

# General Specifications

GS 01C31T04-01EN

EJA-E Series  
PROFIBUS PA  
Communication



*PROFIBUS is a vendor-independent and open fieldbus based on the international standard IEC61158 and IEC61784. It covers a wide range of applications in manufacturing and process automation fields.*

*Vendor-independence and openness allow communication between devices of different manufacturers with no special interface adjustment.*

*EJA-E PROFIBUS PA model offers more flexible instrumentation through a higher level communication capability and proposes the cost reduction by multidrop wirings with less cables.*



## ■ FEATURES

### • Interoperability

PROFIBUS specifications grant the interoperability of the field instruments without preparing designated softwares for the instrument.

### • Multi-sensing function

EJA110E PROFIBUS PA model, for example, has three independent AI function blocks for differential pressure and static pressure.

### • Local operation interface (Applicable when digital indicator is specified)

In addition to being able to perform zero adjustments, the local operation interface can be used to set the Bus address and Ident number by using switch on LCD within Digital indicator code E and external adjustment screw. With this function, it is no longer necessary to use a communication device to set the field device parameters; this can be done directly on the field device.

### • Multi-signal display (Applicable when digital indicator is specified)

Up to four I/O signals can be alternatively displayed on the digital indicator. The block tags, the parameter names, the process units and the statuses are also displayed in order to show what the displayed signals are.

### • Alarm function

EJA-E PROFIBUS PA models securely support various alarm functions, such as high/low alarm, notice of block error, etc. based on PROFIBUS specifications.

### • Self-diagnostic function

A reliable self-diagnostic function based on the NAMUR NE107 standard detects failures in the hardware of pressure sensor, temperature sensor or amplifier assembly, measuring range setting, and communications.

### • Signal totalizer function

Totalized process values can be calculated using the PROFIBUS totalizer function block. This enables the EJA-E to output totalized flow rate signals for flow applications. A periodic backup function guards against the loss of data when the power supply is disrupted.

### • Supported tools

DTM for FieldMate  
EDD for SIEMENS SIMATIC PDM

## ■ STANDARD SPECIFICATIONS

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

### Applicable Model:

All DPharp EJA-E series.

### Output:

Digital communication signal based on PROFIBUS PA protocol.

### Supply Voltage:

9 to 32V DC for general use, flameproof type, intrinsically safe (Ex ic), or nonincendive.  
9 to 24 V DC for intrinsically safe type Entity model  
9 to 17.5 V DC for intrinsically safe type FISCO model

### Communication Requirements:

Supply Voltage: 9 to 32 V DC  
Current Draw: 15 mA (max)

### Response Time (for Primary Value)

150 ms

- When amplifier damping is set to zero, and including dead time.
- 185 ms for the following model and specification
  - EJA120E and EJA130E
  - Measurement span code: F and L

### Update Period:

Differential Pressure: 100 ms

Static Pressure: 100 ms

Capsule Temperature: 1 s

Amplifier Temperature: 1 s

### Integral Indicator (LCD display)

5-digit Numerical Display, 6-digit Unit Display and Bar graph. The indicator is configurable to display one or up to four of the I/O signals periodically.

### Functional Specifications:

Functional specifications for PROFIBUS communication conform to the PROFIBUS PA Ver 3.02.

### Function Block:

Three AI blocks, One Totalizer block

## ■ MODEL AND SUFFIX CODES

EJA□□□E-G□□□□-□□□□□/□

└ Output signal ... Digital communication (PROFIBUS PA protocol)

## ■ OPTIONAL SPECIFICATIONS

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

Item	Description	Code
Data configuration at factory *1	Software damping	CD

\*1: Also see 'Ordering Information'

## ■ OPTIONAL SPECIFICATIONS (For Explosion Protected type)

Item	Description	Code
Factory Mutual (FM)	FM Explosionproof *1 Applicable Standard: FM3600, FM3615, FM3810, ANSI/NEMA 250 Explosionproof for Class I, Division 1, Groups B, C and D, Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G, in Hazardous locations, indoors and outdoors (Enclosure: Type 4X) "FACTORY SEALED, CONDUIT SEAL NOT REQUIRED." Temperature class: T6, Amb. Temp.: -40 to 60°C (-40 to 140°F)	FF1
	FM Intrinsically Safe and Nonincendive *1 Applicable Standard: FM3600, FM3610, FM3611, FM3810, ANSI/NEMA 250, IEC60079-27 Intrinsically Safe for Class I, II, & III, Division 1, Groups A,B,C,D,E,F & G, Entity, FISCO Class I, Zone 0, AEx ia IIC, Enclosure: Type 4X, Temp. Class: T4, Amb. Temp.: -40 to 60°C (-40 to 140°F) Intrinsically Apparatus Parameters : [FISCO (IIC)] $U_i=17.5$ V, $I_i=380$ mA, $P_i=5.32$ W, $C_i=3.52$ nF, $L_i=0$ $\mu$ H [FISCO (IIB)] $U_i=17.5$ V, $I_i=460$ mA, $P_i=5.32$ W, $C_i=3.52$ nF, $L_i=0$ $\mu$ H [Entity] $U_i=24$ V, $I_i=250$ mA, $P_i=1.2$ W, $C_i=3.52$ nF, $L_i=0$ $\mu$ H Nonincendive for Class I, Division 2, Groups A, B, C and D, NIFW, FNICO Class I, Zone 2, Group IIC, NIFW, FNICO Class II, Division 2, Groups F&G Enclosure: Type 4X, Temp. Class: T4, Amb. Temp.: -40 to 60°C (-40 to 140°F) Nonincendive Apparatus Parameters : $V_{max}=32$ V, $C_i = 3.52$ nF, $L_i = 0$ $\mu$ H	FS15

Item	Description	Code
ATEX	<p>ATEX Flameproof *1  Applicable Standard: EN 60079-0:2012+A11:2013, EN 60079-1:2007 ("2014" from August 1, 2017), EN 60079-31:2014  Certificate: KEMA 07ATEX0109 X  II 2G, 2D Ex d IIC T6...T4 Gb ("Ex db IIC T6...T4 Gb" from August 1, 2017), Ex tb IIIC T85°C Db  Degree of protection: IP66/IP67  Amb. Temp. (Tamb) for gas-proof :  T4; -50 to 75°C (-58 to 167°F), T5; -50 to 80°C (-58 to 176°F), T6; -50 to 75°C (-58 to 167°F)  Process Temp. for gas-proof (Tp):  T4; -50 to 120°C (-58 to 248°F), T5; -50 to 100°C (-58 to 212°F), T6; -50 to 85°C (-58 to 185°F)  Max. surface Temp. for dust-proof: T85°C (Tamb: -30 to 75°C, Tp: -30 to 85°C) *2</p>	KF22
	<p>ATEX Intrinsically safe [Ex ia] *1  No. KEMA 04ATEX1116 X  Applicable Standard: EN 60079-0:2012+A11:2013, EN 60079-11:2012  II 1G, 2D Ex ia IIC/T4 Ga Ex ia IIIC T85°C T100°C T120°C Db  Ambient Temperature for EPL Ga: -40 to 60°C  Ambient Temperature for EPL Db: -30 to 60°C *2  Maximum Process Temperature (Tp.): 120°C  Maximum Surface Temperature for EPL Db. T85°C (Tp.: 80°C) T100°C (Tp.: 100°C) T120°C (Tp.: 120°C)  Ambient Humidity: 0 to 100% (No condensation)  Degree of Protection: IP66/IP67  Electrical Data:  [FISCO (IIC)] <math>U_i = 17.5 \text{ V}</math>, <math>I_i = 380 \text{ mA}</math>, <math>P_i = 5.32 \text{ W}</math>, <math>C_i = 3.52 \text{ nF}</math>, <math>L_i = 0 \mu\text{H}</math>  [FISCO (IIB)] <math>U_i = 17.5 \text{ V}</math>, <math>I_i = 460 \text{ mA}</math>, <math>P_i = 5.32 \text{ W}</math>, <math>C_i = 3.52 \text{ nF}</math>, <math>L_i = 0 \mu\text{H}</math>  [Entity] <math>U_i = 24 \text{ V}</math>, <math>I_i = 250 \text{ mA}</math>(resistively limited), <math>P_i = 1.2 \text{ W}</math>, <math>C_i = 3.52 \text{ nF}</math>, <math>L_i = 0 \mu\text{H}</math></p>	
	<p>ATEX Intrinsically safe [Ex ic] *1  Applicable standard: EN 60079-0:2012+A11:2013, EN 60079-11:2012  II 3G Ex ic IIC T4 Gc Amb. Temp.: -30 to 60°C (-22 to 140°F) *2  <math>U_i = 32 \text{ V}</math>, <math>C_i = 3.52 \text{ nF}</math>, <math>L_i = 0 \mu\text{H}</math></p>	KN26
Canadian Standards Association (CSA)	<p>CSA Explosionproof *1  Certificate: 2014354  Applicable Standard: C22.2 No.0, C22.2 No.0.4, C22.2 No.0.5, C22.2 No.25, C22.2 No.30, C22.2 No.94, C22.2 No.60079-0, C22.2 No.60079-1, C22.2 No.61010-1, C22.2 No.61010-2-030  Explosion-proof for Class I, Groups B, C and D.  Dustignition-proof for Class II/III, Groups E, F and G.  When installed in Division 2, "SEAL NOT REQUIRED" Enclosure: Type 4X, Temp. Code: T6...T4  Ex d IIC T6...T4 Enclosure: IP66/IP67  Max. Process Temp.: T4; 120°C (248°F), T5; 100°C (212°F), T6; 85°C (185°F)  Amb. Temp.: -50 to 75°C (-58 to 167°F) for T4, -50 to 80°C (-58 to 176°F) for T5, -50 to 75°C (-58 to 167°F) for T6 *2  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</p>	CF1
	<p>CSA Intrinsically safe *1  Certificate: 1689689  Applicable Standard: C22.2 No.0, C22.2 No.0.4, C22.2 No.25, C22.2 No.94, C22.2 No.157, C22.2 No.213, C22.2 No.61010-1, C22.2 No.61010-2-030  CAN/CSA E60079-11, CAN/CSA E60079-15, IEC 60529  Intrinsically Safe for Class I, Division 1, Groups A, B, C &amp; D, Class II, Division 1, Groups E, F &amp; G, Class III; Ex ia IIC T4  Amb. Temp.: -40 to 60°C (-40 to 140°F) *2 Encl. Type 4X, IP66/IP67  Entity Parameters for Intrinsically Safe :  <math>U_i</math> (<math>V_{max}</math>) = 24 V dc, <math>I_i</math> (<math>I_{max}</math>) = 250 mA, <math>P_i</math> (<math>P_{max}</math>) = 1.2 W, <math>C_i</math> = 3.52 nF, <math>L_i</math> = 0 <math>\mu\text{H}</math> or  <math>U_i</math> (<math>V_{max}</math>) = 17.5 V dc, <math>I_i</math> (<math>I_{max}</math>) = 380 mA, <math>P_i</math> (<math>P_{max}</math>) = 5.32 W, <math>C_i</math> = 3.52 nF, <math>L_i</math> = 0 <math>\mu\text{H}</math>  Nonincendive for Class I, Division 2, Groups A, B, C &amp; D, Class II, Division 2, Groups F &amp; G, Class III; Ex nL IIC T4  Amb. Temp.: -40 to 60°C (-40 to 140°F) *2 Encl. Type 4X, IP66/IP67  Entity Parameters for Nonincendive: <math>U_i</math> = 32V dc, <math>C_i</math> = 3.52 nF, <math>L_i</math> = 0 <math>\mu\text{H}</math>  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</p>	

Item	Description	Code
IECEx	<p>IECEx Flameproof *1</p> <p>Applicable Standard: IEC 60079-0:2011, IEC60079-1:2007-4</p> <p>Certificate: IECEx CSA 07.0008</p> <p>Flameproof for Zone 1, Ex d IIC T6...T4 Gb Enclosure: IP66/IP67</p> <p>Max.Process Temp.: T4;120°C(248°F), T5;100°C(212°F), T6; 85°C(185°F)</p> <p>Amb.Temp.: -50 to 75°C(-58 to 167°F) for T4, -50 to 80°C(-58 to 176°F) for T5, -50 to 75°C(-58 to 167°F) for T6</p>	SF2
	<p>IECEx Intrinsically safe Approval *1</p> <p>Intrinsically safe Ex ia</p> <p>Certificate No.: IECEx DEK 12.0016X</p> <p>Applicable Standard: IEC 60079-0:2011, IEC 60079-11:2011</p> <p>Ex ia IIC/IIB T4 Ga</p> <p>Amb. Temp.: -40 to 60°C(-40 to 140°F), Max. Process Temp.: 120°C(248°F)</p> <p>Electrical parameters:</p> <p>[Entity] <math>U_i = 24</math> V, <math>i_i = 250</math> mA, <math>P_i = 1.2</math> W, <math>C_i = 3.52</math> nF, <math>L_i = 0</math> <math>\mu</math>H</p> <p>[FISCO IIC] <math>U_i = 17.5</math> V, <math>i_i = 380</math> mA, <math>P_i = 5.32</math> W, <math>C_i = 3.52</math> nF, <math>L_i = 0</math> <math>\mu</math>H</p> <p>[FISCO IIB] <math>U_i = 17.5</math> V, <math>i_i = 460</math> mA, <math>P_i = 5.32</math> W, <math>C_i = 3.52</math> nF, <math>L_i = 0</math> <math>\mu</math>H</p> <p>Intrinsically safe Ex ic</p> <p>Certificate No.: IECEx DEK 13.0064X</p> <p>Applicable Standard: IEC 60079-0:2011, IEC 60079-11:2011</p> <p>Ex ic IIC T4 Gc IP code: IP66</p> <p>Amb. Temp.: -30 to 60°C(-22 to 140°F) *2, Max. Process Temp.: 120°C(248°F)</p> <p>Electrical parameters: <math>U_i = 32</math> V, <math>C_i = 3.52</math> nF, <math>L_i = 0</math> <math>\mu</math>H</p>	SS26

Contact Yokogawa representative for the codes indicated as '-'.

\*1: Applicable for Electrical connection code 2, 4, 7, 9, C and D.

\*2: Lower limit of ambient temperature is -15°C (5°F) when /HE is specified.

## &lt; Ordering Information &gt;

Specify the following when ordering

1. Model, suffix codes, and option codes
2. Calibration range and unit (Scale In Lower/Upper Value);
  - 1) Calibration range can be specified with range value specifications up to 5 digits (excluding any decimal point) for low or high range limits within the range of -32000 to 32000.
  - 2) Specify only one unit from the table, 'Factory Setting'.
3. Output mode (Characterization Type); Select 'LINEAR' or 'SQUARE ROOT'.
4. Output scale and unit (Out Scale Lower/Upper value);
 

When digital indicator is required, the scale range can be specified with range limit specifications up to 5 digits (excluding any decimal point) for low or high range limits within the range of -32000 to 32000. Unit display consists of 6-digit, therefore, if the specified scaling unit excluding '/' is longer than 6-characters, the first 6 characters will be displayed on the unit display.
5. Tag Number;
 

Specify software tag (up to 32 letters) to be written on the amplifier memory and Tag number (up to 22 letters, or 16 letters when /N4 is specified) to be engraved on the tag plate separately.
6. Bus Address
 

Specify the address between hexadecimal 0x03(3) and 0x7E(126).

## [When /CD option is specified]

7. Software damping (Filter Time Const of AI function Block); Specify software damping: 0.00 to 100.00(s)

Example; When 50 to 1000 mmH<sub>2</sub>O for calibration range and 0 to 100% output scale is required, specify the values as follows:

Calibration range:

Higher value 1000  
Lower value 50

Calibration unit: mmH<sub>2</sub>O

Output scale:

Higher value 100  
Lower value 0

Unit of output scale: %

Output mode: Linear

Explanation of PROFIBUS PA parameters:

- (1) Characterization Type: Type of Linearization, 'LINEAR' or 'SQUARE ROOT' can be selected.
- (2) Scale In Lower/Upper Value: The value set as calibration range should be entered to this parameter. This is the input conversion of the Pressure using the high and low scale.
- (3) Pressure Unit: The unit of calibration by sensor, this is used as the unit of Scale In.
- (4) Out Scale Lower/Upper value: Output scaling parameter. Set the output value which corresponds to 0% value and 100% value of the calculation in the AI1 function block. The value set as output scale should be entered to this parameter. When integral indicator is required, this output is shown on LCD.

## &lt; Related Instruments &gt;

The customer should prepare instrument maintenance tool, terminator, Profibus power supply etc.

## &lt; DP/PA Coupler for ATEX Intrinsically Safe Type &gt;

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

## &lt; Reference &gt;

- **DPharp EIA<sup>®</sup>**; Registered trademark of Yokogawa Electric Corporation.
- PROFIBUS; Registered trademark of Profibus Nutzerorganisation e.v., Karlsruhe, Germany.

## &lt; Factory Setting &gt;

Tag Number (Tag plate)	As specified in order
Software Tag (TAG)	'PT1001' unless otherwise both Tag Number and Software Tag specified in order
Bus Address	'0x7E(126)' unless otherwise specified in order
Output Mode (Characterization Type)	'Linear' unless otherwise specified in order
Calibration Range (Scale In Lower/Upper Value)	As specified in order
Calibration Range Unit	Selected from mmH <sub>2</sub> O, mmH <sub>2</sub> O(68°F), mmHg, Pa, hPa, kPa, MPa, mbar, bar, gf/cm <sup>2</sup> , kgf/cm <sup>2</sup> , inH <sub>2</sub> O, inH <sub>2</sub> O(68°F), inHg, ftH <sub>2</sub> O, ftH <sub>2</sub> O(68°F) or psi. (Only one unit can be specified)
Output Scale (Out Scale Lower/Upper Value)	'0 to 100%' unless otherwise specified.
Software Damping (Filter Time Const)*1	'2 s' or as specified in order

\*1: To specify this item, /CD option is required.