Set only one each for link object for Alert or Trend. 0: Undefined 2: Publisher 3: Subscriber 6: Alert 7: Trend
5	StaleCountLimit	Set the maximum number of consecutive stale input values which may be received before the input status is set to BAD. To avoid the unnecessary mode transition caused when the data is not correctly received by subscriber, set this parameter to "2" or more.

T0506.EPS

Set link objects as shown in Table 5.7.

Table 5.7 Factory-Settings of Link Objects (example)

Index	Link Object #	Factory Settings
30000	1	AI1.OUT → VCR#6
30001	2	Trend → VCR#5
30002	3	Alert → VCR#7
30003	4	AI2.OUT → VCR#9
30004	5	Not used
30005	6	Not used
30006	7	Not used
30007	8	Not used
30008	9	Not used
30009	10	Not used
30010	11	Not used

T0507.EPS

### 5.6.2 Trend Object

It is possible to set the parameter so that the function block automatically transmits Trend. EJA has five Trend objects, four of which are used for Trend in analog mode parameters and one is used for Trend in discrete mode parameter. A single Trend object specifies the trend of one parameter.

Each Trend object has the parameters listed in Table 5.8. The first four parameters are the items to be set. Before writing to a Trend object, it is necessary to release the WRITE\_LOCK parameter.

Table 5.8 Parameters for Trend Objects

Sub-index	Parameters	Description
1	Block Index	Sets the leading index of the function block that takes a trend.
2	Parameter Relative Index	Sets the index of parameters taking a trend by a value relative to the beginning of the function block. In the EJA AI block, the following three types of trends are possible. 7: PV 8: OUT 19: FIELD_VAL
3	Sample Type	Specifies how trends are taken. Choose one of the following 2 types: 1: Sampled upon execution of a function block. 2: The average value is sampled.
4	Sample Interval	Specifies sampling intervals in units of 1/32 ms. Set the integer multiple of the function block execution cycle.
5	Last Update	The last sampling time.
6 to 21	List of Status	Status part of a sampled parameter.
21 to 37	List of Samples	Data part of a sampled parameter.

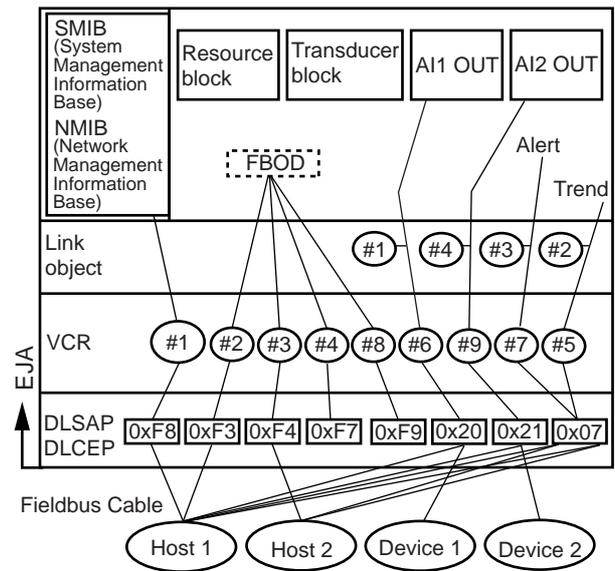
T0508.EPS

Five trend objects are factory-set as shown Table 5.9.

Table 5.9 Trend Object are Factory-Set

Index	Parameters	Factory Settings
32000	TREND_FLT.1	Not used.
32001	TREND_FLT.2	Not used.
32002	TREND_FLT.3	Not used.
32003	TREND_FLT.4	Not used.
32004	TREND_DIS.1	Not used.

T0509.EPS



F0505.EPS

Figure 5.5 Example of Default Configuration

### 5.6.3 View Object

This object forms group of parameters in a block. One advantage brought by forming groups of parameters is the reduction of load for data transaction. EJA has four View Objects for each Resource block, Transducer block and AI1.AI2 function block, and each View Object has the parameters listed in Table 5.11 to 5.13.

Table 5.10 Purpose of Each View Object

	Description
VIEW_1	Set of dynamic parameters required by operator for plant operation. (PV, SV, OUT, Mode etc.)
VIEW_2	Set of static parameters which need to be shown to plant operator at once. (Range etc.)
VIEW_3	Set of all the dynamic parameters.
VIEW_4	Set of static parameters for configuration or maintenance.

T0510.EPS

Table 5.11 View Object for Resource Block

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	RS_STATE	1		1	
8	TEST_RW				
9	DD_RESOURCE				
10	MANUFAC_ID				4

T0511-1.EPS

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
11	DEV_TYPE				2
12	DEV_REV				1
13	DD_REV				1
14	GRANT_DENY		2		
15	HARD_TYPES				2
16	RESTART				
17	FEATURES				2
18	FEATURE_SEL		2		
19	CYCLE_TYPE				2
20	CYCLE_SEL		2		
21	MIN_CYCLE_T				4
22	MEMORY_SIZE				2
23	NV_CYCLE_T		4		
24	FREE_SPACE		4		
25	FREE_TIME	4		4	
26	SHED_RCAS		4		
27	SHED_ROUT		4		
28	FAULT_STATE	1		1	
29	SET_FSTATE				
30	CLR_FSTATE				
31	MAX_NOTIFY				1
32	LIM_NOTIFY		1		
33	CONFIRM_TIME		4		
34	WRITE_LOCK		1		
35	UPDATE_EVT				
36	BLOCK_ALM				
37	ALARM_SUM	8		8	
38	ACK_OPTION				2
39	WRITE_PRI				
40	WRITE_ALM				
41	ITK_VER				2
42	SOFT_REV				
43	SOFT_DESC				
44	SIM_ENABLE_MSG				
45	DEVICE_STATUS_1			4	
46	DEVICE_STATUS_2			4	
47	DEVICE_STATUS_3			4	
48	DEVICE_STATUS_4			4	
49	DEVICE_STATUS_5			4	
50	DEVICE_STATUS_6			4	
51	DEVICE_STATUS_7			4	
52	DEVICE_STATUS_8			4	
	Totals (# bytes)	22	30	54	31

T0511-2.EPS

Table 5.12 View Object for Transducer Block

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	UPDATE_EVT				
8	BLOCK_ALM				
9	TRANSDUCER_DIRECTORY				
10	TRANSDUCER_TYPE	2	2	2	2
11	XD_ERROR	1		1	1
12	COLLECTION_DIRECTORY				
13	PRIMARY_VALUE_TYPE		2		2
14	PRIMARY_VALUE	5		5	
15	PRIMARY_VALUE_RANGE				
16	CAL_POINT_HI		4		4
17	CAL_POINT_LO		4		4
18	CAL_MIN_SPAN				4
19	CAL_UNIT				2
20	SENSOR_TYPE				2
21	SENSOR_RANGE				11
22	SENSOR_SN				
23	SENSOR_CAL_METHOD				1
24	SENSOR_CAL_LOC				32
25	SENSOR_CAL_DATE				6
26	SENSOR_CAL_WHO				32
27	SECONDARY_VALUE	5		5	
28	SECONDARY_VALUE_UNIT		2		2
29	TERTIARY_VALUE	5		5	
30	TERTIARY_VALUE_UNIT		2		2
31	TRIM_PV_ZERO				
32	TRIM_MODE				1
33	EXT_ZERO_ENABLE		1		1
34	MODEL				
35	DISPLAY_MODE		1		1
36	DISPLAY_CYCLE		1		1
37	ALARM_SUM	8		8	
	Totals (# bytes)	34	21	34	116

T0512.EPS

Table 5.13 View Object for AI1.AI2 Function Block

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	OUT	5		5	
9	SIMULATE				
10	XD_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	IO_OPTS				2
14	STATUS_OPTS				2
15	CHANNEL				2
16	L_TYPE				1
17	LOW_CUT				4
18	PV_FTIME				4
19	FIELD_VAL	5		5	
20	UPDATE_EVT				
21	BLOCK_ALM				
22	ALARM_SUM	8		8	
23	ACK_OPTION				2
24	ALARM_HYS				4
25	HI_HI_PRI				1
26	HI_HI_LIM				4
27	HI_PRI				1
28	HI_LIM				4
29	LO_PRI				1
30	LO_LIM				4
31	LO_LO_PRI				1
32	LO_LO_LIM				4
33	HI_HI_ALM				
34	HI_ALM				
35	LO_ALM				
36	LO_LO_ALM				
	Totals (# bytes)	31	26	31	46

T0513.EPS

Table 5.14 Indexes of View for Each Block

	VIEW_1	VIEW_2	VIEW_3	VIEW_4
Resource Block	40100	40101	40102	40103
Transducer Block	40200	40201	40202	40203
AI1 Function Block	40400	40401	40402	40403
AI2 Function Block	40410	40411	40412	40413
(PID Function Block)	40800	40801	40802	40803

T0514.EPS

## 5.6.4 Function Block Parameters

Function block parameters can be read from the host or can be set. For a list of the parameters of blocks held by the EJA, refer to “List of parameters for each block of the EJA” in Appendix 1. For PID/LM function option, refer to Appendix 4&5. The following is a list of important parameters with a guide to how to set them.

### MODE\_BLK:

Indicates the three types of function block modes; Out\_Of\_Service, Manual, and Auto. In Out\_Of\_Service mode, the AI block does not operate. The Manual mode does not allow values to be updated. The Auto mode causes the measured value to be updated. Under normal circumstances, set the Auto mode to take effect. The Auto mode is the factory default.

### CHANNEL:

This is the parameter of the transducer block to be input to the AI block. AI1 block is assigned differential pressure and AI2 block is assigned static pressure, respectively. Do not change this setting.

### XD\_SCALE:

Scale of input from the transducer block. The calibrated range is factory set (from 0% point to 100% point). Usually, the unit is set in kPa. Changing the unit (can be set only in pressure unit) also causes the unit within the transducer block to be automatically changed. (The unit is automatically changed according to the unit selected by AI1.) Unit index which can be set by XD\_SCALE is as shown below.

Table 5.15 Unit Index by XD\_SCALE

MPa	1132, 1545 (abs), 1546 (gauge)
kPa	1133, 1547 (abs), 1548 (gauge)
hPa	1136, 1553 (abs), 1554 (gauge)
bar	1137
mbar	1138
atm	1140

T0515.EPS

### L\_TYPE:

Specifies the operation function of the AI block. If set to “Direct”, the input delivered to CHANNEL is directly reflected on OUT. If set to “Indirect”, scaling by XD\_SCALE and OUT\_SCALE is carried out and is reflected on OUT. If set to “Indirect Sqrt”, after scaling by XD\_SCALE, the square root is extracted and the value scaled by OUT\_SCALE is reflected on OUT.

**PV\_FTIME:**

Sets the time constant of the damping function within AI block (primary delay) in seconds.

**OUT\_SCALE:**

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

**Alarm Priority:**

Indicates the priority of the process alarm. If a value of 3 or greater is set, an alarm is transmitted. The factory default is 0. Four types of alarm can be set: HI\_PRI, HI\_HI\_PRI, LO\_PRI, and LO\_LO\_PRI.

**Alarm Threshold:**

Sets the threshold at which a process alarm is generated. The factory default setting is a value that does not generate an alarm. Four types of alarm can be set: HI\_LIM, HI\_HI\_LIM, LO\_LIM, and LO\_LO\_LIM.

**5.6.5 Transducer Block Parameters**

The transducer block sets functions specific to the measurement of the differential and normal pressure of the EJA. For a list of the parameters of each block of the EJA, refer to “List of parameters for each block of the EJA” in Appendix 1. The following is a list of important parameters with a guide to how to set them.

**TERTIARY\_VALUE:**

Displays the capsule temperature of the EJA.

**TERTIARY\_VALUE\_UNIT:**

Sets display unit of temperature at EJA. If set to 1001, °C is used, and if set to 1002, °F is used. The factory default setting is °C.

**DISPLAY\_MODE:**

Sets the unit to be used for LCD display.

1. Engineering Unit (Engr. Unit)
2. %
3. 1/10 @ Engr. Unit
4. 1/100 @ Engr. Unit
5. 1/1000 @ Engr. Unit
6. 1/10000 @ Engr. Unit
7. 1/1000000 @ Engr. Unit

**DISPLAY\_CYCLE:**

Sets the cycle of LCD display in units of function block execution cycles. The factory default setting is 1, but if a low temperature environment makes it difficult to view the display, it is recommended that you set a longer display cycle.

# 6. IN-PROCESS OPERATION

This chapter describes the procedure performed when changing the operation of the function block of the EJA in process.

## 6.1 Mode Transition

When the function block mode is changed to Out\_Of\_Service, the function block pauses and a block alarm is issued.

When the function block mode is changed to Manual, the function block suspends updating of output values. In this case alone, it is possible to write a value to the OUT parameter of the block for output. Note that no parameter status can be changed.

## 6.2 Generation of Alarm

### 6.2.1 Indication of Alarm

When the self-diagnostics function indicates that a device is faulty, an alarm (device alarm) is issued from the resource block. When an error (block error) is detected in each function block or an error in the process value (process alarm) is detected, an alarm is issued from each block. If an LCD indicator is installed, the error number is displayed as AL.XX. If two or more alarms are issued, multiple error numbers are displayed in 2-second intervals.



F0601.EPS

Figure 6.1 Error Identification on Indicator

Table 6.1 List of Error Messages

LCD	Content of Alarms
AL.01	Capsule module failure.
AL.02	AMP module failure (1).
AL.03	AMP module failure (2).
AL.20	AI1 block is not scheduled.
AL.21	The resource block is in O/S mode.
AL.22	The transducer block is in O/S mode.
AL.23	AI1 function block is in O/S mode.
AL.41	The differential pressure is out of the measurement range. An alarm is issued when the differential pressure exceeds the range of LRL-10%* to URL+10%*.
AL.42	The static pressure is out of the range of the maximum operating pressure. An alarm is issued when the static pressure exceeds 110% of the maximum operating pressure.
AL.43	Temperature is abnormal. An alarm is issued when the temperature is out of the range of -50 to 130°C.
AL.61	Out of the range of the built-in indicator display.
AL.62	All function blocks are in Simulate mode.
AL.63	AI1 function block are in Man mode.
AL.64	Zero-point adjustment is abnormal. An alarm is issued out of the range of LRL-10%* to URL+10%*.
- - - -	EJA is not participating in Fieldbus network.

\* The value indicates % of URL.

T0601.EPS

### 6.2.2 Alarms and Events

The following alarms or events can be reported by the EJA if Link object and VCR static entry are set.

**Analog Alerts** (Generated when a process value exceeds threshold)

By AI1 Block	Hi-Hi Alarm, Hi Alarm, Low Alarm, Low-Low Alarm
By AI2 Block	Hi-Hi Alarm, Hi Alarm, Low Alarm, Low-Low Alarm

**Discrets Alerts** (Generated when an abnormal condition is detected)

By Resource Block	Block Alarm, Write Alarm
By Transducer Block	Block Alarm
By AI1 Block	Block Alarm
By AI2 Block	Block Alarm
By PID Block	Block Alarm

**Update Alerts** (Generated when a important (restorable) parameter is updated)

- By Resource Block Update Event
- By Transducer Block Update Event
- By AI1 Block Update Event
- By AI2 Block Update Event
- By PID Block Update Event

An alert has following structure:

**Table 6.2 Alert Object**

Subindex			Parameter Name	Explanation
Analog Alert	Discrete Alert	Update Alert		
1	1	1	Block Index	Index of block from which alert is generated
2	2	2	Alert Key	Alert Key copied from the block
3	3	3	Standard Type	Type of the alert
4	4	4	Mfr Type	Alert Name identified by manufacturer specific DD
5	5	5	Message Type	Reason of alert notification
6	6	6	Priority	Priority of the alarm
7	7	7	Time Stamp	Time when this alert is first detected
8	8		Subcode	Enumerated cause of this alert
9	9		Value	Value of referenced data
10	10		Relative Index	Relative index of referenced data
		8	Static Revision	Value of static revision (ST_REV) of the block
11	11	9	Unit Index	Unit code of referenced data

T0602.EPS

**6.3 Simulation Function**

The simulation function simulates the input of a function block and lets it operate as if the data was received from the transducer block. It is possible to conduct testing for the downstream function blocks or alarm processes.

A SIMULATE\_ENABLE switch is mounted in the EJA amplifier. This is to prevent the accidental operation of this function. When this is switched on, simulation is enabled. (See Figure 6.2.) To initiate the same action from a remote terminal, if REMOTE LOOP TEST SWITCH is written to the SIM\_ENABLE\_MSG parameter (index 1044) of the resource block, the resulting action is the same as is taken when the above switch is on. Note that this parameter value is lost when the power is turned OFF.

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

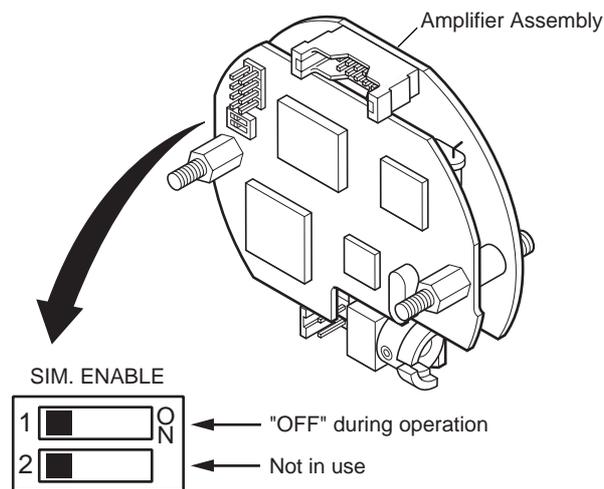
The SIMULATE parameter of AI block consists of the elements listed in Table 6.3 below.

**Table 6.3 SIMULATE Parameter**

Sub-index	Parameters	Description
1	Simulate Status	Sets the data status to be simulated.
2	Simulate Value	Sets the value of the data to be simulated.
3	Transducer Status	Displays the data status from the transducer block. It cannot be changed.
4	Transducer Value	Displays the data value from the transducer block. It cannot be changed.
5	Simulate En/Disable	Controls the simulation function of this block. 1: Simulation disabled (standard) 2: Simulation started

T0603.EPS

When Simulate En/Disable in Table 6.3 above is set to 2, the applicable function block uses the simulation value set in this parameter instead of the data from the transducer block. This setting can be used for propagation of the status to the trailing blocks, generation of a process alarm, and as an operation test for trailing blocks.



F0602.EPS

**Figure 6.2 SIMULATE\_ENABLE Switch Position**

# 7. DEVICE STATUS

Device setting status and failures of EJA are indicated by using parameter DEVICE\_STATUS\_1, DEVICE\_STATUS\_2 and DEVICE\_STATUS\_3 (index 1045, 1046 and 1047) in Resource Block.

**Table 7.1 Contents of DEVICE\_STATUS\_1 (index 1045)**

Hexadecimal	Display through DD	Description
0x80000000		
0x40000000		
0x20000000		
0x10000000		
0x08000000		
0x04000000		
0x02000000		
0x01000000		
0x00800000	Sim.enable Jmpr On	SIMULATE_ENABLE switch is ON.
0x00400000	RB in O/S mode (AL.21)	Resource Block is in O/S mode.
0x00200000		
0x00100000		
0x00080000	AMP Module Failure 2 (AL.03)	AMP module failure
0x00040000		
0x00020000		
0x00010000		
0x00008000	LINK OBJ. 1/17 not open	Link object 1 is not open.
0x00004000	LINK OBJ. 2 not open	Link object 2 is not open.
0x00002000	LINK OBJ. 3 not open	Link object 3 is not open.
0x00001000	LINK OBJ. 4 not open	Link object 4 is not open.
0x00000800	LINK OBJ. 5 not open	Link object 5 is not open.
0x00000400	LINK OBJ. 6 not open	Link object 6 is not open.
0x00000200	LINK OBJ. 7 not open	Link object 7 is not open.
0x00000100	LINK OBJ. 8 not open	Link object 8 is not open.
0x00000080	LINK OBJ. 9 not open	Link object 9 is not open.
0x00000040	LINK OBJ. 10 not open	Link object 10 is not open.
0x00000020	LINK OBJ. 11 not open	Link object 11 is not open.
0x00000010	LINK OBJ. 12 not open	Not used for EJA.
0x00000008	LINK OBJ. 13 not open	Not used for EJA.
0x00000004	LINK OBJ. 14 not open	Not used for EJA.
0x00000002	LINK OBJ. 15 not open	Not used for EJA.
0x00000001	LINK OBJ. 16 not open	Not used for EJA.

**Table 7.2 Contents of DEVICE\_STATUS\_2 (index 1046)**

Hexadecimal	Display through DD	Description
0x80000000		
0x40000000		
0x20000000		
0x10000000		
0x08000000		
0x04000000		
0x02000000		
0x01000000		
0x00800000		
0x00400000		
0x00200000		
0x00100000		
0x00080000		
0x00040000		
0x00020000		
0x00010000		
0x00008000	Data is out of LCD display range (AL.61)	Data is out of LCD display range.
0x00004000		
0x00002000		
0x00001000	Zero Adjust value is out of normal range (AL.64)	Zero adjustment value is out of range. Alarm is generated when the value is out of LRL -10% to URL +10%.
0x00000800		
0x00000400	Temperature is out of normal range (AL.43)	Process temperature is out of limit. Alarm is generated when the temperature is out of -50 to 130 degC.
0x00000200	Static Pressure is out of normal range (AL.42)	Static pressure is out of MWP. Alarm is generated when the static pressure exceeds 110% of MWP.
0x00000100	Differential Pressure is out of normal range (AL.41)	Differential pressure is out of range. Alarm is generated when the value is out of LRL -10% to URL +10%.
0x00000080	AMP Module Failure 3 (AL.02)	Amp module failure
0x00000040	AMP Module Failure 2 (AL.03)	Amp module failure
0x00000020	AMP Module Failure 1 (AL.02)	Amp module failure
0x00000010	Capsule Module Failure 3 (AL.01)	Capsule module failure
0x00000008		
0x00000004		
0x00000002	Capsule Module Failure 2 (AL.01)	Capsule module failure
0x00000001	Capsule Module Failure 1 (AL.01)	Capsule module failure

Table 7.3 Contents of DEVICE\_STATUS\_3 (index 1047)

Hexadecimal	Display through DD	Description
0x80000000		
0x40000000		
0x20000000		
0x10000000		
0x08000000	Transducer Block is in O/S mode (AL.22)	Transducer Block is in O/S mode.
0x04000000		
0x02000000		
0x01000000		
0x00800000		
0x00400000		
0x00200000		
0x00100000		
0x00080000		
0x00040000		
0x00020000		
0x00010000		
0x00008000		
0x00004000	Simulation is enabled in AI2 Function Block	AI2 Function Block is in Simulation mode.
0x00002000	AI2 Function Block is in Manual mode	AI2 Function Block is in Manual mode.
0x00001000	AI2 Function Block is in O/S mode	AI2 Function Block is in O/S mode.
0x00000800	AI1 Function Block is not scheduled (AL.20)	AI1 Function Block is not scheduled.
0x00000400	Simulation is enabled in AI1 Function Block (AL.62)	AI1 Function Block is in Simulation mode.
0x00000200	AI1 Function Block is in Manual mode (AL.63)	AI1 Function Block is in Manual mode.
0x00000100	AI1 Function Block is in O/S mode (AL.23)	AI1 Function Block is in O/S mode.
0x00000080		
0x00000040		
0x00000020		
0x00000010		
0x00000008	PID Function Block Error 2	Not used for EJA.
0x00000004	PID Function Block Error 1	Not used for EJA.
0x00000002	PID Function Block is in BYPASS mode	PID Function Block is in BYPASS mode.
0x00000001	PID Function Block is in O/S mode	PID Function Block is in O/S mode.

T0703.EPS

# 8. GENERAL SPECIFICATIONS

## 8.1 Standard Specifications

For items other than those described below, refer to each User's Manual.

### Applicable Model:

All DPharp EJA series

### Output Signal:

Digital communication signal based on FOUNDATION fieldbus protocol.

### Supply Voltage

9 to 32 V DC for general use, flameproof type, and nonincendive type  
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:  
Steady state: 16.5 mA (max)  
Software download state: 40.5 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 max span.

### Functional Specifications:

Functional specifications for Fieldbus communication conform to the standard specifications (H1) of FOUNDATION fieldbus.

Function Block: Two AI function blocks\*1

One PID function block (option)

Link Master function (option)

\*1: Contact Yokogawa sales representative for the use of function block for static pressure.

### EMC Conformity Standards“◇”:

CE , N200  
EN61326-1 Class A, Table 2 (For use in industrial locations)  
EN61326-2-3

### < Safety Barrier for CENELEC ATEX (KEMA) Intrinsically Safe Type >

Supplier	Type	Model
P+F	Isolator	KLD2-PR-Ex1. IEC1 (FISCO)

T0802.EPS

### < Settings When Shipped >

Tag Number (Tag plate)	As specified in order *2
Software Tag (PD tag)	'PT1001' unless otherwise specified in order *3
Output Mode (L_TYPE)	'Direct' unless otherwise specified in order
Calibration Range (XD_SCALE) Lower/Higher Range Value	As specified in order
Unit (CAL_UNIT) of Calibration Range	Selected from mmH <sub>2</sub> O, inH <sub>2</sub> O, mmHg, inHg, Pa, hPa, kPa, MPa, g/cm <sup>2</sup> , kg/cm <sup>2</sup> , bar, mbar, psi, torr, atm (Only one unit can be specified.)
Output Scale (OUT_SCALE) Lower/Higher Range Value	'0 to 100%' unless otherwise specified
Unit of Output Scale (OUT_SCALE)	As specified in order
Damping Time Constant (PV_FTIME)	'2 sec.'
Node Address	'0xF5' unless otherwise specified in order
Operation Functional Class (When /LC1 is specified)	'BASIC' unless otherwise specified in order

T0803.EPS

\*2: Specified Tag Number is engraved on the stainless steel plate: Up to 16 letters using any of alphanumerics and symbols of [-], [ ], and [ / ].

\*3: Specified Software Tag is entered in the amplifier memory: Up to 32 letters using any of alphanumerics and symbols of [-] and [ / ].

## 8.2 Optional Specifications

For items other than those described below, refer to each 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)	<b>FF15</b>
	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)	<b>FS15</b>
	FM Nonincendive Approval for /EE Software download *1 *3 Class I, Division 2, Group A, B, C, & D Class II, Division 2, Group F & G and Class III, Division 1 Class I, Zone 2, Group IIC in Hazardous (Classified) locations Enclosure: "NEMA4X", Temp. Cl.: T4, Amb. Temp. -40 to 60°C (-40 to 140°F) Vmax.=32V, Ci=3.52 nF, Li=0μH	<b>FN15</b>
CENELEC ATEX (KEMA)	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	<b>KF25</b>
	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	<b>KS25</b>
	CENELEC ATEX (KEMA) 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	<b>KN25</b>
IECEX Scheme	IECEX Flameproof Approval *2 Certificate: IECEX KEM 06.0005 Ex d IIC T6...T4 Enclosure: IP67 Max.Process Temp.: T4;120°C (248°F), T5;100°C (212°F), T6; 85°C (185°F) Amb.Temp.: -40 to 75°C (-40 to 167°F) for T4, -40 to 80°C (-40 to 176°F) for T5, -40 to 75°C (-40 to 167°F) for T6	<b>SF25</b>

T0801.EPS

\*1: Applicable for Electrical connection code 2 and 7.

\*2: Applicable for Electrical connection code 2, 4, 7 and 9.

\*3: Applicable for only Option code EE.

## 8. GENERAL SPECIFICATIONS

Item	Description	Code
Canadian Standards Association (CSA)	CSA Explosionproof Approval *5 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) Electrical connection: 1/2 NPT female *1 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 adjustment screw	<b>CF15</b>
TIIS Certification	TIIS Flameproof Approval, Ex do II C T4X *2 *3 *5 *6	<b>JF35</b>
PID/LM function	PID control function, Link Master function *4	<b>LC1</b>
Software download function*7	Based on FOUNDATION Fieldbus Specification (FF-883) Download class: Class1	<b>EE</b>

T0804.EPS

\*1: Applicable for Electrical connection code 2 and 7.

\*2: If cable wiring is to be used, add the YOKOGAWA-assured flameproof packing adapter.

\*3: In case the ambient temperature exceeds 45°C, use heat-resistant cables with maximum allowable temperature of 75°C or above.

\*4: Set as basic device when shipped.

\*5: See certificate list of TIIS flameproof approval below.

		Without integral indicator	With integral indicator
Wetted parts material code	S	C15296	C15297
	H, A	C15298	C15299
	T, D	C15300	C15301
	M, B	C15302	C15303

T0805.EPS

\*6: TIIS (The Technology Institution of Industrial Safety) Certification is a new notation for the explosionproof approval in Japan instead of JIS.

\*7: Not applicable for Option code FS15 and KS25.

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

Note: The Write Mode column contains the modes in which each parameter is write enabled.

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

MAN: Write enabled in Man mode and O/S mode.

AUTO: Write enabled in Auto mode, Man mode, and O/S mode.

## A1.1 Resource Block

Relative Index	Index	Parameter Name	Factory Default	Write Mode	Explanation
0	1000	Block Header	TAG:"RS"	Block Tag = O/S	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	1001	ST_REV	–	–	The revision level of the static data associated with the resource block. The revision value is incremented each time a static parameter value in this block is changed.
2	1002	TAG_DESC	Null	AUTO	The user description of the intended application of the block.
3	1003	STRATEGY	1	AUTO	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
4	1004	ALERT_KEY	1	AUTO	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	1005	MODE_BLK	AUTO	AUTO	The actual, target, permitted, and normal modes of the block.
6	1006	BLOCK_ERR	–	–	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
7	1007	RS_STATE	–	–	State of the resource block state machine.
8	1008	TEST_RW	Null	AUTO	Read/write test parameter-used only for conformance testing and simulation.
9	1009	DD_RESOURCE	Null	–	String identifying the tag of the resource which contains the Device Description for this resource.
10	1010	MANUFAC_ID	0x594543	–	Manufacturer identification number-used by an interface device to locate the DD file for the resource.
11	1011	DEV_TYPE	3	–	Manufacturer's model number associated with the resource-used by interface devices to locate the DD file for the resource.
12	1012	DEV_REV	2	–	Manufacturer revision number associated with the resource-used by an interface device to locate the DD file for the resource.
13	1013	DD_REV	2	–	Revision of the DD associated with the resource-used by an interface device to locate the DD file for the resource.
14	1014	GRANT_DENY	0	AUTO	Options for controlling access of host computer and local control panels to operating, tuning and alarm parameters of the block.
15	1015	HARD_TYPES	Scalar input	–	The types of hardware available as channel numbers. bit0: Scalar input bit1: Scalar output bit2: Discrete input bit3: Discrete output
16	1016	RESTART	–	–	Allows a manual restart to be initiated. Several degrees of restart are possible. They are 1: Run, 2: Restart resource, 3: Restart with initial value specified in FF functional spec. (*1), and 4: Restart processor. *1: FF-891 Foundation™ Specification Function Block Application Process Part 2.
17	1017	FEATURES	Soft write lock supported Report supported	–	Used to show supported resource block options.

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

Relative Index	Index	Parameter Name	Factory Default	Write Mode	Explanation
18	1018	FEATURE_SEL	Soft write lock supported Report supported	AUTO	Used to select resource block options defined in FEATURES. bit0: Scheduled bit1: Event driven bit2: Manufacturer specified
19	1019	CYCLE_TYPE	Scheduled	–	Identifies the block execution methods available for this resource.
20	1020	CYCLE_SEL	Scheduled	AUTO	Used to select the block execution method for this resource.
21	1021	MIN_CYCLE_T	3200 (100ms)	–	Time duration of the shortest cycle interval of which the resource is capable.
22	1022	MEMORY_SIZE	0	–	Available configuration memory in the empty resource. To be checked before attempting a download.
23	1023	NV_CYCLE_T	0	–	Interval between writing copies of NV parameters to non-volatile memory. Zero means never.
24	1024	FREE_SPACE	0	–	Percent of memory available for further configuration. EJA has zero which means a preconfigured resource.
25	1025	FREE_TIME	0	–	Percent of the block processing time that is free to process additional blocks. EJA does not support this.
26	1026	SHED_RCAS	640000 (20S)	AUTO	Time duration at which to give up on computer writes to function block RCas locations. Supported only with PID function.
27	1027	SHED_ROUT	640000 (20S)	AUTO	Time duration at which to give up on computer writes to function block ROut locations. Supported only with PID function.
28	1028	FAULT_STATE	1	–	Condition set by loss of communication to an output block, failure promoted to an output block or a physical contact. When fail-safe condition is set, Then output function blocks will perform their FSAFE actions.
29	1029	SET_FSTATE	1	AUTO	Allows the fail-safe condition to be manually initiated by selecting Set.
30	1030	CLR_FSTATE	1	AUTO	Writing a Clear to this parameter will clear the device fail-safe state if the field condition, if any, has cleared.
31	1031	MAX_NOTIFY	3	–	Maximum number of unconfirmed notify messages possible.
32	1032	LIM_NOTIFY	3	AUTO	Maximum number of unconfirmed alert notify messages allowed.
33	1033	CONFIRM_TIM	640000 (20s)	AUTO	The minimum time between retries of alert reports.
34	1034	WRITE_LOCK	Not locked	AUTO	If set, no writes from anywhere are allowed, except to clear WRITE_LOCK. Block inputs will continue to be updated
35	1035	UPDATE_EVT	–	–	This alert is generated by any change to the static data.
36	1036	BLOCK_ALM	–	–	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
37	1037	ALARM_SUM	Enable	–	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.
38	1038	ACK_OPTION	0xFFFF	AUTO	
39	1039	WRITE_PRI	0	AUTO	Priority of the alarm generated by clearing the write lock.
40	1040	WRITE_ALM	–	–	This alert is generated if the write lock parameter is cleared.
41	1041	ITK_VER	4	–	Version number of interoperability test by Fieldbus Foundation applied to EJA.
42	1042	SOFT_REV		–	EJA software revision number.
43	1043	SOFT_DESC		–	Yokogawa internal use.
44	1044	SIM_ENABLE_MSG	Null	AUTO	Software switch for simulation function.
45	1045	DEVICE_STATUS_1	0	–	Device status (VCR setting etc.)

TA0101-2.EPS

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

Relative Index	Index	Parameter Name	Factory Default	Write Mode	Explanation
46	1046	DEVICE_STATUS_2	0	–	Device status (failure or setting error etc.)
47	1047	DEVICE_STATUS_3	0	–	Device status (function block setting.)
48	1048	DEVICE_STATUS_4	0	–	Not used for EJA.
49	1049	DEVICE_STATUS_5	0	–	Not used for EJA.
50	1050	DEVICE_STATUS_6	0	–	Not used for EJA.
51	1051	DEVICE_STATUS_7	0	–	Not used for EJA.
52	1052	DEVICE_STATUS_8	0	–	Not used for EJA.

TA0101-3EPS

## A1.2 AI Function Block

Relative Index	Index AI1	Index AI2	Parameter Name	Factory Default	Write Mode	Explanation
0	4000	4100	Block Header	TAG: "AI1" or "AI2"	Block Tag = O/S	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	4001	4101	ST_REV	–	–	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.
2	4002	4102	TAG_DESC	(blank)	AUTO	The user description of the intended application of the block.
3	4003	4103	STRATEGY	1	AUTO	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
4	4004	4104	ALERT_KEY	1	AUTO	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	4005	4105	MODE_BLK	AUTO	AUTO	The actual, target, permitted, and normal modes of the block.
6	4006	4106	BLOCK_ERR	–	–	This parameter reflects the error status associated with the hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
7	4007	4107	PV	–	–	Either the primary analog value for use in executing the function, or a process value associated with it. May also be calculated from the READBACK value of an AO block.
8	4008	4108	OUT	–	Value = MAN	The primary analog value calculated as a result of executing the function.
9	4009	4109	SIMULATE	Disable	AUTO	Allows the transducer analog input or output to the block to be manually supplied when simulate is enabled. When simulation is disabled, the simulate value and status track the actual value and status.
10	4010	4110	XD_SCALE	Specified at the time of order	O/S	The high and low scale values, engineering units code, and number of digits to the right of the decimal point used with the value obtained from the transducer for a specified channel. Refer to Table 5.15 for the unit available.
11	4011	4111	OUT_SCALE	Specified at the time of order	O/S	The high and low scale values, engineering units code, and number of digits to the right of the decimal point to be used in displaying the OUT parameter and parameters which have the same scaling as OUT.
12	4012	4112	GRANT_DENY	0	AUTO	Options for controlling access of host computers and local control panels to operating, tuning and alarm parameters of the block.
13	4013	4113	IO_OPTS	0	O/S	Options which the user may select to alter input and output block processing

TA0102-1.EPS

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

Relative Index	Index AI1	Index AI2	Parameter Name	Factory Default	Write Mode	Explanation
14	4014	4114	STATUS_OPTS	0	O/S	Options which the user may select in the block processing of status
15	4015	4115	CHANNEL	AI1: 1 AI2: 2	O/S	The number of the logical hardware channel that is connected to this I/O block. This information defines the transducer to be used going to or from the physical world.
16	4016	4116	L_TYPE	Specified at the time of order	MAN	Determines if the values passed by the transducer block to the AI block may be used directly (Direct) or if the value is in different units and must be converted linearly (Indirect), or with square root (Ind Sqr Root), using the input range defined by the transducer and the associated output range.
17	4017	4117	LOW_CUT	Linear: 0% Square root: 10%	AUTO	Limit used in square root processing. A value of zero percent of scale is used in block processing if the transducer value falls below this limit, in % of scale. This feature may be used to eliminate noise near zero for a flow sensor.
18	4018	4118	PV_FTIME	2sec	AUTO	Time constant of a single exponential filter for the PV, in seconds.
19	4019	4119	FIELD_VAL	–	–	Raw value of the field device in percent of the PV range, with a status reflecting the Transducer condition, before signal characterization (L_TYPE) or filtering (PV_FTIME).
20	4020	4120	UPDATE_EVT	–	–	This alert is generated by any change to the static data.
21	4021	4121	BLOCK_ALM	–	–	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute. As soon as the Unreported status is cleared by the alert reporting task, another block alert may be reported without clearing the Active status, if the subcode has changed.
22	4022	4122	ALARM_SUM	Enable	–	The current alert status, unacknowledged states, unreported states, and disabled states of the alarms associated with the function block.
23	4023	4123	ACK_OPTION	0xFFFF	AUTO	Selection of whether alarms associated with the block will be automatically acknowledged.
24	4024	4124	ALARM_HYS	0.5%	AUTO	Amount the PV must return within the alarm limits before the alarm condition clears. Alarm Hysteresis is expressed as a percent of the PV span.
25	4025	4125	HI_HI_PRI	0	AUTO	Priority of the high high alarm.
26	4026	4126	HI_HI_LIM	+INF	AUTO	The setting for high high alarm in engineering units.
27	4027	4127	HI_PRI	0	AUTO	Priority of the high alarm.
28	4028	4128	HI_LIM	+INF	AUTO	The setting for high alarm in engineering units.
29	4029	4129	LO_PRI	0	AUTO	Priority of the low alarm.
30	4030	4130	LO_LIM	–INF	AUTO	The setting for the low alarm in engineering units.
31	4031	4131	LO_LO_PRI	0	AUTO	Priority of the low low alarm.
32	4032	4132	LO_LO_LIM	–INF	AUTO	The setting of the low low alarm in engineering units.
33	4033	4133	HI_HI_ALM	–	–	The status for high high alarm and its associated time stamp.
34	4034	4134	HI_ALM	–	–	The status for high alarm and its associated time stamp.
35	4035	4135	LO_ALM	–	–	The status of the low alarm and its associated time stamp.
36	4036	4136	LO_LO_ALM	–	–	The status of the low low alarm and its associated time stamp.

TA0102-2.EPS

## A1.3 Transducer Block

Relative Index	Index	Parameter Name	Factory Default	Write Mode	Explanation
0	2000	Block Header	TAG: "TB"	Block Tag = O/S	Information on this block such as Block Tag, DD Revision, Execution Time etc.
1	2001	ST_REV	–	–	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.
2	2002	TAG_DESC	(blank)	AUTO	The user description of the intended application of the block
3	2003	STRATEGY	1	AUTO	The strategy field can be used to identify grouping of blocks. This data is not checked or processed by the block.
4	2004	ALERT_KEY	1	AUTO	The identification number of the plant unit. This information may be used in the host for sorting alarms, etc.
5	2005	MODE_BLK	AUTO	AUTO	The actual, target, permitted, and normal modes of the block.
6	2006	BLOCK_ERR	–	–	This parameter reflects the error status associated with hardware or software components associated with a block. It is a bit string, so that multiple errors may be shown.
7	2007	UPDATE_EVT	–	–	This alert is generated by any change to the static data.
8	2008	BLOCK_ALM	–	–	The block alarm is used for all configuration, hardware, connection failure or system problems in the block. The cause of the alert is entered in the subcode field. The first alert to become active will set the Active status in the Status attribute.
9	2009	TRANSDUCER_DIRECTORY	–	–	A directory that specifies the number and starting indices of the transducers.
10	2010	TRANSDUCER_TYPE	100 (Standard Pressure with Calibration)	–	Identifies transducer.
11	2011	XD_ERROR	–	–	The error code in transducer. 0=No failure 20=Electronics failure 22=I/O failure 21=Mechanical failure
12	2012	COLLECTION_DIRECTORY	–	–	A directory that specifies the number, starting indices, and DD Item Ids of the data collections in each transducer within a transducer block.
13	2013	PRIMARY_VALUE_TYPE	107: differential pressure 108: gauge pressure 109: absolute pressure	O/S	The type of measurement represented by primary value. Followings are available for EJA: 107=differential pressure 108=gauge pressure 109=absolute pressure
14	2014	PRIMARY_VALUE	–	–	The measured value and status available to the function block.
15	2015	PRIMARY_VALUE_RANGE	Range of capsule	–	The High and Low range limit values, engineering units code and the number of digits to the right of the decimal point to be used to display the primary value.
16	2016	CAL_POINT_HI	Max range	O/S	The highest calibrated value.
17	2017	CAL_POINT_LO	0	O/S	The lowest calibrated value.
18	2018	CAL_MIN_SPAN	Minimum span of capsule	–	The minimum calibration span value allowed.
19	2019	CAL_UNIT	kPa	–	The engineering unit for the calibrated values.
20	2020	SENSOR_TYPE	Silicon resonant	–	The type of sensor.
21	2021	SENSOR_RANGE	Range of capsule	–	The High and Low range limit values, engineering units code and the number of digits to the right of the decimal point for the sensor.

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

<b>Relative Index</b>	<b>Index</b>	<b>Parameter Name</b>	<b>Factory Default</b>	<b>Write Mode</b>	<b>Explanation</b>
22	2022	SENSOR_SN	Serial No.	–	Serial number.
23	2023	SENSOR_CAL_METHOD	103: factory trim standard calibration	O/S	The method of the last sensor calibration. 100=volumetric 101=static weight 102=dynamic weight 103=factory trim standard calibration 104=user trim standard calibration 105=factory trim special calibration 106=user trim special calibration 255=others
24	2024	SENSOR_CAL_LOC	–	O/S	Set/indicate the location of the last sensor calibration.
25	2025	SENSOR_CAL_DATE	–	O/S	Set/indicate the date of the last sensor calibration.
26	2026	SENSOR_CAL_WHO	–	O/S	Set/indicate the name of the person responsible for the last sensor calibration.
27	2027	SECONDARY_VALUE	–	–	The secondary value (istatic pressure) of transducer.
28	2028	SECONDARY_VALUE_UNIT	MPa	–	The engineering unit of secondary value.
29	2029	TERTIARY_VALUE	–	–	The tertiary value (Temperature) of transducer.
30	2030	TERTIARY_VALUE_UNIT	C	O/S	The engineering unit of tertiary value.
31	2031	TRIM_PV_ZERO	0	O/S	The trim zero of primary value.
32	2032	TRIM_MODE	Trim disable	O/S	Trim disable: Prohibit zero/span calibration Trim enable: Enable zero/span calibration Trim data clear: Clear zero/span calibration
33	2033	EXT_ZERO_ENABLE	Enable	O/S	The permission of external SW for trim zero.
34	2034	MODEL	Model code	–	The model code.
35	2035	DISPLAY_MODE	Specified at the time of order	O/S	The mode of display. 1=Engineering unit, 2=% display, 3=1/10@Engr. Unit, 4=1/100@Engr. Unit, 5=1/1000@Engr. Unit, 6=1/10000@Engr. Unit, 7=1/1000000@Engr. Unit.
36	2036	DISPLAY_CYCLE	1	O/S	The cycle of display on LCD.
37	2037	ALARM_SUM	Disable	–	The current alert status, unacknowledged status, unreported status and disabled status of the alarms associated with the function block.
38	2038	TEST_1	–	–	Not used for EJA.
39	2039	TEST_2	–	–	Not used for EJA.
40	2040	TEST_3	–	–	Not used for EJA.
41	2041	TEST_4	–	–	Not used for EJA.
42	2042	TEST_5	–	–	Not used for EJA.
43	2043	TEST_6	–	–	Not used for EJA.
44	2044	TEST_7	–	–	Not used for EJA.
45	2045	TEST_8	–	–	Not used for EJA.
46	2046	TEST_9	–	–	Not used for EJA.
47	2047	TEST_10	–	–	Not used for EJA.
48	2048	TEST_11	–	–	Not used for EJA.
49	2049	TEST_12	–	–	Not used for EJA.
50	2050	TEST_13	–	–	Not used for EJA.
51	2051	TEST_14	–	–	Not used for EJA.
52	2052	TEST_15	–	–	Not used for EJA.
53	2053	TEST_16	–	–	Not used for EJA.
54	2054	TEST_17	–	–	Not used for EJA.

TA0103-2.EPS

# APPENDIX 2. APPLICATION, SETTING AND CHANGE OF BASIC PARAMETERS

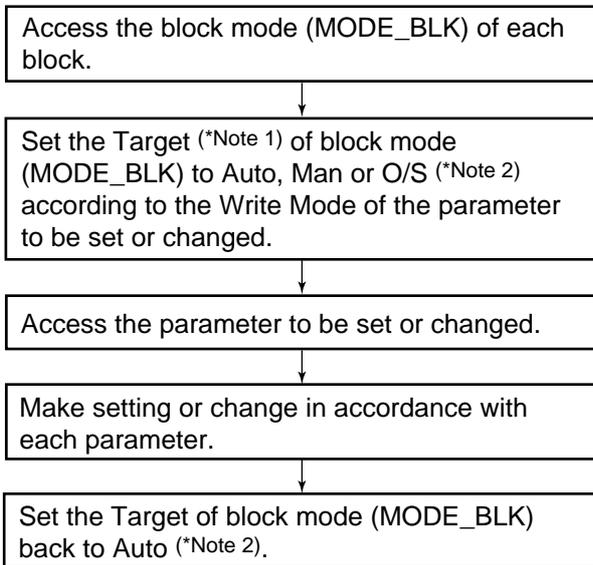
## A2.1 Applications and Selection of Basic Parameters

Setting Item (applicable parameters)	Summary
Tag No. (PD_TAG)	Sets PD Tag and each block tag. Up to 32 alphanumeric characters can be set for both tags. Refer to "Tag and address" in Section 5.4.
Calibration range setup (XD_SCALE)	Sets the range of input from the transducer block corresponding to the 0% and 100% points in operation within the AI1 function block. The calibrated range (0% and 100%) is the factory default setting. Sets the range unit, input value of the 0% point (lower range limit), input value of the 100% point (higher range limit), and the 4 data at the decimal point.
Output scale setup (OUT_SCALE)	Sets the scale of output corresponding to the 0% and 100% points in operation within the AI1 function block. It is possible to set a unit and scale that differs from the calibration range. Sets the range unit, input value of the 0% point (lower bound of output scale), input value of the 100% point (upper bound of output scale), and the 4 data at the decimal point.
Scale range and unit of built-in indicator setup (OUT_SCALE)	The range determined with the output scale becomes the scale and unit of the built-in indicator. Note: If a built-in indicator is available, the lower bound and the upper bound of the range (numeric string excluding the decimal point if it is included) may be set in a range from -19999 to 19999. Down to the third decimal position can be set.
Output mode setup (L_TYPE)	Selects the operation function of the AI function block. It may be chosen from among Direct, Indirect, and IndirectSQRT. Direct: The output of the transducer block is directly output only via filtering without scaling and square root extraction. Indirect: Output processed by proportion at the AI function block. IndirectSQRT: Output processed by square root extraction at the AI function block.
Output signal low cut mode setup (LOW_CUT)	If the output falls below the setting of this parameter, the output is set to Zero. It can be set individually with Direct, Indirect, and IndirectSQRT.
Damping time constant setup (PV_FTIME)	Sets the time constant of the damping (primary delay) function in the AI function block in seconds.
Simulation setup (SIMULATE)	Performs simulation of the AI function block. The input value and status for the calibration range can also be set. It is recommended that this parameter be used for loop checks and other purposes. Refer to "Simulation Function" in Section 6.3.
Static pressure	Sets the static pressure to be processed by the AI2 function block.
LCD display setup (DISPLAY_MODE, DISPLAY_CYCLE)	Sets the unit to be displayed on the LCD and the display speed. Adjust display speed if a low temperature environment causes a poor LCD display quality.
Temperature unit setup (TERTIARY_VALUE_UNIT)	Sets the temperature unit.
Range change (while applying actual inputs) (CAL_POINT_HI, CAL_POINT_LO)	Sets the range corresponding to the 0% and 100% points while adding the real input. It is possible to set output to correctly match the user's reference device output.
Zero-point adjustment (TRIM_PV_ZERO, EXT_ZERO_ENABLE)	Performs zero-point adjustment. There are two methods for adjustment, (1) using an external zero-point adjustment screw, and (2) by using the parameter of the transducer block.

TA0201.EPS

## A2.2 Setting and Change of Basic Parameters

This section describes the procedure taken to set and change the parameters for each block. Obtaining access to each parameter differs depending on the configuration system used. For details, refer to the instruction manual for each configuration system.



FA0201.EPS



### IMPORTANT

Do not turn the power OFF immediately after parameter setting. When the 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: Block mode consists of the following four modes that are controlled by the universal parameter that displays the running condition of each block.

Target: Sets the operating condition of the block.

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.

Note 2: The following are the operating conditions which the individual blocks will take.

	AI Function Block	Transducer Block	Resource Block
Automatic (Auto)	Yes	Yes	Yes
Manual (Man)	Yes		
Out of Service (O/S)	Yes	Yes	Yes

TA0202.EPS

Refer to the “List of parameters for each block of the EJA” for details of the Write Mode for each block.

## A2.3 Setting the AI1 Function Block

The AI1 function block outputs the differential pressure signals.

### (1)Setting the calibration range

Access the XD\_SCALE parameter.  
 Set the higher range value to EU at 100% on XD\_SCALE.  
 Set the lower range value to EU at 0% on XD\_SCALE.  
 Set the necessary unit to Units Index.  
 Set the decimal position of 2 to Decimal Point.

FA0202.EPS

Example:

To measure 0 to 100kPa,

Set 100 to EU at 100% on XD\_SCALE,

Set 0 to EU at 0% on XD\_SCALE, and

Set 1133 to Units Index on XD\_SCALE (\*Note).

Note 1: Each unit is expressed using a 4-digit numeric code. Refer to the table 5.15 in 5.6.3 for each unit and the corresponding 4-digit codes.

Note 2: Consider the following precautions when selecting each unit.

- Do not select a unit in gauge for an absolute pressure gauge (EJA310).
- Do not select the unit in abs for a gauging pressure gauge (EJA430, EJA438W, and EJA438N).

### (2)Setting the output scale

Access the OUT\_SCALE parameter.  
 Set an output value corresponding to the higher range value to EU at 100% on OUT\_SCALE.  
 Set an output value corresponding to the lower range value to EU at 0% on OUT\_SCALE.  
 Set the necessary unit of output to Units Index.  
 Set the decimal position to Decimal Point.

FA0203.EPS

Example:

To set the output to 0.00 to 100.00%,

Set 100 to EU at 100% on OUT\_SCALE,

Set 0 to EU at 0% on OUT\_SCALE,

Set 1342 to Units Index on OUT\_SCALE, and

Set 2 to Decimal Point on OUT\_SCALE.

**Restrictions imposed when the device is equipped with a built-in indicator.**

When the output mode (L\_TYPE) is set as Indirect or IndirectSQRT, the range determined by the output scale corresponds to the scale and unit of the indicator. Set the lower and higher value of the range (numeric string excluding decimal point if the decimal point is included) in a range of -19999 to 19999. Down to the third decimal position can be set. (When the output mode (L\_TYPE) is set as Direct, unit determined at XD\_SCALE is displayed.)

- Pa: 1130, 1541(abs), 1542(gauge)
- MPa: 1132, 1545(abs), 1546(gauge)
- kPa: 1133, 1547(abs), 1548(gauge)
- bar: 1137
- mbar: 1138
- torr: 1139
- atm: 1140
- psi: 1141, 1142(abs), 1143(gauge)
- g/cm<sup>2</sup>: 1144, 1155(abs), 1156(gauge)
- kg/cm<sup>2</sup>: 1145, 1157(abs), 1158(gauge)
- inH<sub>2</sub>O: 1146, 1559(abs), 1560(gauge), 1147(4°C), 1561(abs), 1562(gauge), 1148(6°F), 1569(abs), 1564(gauge)
- mmH<sub>2</sub>O: 1149, 1565(abs), 1566(gauge), 1150(4°C), 1567(abs), 1568(gauge), 1151(6°F), 1569(abs), 1576(gauge)
- ftH<sub>2</sub>O: 1152, 1571(abs), 1572(gauge), 1153(4°C), 1573(abs), 1574(gauge), 1154(6°F), 1575(abs), 1576(gauge)
- inHg: 1155, 1577(abs), 1578(gauge), 1156(0°C), 1579(abs), 1580(gauge)
- mmHg: 1157, 1581(abs), 1582(gauge), 1158(0°C), 1583(abs), 1584(gauge)
- %: 1342

**(3)Setting the output mode**

Access the L\_TYPE parameter.  
Set the output mode.

- 1: Direct (Sensor output value)
- 2: Indirect (Linear output value)
- 3: IndirectSQRT (Square root extraction output value)

FA0204.EPS

**(4)Setting the output signal Low Cut**

Set the low cut value.

Access the LOW\_CUT parameter.  
Set the value subject to LOW\_CUT.



Access the IO\_OPTS parameter.  
Turn Low cutoff ON.  
If Low cutoff is turned OFF, Low cut function is released.

FA0205.EPS

**(5)Setting the damping time constant**

Access the PV\_FTIME parameter.  
Set the damping time (in seconds).

FA0206.EPS

**(6)Simulation**

By optionally setting the input value to the calibration range and status, perform simulation of the AI function block.

Access the Simulate Status parameter.  
Set the status code.



Access the Simulate Value parameter.  
Set an optional input value.



Access the Simulate En/Disable parameter.  
Set whether Simulation is enabled or disabled.  
2: Enabled  
1: Disabled

FA0207.EPS

If simulation is enabled, AI block uses Simulate Status and Simulate Value as the input, and if disabled, the AI block uses Transducer Status and Transducer Value as input.  
Refer to Section 6.3 Simulation Function.

## A2.4 Setting the AI2 Function Block

The AI2 function block outputs the static pressure signals.

### (1) Setting the static pressure information

The static pressure range and output range can be set using the same procedure as is used for the AI1 function block. For details of how to set these values, refer to “Setting the AI1 function block” in Appendix 2.3.

## A2.5 Setting the Transducer Block

To access function specifics of the EJA of the transducer block, the DD (Device Description) for EJA needs to have been installed in the configuration tool used. For integration of DD, refer to “Integration of DD” in Section 4.4.

### (1) Setting the LCD display

Access the DISPLAY\_MODE parameter and set the unit of display.

- 1: Engineering Unit (Engr. Unit)
- 2: %
- 3: 1/10 @ Engr. Unit
- 4: 1/100 @ Engr. Unit
- 5: 1/1000 @ Engr. Unit
- 6: 1/10000 @ Engr. Unit
- 7: 1/1000000 @ Engr. Unit

Access the DISPLAY\_CYCLE parameter and set display cycle.  
The display cycle is 300 mS x (setting).  
It defaults to 1, but if the LCD display looks unclear when used in lower temperature environments, increase the value as required.

FA0208.EPS

### (2) Setting the unit of temperature

Access the TERTIARY\_VALUE parameter.  
Set the temperature in the following units:

- 1001 = °C
- 1002 = °F

FA0209.EPS

### (3) Range change while applying actual inputs

It is possible to calibrate the sensor by applying the actual inputs to low-pressure and high-pressure points.

Apply the pressure to the low-pressure point from the pressure standard.

Access the TRIM\_MODE parameter.  
Set Trim enable

Access the CAL\_POINT\_LO parameter.  
Write the pressure value being applied in Pa.

Apply the pressure to the high-pressure point from the pressure reference tool.

Access the CAL\_POINT\_HI parameter.  
Write the pressure value being applied in Pa.

Access the TRIM\_MODE parameter.  
Set Trim disable

FA0210.EPS

### (4) Zero-point adjustment

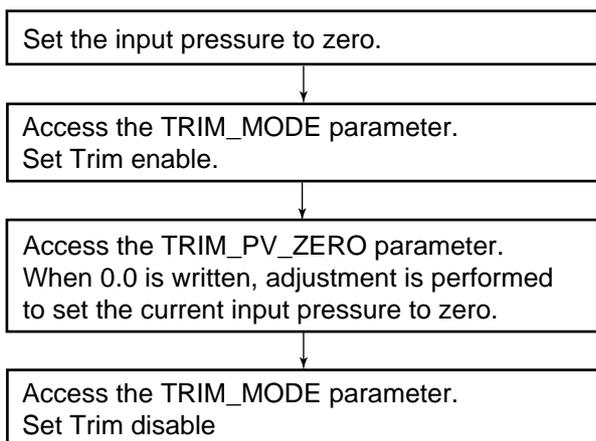
Zero-point adjustment can be performed in various ways.

Choose the optimum method in accordance with the circumstances specific to the application employed.

Adjustment	Summary	
Zero-point adjustment using setting tool.	(a) Set the current input value to 0%.	Set the input signal to 0% status and adjust 0% output.
	(b) Adjust the output to a reference value obtained using other means.	If it is difficult to set input signals such as tank level to 0% status, adjust the output to a reference value obtained using other means.
Zero-point adjustment using an external zero-point adjustment screw.	(c) Perform zero-adjustment with the zero-point adjustment screw attached to the transmitter.	

TA0203.EPS

- (a) Perform the following procedure to set the current output value to 0%.



Note: TRIM\_PV\_ZERO allows only 0 to be executable.

FA0211.EPS

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

Current level: 45%

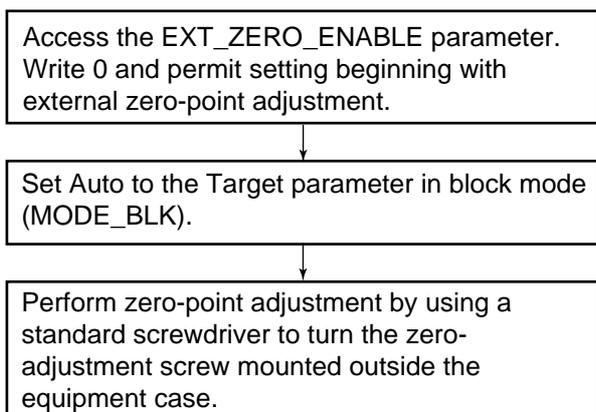
Current output: 42% (output range value)

Current setting of calibration range: 0 - 100kPa

In order to adjust the current output with the actual level, it is necessary to shift current output so as to indicate the actual correct level with the XD\_SCALE parameter. For details of how to set the XD\_SCALE parameter, refer to “Setting the output scale” in Section A2.3 (2).

- (c) Zero-point adjustment using an external zero-adjustment screw

If zero- adjustment by means of adjustment screw is permitted, perform adjustment by turning the screw.



FA0212.EPS

Turning the screw clockwise causes the output value to increase while turning it counterclockwise causes the output to decrease; zero-point can be adjusted with a resolution of 0.001% of URV.

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

# APPENDIX 3. OPERATION OF EACH PARAMETER IN FAILURE MODE

- Following table summarizes the value of EJA parameters when LCD display indicates an Alarm. (1)

ALARM Display	Cause of Alarm	Resource Block	Transducer Block	Function Block	
AL. 01	Capsule Module Failure	-	BLOCK_ERR=Input Failure	-	
			XD_ERROR=Mechanical Failure		
			PV. STATUS=BAD: Sensor Failure		PV. STATUS=BAD: Sensor Failure
			SV. STATUS=BAD: Sensor Failure		OUT. STATUS=BAD: Sensor Failure
AL. 02	AMP Module Failure 1	-	BLOCK_ERR=Device Needs Maintenance Now	-	
			XD_ERROR=I/O Failure or Electronics Failure		
			PV. STATUS=BAD: Device Failure		PV. STATUS=BAD: Device Failure
			SV. STATUS=BAD: Device Failure		OUT. STATUS=BAD: Device Failure
AL. 03	AMP Module Failure 2	BLOCK_ERR=Lost Static Data or Lost NV Data	-	-	
			-		
			PV. STATUS=BAD: Non Specific		PV. STATUS=BAD: Non Specific
			SV. STATUS=BAD: Non Specific		OUT. STATUS=BAD: Non Specific
AL. 20	All Block is not scheduled	-	-	-	
				PV. STATUS=HOLD	
				OUT. STATUS=HOLD	
AL. 21	Resource Block is in O/S mode	BLOCK_ERR=Out of Service	-	BLOCK_ERR=Out of Service	
		-	PV. STATUS=BAD: Non Specific	PV. STATUS=HOLD	
		-	SV. STATUS=BAD: Non Specific	OUT. STATUS=BAD: Out of Service	
AL. 22	Transducer Block is in O/S mode	-	BLOCK_ERR=Out Of Service	-	
			PV. STATUS=BAD: Out Of Service	PV. STATUS=BAD: Non Specific	
			SV. STATUS=BAD: Out Of Service	OUT. STATUS=BAD: Non Specific	

TA0301-1.EPS

- Following table summarizes the value of EJA parameters when LCD display indicates an Alarm.  
(2)

ALARM Display	Cause of Alarm	Resource Block	Transducer Block	Function Block
AL. 23	AI1 Function Block is in O/S mode	-	-	BLOCK_ERR=Out Of Service
				PV. STATUS=HOLD
				OUT. STATUS=BAD: Out of Service
AL. 41	Differential Pressure is out of normal range	-	PV. STATUS= UNCERTAIN: Sensor Conversion not accurate	PV. STATUS= UNCERTAIN: Non Specific
			SV. STATUS= UNCERTAIN: Non Specific	OUT. STATUS= UNCERTAIN: Non Specific
AL. 42	Static Pressure is out of normal range	-	PV. STATUS= UNCERTAIN: Non Specific	PV. STATUS= UNCERTAIN: Non Specific
			SV. STATUS= UNCERTAIN: Sensor Conversion not accurate	OUT. STATUS= UNCERTAIN: Non Specific
AL. 43	Fluid temperature is out of normal range	-	PV. STATUS= UNCERTAIN: Non Specific	PV. STATUS= UNCERTAIN: Non Specific
			SV. STATUS= UNCERTAIN: Non Specific	OUT. STATUS= UNCERTAIN: Non Specific
AL. 61	Data is out of LCD display range	-	-	-
AL. 62	Simulation is enabled in AI1 Function Block	BLOCK_ERR= Simulate Active	-	BLOCK_ERR= Simulate Active
AL. 63	AI1 Function Block is in Manual mode	-	-	OUT. STATUS=HOLD (When "if Man Mode" is not set.) or =Uncertain Substitute (When OUT is changed)
AL. 64	Zero Adjust value is out of normal range	-	PV. STATUS=BAD: Configuration Error	PV. STATUS= BAD: Non Specific (for AI1)
			-	OUT. STATUS= BAD: Non Specific (for AI1)

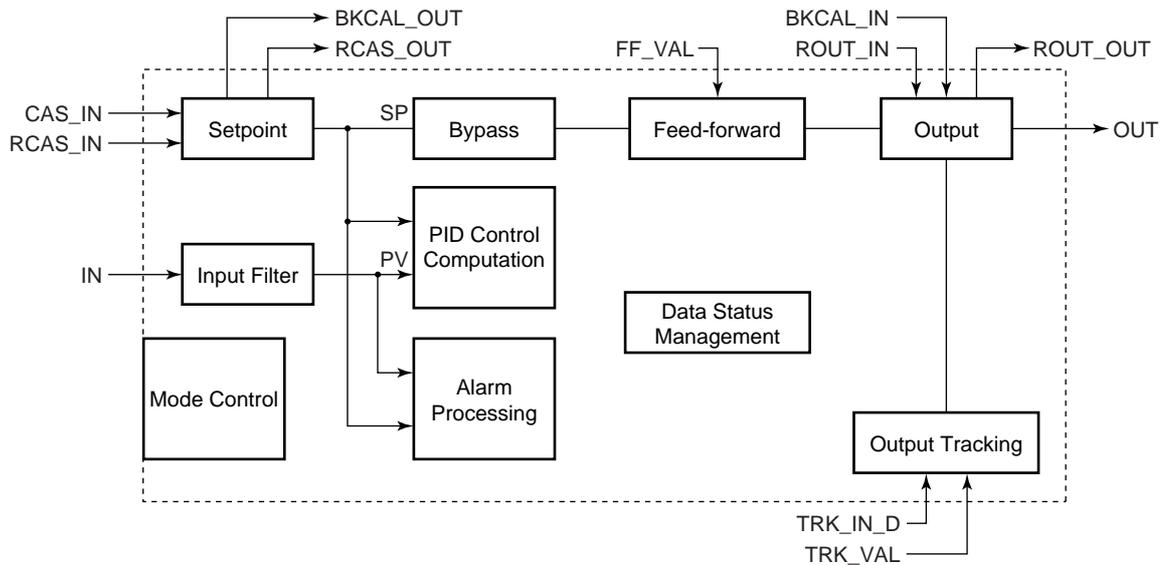
TA0301-2.EPS

# APPENDIX 4. PID BLOCK

A PID block performs the PID control computation based on the deviation of the measured value (PV) from the setpoint (SV), and is generally used for constant-setpoint and cascaded-setpoint control.

## A4.1 Function Diagram

The figure below depicts the function diagram of a PID block.



FA0401.EPS

## A4.2 Functions of PID Block

The table below shows the functions provided in a PID block.

Function	Description
PID control computation	Computes the control output in accordance with the PID control algorithm.
Control output	Converts the change in control output $\Delta MV$ to the manipulated value MV that is to be actually output.
Switching of direction of control action	Switches over the direction of control action between direct and reverse, i.e., the direction of changes in the control output depending on the changes in the deviation.
Control action bypass	When the bypass is on, the value of the SP is scaled to the range of the OUT and output as the OUT.
Feed-forward	Adds the value of the FF_VAL (input to the PID block) to the output from the PID computation.
Measured-value tracking	Equalizes the setpoint SP to the measured value PV.
Setpoint limiters	Limit the value of setpoint SP within the preset upper and lower levels as well as limit the rate of change when the PID block is in Auto mode.
External-output tracking	Performs the scaling of the value of TRK_VAL to the range of the OUT and outputs it as the OUT.
Mode change	Changes the block mode between 8 modes: O/S, IMan, LO, Man, Auto, Cas, RCas, ROut.
Bumpless transfer	Prevents a sudden change in the control output OUT at changes in block mode and at switching of the connection from the control output OUT to the cascaded secondary function block.
Initialization and manual fallback	Changes the block mode to IMan and suspends the control action when the specified condition is met.
Manual fallback	Changes the block mode to Man and aborts the control action.
Auto fallback	Changes the block mode to Auto when it is Cas, and continues the control action with the setpoint set by the operator.
Mode shedding upon computer failure	Changes the block mode in accordance with the SHED_OPT setting upon a computer failure.
Alarm processing	Generates block alarms and process alarms, and performs event updates.

TA0401.EPS

### A4.3 Parameters of PID Block

NOTE: In the table below, the Write column shows the modes in which the respective parameters can be written. A blank in the Write column indicates that the corresponding parameter can be written in all modes of the PID block. A dash (-) indicates that the corresponding parameter cannot be written in any mode.

Index	Parameter Name	Default (factory setting)	Write	Valid Range	Description
0	Block Header	TAG: "PID"	Block Tag = O/S		Same as that for an AI block.
1	ST_REV		—		Same as that for an AI block.
2	TAG_DESC	(blank)			Same as that for an AI block.
3	STRATEGY	1			Same as that for an AI block.
4	ALERT_KEY	1		1 to 255	Same as that for an AI block.
5	MODE_BLK				
6	BLOCK_ERR		—		Same as that for an AI block.
7	PV		—		Measured value; the non-dimensional value that is converted from the input (IN) value based on the PV_SCALE values and filtered.
8	SP	0	AUTO	PV_SCALE ±10%	Setpoint
9	OUT		MAN		Output
10	PV_SCALE	100 0 1133 1	O/S		Upper and lower scale limit values used for scaling of the input (IN) value.
11	OUT_SCALE	100 0 1342 1	O/S		Upper and lower scale limit values used for scaling of the control output (OUT) value to the values in the engineering unit.
12	GRANT_DENY	0	AUTO		Same as that for an AI block.
13	CONTROL_OPTS	0	O/S		Setting for control action. See Section A4.13 for details.
14	STATUS_OPTS	0	O/S		See Section A4.15 for details.
15	IN	0			Controlled-value input
16	PV_FTIME	2	AUTO	Non-negative	Time constant (in seconds) of the first-order lag filter applied to IN
17	BYPASS	1 (off)	MAN	1, 2	Whether to bypass the control computation. 1 (off): Do not bypass. 2 (on): Bypass.
18	CAS_IN	0			Cascade setpoint
19	SP_RATE_DN	+INF		Positive	Rate-of-decrease limit for setpoint (SP)
20	SP_RATE_UP	-INF		Positive	Rate-of-increase limit for setpoint (SP)
21	SP_HI_LIM	100		PV_SCALE ±10%	Upper limit for setpoint (SP)
22	SP_LO_LIM	0		PV_SCALE ±10%	Lower limit for setpoint (SP)
23	GAIN	1			Proportional gain (= 100 / proportional band)
24	RESET	10			Integration time (seconds)
25	BAL_TIME	0		Positive	Unused
26	RATE	0		Positive	Derivative time (seconds)
27	BKCAL_IN	0			Read-back of control output
28	OUT_HI_LIM	100		OUT_SCALE ±10%	Upper limit for control output (OUT)
29	OUT_LO_LIM	0		OUT_SCALE ±10%	Lower limit for control output (OUT)
30	BKCAL_HYS	0.5 (%)		0 to 50%	Hysteresis for release from a limit for OUT.status
31	BKCAL_OUT	0	—		Read-back value to be sent to the BKCAL_IN in the upper block
32	RCAS_IN	0			Remote setpoint set from a computer, etc.
33	ROUT_IN	0			Remote control output value set from a computer, etc.

TA0402-1.EPS

Index	Parameter Name	Default (factory setting)	Write	Valid Range	Description
34	SHED_OPT	0			Action to be performed in the event of mode shedding. SHED_OPT defines the changes to be made to MODE_BLK.target and MODE_BLK.actual when the value of RCAS_IN.status or ROU_OUT.status becomes Bad if .MODE_BLK.actual = RCas or ROut. See Section A4.17.1 for details.
35	RCAS_OUT	0	—		Remote setpoint sent to a computer, etc.
36	ROU_OUT	0	—		Remote control output value
37	TRK_SCALE	100 0 1342 1	MAN		Upper and lower scale limits used to convert the output tracking value (TRK_VAL) to non-dimensional.
38	TRK_IN_D	0			Switch for output tracking. See Section A4.12 for details.
39	TRK_VAL	0			Output tracking value (TRK_VAL) When MODE_BLK.actual = LO, the value scaled from the TRK_VAL value is set in OUT.
40	FF_VAL	0			Feedforward input value. The FF_VAL value is scaled to a value with the same scale as for OUT, multiplied by the FF_GAIN value, and then added to the output of the PID computation.
41	FF_SCALE	100 0 1342 1	MAN		Scale limits used for converting the FF_VAL value to a non-dimensional value.
42	FF_GAIN	0	MAN		Gain for FF_VAL
43	UPDATE_EVT		—		Same as that for an AI block.
44	BLOCK_ALM		—		Same as that for an AI block.
45	ALARM_SUM	Enable			Same as that for an AI block.
46	ACK_OPTION	0xFFFF			Same as that for an AI block.
47	ALARM_HYS	0.5%		0 to 50%	Hysteresis for alarm detection and resetting to prevent each alarm from occurring and recovering repeatedly within a short time.
48	HI_HI_PRI	0		0 to 15	Priority order of HI_HI_ALM alarm
49	HI_HI_LIM	+INF		PV_SCALE	Setting for HI_HI_ALM alarm
50	HI_PRI	0		0 to 15	Priority order of HI_ALM alarm
51	HI_LIM	+INF		PV_SCALE	Setting for HI_ALM alarm
52	LO_PRI	0		0 to 15	Priority order of LO_ALM alarm
53	LO_LIM	-INF		PV_SCALE	Setting for LO_ALM alarm
54	LO_LO_PRI	0		0 to 15	Priority order of LO_LO_ALM alarm
55	LO_LO_LIM	-INF		PV_SCALE	Setting for LO_LO_ALM alarm
56	DV_HI_PRI	0		0 to 15	Priority order of DV_HI_ALM alarm
57	DV_HI_LIM	+INF			Setting for DV_HI_ALM alarm
58	DV_LO_PRI	0		0 to 15	Priority order of DV_LO_ALM alarm
59	DV_LO_LIM	-INF			Setting for DV_LO_ALM alarm
60	HI_HI_ALM	—	—		Alarm that is generated when the PV value has exceeded the HI_HI_LIM value and whose priority order* is defined in HI_HI_PRI. * Priority order: Only one alarm is generated at a time. When two or more alarms occur at the same time, the alarm having the highest priority order is generated. When the PV value has decreased below [HI_HI_LIM - ALM_HYS], HI_HI_ALM is reset.
61	HI_ALM	—	—		As above
62	LO_ALM	—	—		As above Reset when the PV value has increased above [LO_LIM + ALM_HYS].
63	LO_LO_ALM	—	—		As above
64	DV_HI_ALM	—	—		Alarm that is generated when the value of [PV - SP] has exceeded the DV_HI_LIM value. Other features are the same as HI_HI_ALM.
65	DV_LO_ALM	—	—		Alarm that is generated when the value of [PV - SP] has decreased below the DV_LO_LIM value. Other features are the same as LO_LO_ALM.

TA0402-2.EPS

## A4.4 PID Computation Details

### A4.4.1 PV-proportional and -derivative Type PID (I-PD) Control Algorithm

For PID control, the PID block in an EJA employs the PV-proportional and PV-derivative type PID control algorithm (referred to as the I-PD control algorithm) in Auto and RCas mode. The I-PD control algorithm ensures control stability against sudden changes in the setpoint, such as when the user enters a new setpoint value. At the same time, the I-PD algorithm ensures excellent controllability by performing proportional, integral, and derivative control actions in response to changes of characteristics in the controlled process, changes in load, and occurrences of disturbances.

In Cas mode, PV derivative type PID control algorithm (referred to as the PI-D control algorithm) is employed in order to obtain better performance against the changes in the setpoint. The algorithm is automatically switched by the block according to the mode. A basic form of each algorithm is expressed in the equation below.

#### I-PD Control Algorithm (in Auto / RCas mode)

$$\Delta MV_n = K \left\{ \Delta PV_n + \frac{\Delta T}{T_i} (PV_n - SP_n) + \frac{T_d}{\Delta T} \Delta(\Delta PV_n) \right\}$$

#### PI-D Control Algorithm (in Cas mode)

$$\Delta MV_n = K \left\{ \Delta(PV_n - SP_n) + \frac{\Delta T}{T_i} (PV_n - SP_n) + \frac{T_d}{\Delta T} \Delta(\Delta PV_n) \right\}$$

Where,

- $\Delta MV_n$  = change in control output
- $\Delta PV_n$  = change in measured (controlled) value =  $PV_n - PV_{n-1}$
- $\Delta T$  = control period = period\_of\_execution in Block Header
- $K$  = proportional gain = GAIN (= 100/proportional band)
- $T_i$  = integral time = RESET
- $T_d$  = derivative time = RATE

The subscripts, n and n-1, represent the time of sampling such that  $PV_n$  and  $PV_{n-1}$  denote the PV value sampled most recently and the PV value sampled at the preceding control period, respectively.

### A4.4.2 PID Control Parameters

The table below shows the PID control parameters.

Parameter	Description	Valid Range
GAIN	Proportional gain	0.05 to 20
RESET	Integral time	0.1 to 10,000 (seconds)
RATE	Derivative time	0 to infinity (seconds)

TA0403.EPS

## A4.5 Control Output

The final control output value, OUT, is computed based on the change in control output  $\Delta MV_n$ , which is calculated at each control period in accordance with the aforementioned algorithm. The PID block in an EJA performs the velocity type output action for the control output.

### A4.5.1 Velocity Type Output Action

The PID block determines the value of the new control output OUT by adding the change in control output calculated in the current control period,  $\Delta MV_n$ , to the current read-back value of the MV,  $MV_{RB}$  (BKCAL\_IN). This action can be expressed as:

$$\Delta MV_n' = \Delta MV_n * (OUT\_SCALE.EU100 - OUT\_SCALE.EU_0) / (PV\_SCALE.EU_100 - PV\_SCALE.EU_0)$$

(Direct Acting is False in CONTROL\_OPTS)

$$OUT = BKCAL\_IN - \Delta MV_n'$$

(Direct Acting is True in CONTROL\_OPTS)

$$OUT = BKCAL\_IN + \Delta MV_n'$$

## A4.6 Direction of Control Action

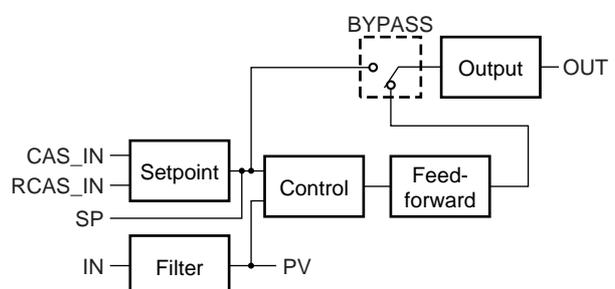
The direction of the control action is determined by the Direct Acting setting in CONTROL\_OPTS.

Value of Direct Acting	Resulting Action
True	The output increases when the input PV is greater than the setpoint SP.
False	The output decreases when the input PV is greater than the setpoint SP.

TA0404.EPS

## A4.7 Control Action Bypass

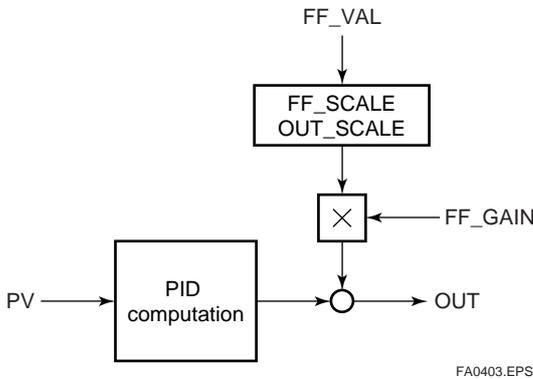
The PID control computation can be bypassed so as to set the SP value in the control output OUT as shown below. Setting BYPASS to "On" bypasses the PID control computation.



FA0402.EPS

### A4.8 Feed-forward

Feed-forward is an action to add a compensation output signal FF\_VAL to the output of the PID control computation, and is typically used for feed-forward control. The figure below illustrates the action.



### A4.9 Block Modes

The block mode is set in the parameter MODE-BLK.

MODE_BLK	Target	Stipulates the target mode to which the PID block transfers.
	Actual	Indicates the current mode of the PID block.
	Permitted	Stipulates all the modes that the PID block can enter. The PID block is prohibited to enter any mode other than those set in this element.
	Normal	Stipulates the mode in which the PID block normally resides.

TA0405.EPS

There are eight modes for a PID block as shown below.

Block Mode	Description
ROut	Remote output mode, in which the PID block outputs the value set in ROUT_IN.
RCas	Remote cascade mode, in which the PID block carries out the PID control computation based on the setpoint (SP) set via the remote cascade connection, such as from a computer, and outputs the computed result.
Cas	Cascade mode, in which the PID block carries out the PID control computation based on the setpoint (SP) set from another fieldbus function block, and outputs the computed result.
Auto	The PID block carries out automatic control and outputs the result computed by the PID control computation.
Man	Manual mode, in which the PID block outputs the value set by the user manually.
LO	The PID block outputs the value set in TRK_VAL.

TA0406-1.EPS

Block Mode	Description
IMan	Initialization and manual mode, in which the control action is suspended. The PID block enters this mode when the specified condition is met (see Section A4.14).
O/S	Out of service mode, in which neither the control computation nor action is carried out, and the output is kept at the value that was output before the PID block entered into O/S mode.

TA0406-2.EPS

#### A4.9.1 Mode Transitions

Transition Destination Mode	Condition	NOT Conditions
O/S	1. If O/S is set in <b>MODE_BLK.target</b> (or if O/S is set in <b>target</b> inside the resource block)	
IMan	2. If the specified condition is met (see Section A4.14)	<b>NOT</b> if condition 1 is met
LO	3. If Track Enable is specified in <b>CONTROL_OPTS</b> and the value of <b>TRK_IN_D</b> is true	<b>NOT</b> if either or both of conditions 1 and 2 are met
Man	4. If Man is set in <b>MODE_BLK.target</b> or if <b>IN.status</b> (input status) is Bad	<b>NOT</b> if any one or more of conditions 1 to 3 are met
Auto*	5. If Auto is set in <b>MODE_BLK.target</b> - <b>AND</b> - if <b>IN.status</b> (input status) is not Bad	<b>NOT</b> if any one or more of conditions 1 to 3 are met
Cas***	6. If Cas is set in <b>MODE_BLK.target</b> - <b>AND</b> - if neither <b>IN.status</b> (input status) nor <b>CAS_IN.status</b> is Bad.	<b>NOT</b> if any one or more of conditions 1 to 3 are met
RCas***	7. If RCas is set in <b>MODE_BLK.target</b> - <b>AND</b> - if neither <b>IN.status</b> (input status) nor <b>RCAS_IN.status</b> is Bad.	<b>NOT</b> if any one or more of conditions 1 to 3 are met.
ROut***	8. If ROut is set in <b>MODE_BLK.target</b> - <b>AND</b> - if <b>ROUT_IN.status</b> (input status) is not Bad	<b>NOT</b> if any one or more of conditions 1 to 3 are met.
In accordance with the <b>SHED_OPT</b> setting	9. If <b>RCAS_IN.status</b> or <b>ROUT_IN.status</b> is Bad (indicating a computer failure; see Section A4.17.1 for details)	

TA0407.EPS

\* To activate mode transitions to Auto, Cas, RCas, and ROut, the respective target modes must be set beforehand to **MODE\_BLK.permitted**.

\*\* A transition to Cas, RCas, or ROut requires that initialization of the cascade connection has been completed.

## A4.10 Bumpless Transfer

Prevents a sudden change in the control output OUT at changes in block mode (MODE\_BLK) and at switching of the connection from the control output OUT to the cascaded secondary function block. The action to perform a bumpless transfer differs depending on the MODE\_BLK values.

## A4.11 Setpoint Limiters

Active setpoint limiters that limit the changes in the SP value, differ depending on the block mode as follows.

### A4.11.1 When PID Block Is in Auto Mode

When the value of MODE\_BLK is Auto, the four types of limiters are in force: high limit, low limit, rate-of-increase limit, and rate-of-decrease limit.

#### Setpoint High/Low Limits

- A value larger than the value of SP\_HI\_LIM cannot be set for SP.
- A value smaller than the value of SP\_LO\_LIM cannot be set for SP.

#### Setpoint Rate Limits

The setpoint rate limits are used to restrict the magnitude of changes in the SP value so as to change the SP value gradually towards a new setpoint.

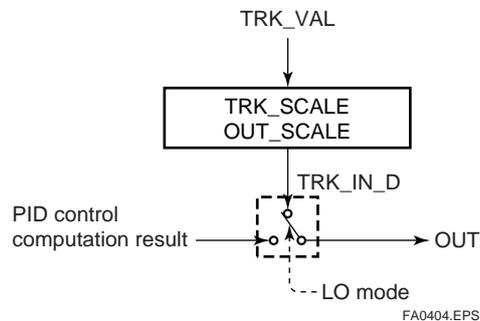
- An increase of the SP value at each execution period (period of execution in the Block Header) is limited to the value of SP\_RATE\_UP.
- A decrease of the SP value at each execution period (period of execution in the Block Header) is limited to the value of SP\_RATE\_DOWN.

### A4.11.2 When PID Block Is in Cas or RCas Mode

By selecting Obey SP Limits if Cas or RCas in CONTROL\_OPTS (see Section A4.13), the setpoint high/low limits can be put into force also when the value of MODE\_BLK is Cas or RCas.

## A4.12 External-output Tracking

External tracking is an action of outputting the value of the remote output TRK\_VAL set from outside the PID block, as illustrated in the figure below. External tracking is performed when the block mode is LO.



To change the block mode to LO:

- (1) Select Track Enable in CONTROL\_OPTS.
- (2) Set TRK\_IN\_D to true.

However, to change the block mode from Man to LO, Track in Manual must also be specified in CONTROL\_OPTS.

## A4.13 Measured-value Tracking

Measured-value tracking, also referred to as SP-PV tracking, is an action to equalize the setpoint SP to the measured value PV when the block mode (MODE\_BLK.actual) is Man in order to prevent a sudden change in control output from being caused by a mode change to Auto.

While a cascade primary control block is performing the automatic or cascade control (in the Auto or Cas mode), when the mode of its secondary control block is changed from Cas to Auto, the cascade connection is opened and the control action of the primary block stops. The SP of the secondary controller can be equalized to its cascade input signal CAS\_IN also in this case.

The settings for measured-value tracking are made in the parameter CONTROL\_OPTS, as shown in the table below.

Options in CONTROL_OPTS	Description
Bypass Enable	This parameter allows BYPASS to be set.
SP-PV Track in Man	Equalizes SP to PV when <b>MODE_BLK.target</b> is set to Man.
SP-PV Track in ROut	Equalizes SP to PV when <b>MODE_BLK.target</b> is set to ROut.
SP-PV Track in LO or IMan	Equalizes SP to PV when actual is set to LO or IMan.
SP-PV Track retained Target	Equalizes SP to RCAS_IN when <b>MODE_BLK.target</b> is set to RCas, and to CAS_IN when the actual mode of the block is IMan, LO, Man or ROut.
Direct Acting	Set the PID block to a direct acting controller.
Track Enable	This enables the external tracking function. The value in TRK_VAL will replace the value of OUT if TRK_IN_D becomes true and the target mode is not Man.
Track in Manual	This enables TRK_VAL to replace the value of OUT when the target mode is Man and TRK_IN_D is true. The actual mode will then be LO.
Use PV for BKCAL_OUT	Sets the value of PV in BKCAL_OUT and RCAS_OUT, instead of the value of SP.
Obey SP limits if Cas or RCas	Puts the setpoint high/low limits in force in the Cas or RCas mode.
No OUT limits in Manual	Disables the high/low limits for OUT in the Man mode.

TA0408.EPS

## A4.14 Initialization and Manual Fallback (IMan)

Initialization and manual fallback denotes a set of actions in which a PID block changes mode to IMan (initialization and manual) and suspends the control action. Initialization and manual fallback takes place automatically as a means of abnormality handling when the following condition is met:

- The quality component of BKCAL\_IN.status is Bad.  
- OR -
- The quality component of BKCAL\_IN.status is Good (c)  
- AND -

The sub-status component of BKCAL\_IN.status is FSA, LO, NI, or IR.

The user cannot manually change the mode to IMan. A mode transition to IMan occurs only when the condition above is met.

## A4.15 Manual Fallback

Manual fallback denotes an action in which a PID block changes mode to Man and suspends the control action. Manual fallback takes place automatically as a means of abnormality handling when the following condition is met:

- IN.status is Bad except when the control action bypass is on.

To enable the manual fallback action to take place when the above condition is met, Target to Manual if BAD IN must be specified beforehand in STATUS\_OPTS.

The table below shows the options in STATUS\_OPTS.

Options in STATUS_OPTS	Description
IFS if BAD IN	Sets the sub-status component of <b>OUT.status</b> to IFS if <b>IN.status</b> is Bad except when PID control bypass is on.
IFS if BAD CAS IN	Sets the sub-status component of <b>OUT.status</b> to IFS if <b>CAS_IN.status</b> is Bad.
Use Uncertain as Good	Does not regard <b>IN</b> as being in Bad status when <b>IN.status</b> is Uncertain (to prevent mode transitions from being affected when it is Uncertain).
Target to Manual if BAD IN	Automatically changes the value of <b>MODE_BLK.target</b> to MAN when <b>IN</b> falls into Bad status.
Target to next permitted mode if BAD CAS IN	Automatically changes the value of <b>MODE_BLK.target</b> to Auto (or to Man if Auto is not set in Permitted) when <b>CAS_IN</b> falls into Bad status.

TA0409.EPS

## A4.16 Auto Fallback

Auto fallback denotes an action in which a PID block changes mode from Cas to Auto and continues automatic PID control with the user-set setpoint. Auto fallback takes place automatically when the following condition is met:

- IN.status (data status of IN) is Bad except when the control action bypass is on.

To enable the manual fallback action to take place when the above condition is met:

- Target to next permitted mode if BAD CAS IN must be previously specified in STATUS\_OPTS.  
- AND -
- Auto must be previously set in **MODE\_BLK.permitted**.

## A4.17 Mode Shedding upon Computer Failure

When the data status of RCAS\_IN or ROUT\_IN, which is the setting received from a computer as the setpoint SP, falls to Bad while the PID block is running in the RCas or ROut mode, the mode shedding occurs in accordance with the settings in SHED\_OPT. If the RCAS\_IN data is not renewed within the time specified by SHED\_RCAS in resource block, the data status of RCAS\_IN falls to Bad.

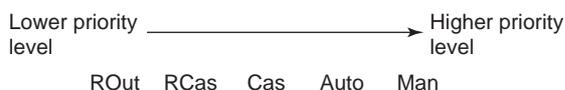
### A4.17.1 SHED\_OPT

The SHED\_OPT setting stipulates the specifications of mode shedding as shown below. Only one can be set.

Available Setting for SHED_OPT	Actions upon Computer Failure
Normal shed, normal return	Sets <b>MODE_BLK.actual</b> to Cas* <sup>1</sup> , and leaves <b>MODE_BLK.target</b> unchanged.
Normal shed, no return	Sets both <b>MODE_BLK.actual</b> and <b>MODE_BLK.target</b> to Cas* <sup>1</sup> .
Shed to Auto, normal return	Sets <b>MODE_BLK.actual</b> to Auto* <sup>2</sup> , and leaves <b>MODE_BLK.target</b> unchanged.
Shed to Auto, no return	Sets both <b>MODE_BLK.actual</b> and <b>MODE_BLK.target</b> to Auto* <sup>2</sup> .
Shed to Manual, normal return	Sets <b>MODE_BLK.actual</b> to Man, and leaves <b>MODE_BLK.target</b> unchanged.
Shed to Manual, no return	Sets both <b>MODE_BLK.actual</b> and <b>MODE_BLK.target</b> to Man.
Shed to retained target, normal return	If Cas is in <b>MODE_BLK.target</b> , sets <b>MODE_BLK.actual</b> to Cas* <sup>1</sup> , and leaves <b>MODE_BLK.target</b> unchanged. If Cas is not set in <b>MODE_BLK.target</b> , sets <b>MODE_BLK.actual</b> to Auto* <sup>2</sup> , and leaves <b>MODE_BLK.target</b> unchanged.
Shed to retained target, no return	If Cas is set in <b>MODE_BLK.target</b> , sets both <b>MODE_BLK.actual</b> and <b>MODE_BLK.target</b> to Cas* <sup>1</sup> . If Cas is not set in <b>MODE_BLK.target</b> , sets <b>MODE_BLK.actual</b> to Auto* <sup>2</sup> , and <b>MODE_BLK.target</b> to Cas.

TA0410.EPS

\*1 The modes to which a PID block can transfer are limited to those set in MODE\_BLK.permitted, and the priority levels of modes are as shown below. In fact, if Normal shed, normal return is set for SHED\_OPT, detection of a computer failure causes MODE\_BLK.actual to change to Cas, Auto, or MAN, whichever is set in MODE\_BLK.permitted and has the lowest priority level.



FA0405.EPS

\*2 Only when Auto is set as permitted mode.

NOTE: If a control block is connected as a cascade primary block of the PID block in question, a mode transition of the PID block to Cas occurs in the following sequence due to initialization of the cascade connection: RCas or ROut  $\rightarrow$  Auto  $\rightarrow$  Cas.

## A4.18 Alarms

There are two kinds of alarms generated by a PID block: block and process alarms.

### A4.18.1 Block Alarm (BLOCK\_ALM)

The block alarm BLOCK\_ALM is generated upon occurrence of either of the following errors (values set in BLOCK\_ERR) and notifies the content of BLOCK\_ERR.

Value of BLOCK_ERR	Condition
Local Override	<b>MODE_BLK</b> actual of PID block is LO.
Input Failure	<b>IN.status</b> of the PID block is either of the following: • Bad-Device Failure • Bad-Sensor Failure
Out of Service	<b>MODE_BLK.target</b> of the PID block is O/S.

TA0411.EPS

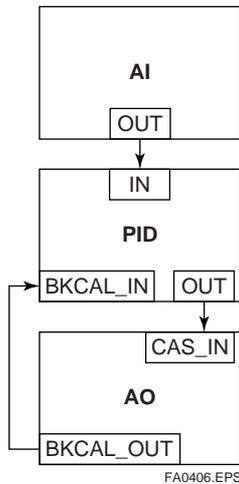
### A4.18.2 Process Alarms

There are six types of process alarms. Only one process alarm can be generated at the same time, and the process alarm having the highest priority level from among those occurring at the same time is generated. The priority level is set for each process alarm type.

Process Alarm	Cause of Occurrence	Parameter Containing Priority Level Setting
HI_HI_ALM	Occurs when the PV increases above the HI_HI_LIM value.	HI_HI_PRI
HI_ALM	Occurs when the PV increases above HI_LIM value.	HI_PRI
LO_ALM	Occurs when the PV decreases below the LO_LIM value.	LO_PRI
LO_LO_ALM	Occurs when the PV decreases below the LO_LO_LIM value.	LO_LO_LIM
DV_HI_ALM	Occurs when the value of [PV - SP] increases above the DV_HI_LIM value.	DV_HI_PRI
DV_LO_ALM	Occurs when the value of [PV - SP] decreases below the DV_LO_LIM value.	DV_LO_PRI

TA0412.EPS

### A4.19 Example of Block Connections



When configuring a simple PID control loop by combining an EJA transmitter with a fieldbus valve positioner that contains an AO block, follow the procedure below to make the settings of the corresponding fieldbus function blocks:

1. Connect the AI block and PID block of the EJA, and the AO block of the valve positioner as shown above.
2. Set MODE\_BLK.target of the PID block to O/S, and then set GAIN, RESET, and RATE to appropriate values.
3. Check that the value of MODE\_BLK.actual of the AI block is Auto.
4. Set MODE\_BLK.target of the AO block to CAS|AUTO (meaning "Cas and Auto").
5. Check that the value of BKCAL\_IN.status of the PID block is not Bad.
6. Check that the value of IN.status of the PID block is not Bad.
7. Check that Auto is set in MODE\_BLK.permitted of the PID block.
8. Set MODE\_BLK.target of the PID block to Auto.

When finishing all steps in order, the PID block and AO block exchange the respective information and initialize the cascade connection. Consequently, the value of MODE\_BLK.actual of the PID block changes to Auto and automatic PID control starts.

### A4.19.1 View Object for PID Function Block

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
1	ST_REV	2	2	2	2
2	TAG_DESC				
3	STRATEGY				2
4	ALERT_KEY				1
5	MODE_BLK	4		4	
6	BLOCK_ERR	2		2	
7	PV	5		5	
8	SP	5		5	
9	OUT	5		5	
10	PV_SCALE		11		
11	OUT_SCALE		11		
12	GRANT_DENY		2		
13	CONTROL_OPTS				2
14	STATUS_OPTS				2
15	IN			5	
16	PV_FTIME				4
17	BYPASS		1		
18	CAS_IN	5		5	
19	SP_RATE_DN				4
20	SP_RATE_UP				4
21	SP_HI_LIM		4		
22	SP_LO_LIM		4		
23	GAIN				4
24	RESET				4
25	BAL_TIME				4
26	RATE				4
27	BKCAL_IN			5	
28	OUT_HI_LIM		4		
29	OUT_LO_LIM		4		
30	BKCAL_HYS				4
31	BKCAL_OUT			5	
32	RCAS_IN			5	
33	ROUT_IN			5	
	Subtotals	28	43	53	41

TA0413-1.EPS

Relative Index	Parameter Mnemonic	VIEW 1	VIEW 2	VIEW 3	VIEW 4
34	SHED_OPT				1
35	RCAS_OUT			5	
36	ROUT_OUT			5	
37	TRK_SCALE				11
38	TRK_IN_D	2		2	
39	TRK_VAL	5		5	
40	FF_VAL			5	
41	FF_SCALE				11
42	FF_GAIN				4
43	UPDATE_EVT				
44	BLOCK_ALM				
45	ALARM_SUM	8		8	
46	ACK_OPTION				2
47	ALARM_HYS				4
48	HI_HI_PRI				1
49	HI_HI_LIM				4
50	HI_PRI				1
51	HI_LIM				4
52	LO_PRI				1
53	LO_LIM				4
54	LO_LO_PRI				1
55	LO_LO_LIM				4
56	DV_HI_PRI				1
57	DV_HI_LIM				4
58	DV_LO_PRI				1
59	DV_LO_LIM				4
60	HI_HI_ALM				
61	HI_ALM				
62	LO_ALM				
63	LO_LO_ALM				
64	DV_HI_ALM				
65	DV_LO_ALM				
	Subtotals	15	0	30	63
	Totals	43	43	83	104

TA0413-2.EPS

# APPENDIX 5. LINK MASTER FUNCTIONS

## A5.1 Link Active Scheduler

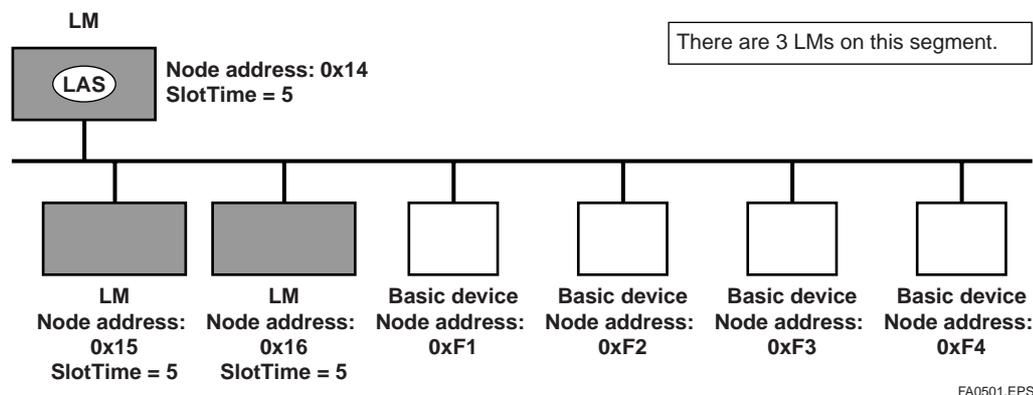
A link active scheduler (LAS) is a deterministic, centralized bus scheduler that can control communications on an H1 fieldbus segment. There is only one LAS on an H1 fieldbus segment.

An EJA supports the following LAS functions.

- PN transmission: Identifies a fieldbus device newly connected to the same fieldbus segment. PN is short for Probe Node.
- PT transmission: Passes a token governing the right to transmit, to a fieldbus device on the same segment. PT is short for Pass Token.
- CD transmission: Carry out a scheduled transmission to a fieldbus device on the same segment. CD is short for Compel Data.
- Time synchronization: Periodically transmits the time data to all fieldbus devices on the segment and returns the time data in response to a request from a device.
- Live list equalization: Sends the live list data to link masters on the same segment.
- LAS transfer: Transfers the right to be the LAS on the segment to another link master.

## A5.2 Link Master

A link master (LM) is any device containing a link active scheduler. There must be at least one LM on a segment. When the LAS on a segment has failed, another LM on the same segment starts working as the LAS.



FA0501.EPS

Figure 1. Example of Fieldbus configuration-3 LMs on Same Segment

### A5.3 Transfer of LAS

There are two procedures for an LM to become the LAS:

- If the LM whose value of  $[V(ST) \times V(TN)]$  is the smallest on a segment, with the exception of the current LAS, judges that there is no LAS on the segment, in such a case as when the segment has started up or when the current LAS has failed, the LM declares itself as the LAS, then becomes the LAS. (With this procedure, an LM backs up the LAS as shown in the following figure.)
- The LM whose value of  $[V(ST) \times V(TN)]$  is the smallest on a segment, with the exception of the current LAS, requests the LAS on the same segment to transfer the right of being the LAS, then becomes the LAS.

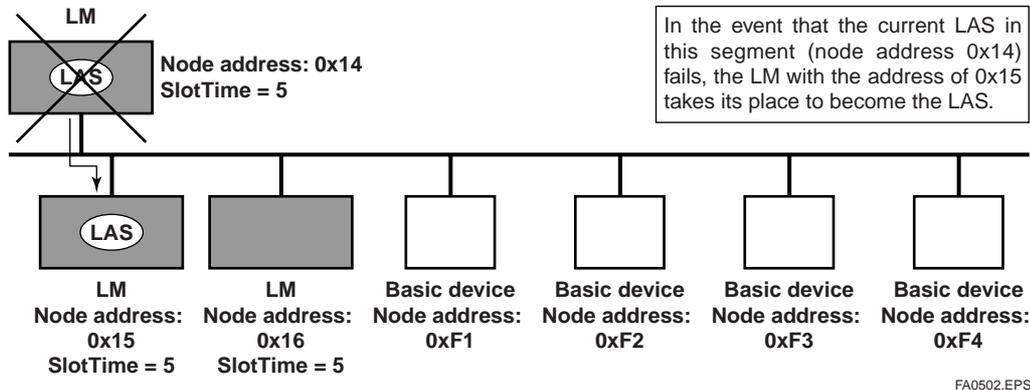


Figure 2. Backup of LAS

To set up an EJA as a device that is capable of backing up the LAS, follow the procedure below.

NOTE: When changing the settings in an EJA, add the EJA to the segment in which an LAS is running. After making changes to the settings, do not turn off the power to the EJA for at least 30 seconds.

- (1) Set the node address of the EJA. In general, use an address from 0x14 to  $[V(FUN) - 1]$ .

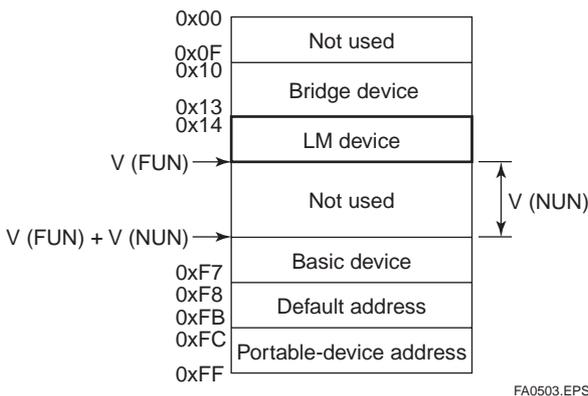


Figure 3. Node Address Ranges

- (2) In the LAS settings of the EJA, set the values of  $V(ST)$ ,  $V(MRD)$ , and  $V(MID)$  to the same as the respective lowest capability values in all the devices within the segment. An example is shown below.

#### DlmeBasicInfo (EJA Index 361 (SM))

Sub-index	Element	EJA	Device 1	Device 2	Device 3	Description
1	SlotTime	4	8	10	20	Capability value for $V(ST)$
3	MaxResponseDelay	3	6	3	5	Capability value for $V(MRD)$
6	MinInterPduDelay	4	8	12	10	Capability value for $V(MID)$

TA0501.EPS

In this case, set SlotTime, MaxResponseTime, and MinInterPduDelay as follows:

#### ConfiguredLinkSettingsRecord (EJA Index 369 (SM))

Subindex	Element	Setting (Default)	Description
1	SlotTime	20(4095)	$V(ST)$
3	MaxResponseDelay	6( 5)	$V(MRD)$
6	MinInterPduDelay	12( 12)	$V(MID)$

TA0502.EPS

- (3) In the LAS settings of the EJA, set the values of  $V(FUN)$  and  $V(NUN)$  so that they include the node addresses of all nodes within the same segment. (See also Figure 3.)

#### ConfiguredLinkSettingsRecord (EJA Index 369 (SM))

Subindex	Element	Default Value	Description
4	FirstUnpolledNodeId	0x25	$V(FUN)$
7	NumConsecUnpolledNodeId	0xBA	$V(NUN)$

TA0503.EPS

## A5.4 LM Functions

No.	Function	Description
1	LM initialization	When a fieldbus segment starts, the LM with the smallest $[V(ST) \times V(TN)]$ value within the segment becomes the LAS. At all times, each LM is checking whether or not a carrier is on the segment.
2	Startup of other nodes (PN and Node Activation SPDU transmissions)	Transmits a PN (Probe Node) message, and Node Activation SPDU message to devices which return a new PR (Probe Response) message.
3	PT transmission (including final bit monitoring)	Passes a PT (Pass Token) message to devices included in the live list sequentially, and monitors the RT (Return Token) and final bit returned in reply to the PT.
4	CD transmission	Transmits a CD (Compel Data) message at the scheduled times.
5	Time synchronization	Supports periodic TD (Time Distribution) transmissions and transmissions of a reply to a CT (Compel Time).
6	Domain download server	Sets the schedule data. The schedule data can be equalized only when the Domain Download command is carried out from outside the LM in question. (The version of the schedule is usually monitored, but no action takes place, even when it changes.)
7	Live list equalization	Transmits SPDU messages to LMs to equalize live lists.
8	LAS transfer	Transfers the right of being the LAS to another LM.
9	Reading/writing of NMIB for LM	See Section A5.5.
10	Round Trip Delay Reply (RR) Reply to DLPDU	Not yet supported in the current version.
11	Long address	Not yet supported in the current version.

TA0504.EPS

## A5.5 LM Parameters

### A5.5.1 LM Parameter List

The tables below show LM parameters of an EJA transmitter.

Meanings of **Access** column entries: RW = read/write possible; R = read only

Index (SM)	Parameter Name	Sub-parameter Name (Sub Index)	Default Factory Setting	Access	Remarks
362	DLME_LINK_MASTER_CAPABILITIES_VARIABLE		0x04	RW	
363	DLME_LINK_MASTER_INFO_RECORD	0		RW	
		1 MaxSchedulingOverhead	0		
		2 DefMinTokenDelegTime	100		
		3 DefTokenHoldTime	300		
		4 TargetTokenRotTime	4096		
		5 LinkMaintTokHoldTime	400		
		6 TimeDistributionPeriod	5000		
		7 MaximumInactivityToClaimLasDelay	8		
		8 LasDatabaseStatusSpduDistributionPeriod	6000		
364	PRIMARY_LINK_MASTER_FLAG_VARIABLE		–	RW	LAS: True = 0xFF; non-LAS: False = 0x00
365	LIVE_LIST_STATUS_ARRAY_VARIABLE		–	R	
366	MAX_TOKEN_HOLD_TIME_ARRAY	0	0x0000x16, 0x012cx16	RW	
		1 Element1	0x012cx5, 0x0000x27		
		2 Element2	0x0000x32		
		3 Element3	0x0000x32		
		4 Element4	0x0000x32		
		5 Element5	0x0000x32		
		6 Element6	0x0000x31 ox012c		
		7 Element7	0x012cx32		
		8 Element8	0x02		
367	BOOT_OPERAT_FUNCTIONAL_CLASS		Specified at the time of order	RW	0x01 (basic device); 0x02 (LM)
368	CURRENT_LINK_SETTING_RECORD	0		R	Settings for LAS
		1 SlotTime			
		2 PerDlpduPhlOverhead			
		3 MaxResponseDelay			
		4 FirstUnpolledNodeId			
		5 ThisLink			
		6 MinInterPduDelay			
		7 NumConseeUnpolledNodeId			
		8 PreambleExtension			
		9 PostTransGapExtension			
		10 MaxInterChanSignalSkew			
		11 TimeSyncClass			
369	CONFIGURED_LINK_SETTING_RECORD	0		RW	
		1 SlotTime	4095		
		2 PerDlpduPhlOverhead	4		
		3 MaxResponseDelay	5		
		4 FirstUnpolledNodeId	37		
		5 ThisLink	0		
		6 MinInterPduDelay	12		
		7 NumConseeUnpolledNodeId	186		
		8 PreambleExtension	2		
		9 PostTransGapExtension	1		
		10 MaxInterChanSignalSkew	0		
		11 TimeSyncClass	4		

TA0505-1.EPS

APPENDIX 5. Link Master Functions

Index (SM)	Parameter Name	Sub-parameter Name (Sub Index)	Default Factory Setting	Access	Remarks
370	PLME_BASIC_CHARACTERISTICS	0		R	
		1 ChannelStatisticsSupported	0x00		
		2 MediumAndDataRatesSupported	0x4900000000000000		
		3 lecVersion	1 (0x1)		
		4 NumOfChannels	1 (0x1)		
371	CHANNEL_STATES	0		R	
		1 channel-1	0 (0x0)		
		2 channel-2	128 (0x80)		
		3 channel-3	128 (0x80)		
		4 channel-4	128 (0x80)		
		5 channel-5	128 (0x80)		
		6 channel-6	128 (0x80)		
		7 channel-7	128 (0x80)		
372	PLME_BASIC_INFO	0		R	
		1 InterfaceMode	0 (0x0)		
		2 LoopBackMode	0 (0x0)		
		3 XmitEnabled	1 (0x1)		
		4 RcvEnabled	1 (0x1)		
		5 PreferredReceiveChannel	1 (0x1)		
		6 MediaTypeSelected	73 (0x49)		
7 ReceiveSelect	1 (0x1)				
373	LINK_SCHEDULE_ACTIVATION_VARIABLE			RW	
374	LINK_SCHEDULE_LIST_CHARACTERISTICS_RECORD	0		R	
		1 NumOfSchedules	0		
		2 NumOfSubSchedulesPerSchedule	1		
		3 ActiveScheduleVersion	0		
		4 ActiveSheduleOdIndex	0		
375	DLME_SCHEDULE_DESCRIPTOR.1	0		R	
		1 Version	0		
		2 MacrocycleDuration	0		
		3 TimeResolution	0		
376	DLME_SCHEDULE_DESCRIPTOR.2	0		R	
		1 Version	0		
		2 MacrocycleDuration	0		
		3 TimeResolution	0		
377	DOMAIN.1				Read/write impossible. Get-OD possible.
378	DOMAIN.2				Read/write impossible. Get-OD possible.

TA0505-2.EPS

### A5.5.2 Descriptions for LM Parameters

The following describes LM parameters of an EJA transmitter.

NOTE: Do not turn off the power to the EJA for 60 seconds after making a change to its parameter settings.

#### (1) DImeLinkMasterCapabilitiesVariable

Bit Position	Meaning	Description	Value
B3: 0x04	LAS Schedule in Non-volatile Memory	Whether the LAS schedule can (= 1) or cannot (= 0) be saved to the non-volatile memory	1
B2: 0x02	Last Values Record Supported	Whether to support (= 1) or not to support (= 0) LastValuesRecord.	0
B1: 0x01	Link Master Statistics Record Supported	Whether to support (= 1) or not to support (= 0) DImeLinkMasterStatisticsRecord.	0

TA0506.EPS

#### (2) DImeLinkMasterInfoRecord

Sub-index	Element	Size [bytes]	Description
1	MaxSchedulingOverhead	1	V(MSO)
2	DefMinTokenDelegTime	2	V(DMDT)
3	DefTokenHoldTime	2	V(DTHT)
4	TargetTokenRotTime	2	V(TTRT)
5	LinkMaintTokHoldTime	2	V(LTHT)
6	TimeDistributionPeriod	4	V(TDP)
7	MaximumInactivityToClaimLasDelay	2	V(MICD)
8	LasDatabaseStatusSpduDistributionPeriod	2	V(LDDP)

TA0507.EPS

#### (3) PrimaryLinkMasterFlagVariable

Explicitly declares the LAS. Writing “true” (0xFF) to this parameter in a device causes that device to attempt to become the LAS. However, a request of writing “true” to this parameter in a device is rejected if the value of the same parameter in any other device that has a smaller node address within the same segment is true.

#### (4) LiveListStatusArrayVariable

A 32-byte variable, in which each bit represents the status of whether a device on the same segment is live or not. The leading bit corresponds to the device address 0x00, and final bit to 0xFF. The value of LiveListStatusArrayVariable in the case where devices having the addresses 0x10 and 0x15 in the fieldbus segment is shown below.

```

0x00 00 84 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00
      ▶ Bit correspondences: 0 0 0 0 0 0 0 0 0 0
                          0x00
                          0 0 0 0 0 1 0 0 0 0 1 0 0...
                          0x10   0x15
    
```

#### (5) MaxTokenHoldTimeArray

An 8(64 byte array variable, in which each set of 2 bytes represents the delegation time (set as an octet time) assigned to a device. The delegation time denotes a time period that is given to a device by means of a PT message sent from the LAS within each token circulation cycle.

The leading 2 bytes correspond to the device address 0x00, and the final 2 bytes to the device address 0xFF. Specify the subindex to access this parameter.

#### (6) BootOperatFunctionalClass

Writing 1 to this parameter in a device and restarting the device causes the device to start as a basic device. On the contrary, writing 2 to this parameter and restarting the device causes the device to start as an LM.

#### (7) CurrentLinkSettingRecord and ConfiguredLinkSettingsRecord

CurrentLinkSettingRecord indicates the bus parameter settings currently used. ConfiguredLinkSettingsRecord indicates the bus parameter settings to be used when the device becomes the LAS. Thus, when a device is the LAS, its CurrentLinkSettingRecord and ConfiguredLinkSettingsRecord have the same values.

Sub-index	Element	Size [bytes]	Description
1	SlotTime	2	V(ST)
2	PerDlpduPhiOverhead	1	V(PhLO)
3	MaxResponseDelay	1	V(MRD)
4	FirstUnpolledNodeId	1	V(FUN)
5	ThisLink	2	V(TL)
6	MinInterPduDelay	1	V(MID)
7	NumConsecUnpolledNodeId	1	V(NUN)
8	PreambleExtension	1	V(PhPE)
9	PostTransGapExtension	1	V(PhGE)
10	MaxInterChanSignalSkew	1	V(PhIS)
11	TimeSyncClass	1	V(TSC)

TA0508.EPS

**(8) DlmeBasicInfo**

Sub-index	Element	Size [bytes]	Description
1	SlotTime	2	Indicates the capability value for V(ST) of the device.
2	PerDlpduPhlOverhead	1	V(PhLO)
3	MaxResponseDelay	1	Indicates the capability value for V(MRD) of the device.
4	ThisNode	1	V(TN), node address
5	ThisLink	2	V(TL), link-id
6	MinInterPduDelay	1	Indicates the capability value for V(MID) of the device.
7	TimeSyncClass	1	Indicates the capability value for V(TSC) of the device.
8	PreambleExtension	1	V(PhPE)
9	PostTransGapExtension	1	V(PhGE)
10	MaxInterChanSignalSkew	1	V(PhIS)

TA0509.EPS

**(9) PlmeBasicCharacteristics**

Sub-index	Element	Size [bytes]	Value	Description
1	Channel Statistics Supported	1	0	Statistics data are not supported.
2	Medium AndData Rates Supported	8	0x4900000000000000	Wire medium, voltage mode, and 31.25 kbps are supported.
3	IceVersion	2	0x0403	IEC 4.3 is supported.
4	NumOf Channels	1	1	
5	Power Mode	1	0	0: Bus-powered; 1: Self-powered

TA0510.EPS

**(10) ChannelStates**

Sub-index	Element	Size [bytes]	Value	Description
1	Channel 1	1	0x00	In Use, No Bad since last read, No Silent since last read, No Jabber since last read, Tx Good, Rx Good
2	Channel 2	1	0x80	Unused
3	Channel 3	1	0x80	Unused
4	Channel 4	1	0x80	Unused
5	Channel 5	1	0x80	Unused
6	Channel 6	1	0x80	Unused
7	Channel 7	1	0x80	Unused
8	Channel 8	1	0x80	Unused

TA0511.EPS

**(11) PlmeBasicInfo**

Sub-index	Element	Size [bytes]	Value	Description
1	InterfaceMode	1	0	0: Half duplex; 1: Full duplex
2	LoopBackMode	1	0	0: Disabled; 1: MAU; 2: MDS
3	XmitEnabled	1	0x01	Channel 1 is enabled.
4	RcvEnabled	1	0x01	Channel 1 is enabled.
5	PreferredReceive Channel	1	0x01	Channel 1 is used for reception.
6	MediaType Selected	1	0x49	Wire medium, voltage mode, and 31.25 kbps are selected.
7	ReceiveSelect	1	0x01	Channel 1 is used for reception.

TA0512.EPS

**(12) LinkScheduleActivationVariable**

Writing the version number of an LAS schedule, which has already been downloaded to the domain, to this parameter causes the corresponding schedule to be executed. On the other hand, writing 0 to this parameter stops execution of the active schedule.

**(13) LinkScheduleListCharacteristicsRecord**

Sub-index	Element	Size [bytes]	Description
1	NumOf Schedules	1	Indicates the total number of LAS schedules that have been downloaded to the domain.
2	NumOfSub SchedulesPer Schedule	1	Indicates the maximum number of sub-schedules an LAS schedule can contain. (This is fixed to 1 in the Yokogawa communication stacks.)
3	ActiveSchedule Version	2	Indicates the version number of the schedule currently executed.
4	ActiveSchedule OdIndex	2	Indicates the index number of the domain that stores the schedule currently executed.
5	ActiveSchedule StaringTime	6	Indicates the time when the current schedule began being executed.

TA0513.EPS

**(14) DlmeScheduleDescriptor**

This parameter exists for the same number as the total number of domains, and each describes the LAS schedule downloaded to the corresponding domain. For the domain to which a schedule has not yet been downloaded, the values in this parameter are all zeros.

Sub-index	Element	Size [bytes]	Description
1	Version	2	Indicates the version number of the LAS schedule downloaded to the corresponding domain.
2	Macrocycle Duration	4	Indicates the macro cycle of the LAS schedule downloaded to the corresponding domain.
3	TimeResolution	2	Indicates the time resolution that is required to execute the LAS schedule downloaded to the corresponding domain.

TA0514.EPS

**(15) Domain**

Read/write: impossible; get-OD: possible

Carrying out the GenericDomainDownload command from a host writes an LAS schedule to Domain.

**A5.6 FAQs**

**Q1. When the LAS stops, an EJA does not back it up by becoming the LAS. Why?**

A1-1. Is that EJA running as an LM? Check that the value of BootOperatFunctionalClass (index 367) is 2 (indicating that it is an LM).

A1-2. Check the values of V(ST) and V(TN) in all LMs on the segment and confirm that the following condition is met:

EJA	Other LMs
$V(ST) \times V(TN)$	$V(ST) \times V(TN)$
<	

**Q2. How can I make an EJA become the LAS?**

A2-1. Check that the version numbers of the active schedules in the current LAS and the EJA are the same by reading:

LinkScheduleListCharacteristicsRecord (index 374 for an EJA)  
 - ActiveScheduleVersion (subindex 3)

A2-2. Make the EJA declare itself as and become the LAS by writing:

- 0x00 (false) to PrimaryLinkMasterFlagVariable in the current LAS; and
- 0xFF (true) to PrimaryLinkMasterFlagVariable (index 364) in the EJA.

**Q3. On a segment where an EJA works as the LAS, another device cannot be connected. How come?**

A3-1. Check the following bus parameters that indicate the bus parameter as being the LAS for the EJA and the capabilities of being the LAS for the device that cannot be connected:

- V(ST), V(MID), V(MRD) of EJA: ConfiguredLinkSettingsRecord (index 369)
- V(ST), V(MID), V(MRD) of problematic device: DlmeBasicInfo

Then, confirm that the following conditions are met:

EJA	Problematic Device
$V(ST)$	$V(ST)$
>	>
$V(MID)$	$V(MID)$
>	>
$V(MRD)$	$V(MRD)$
>	>

A3-2. Check the node address of the problematic device is not included in the V(FUN)+V(NUN) of the EJA.

**Q4. “----” is kept shown on LCD.**

The LAS does not exist or is not identified in the fieldbus network, or the EJA is not able to establish communication with the LAS.

A4-1. Check that the LAS is connected on the network. When using the EJA as the LAS, follow the steps described in section A5.3.

A4-2. Adjust the parameters of the LAS to that of the EJA. Refer to section 5.2 for details.

LAS	EJA
$V(ST)$	$V(ST)$ 4 or above
>	>
$V(MID)$	$V(MID)$ 4 or above
>	>
$V(MRD)$	$V(MRD)$ 12 or above
>	>

A4-3. Check that the correct Node Address is used for the EJA. Refer to section 5.2 for details. Confirm that the Node Address of EJA should be out of the parameters of the LAS of  $V(FUN) \sim V(FUN) + V(NUN)$ . Confirm that the Node Address is not within the default address (0xF8 to 0xFB).

# APPENDIX 6. SOFTWARE DOWNLOAD

## A6.1 Benefits of Software Download

This function enables you to download software to field devices via a FOUNDATION fieldbus to update their software. Typical uses are to add new features such as function blocks and diagnostics to existing devices, and to optimize existing field devices for your plant.

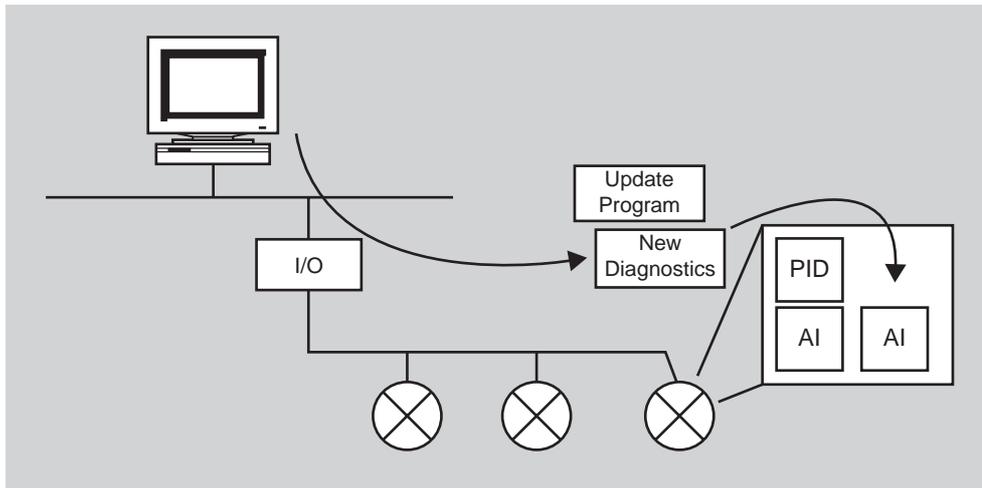


Figure 1. Concept of Software Downloading

## A6.2 Specifications

Steady-state current:

Max. 16.5 mA

Current during FlashROM blanking time:

Max. 24 mA additional to steady-state current

FOUNDATION fieldbus download class:

Class 1



### NOTE

Class 1 devices can continue the specified measurement and/or control actions even while software is being downloaded to them. Upon completion of a download, however, the devices will be reset internally to make the new, downloaded software take effect, and this will temporarily halt fieldbus communication and function block executions.

## A6.3 Preparations for Software Downloading

For software downloading, you need to prepare the following:

- Software download tool
- Software binary file for each of the target field devices

For the software download tool, use only the specific program. For details, see the User's Manual of download tool. For information about updates of software binary files for field devices and how to obtain them, visit the following web site.

<http://www.yokogawa.com/fi/fieldbus/download.htm>



### CAUTION

Avoid linking the software download tool to a fieldbus segment, as this may adversely affect the plant operation.

 **NOTE**

The download tool can not execute downloading during other system connects to the system/network management VFD of the device.

## A6.4 Flow of Software Download

The flowchart below outlines the software download procedure. Although the time taken for the entire procedure varies depending on the size of the field bus device's software, it will take about 20 minutes for a one-to-one connection between a fieldbus device and download tool, and longer when multiple field devices are connected to the fieldbus.

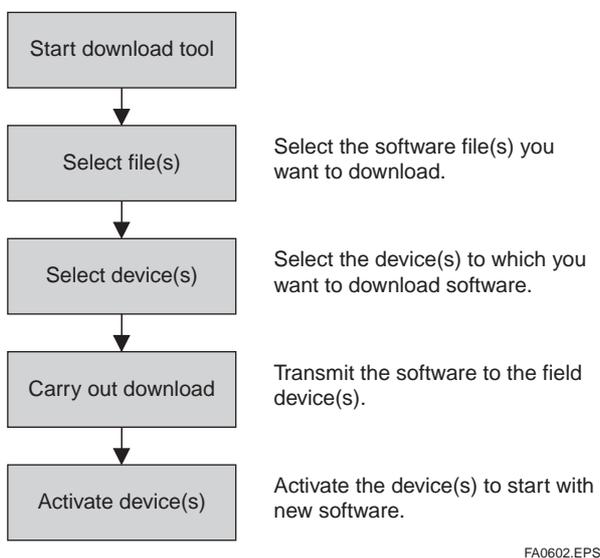


Figure 2. Flow of Software Download Procedure

 **CAUTION**

Carrying out a software download leaves the PD tag, node address, and transducer block calibration parameters that are retained in the nonvolatile memory inside the target device, but may reset other parameters to the defaults (except a minor update that does not change the number of parameters). Hence, where necessary, save the parameters using an engineering tool, parameter setting utility, or the like before carrying out a software download, and then reconfigure the field device(s) after the download. For details, see Section A6.6.

 **CAUTION**

The current dissipation of the target field device increases transiently immediately after a download due to erasing of the FlashROM's contents. Use a fieldbus power supply which has sufficient capacity to cover such increases in feed current.

 **CAUTION**

Upon completion of the activation, the target fieldbus device performs resetting internally, which temporarily halts fieldbus communication and function block executions. Be especially careful about a valve positioner; the output air pressure will fall to the minimum level (i.e., zero).

 **CAUTION**

Do not turn off the power to a field device or disconnect the download tool during a download or activation. The device may fail as a result.

 **NOTE**

Be careful about the noise on the fieldbus link. If the fieldbus is noisy, the downloading may take a very long time or fail.

## A6.5 Download Files

Download files have the following filenames (with the filename extension of ".ffd"). Take care to choose the correct download file for the target field device:

"594543" + device family + "\_" + device type + "\_" + domain name + "\_" + software name + "\_" + software revision + ".ffd"

For example, the name of the download file for an EJA may have the following name:

5945430008\_0008\_EJA\_ORIGINAL\_R101.ffd

Refer to A6.11(3) DOMAIN\_HEADER about each keyword of the file name.

The device type is “0008” for an EJA transmitter (with software download capability).

The software name is “ORIGINAL” or “UPDATE.” The former indicates an original file and the latter an update file. Whenever performing a download to update the device revision, obtain the original file. In general, an addition to the parameters or blocks requires a device revision update.

## A6.6 Steps after Activating a Field Device

When the communication with a field device has recovered after activating the device, check using the download tool that the software revision of the field device has been updated accordingly. The value of SOFT\_REV of the resource block indicates the software revision.

The PD tag, node address, and transducer block calibration parameters that are retained in the nonvolatile memory inside the target device will remain unchanged after a software download. However, after a software update which causes an addition to the block parameters or blocks, or to the system/network management VFD parameters, some parameters may be reset to the defaults, thus requiring parameter setup and engineering again. For details, see the table below.

Also note that a change in the number of parameters or blocks requires the DD and capabilities files corresponding to the new software revision.

**Table 1. Actions after Software Update**

Contents of Software Update	Action
Does not change the number of parameters.	Re-setup of parameters not needed.
Adds a block parameter.	Setup of the added parameter needed.
Adds a block.	Reengineering and setup of the added block's parameters needed.
Changes the number of system/network management VFD parameters.	Reengineering needed.

TA0601.EPS

## A6.7 Troubleshooting

For error messages appearing in the download tool, see also the User's Manual of download tool.

**Table 2. Actions after Software Update**

Symptom	Cause	Remedy
An error occurs before starting a download, disabling the download.	The selected download file is not for the selected field device.	Check SOFTDWN_ERROR in the resource block and obtain the correct file.
An error occurs after starting a download, disabling the download.	You attempted to update the device revision by downloading a file which is not an original file.	Check SOFTDWN_ERROR in the resource block and obtain the original file.
	The selected field device does not support software downloading.	Check whether the option code /EE is included in the model and suffix codes of the device.
	The voltage on the fieldbus segment falls below the specified limit (9 volts).	Check the capacity of the field bus power supply used and the voltage at the terminal.
	There was an error in a checksum or the number of transmission bytes.	Check SOFTDWN_ERROR in the resource block and obtain the correct file.
	The download tool does not allow download with same software revision.	Check the setting of the download tool.
The download takes far longer than expected or fails frequently.	The fieldbus segment is noisy.	Check the noise on the fieldbus segment.
An error occurs after activation.	Transient error caused by the internal resetting of the field device	Check whether communication with the field device has recovered after a while.
The new software does not take effect after the activation.	The file of the current revision was downloaded.	Obtain the correct file.
	Failure of the memory in field device, etc.	Check SOFTDWN_ERROR in the resource block, and re-try downloading. If fails, place a service call.

TA0602.EPS

## A6.8 Resource Block's Parameters Relating to Software Download

**Table 3. Additional Parameters of Resource Block**

Relative Index	Index	Parameter Name	Default (Factory Set)	Write Mode	Description
53	1053	SOFTDWN_PROTECT	0x01		Defines whether to accept software downloads. 0x01: Unprotected 0x02: Protected
54	1054	SOFTDWN_FORMAT	0x01		Selects the software download method. 0x01: Standard
55	1055	SOFTDWN_COUNT	0	—	Indicates the number of times the internal FlashROM was erased.
56	1056	SOFTDWN_ACT_AREA	0	—	Indicates the ROM number of the currently working FlashROM. 0: FlashROM #0 working 1: FlashROM #1 working
57	1057	SOFTDWN_MOD_REV	1, 0, 0, 0, 0, 0, 0, 0, 0	—	Indicates the software module revision.
58	1058	SOFTDWN_ERROR	0	—	Indicates the error during a software download. See Table 4.

TA0603.EPS

Table 4. Error Codes of Errors during Download

Error Code	Detail
0	No error
32768	Unsupported header version
32769	Abnormal header size
32770	Abnormal manufacturer ID
32771	Abnormal device family
32772	Abnormal device revision
32773	Abnormal vendor specification version
32774	Abnormal number of modules
32775	Abnormal number of bytes in module 1
32776	Abnormal number of bytes in module 2
32777	Device error in module 1
32778	Checksum error in module 1
32779	Checksum error in file
32780	Unused
32781	Write-prohibited area in FlashROM
32782	Verification error during FlashROM writing
32783	Polling error during FlashROM erasing
32784	Polling time-out during FlashROM erasing
32785	Polling error during FlashROM writing
32786	Polling time-out during FlashROM writing
32787	FlashROM driver undefined number error
32788	File endcode error
32789	File type error (UPDATE, ORIGINAL)
32790	FlashROM driver undefined number error
32791	On-start state error (other than DWNLD_NOT_READY)
32792	Start segment error in module 1
32793	Binary file error
32794	Binary file error
32795	Device error in module 2
32796	Detection of EEPROM state other than backup after activation
32797	Checksum error in module 2
32798	Not in DWNLD_READY state when receiving GenericDomainInitiate
32799	Not in DWNLD_OK state when receiving GenericDomainTerminate
32800	Not in DOWNLOADING state when receiving GenericDomainSegment
32801	Firmware error
36863	Unused

TA0604.EPS

## A6.9 View Objects Altered by Software Download

### (1) Resource Block

Relative Index	Parameter Name	VIEW 1	VIEW 2	VIEW 3	VIEW 4
53	SOFTDWN_PROTECT				1
54	SOFTDWN_FORMAT				1
55	SOFTDWN_COUNT				2
56	SOFTDWN_ACT_AREA			1	
57	SOFTDWN_MOD_REV			16	
58	SOFTDWN_ERROR			2	
	Total bytes	22	30	73	35

TA0605.EPS

### (2) Transducer Block

Relative Index	Parameter Name	VIEW 1	VIEW 2	VIEW 3	VIEW 4
55	TEST_18			1	
	Total bytes	34	21	35	116

TA0607.EPS

## A6.10 System/Network Management VFD Parameters Relating to Software Download

Table 5. System/Network Management VFD Parameters

Write Mode: R/W = read/write; R = read only

Index (SM)	Parameter Name	Sub Index	Sub-parameter Name	Default (Factory Set)	Write Mode	Remarks
400	DWNLD_PROPERTY	0			R	
		1	Download Class	1		
		2	Write Rsp Returned For ACTIVATE	1		
		3	Write Rsp Returned For PREPARE	1		
		4	Reserved	0		
		5	ReadyForDwnld Delay Secs	200		
		6	Activation Delay Secs	60		
410	DOMAIN_DESCRIPTOR	0			R/W	Read/write-permitted only for sub-index 1
		1	Command	3		
		2	State	1		
		3	Error Code	0		
		4	Download Domain Index	440		
		5	Download Domain Header Index	420		
		6	Activated Domain Header Index	430		
		7	Domain Name	(Device name)		
420	DOMAIN_HEADER.1	0				
		1	Header Version Number	0		
		2	Header Size	0		
		3	Manufacturer ID			
		4	Device Family			
		5	Device Type			
		6	Device Revision	0		
		7	DD Revision	0		
		8	Software Revision			
		9	Software Name			
		10	Domain Name			
430	DOMAIN_HEADER.2	0				
		1	Header Version Number	1		
		2	Header Size	44		
		3	Manufacturer ID	0x594543		
		4	Device Family	(DEV_TYPE of RB)		
		5	Device Type	(DEV_TYPE of RB)		
		6	Device Revision	(DEV_REV of RB)		
		7	DD Revision	(DD_REV of RB)		
		8	Software Revision	(SOFT_REV of RB)		
		9	Software Name	ORIGINAL		
		10	Domain Name	(Device name)		
440	DOMAIN					Read/write: prohibited Get-OD: permitted

TA0608.EPS

## A6.11 Comments on System/Network Management VFD Parameters Relating to Software Download



### IMPORTANT

Do not turn off the power to a field device immediately after changing parameter settings. Data writing actions to the EEPROM are made redundant to ensure reliability. If the power is turned off within 60 seconds after setup, the parameters may revert to the previous settings.

#### (1) DWNLD\_PROPERTY

Sub Index	Element	Size (Bytes)	Description
1	Download Class	1	Indicates the download class. 1: Class 1
2	Write Rsp Returned For ACTIVATE	1	Indicates whether a write response is returned to the ACTIVATE command. 1: Write Response Returned
3	Write Rsp Returned For PREPARE	1	Indicates whether a write response is returned to the PREPARE command. 1: Write Response Returned
4	Reserved	1	(Reserved)
5	ReadyForDwnld Delay Secs	2	Indicates the maximum delay after receipt of the PREPARE_FOR_DWNLD command to proceed to transition from DWNLD_NOT_READY to DWNLD_READY.
6	Activation Delay Secs	2	Indicates the maximum delay after receipt of the ACTIVATE command to proceed to transition from DWNLD_OK to DWNLD_NOT_READY.

TA0609.EPS

**(2) DOMAIN\_DESCRIPTOR**

Sub Index	Element	Size (Bytes)	Description
1	Command	1	Reads/writes software download commands. 1: PREPARE_FOR_DWNLD (instruction of download preparation) 2: ACTIVATE (activation instruction) 3: CANCEL_DWNLD (instruction of download cancellation)
2	State	1	Indicates the current download status. 1: DWNLD_NOT_READY (download not ready) 2: DWNLD_PREPARING (download under preparation) 3: DWNLD_READY (ready for download) 4: DWNLD_OK (download complete) 5: DOWNLOADING (download underway) 6: CHECKSUM_FAIL (not used in this product) 7: FMS_DOWNLOAD_FAIL (failure during download) 8: DWNLD_INCOMPLETE (download error detected at restart) 9: VCR_FAIL (not used in this product) 10: OTHER (download error other than 6 and 7 detected)
3	Error Code	2	Indicates the error during a download and activation. 0: success, configuration retained (download successfully completed) 32768 - 65535: Download error (See Table 4 for error codes.)
4	Download Domain Index	4	Indicates the index number of the domain for software downloading.
5	Download Domain Header Index	4	Indicates the index number of the domain header to which the download is performing.
6	Activated Domain Header Index	4	Indicates the index numbers of the domain header currently running.
7	Domain Name	8	Indicates the domain name. With this product, Domain Name indicates the field device name.

TA0610.EPS

**(3) DOMAIN\_HEADER**

Sub Index	Element	Size (Bytes)	Description
1	Header Version Number	2	Indicates the version number of the header.
2	Header Size	2	Indicates the header size.
3	Manufacturer ID	6	Indicates the value of resource block's MANUFAC_ID (manufacturer ID) as character string data.
4	Device Family	4	Indicates the device family. With this product, Device Family indicates the value of resource block's DEV_TYPE as character string data.
5	Device Type	4	Indicates the value of resource block's DEV_TYPE as character string data.
6	Device Revision	1	Indicates the value of resource block's DEV_REV.
7	DD Revision	1	Indicates the value of resource block's DD_REV.
8	Software Revision	8	Indicates the value of resource block's SOFT_REV.
9	Software Name	8	Indicates the attribute of the binary file. With this product, Software Name indicates either of the following: "ORIGINAL" followed by one space: Original file "UPDATE" followed by two spaces: Update file
10	Domain Name	8	Indicates the domain name. With this product, Domain Name indicates the field device name.

TA0611.EPS

# REVISION RECORD

Title: Model EJA Series Fieldbus Communication Type  
Manual No.: IM 01C22T02-01E

Edition	Date	Page	Revised Item
1st	Sep. 1998	2	New publication
2nd	Feb. 2000	2 4-1 5-3 5-6 5-8 6-2 7-1, 2	Revised a book in a new format. (The location of contents and the associated page numbers may not coincide with the one in old editions.) 4.1 • Add 'IMPORTANT' notice for connections of devices. 5.3 • Add Figure 5.2 Example of Loop Connecting Function Block of Two EJA with Other Instruments. 5.6.2 • Add Figure 5.5 Default Configuration of EJA. 5.6.3 • Add Table 5.10 Purpose of Each View Object. • Add Table 5.14 Indexes of View for Each Block. 6.3 • Add Figure 6.2 SIMULATE_ENABLE Switch Position. 7.1, 7.2 • Add Chapter 7, "HANDLING CAUTION."
3rd	Aug. 2000	2	• Add Chapter 7, "DEVICE STATUS." • Add Chapter 9, "GENERAL SPECIFICATIONS." • Add Appendix 4, "PID BLOCK." • Add Appendix 5, "LINK MASTER FUNCTIONS"
4th	Feb. 2001	8-2 9-1	8.1(3)b. • Add "CENELEC (KEMA) Intrinsically Safe Type." 9.2 • Add "KS5" to the Optional Specifications table.
5th	May 2002	1-2 8-2 9-1	1.1 • Add "1.1 For Safety Using." 8.1.3a • Add descriptions based on ATEX directive. 9.2 • Add Optional code FS15 and KF25.
6th	Apr. 2003	2-4 8-1	2.1.3 • Add "CENELEC ATEX (KEMA) Explosionproof." 8.2 • Add "KS25" to the Optional Specifications table.
7th	Jan. 2005	1-3 2-3 4-2 5-2 5-8 5-9 6-1 8-1 8-2 A-4 A-6 A-8 A-24	1.3 • Add "ATEX Documentation." 2.1.1 • Add the "Installation Diagram" for nonincendive type. 4.2 • Change explanation for Node address. 5.2 • Change explanation for Node address. 5.3 • Change the factory setting value on Table 5.3. 5.6.4 • Delete "%" unit on Table 5.15. 5.6.5 • Add Exponential Factor to DISPLAY_MODE. 6.2.2 • Add Alarm and Event for PID Block. 8.1 • Add supply voltage for nonincendive type. 8.2 • Add new notation for the explosionproof approval in Japan. "JIS" to "TIIS" • Add Software Tag. • Add Operation Functional Class. • Change the factory setting value of L_TYPE parameter. • Change the factory setting value of STATUS_OPTS. A1.2 • Add Exponential Factor to DISPLAY_MODE. A1.3 • Change the reference of XD_SCALE unit. A2.3 • Change explanation for Node address. A5.2
8th	July 2006	2-1 through 2-7 2-4 2-7 8-1 8-2, 3 A-32 through A-40	2 • Add applicable standard and certificate number for each approval. 2.1.1c • Add "FM Nonincendive approval." 2.1.3c • Add "CENELEC ATEX Type of Protection n." 8.1 • Add current draw of software download state. 8.2 • Add "FN15", "KN25" and "EE" to the Optional Specifications table. Appendix 6 • Add "Software download."
9th	Jan. 2008	2-8 2-9 8-2, 3	2.1.3 • Change installation diagram for "KN25." 2.1.4 • Add "2.1.4 IECEx Certification." 8-2 • Delete applicable standard from the table.
10th	Oct. 2008	2-7 8-1 8-3	2.1.3 • Change explosion protection marking for KN25 from EEx to Ex. 8.1 • Add "EMC Conformity Standards." 8-2 • Add sealing statement for CSA certification