■ OPTIONAL SPECIFICATIONS

Item		Description		Code
High accuracy type *11		High accuracy		HAC
Painting	Color change	Amplifier cover only		P□
	Coating change	Epoxy resin-baked coating		X1
Lightning protector		Transmitter power supply voltage: 10.5 to 32 V DC (10.5 to 30 V DC for intrinsically safe type.) Allowable current: Max. 6000 A (1×40 μs), Repeating 1000 A (1×40 μs) 100 times		A
Oil-prohibited use		Degrease cleansing treatment		K1
		Degrease cleansing treatment and with fluorinated oil filled capsule. Operating temperature −20 to 80°C		K2
Calibration units *1		P calibration (psi unit)	(See Table for Span and Range Limits.)	D1
		bar calibration (bar unit)		D3
		M calibration (kgf/cm² unit)		D4
Fast response *9		Update time: 0.125 sec or less Amplifier damping time constant: 0.1 to 64 sec in 9 increments Response time (with min. damping time constant): max. 0.3 sec		F1
Failure alarm down-scale *2		Output status at CPU failure and hardware error is −5%, 3.2 mA or less.		C1
NAMUR NE43 compliant *2 *10		Output signal limits: 3.8 mA to 20.5 mA	Failure alarm down-scale: output status at CPU failure and hardware error is −5%, 3.2 mA or less.	C2
			Failure alarm up-scale: output status at CPU failure and hardware error is 110%, 21.6 mA or more.	C3
Stainless steel amplifier housing *3		Amplifier housing material; SCS14A stainless steel (equivalent to SUS316 cast stainless steel or ASTM CF-8M)		E1
Stainless steel tag plate		SUS304 stainless steel tag plate wired onto transmitter		N4
Mill Certificate		Process connector		M15
Pressure test/Leak test Certificate		Test Pressure: 200 kPa (2 kgf/cm²) *4	Nitrogen (N_2) Gas *8 Retention time: 10 minutes	T05
		Test Pressure: 2 MPa (20 kgf/cm²) *5		T06
		Test Pressure: 10 MPa (100 kgf/cm²) *6		T07
		Test Pressure: 50 MPa (500 kgf/cm²) *7		T08

T04E.EPS

*1: The unit of MWP (Max. working pressure) on the name plate of a housing is the same unit as specified by Optional code D1, D3 and D4.
*2: The hardware error indicates faulty amplifier or capsule.
When combining with Optional code F1, output status for down-scale is −2.5%, 3.6 mA DC or less.
*3: Applicable for Electrical connection code 2, 3, 4, and 7. Not applicable for Optional code P□ and X1.
*4: Applicable for Capsule code A.
*5: Applicable for Capsule code B.
*6: Applicable for Capsule code C.
*7: Applicable for Capsule code D.
*8: Pure nitrogen gas is used for oil-prohibited use (Optional code K1 and K2)
*9: Consult Yokogawa when combining with Optional code for explosion protected type.
*10: Not applicable for Optional code C1.
*11: Applicable for EJA530A.

< Settings When Shipped >

Tag Number	As specified in order *1
Output Mode	'Linear'
Display Mode	'Linear'
Operation Mode	'Normal' unless otherwise specified in order
Damping Time Constant	'2 sec.'

Calibration Range Lower Range Value	As specified in order
Calibration Range Higher Range Value	As specified in order
Calibration Range Units	Selected from mmH_2O, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, gf/cm², kgf/cm², inH_2O, inHg, ftH_2O, psi, or atm.(Only one unit can be specified)

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*1: Up to 16 alphanumeric characters (including - and ·) for Output Signal code D or up to 8 alphanumeric characters for Output Signal code E will be entered in the amplifier memory.

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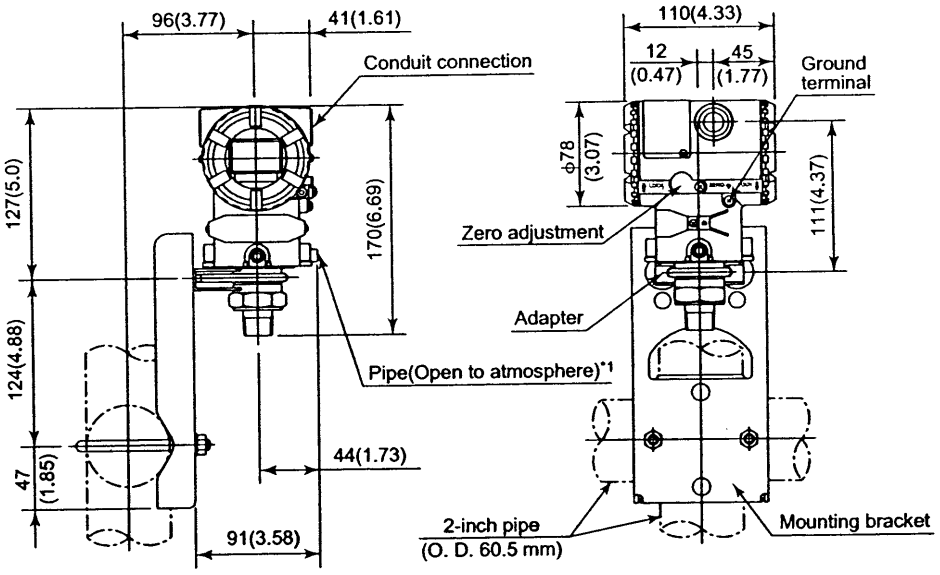
■ DIMENSIONS

● Model EJA510A and EJA530A

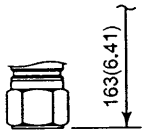
◆ With Process Connection code 7

Unit: mm(Approx. inch)

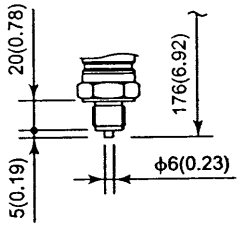


*1: Applied to Model EJA530A with Measurement span code A, B, and C.

◆ For Process Connection code 4



◆ For Process Connection code 8 and 9



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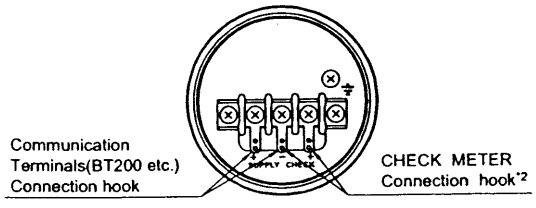
● Terminal Configuration



● Terminal Wiring

SUPPLY + −	Power supply and output terminal
CHECK + −	External indicator(ammeter) terminal*2
⏚	Ground terminal

*2: When using an external indicator or a check meter, the internal resistance must be 10 Ω or less.

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YOKOGAWA
2 Dart Road
Newnan, GA 30265
Fax: (770) 254-0928
Tel: (770) 254-0400

DPharp Factory Calibration Test Report

Model Number	EJA530A-EAS4N-02EE/CF1/D1
Serial Number	27E620228U
Capsule Serial	1S5F041J
Date	8/2/05
Ambient Temperature	23.70 Deg. C
Operator	2426
Order Number	KDG0241
Line Number	02
Component Number	01
PO Number	155402
Tag Number	

Calibrated Range

Low Range Value	0.00
High Range Value	29.00
Unit of Measure	psi
Pressure Std Serial #	49069

Test Point	Pressure	Output Voltage	Error %
1. Voltage Output 0%	0.00 psi	1.0001 V	0.003 %
2. Voltage Output 25%	7.25 psi	1.9996 V	-0.010 %
3. Voltage Output 50%	14.50 psi	2.9993 V	-0.017 %
4. Voltage Output 75%	21.75 psi	3.9990 V	-0.025 %
5. Voltage Output 100%	29.00 psi	4.9988 V	-0.030 %
6. Voltage Output 75%	21.75 psi	3.9992 V	-0.020 %
7. Voltage Output 50%	14.50 psi	2.9994 V	-0.015 %
8. Voltage Output 25%	7.25 psi	1.9995 V	-0.012 %
9. Voltage Output 0%	0.00 psi	0.9997 V	-0.007 %
		Average Error:	0.016 %

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User's Manual

DPharp

Model EJA510A and EJA530A Absolute Pressure and Gauge Pressure Transmitters

[Style: S2]

IM 01C21F01-01E

YOKOGAWA
Yokogawa Electric Corporation

IM 01C21F01-01E
5th Edition

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CONTENTS

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1. INTRODUCTION

Thank you for purchasing the DPharp electronic pressure transmitter.

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

■ Regarding This Manual

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

NOTE

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

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

WARNING

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

CAUTION

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

IMPORTANT

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

NOTE

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

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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.

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 wark+0-ŒXased, 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.

2. HANDLING CAUTIONS

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

The EJA-A Series pressure transmitters are thoroughly tested at the factory before shipment. When the transmitter is delivered, visually check them to make sure that no damage occurred during shipment.

Also check that all transmitter mounting hardware shown in Figure 2.1.1 is included. If the transmitter was ordered without the mounting bracket, the transmitter mounting hardware is not included. After checking the transmitter, repack it in the way it was delivered until installation.

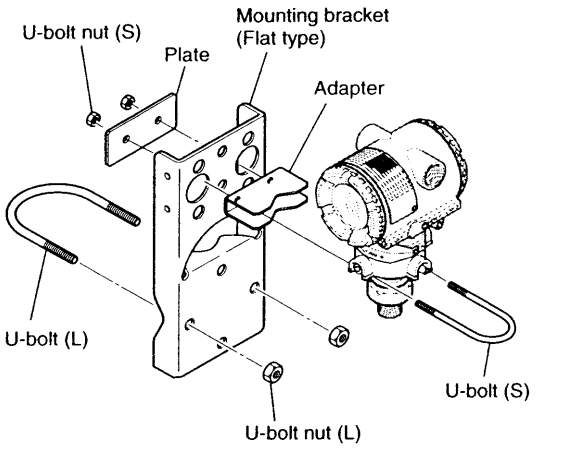

Figure 2.1.1 Transmitter Mounting Hardware

2.1 Model and Specifications Check

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

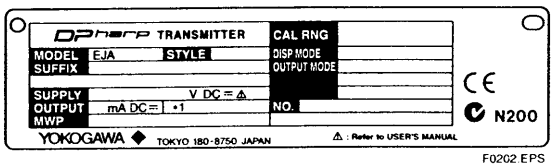

Figure 2.1.2 Name Plate

2.2 Unpacking

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

2.3 Storage

The following precautions must be observed when storing the instrument, especially for a long period.

(a) Select a storage area which meets the following conditions:
- It is not exposed to rain or water.
- It suffers minimum vibration and shock.
- It has an ambient temperature and relative humidity within the following ranges.

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

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

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

2.4 Selecting the Installation Location

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

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

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

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

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

2.5 Pressure Connection

WARNING

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

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

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

2.6 Waterproofing of Cable Conduit Connections

Apply a non-hardening sealant to the threads to waterproof the transmitter cable conduit connections. (See Figure 6.4.2a, 6.4.2b and 6.4.2c.)

2.7 Restrictions on Use of Radio Transceiver

IMPORTANT

Although the transmitter has been designed to resist high frequency electrical noise, if a radio transceiver is used near the transmitter or its external wiring, the transmitter may be affected by high frequency noise pickup. To test for such effects, bring the transceiver in use slowly from a distance of several meters from the transmitter, and observe the measurement loop for noise effects. Thereafter, always use the transceiver outside the area affected by noise.

2.8 Insulation Resistance and Dielectric Strength Test

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

(a) Do not perform such tests more frequently than is absolutely necessary. Even test voltages that do not cause visible damage to the insulation may degrade the insulation and reduce safety margins.

(b) Never apply a voltage exceeding 500 V DC (100 V DC with an internal lightning protector) for the insulation resistance test, nor a voltage exceeding 500 V AC (100 V AC with an internal lightning protector) for the dielectric strength test.

(c) Before conducting these tests, disconnect all signal lines from the transmitter terminals. Perform the tests in the following procedure:

• Insulation Resistance Test

1) Short-circuit the + and – SUPPLY terminals in the terminal box.
2) Turn OFF the insulation tester. Then connect the insulation tester plus (+) lead wire to the shorted SUPPLY terminals and the minus (–) leadwire to the grounding terminal.
3) Turn ON the insulation tester power and measure the insulation resistance. The voltage should be applied short as possible to verify that the insulation resistance is at least 20 MΩ.
4) After completing the test and being very careful not to touch exposed conductors disconnect the insulation tester and connect a 100 kΩ resistor between the grounding terminal and the short-circuiting SUPPLY terminals. Leave this resistor connected at least one second to discharge any static potential. Do not touch the terminals while it is discharging.

• Dielectric Strength Test

1) Short-circuit the + and – SUPPLY terminals in the terminal box.

2) Turn OFF the dielectric strength tester. Then connect the tester between the shorted SUPPLY terminals and the grounding terminal. Be sure to connect the grounding lead of the dielectric strength tester to the ground terminal.

3) Set the current limit on the dielectric strength tester to 10 mA, then turn ON the power and gradually increase the test voltage from '0' to the specified voltage.

4) When the specified voltage is reached, hold it for one minute.

5) After completing this test, slowly decrease the voltage to avoid any voltage surges.

2.9 Installation of Explosion Protected Type

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

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

⚠ CAUTION

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

⚠ WARNING

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

2.9.1 FM Approval

a. FM Intrinsically Safe Type

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

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

- Intrinsically Safe for Class I, Division 1, Groups A, B, C & D. Class II, Division 1, Groups E, F & G and Class III, Division 1 Hazardous Locations.
- Nonincendive for Class I, Division 2, Groups A, B, C & D. Class II, Division 2, Groups E, F & G and Class III, Division 1 Hazardous Locations.
- Outdoor hazardous locations, NEMA 4X.
- Temperature Class: T4
- Ambient temperature: –40 to 60°C

Note 2. Entity Parameters

- Intrinsically Safe Apparatus Parameters
  [Groups A, B, C, D, E, F and G]
  Vmax = 30 V Ci = 22.5 nF
  Imax = 165 mA Li = 730 µH
  Pmax = 0.9 W
- * Associated Apparatus Parameters
  (FM approved barriers)
  Voc ≤ 30 V Ca > 22.5 nF
  Isc ≤ 165 mA La > 730 µH
  Pmax ≤ 0.9W
- Intrinsically Safe Apparatus Parameters
  [Groups C, D, E, F and G]
  Vmax = 30 V Ci = 22.5 nF
  Imax = 225 mA Li = 730 µH
  Pmax = 0.9 W
- * Associated Apparatus Parameters
  (FM approved barriers)
  Voc ≤ 30 V Ca > 22.5 nF
  Isc ≤ 225 mA La > 730 µH
  Pmax ≤ 0.9 W
- Entity Installation Requirements
  Vmax ≥ Voc or Vt, Imax ≥ Isc or It,
  Pmax (IS Apparatus) ≥ Pmax (Barrier)
  Ca ≥ Ci + Ccable, La ≥ Li + Lcable

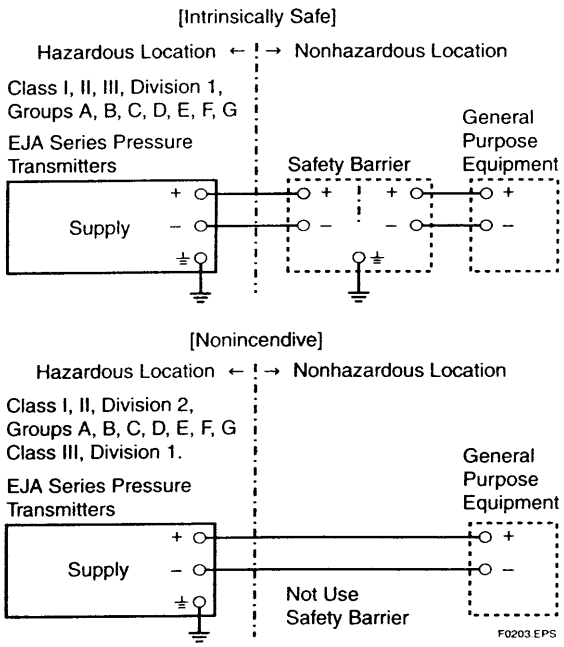
Note 3. Installation

- Barrier must be installed in an enclosure that meets the requirements of ANSI/ISA S82.01.
- Control equipment connected to barrier must not use or generate more than 250 V rms or V dc.
- Installation should be in accordance with ANSI/ISA RP12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electric Code (ANSI/NFPA 70).

- The configuration of associated apparatus must be FMRC Approved.
- Dust-tight conduit seal must be used when installed in a Class II, III, Group E, F and G environments.
- Associated apparatus manufacturer's installation drawing must be followed when installing this apparatus.
- The maximum power delivered from the barrier must not exceed 0.9 W.
- Note a warning label worded "SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY," and "INSTALL IN ACCORDANCE WITH DOC. No. IFM012-A12 P.1 and 2."

Note 4. Maintenance and Repair

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



b. FM Explosionproof Type

Caution for FM explosionproof type.

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

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

Note 2. Wiring

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

Note 3. Operation

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

Note 4. Maintenance and Repair

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

c. FM Intrinsically Safe Type/FM Explosionproof Type

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

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

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

2.9.2 CSA Certification

a. CSA Intrinsically Safe Type

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

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

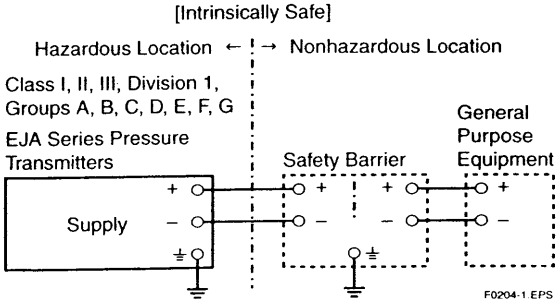
- Intrinsically Safe for Class I, Division 1, Groups A, B, C & D. Class II, Division 1, Groups E, F & G and Class III, Division 1 Hazardous Locations.
- Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division 2, Groups F & G, and Class III, Hazardous Locations. (not use Safety Barrier)
- Encl. "Type 4X"
- Temperature Class: T4
- Ambient temperature: –40 to 60°C
- Process Temperature: 120°C max.

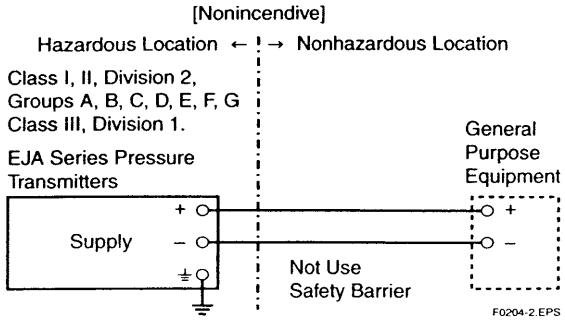
Note 2. Entity Parameters

- Intrinsically safe ratings are as follows:
  Maximum Input Voltage (Vmax) = 30 V
  Maximum Input Current (Imax) = 165 mA
  Maximum Input Power (Pmax) = 0.9 W
  Maximum Internal Capacitance (Ci) = 22.5 nF
  Maximum Internal Inductance (Li) = 730 μH
- * Associated apparatus (CSA certified barriers)
  Maximum output voltage (Voc) ≤ 30 V
  Maximum output current (Isc) ≤ 165 mA
  Maximum output power (Pmax) ≤ 0.9 W

Note 3. Installation

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





b. CSA Explosionproof Type

Caution for CSA explosionproof type.

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

- Explosionproof for Class I, Division 1, Groups B, C and D.
- Dust-ignitionproof for Class II/III, Division 1, Groups E, F and G.
- Encl "Type 4X"
- Temperature Class: T6, T5, and T4
- Process Temperature: 85°C (T6), 100°C (T5), and 120°C (T4)
- Ambient Temperature: –40 to 80°C
- Supply Voltage: 42 V dc max.
- Output Signal: 4 to 20 mA

Note 2. Wiring

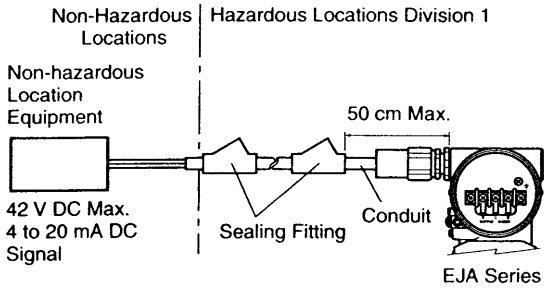
- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- In hazardous location, wiring shall be in conduit as shown in the figure.
  CAUTION: SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE.
  UN SCELLEMENT DOIT ÊTRE INSTALLÉ À MOINS DE 50 cm DU BÎTIER.
- When installed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

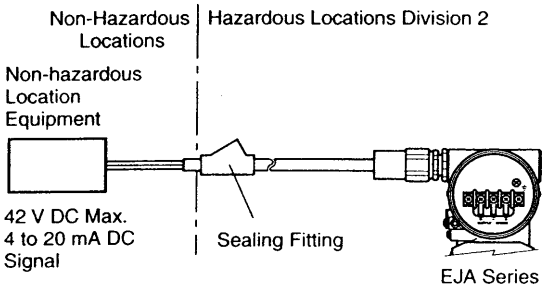
Note 3. Operation

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

Note 4. Maintenance and Repair

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





F0205.EPS

c. CSA Intrinsically Safe Type/CSA Explosionproof Type

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

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

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

2.9.3 SAA Certification

a. SAA Intrinsically Safe Type

Caution for SAA Intrinsically safe type and Type n.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /SU1 are applicable for use in hazardous locations.

- Type of Protection and Marking Code: Ex ia IIC T4 (Tamb = 60°C) IP67 Class I Zone 0
- Type of Protection and Marking Code: Ex n IIC T4 (Tamb = 60°C) IP67 Class I Zone 2
- Ambient Temperature: –40 to 60°C

Note 2. Entity Parameters

- Intrinsically safe rating of the transmitters are as follows.

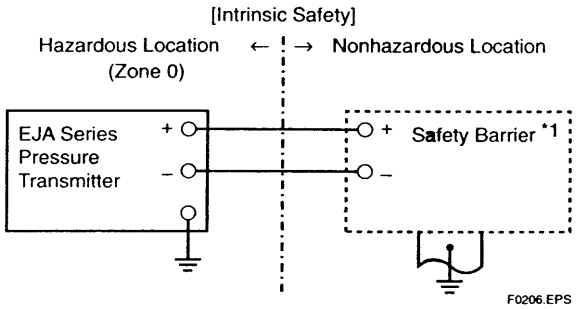
  Maximum Input Voltage (Ui) = 30 V
  Maximum Input Current (Ii) = 165 mA
  Maximum Input Power (Pi) = 0.9 W
  Maximum Internal Capacitance (Ci) = 0.02 μF
  Maximum Internal Inductance (Li) = 0.73 mH

Note 3. Wiring

- All Wiring shall comply with the Australian Standard.

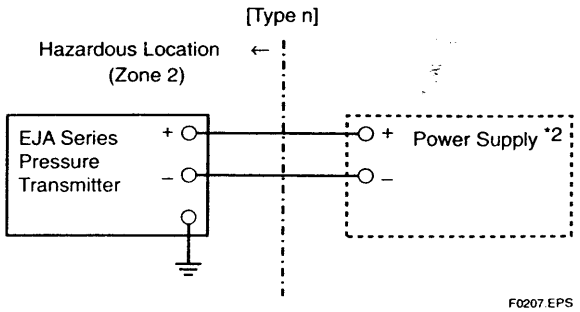
Note 4. Maintenance and Repair

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



F0206.EPS

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



F0207.EPS

*2: The voltage of the power supply is not exceed 30V dc.

b. SAA Flameproof Type

Caution for SAA flameproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /SU1 are applicable for use in hazardous locations:

- Type of Protection and marking Code: Ex d II C T* IP67 Class I Zone 1 (T* see schedule)
- Temperature Class: T6, T5, and T4
- Process Temperature: 85°C (T6), 100°C (T5), and 120°C (T4)
- Supply voltage: 42 V dc max.
- Output Signal: 4 to 20 mA
- Ambient Temperature: –40 to 80°C

Note 2. Wiring

- All wiring shall comply with the Australian Standard.

Note 3. Operation

- Keep the "CAUTION" label attached to the transmitter.

  CAUTION: AMBIENT TEMPERATURE ABOVE 75 DEG C SELECT SUITABLE CABLE.
  DISCONNECT POWER AND WAIT 1 MINUTE BEFORE REMAKING COVER

- 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 Standards Association of Australia Flameproof Certification.

2.9.4 CENELEC ATEX (KEMA) Certification

(1) Technical Data

a. CENELEC ATEX (KEMA) Intrinsically Safe Type

Caution for CENELEC ATEX (KEMA) Intrinsically safe type.

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

- No. KEMA 02ATEX1030 X
- Type of Protection and Marking code: EEx ia IIC T4
- Temperature Class: T4
- Enclosure: IP67
- Process Temperature: 120°C max.
- Ambient Temperature: –40 to 60°C

Note 2. Electrical Data

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

Note 3. Installation

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

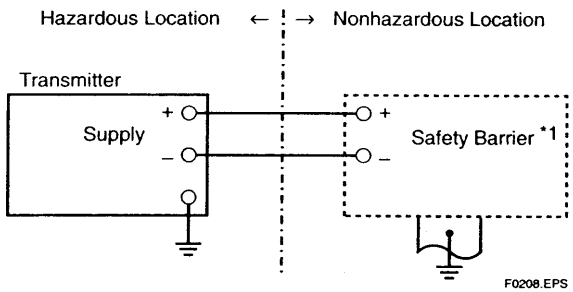
Note 4. Maintenance and Repair

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

Note 5. Special Conditions for Safe Use

- In the case where the enclosure of the Pressure Transmitter is made of aluminium, if it is mounted in an area where the use of category 1 G apparatus is required, it must be installed such, that, even in the event of rare incidents, ignition sources due to impact and friction sparks are excluded.

[Installation Diagram]



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

b. CENELEC ATEX (KEMA) Flameproof Type

Caution for CENELEC ATEX (KEMA) flameproof type.

Note 1. Model EJA Series differential, gauge, and absolute pressure transmitters with optional code /KF2 for potentially explosive atmospheres:

- No. KEMA 02ATEX2148
- Type of Protection and Marking Code: EEx d IIC T6···T4
- Temperature Class: T6, T5, and T4
- Enclosure: IP67

- Maximum Process Temperature: 85°C (T6), 100°C (T5), and 120°C (T4)
- Ambient Temperature: T4 and T6; –40 to 75°C, T5; –40 to 80°C

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

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

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

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

c. CENELEC ATEX (KEMA) Intrinsically Safe Type/CENELEC ATEX (KEMA) Flameproof Type/ CENELEC ATEX Type n

Model EJA-A Series pressure transmitters with optional code /KU2 can be selected the type of protection CENELEC ATEX (KEMA) Intrinsically Safe, Flameproof or CENELEC ATEX Type n for use in hazardous locations.

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

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

● CENELEC ATEX Type of Protection "n"

⚠ WARNING

When using a power supply not having a non-incendive 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.

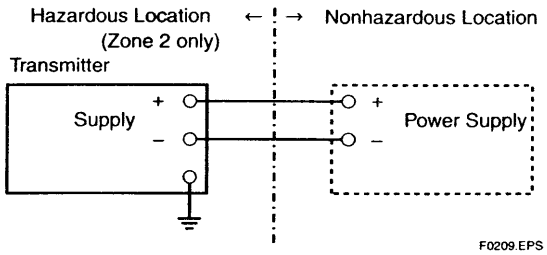
- Type of Protection and Marking Code: EEx nC IIL T4
- Temperature Class: T4
- Enclosure: IP67
- Process Temperature: 120°C max.
- Ambient Temperature: –40 to 60°C

Note 1. Electrical Data
  Ui = 30 V
  Effective internal capacitance; Ci = 22.5 nF
  Effective internal inductance; Li = 730 μH

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

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

[Installation Diagram]



Ratings of the Power Supply as follows;
  Maximum Voltage: 30 V

● CENELEC ATEX Type of Protection "Dust"

- Type of Protection and Marking Code: II 1D
- Maximum Surface Temperature: T65°C (Tamb.: 40°C), T85°C (Tamb.: 60°C), and T105°C (Tamb.: 80°C)

(2) Electrical Connection

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

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

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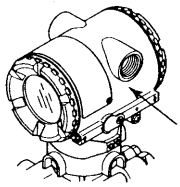


F0200.EPS

(3) Installation

⚠ **WARNING**

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

(4) Operation

⚠ **WARNING**

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

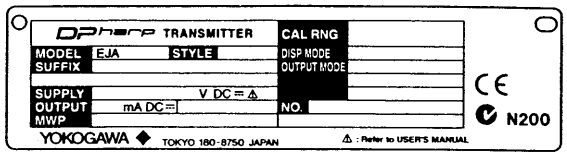
(5) Maintenance and Repair

⚠ **WARNING**

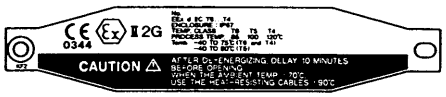
The instrument modification or parts replacement by other than authorized Representative of Yokogawa Electric Corporation is prohibited and will void the certification.

(6) Name Plate

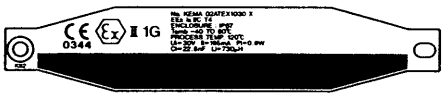
● Name plate



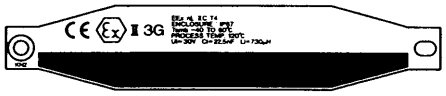
● Tag plate for flameproof type



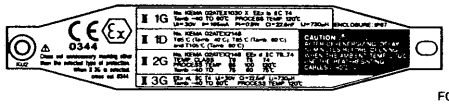
● Tag plate for intrinsically safe type



● Tag plate for type n protection



● Tag plate for flameproof, intrinsically safe type, type n protection, and Dust



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

12A819857 132
The year 2001

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

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

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18.4

2.10 EMC Conformity Standards

EN61326, AS/NZS 2064

NOTE

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

2.11 PED (Pressure Equipment Directive)

(1) General

- EJA series of pressure transmitters are categorized as pressure accessories under the piping section of this directive 97/23/EC, which corresponds with Article 3, Paragraph 3 of PED, denoted as Sound Engineering Practice (SEP).
- EJA130A, EJA440A, EJA510A, and EJA530A can be used above 200 bar and therefore considered as a part of a pressure retaining vessel where category lll, Module H applies. These models can be specified by using the optional code /PE3.

(2) Technical Data

Module: H
Type of Equipment: Pressure Accessory - Vessel
Type of Fluid: Liquid and Gas
Group of Fluid: 1 and 2

Model	PS(bar)*1	V(L)	PS·V(bar·L)	Category*2
EJA110A	160	0.01	1.6	Article 3, Paragraph 3
EJA120A	0.5	0.01	0.005	Article 3, Paragraph 3
EJA130A	420	0.01	4.2	III
EJA310A	140	0.01	1.4	Article 3, Paragraph 3
EJA430A	140	0.01	1.4	Article 3, Paragraph 3
EJA440A	500	0.01	5	III
EJA510A	500	0.1	50	III
EJA530A	500	0.1	50	III

*1: PS is maximum allowable pressure for vessel itself.
*2: Referred to Table 1 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC

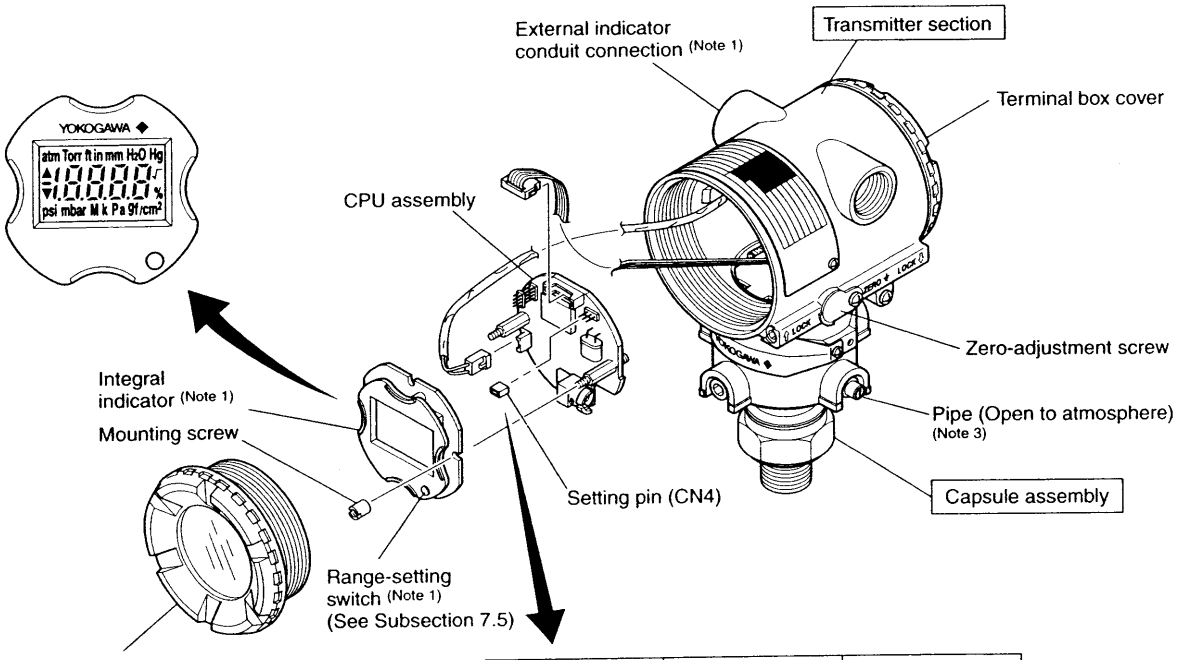
T0299.EPS

(3) Operation

CAUTION

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

3. COMPONENT NAMES



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

F0301.EPS

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

Figure 3.1 Component Names

Table 3.1 Display Symbol

Display Symbol	Meaning of Display Symbol
▲	The output signal being zero-adjusted is increasing.
▼	The output signal being zero-adjusted is decreasing.
%, Pa, kPa, MPa, kgf/cm^2, gf/cm^2, mbar, bar, atm, mmHg, mmH_2O, inH_2O, inHg, ftH_2O, psi, Torr	Select one of these sixteen available engineering units for the display.

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4. INSTALLATION

4.1 Precautions

Before installing the transmitter, read the cautionary notes in Section 2.4, "Selecting the Installation Location." For additional information on the ambient conditions allowed at the installation location, refer to Subsection 10.1 "Standard Specifications."

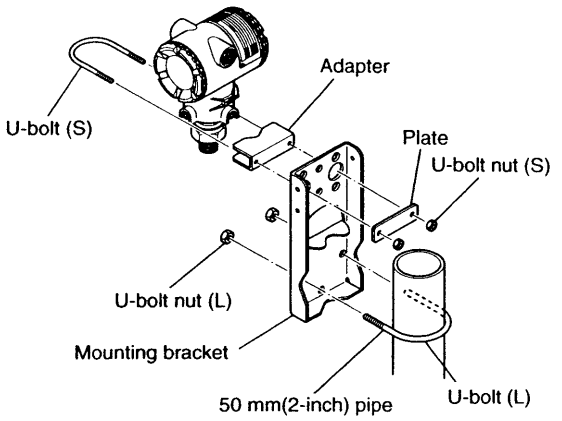
IMPORTANT

- When welding piping during construction, take care not to allow welding currents to flow through the transmitter.
- Do not step on this instrument after installation.

4.2 Mounting

- The impulse piping connection port of the transmitter is covered with a plastic cap to protect against dust. This cap must be removed before connecting the piping. (Be careful not to damage the threads when removing these caps. Never insert a screw driver or other tool between the cap and the port threads to remove the cap.)
- The transmitter can be mounted on a nominal 50 mm (2-inch) pipe using the mounting bracket supplied, as shown in Figure 4.2.1.
- The user should prepare the mating gasket for the transmitters with Process connection code 8 and 9. See Figure 4.2.2.

Vertical pipe mounting



Horizontal pipe mounting

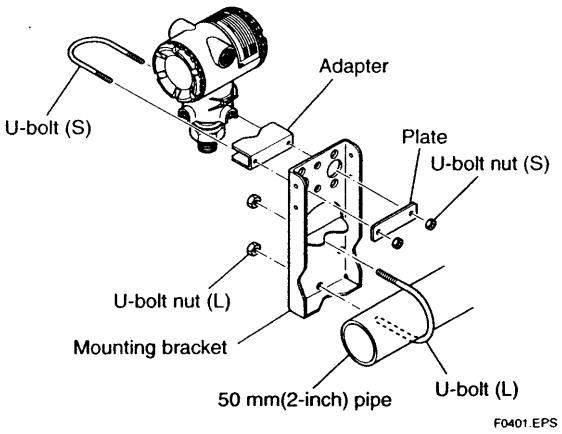


Figure 4.2.1 Transmitter Mounting

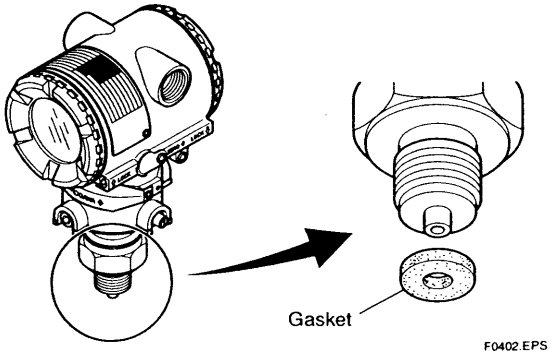
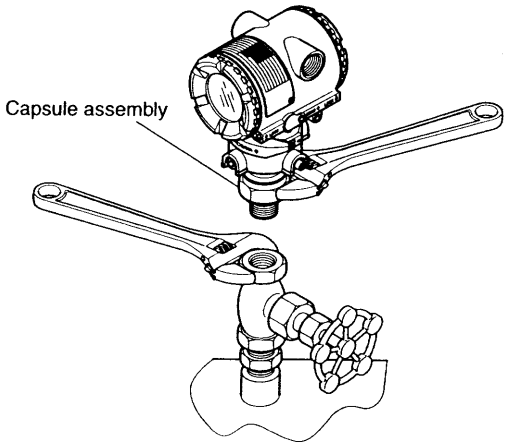


Figure 4.2.2 Gasketing

IMPORTANT

Tighten the hexagonal nut part of the capsule assembly. See Figure 4.2.3.



F0404.EPS

Figure 4.2.3 Tightening Transmitter

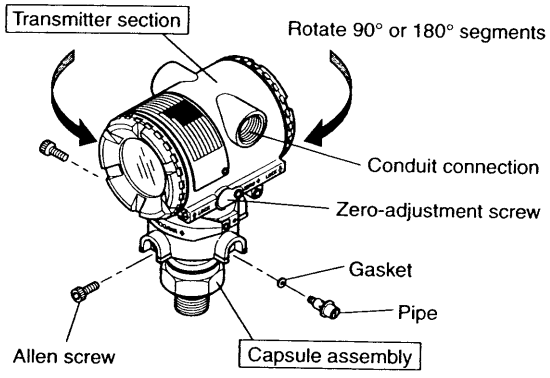
4.3 Rotating Transmitter Section

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

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

IMPORTANT

Do not rotate the transmitter section more than 180°.



F0403.EPS

Figure 4.3 Rotating Transmitter Section

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5. INSTALLING IMPULSE PIPING

5.1 Impulse Piping Installation Precautions

5.1.1 Connecting Impulse Piping to the Transmitter

IMPORTANT

The transmitter can be installed in horizontal impulse piping configuration, tilting the transmitter's position up to 90°. When tilting, observe that the zero-adjustment screw and the pipe (for Model EJA530A with Measurement span code A, B, and C) are positioned downwards, as shown in Figure 5.1.1.

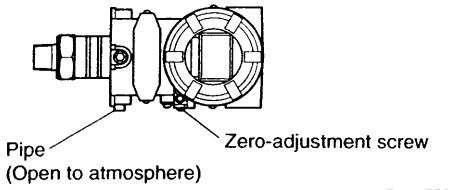


Figure 5.1.1 Horizontal Impulse Piping Connection

5.1.2 Routing the Impulse Piping

(1) Process Pressure Tap Angles

If condensate, gas, sediment or other extraneous material in the process piping gets into the impulse piping, pressure measurement errors may result. To prevent such problems, the process pressure taps must be angled as shown in Figure 5.1.2 according to the kind of fluid being measured.

NOTE

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

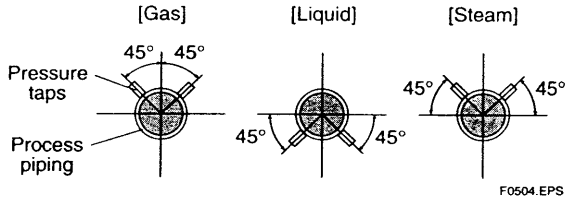


Figure 5.1.2 Process Pressure Tap Angle (For Horizontal Piping)

(2) Position of Process Pressure Taps and Transmitter

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

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

(3) Impulse Piping Slope

The impulse piping must be routed with only an upward or downward slope. Even for horizontal routing, the impulse piping should have a slope of at least 1/10 to prevent condensate (or gases) from accumulating in the pipes.

(4) Preventing Freezing

If there is any risk that the process fluid in the impulse piping or transmitter could freeze, use a steam jacket or heater to maintain the temperature of the fluid.

NOTE

After completing the connections, close the valves on the process pressure taps (*main valves*), the valves at the transmitter (*stop valves*), and the impulse piping drain valves, so that condensate, sediment, dust and other extraneous material cannot enter the impulse piping.

5.2 Impulse Piping Connection Examples

Figure 5.2 shows examples of typical impulse piping connections. Before connecting the transmitter to the process, study the transmitter installation location, the process piping layout, and the characteristics of the process fluid (corrosiveness, toxicity, flammability, etc.), in order to make appropriate changes and additions to the connection configurations.

Note the following points when referring to these piping examples.

- If the impulse piping is long, bracing or supports should be provided to prevent vibration.
- The impulse piping material used must be compatible with the process pressure, temperature, and other conditions.
- A variety of process pressure tap valves (main valves) are available according to the type of connection (flanged, screwed, welded), construction (globe, gate, or ball valve), temperature and pressure. Select the type of valve most appropriate for the application.

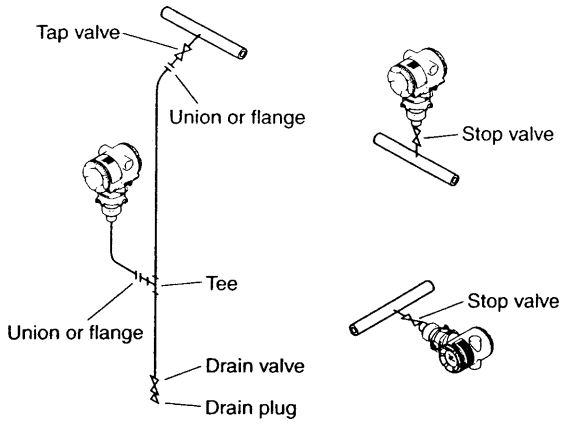


Figure 5.2 Impulse Piping Connection Examples

6. WIRING

6.1 Wiring Precautions

IMPORTANT

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

6.2 Selecting the Wiring Materials

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

6.3 Connections of External Wiring to Terminal Box

6.3.1 Power Supply Wiring Connection

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

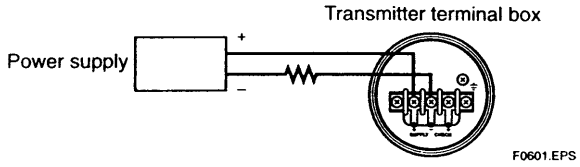


Figure 6.3.1 Power Supply Wiring Connection

6.3.2 External Indicator Connection

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

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

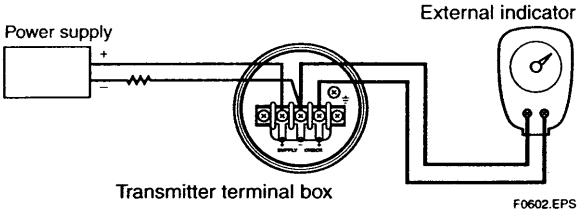


Figure 6.3.2 External Indicator Connection

6.3.3 BRAIN TERMINAL BT200 Connection

Connect the BT200 to the SUPPLY + and – terminals (Use hooks).

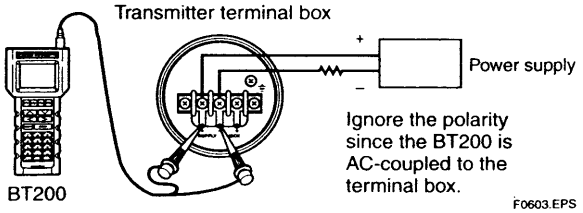


Figure 6.3.3 BT200 Connection

6.3.4 Check Meter Connection

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

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

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

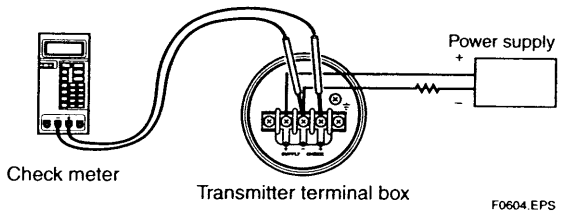


Figure 6.3.4 Check Meter Connection

6.4 Wiring

6.4.1 Loop Configuration

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

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

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

(1) General-use Type and Flameproof Type

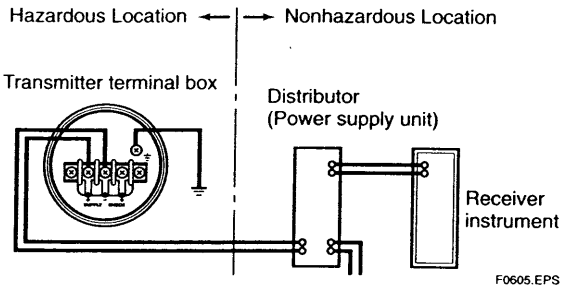


Figure 6.4.1a Connection between Transmitter and Distributor

(2) Intrinsically Safe Type

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

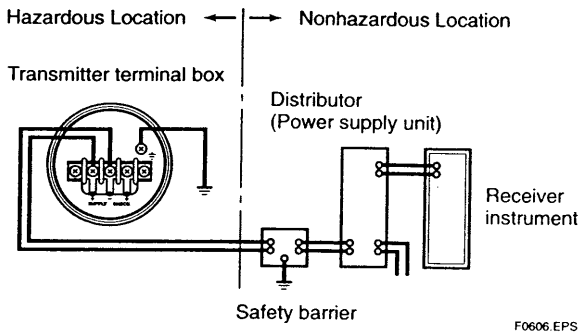


Figure 6.4.1b Connection between Transmitter and Distributor

6.4.2 Wiring Installation

(1) General-use Type and Intrinsically Safe Type

Make cable wiring using metallic conduit or waterproof glands.

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

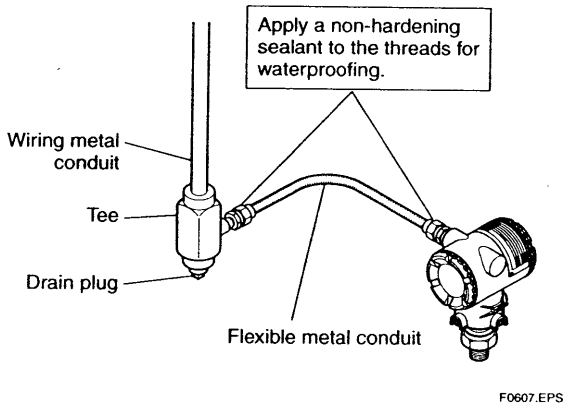


Figure 6.4.2a Typical Wiring Using Flexible Metal Conduit

18.4

(32)

(2) Flameproof Type

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

■ Wiring cable through flameproof packing adapter.

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

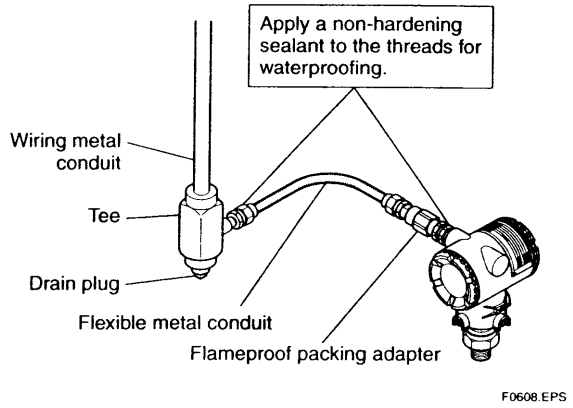


Figure 6.4.2b Typical Cable Wiring Using Flameproof Packing Adapter

■ Flameproof metal conduit wiring

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

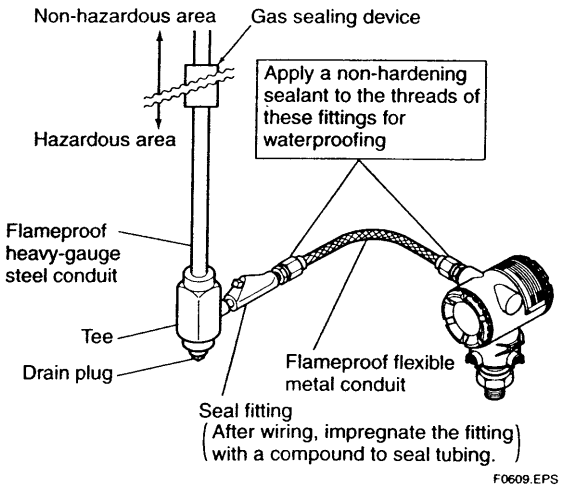


Figure 6.4.2c Typical Wiring Using Flameproof Metal Conduit

6.5 Grounding

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

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

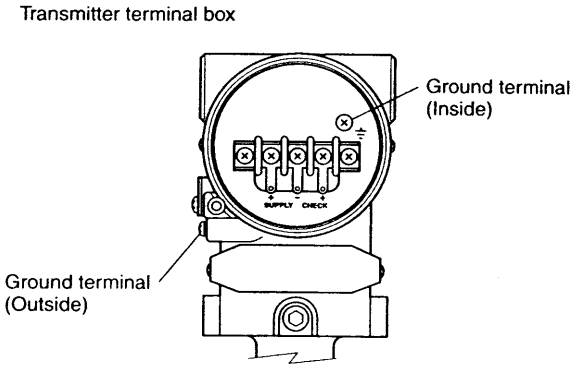


Figure 6.5 Ground Terminals

6.6 Power Supply Voltage and Load Resistance

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

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

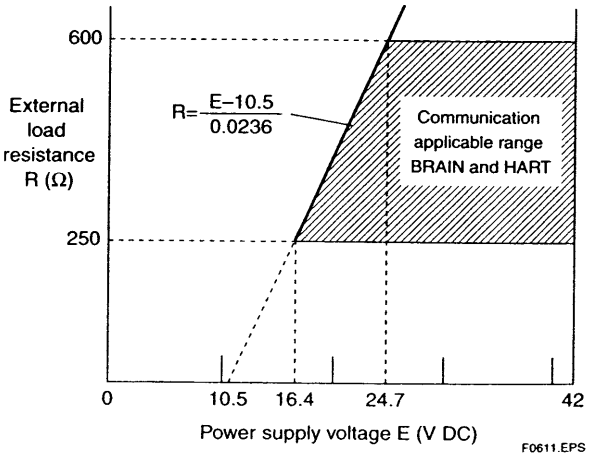


Figure 6.6 Relationship between Power Supply Voltage and External Load Resistance

7. OPERATION

7.1 Preparation for Starting Operation

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

NOTE

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

(a) Introduce a process fluid into the impulse piping and then to the transmitter in the following procedure:

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

(b) Turn ON power and connect the BT200.

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

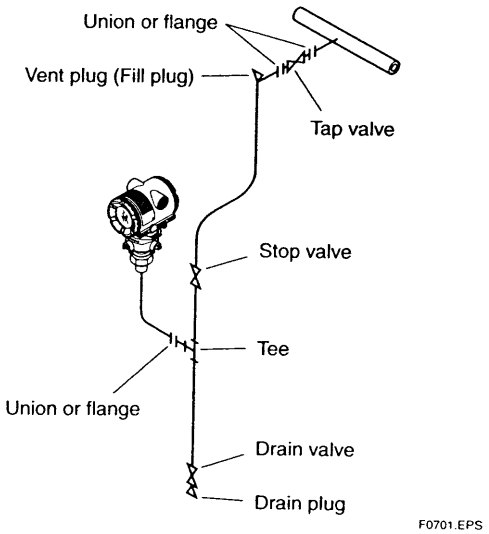
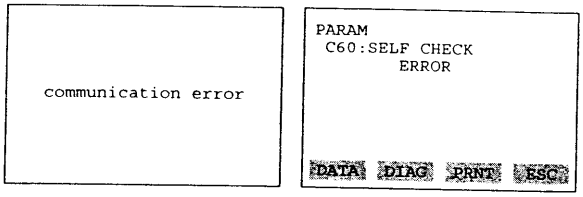


Figure 7.1 Liquid Flow Measurement (Gauge Pressure Transmitters)

■ Confirming that Transmitter is Operating Properly

Using the BT200

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

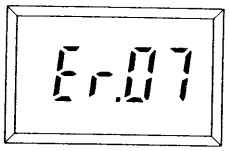


Communication error (Faulty wiring)

Self-diagnostic error (Faulty transmitter)

Using the integral indicator

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



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

NOTE

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

■ Verify and Change Transmitter Parameter Setting and Values

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

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

18.4 (34)

7.2 Zero Point Adjustment

Adjust the zero point after operating preparation is completed.

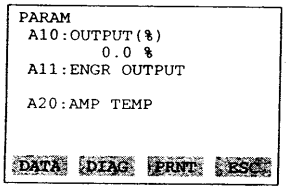
IMPORTANT

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

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

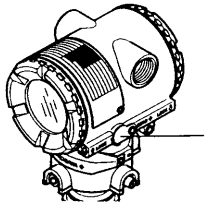
For output signal checking, display the parameter **A10: OUTPUT (%)** in the BT200.

●BT200



Output signal (%) display

●Zero-adjustment Screw



Zero-adjustment screw

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

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

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

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

■ Using the Transmitter Zero-adjustment Screw

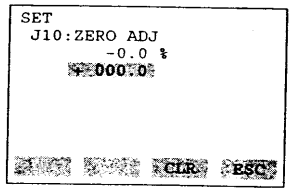
Before adjusting a screw, check that the parameter **J20: EXT ZERO ADJ** displays **ENABLE**. See Subsection 8.3.3 (11) for the setting procedure.

- Use a slotted screwdriver to turn the zero-adjustment screw. Turn the screw clockwise to increase the output or counterclockwise to decrease the output. The zero point adjustment can be made with a resolution of 0.01% of the setting range. Since the degree of zero adjustments varies with the screw turning speed, turn the screw slowly for fine adjustment and quickly for coarse adjustment.

■ Using the BT200

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

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



Display when parameter J10 is selected.
Press [ENTER] key twice for 0% output 4 mA DC.

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

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

[Example]

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

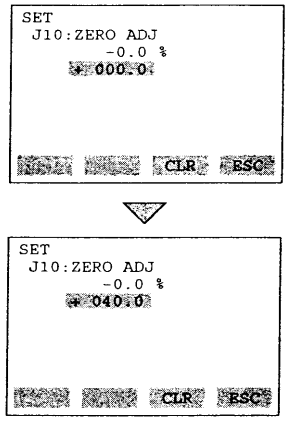
$$\text{Actual measured value} = \frac{130-50}{250-50} \times 100 = 40.0\%$$

■ Using the Transmitter Zero-Adjustment Screw

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

■ Using the BT200

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



Display at J10

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

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7.3 Starting Operation

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

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

IMPORTANT

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

7.4 Shutting Down Operation

Shut down the transmitter operation as follows.

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

NOTE

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

7.5 Setting the Range Using the Range-setting Switch

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

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

[Example]

Rerange LRV to 0 and HRV to 3 MPa.

1) Connect the transmitter and apparatus as shown in Figure 9.3.1 and warm up for at least five minutes.
2) Press the range-setting push-button.
   The integral indicator then displays "LSET."
3) Apply a pressure of 0 kPa (atmospheric pressure) to the transmitter. (Note 1)
4) Turn the external zero-adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
5) Adjust the output signal to 0% (1 V DC) by rotating the external zero-adjustment screw. Doing so completes the LRV setting.
6) Press the range-setting push-button. The integral indicator then displays "HSET."
7) Apply a pressure of 3 MPa to the transmitter. (Note 1)
8) Turn the external zero-adjustment screw in the desired direction. The integral indicator displays the output signal in %. (Note 2)
9) Adjust the output signal to 100% (5 V DC) by rotating the external zero-adjustment screw. Doing so completes the HRV setting.
10) Press the range-setting push-button. The transmitter then switches back to the normal operation mode with the measurement range of 0 to 3 MPa.

Note 1: Wait until the pressure inside the pressure-detector section has stabilized before proceeding to the next step.

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

IMPORTANT

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

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

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

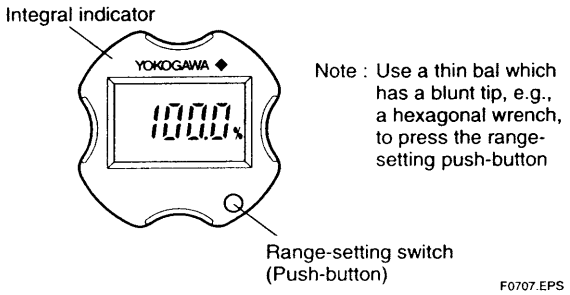

Figure 7.5 Range-setting Switch

8. BRAIN TERMINAL BT200 OPERATION

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

8.1 BT200 Operation Precautions

8.1.1 Connecting the BT200

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

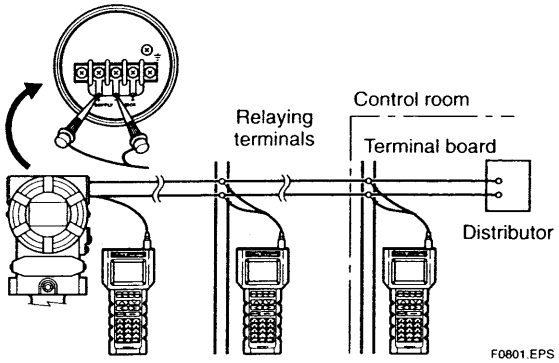

Figure 8.1.1 Connecting the BT200

8.1.2 Conditions of Communication Line

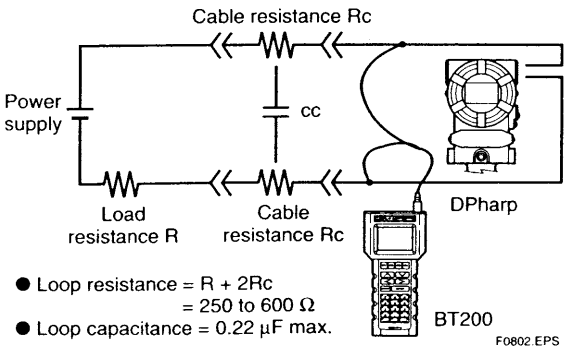

Figure 8.1.2 Conditions of Communication Line

8.2 BT200 Operating Procedures

8.2.1 Key Layout and Screen Display

Figure 8.2.1a shows the arrangement of the operating keys on the BT200 keypad, and Figure 8.2.1b shows the BT200 screen component.

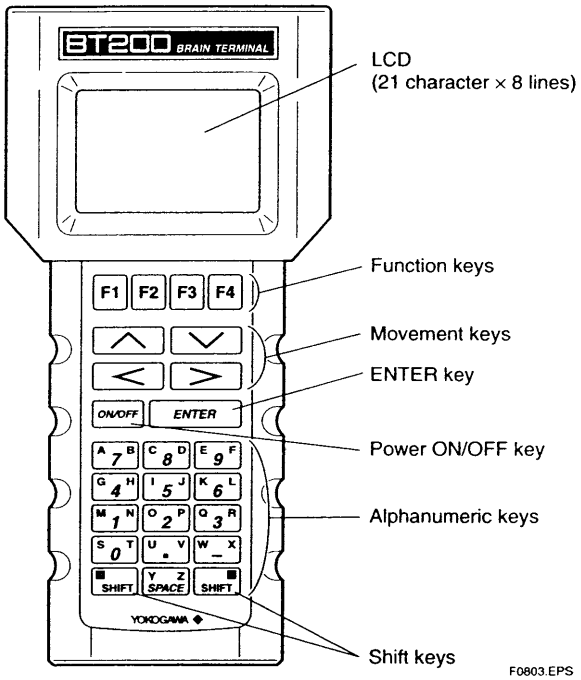

Figure 8.2.1a BT200 Key Layout

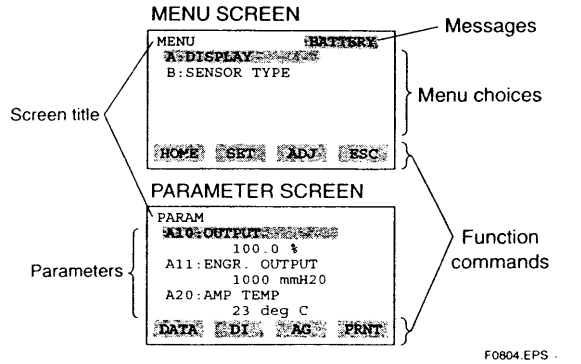

Figure 8.2.1b BT200 Screen Component

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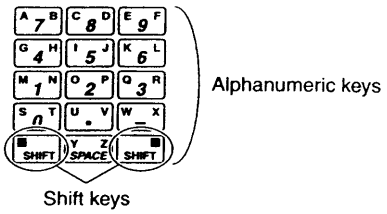
8.2.2 Operating Key Functions

(1) Alphanumeric Keys and Shift Keys

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



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

Simply press the alphanumeric keys.

Entry	Key-in Sequence
–4	[–] [4]
0.3	[0] [.] [3]
1 ␣ –9	[1] [SPACE] [–] [9]

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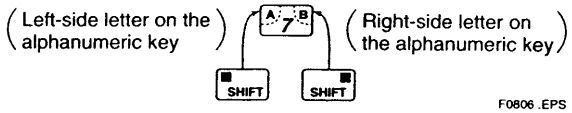
b. Entering Letters (A through Z)

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



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Entry	Key-in Sequence
W	[SHIFT] [–]
IC	[SHIFT] [5] [SHIFT] [8]
J. B	[SHIFT] [5] [.] [SHIFT] [7]

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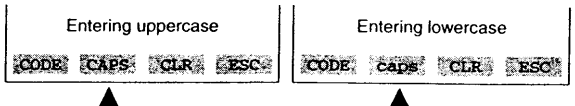
Use the function key [F2] CAPS to select between uppercase and lowercase (for letters only). The case toggles between uppercase and lowercase each time you press [F2] CAPS.



Entry	Key-in Sequence
Boy	to lower case [SHIFT] [7] [F2] [SHIFT] [2] [SHIFT] [SPACE] (B) (o) (y)

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

/ . – , + *) (' & % $ # " !

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

Entry	Key-in Sequence
l/m	symbol command [F2] [SHIFT] [6] [F1] [>] [SHIFT] [1] (l) (/) (m)

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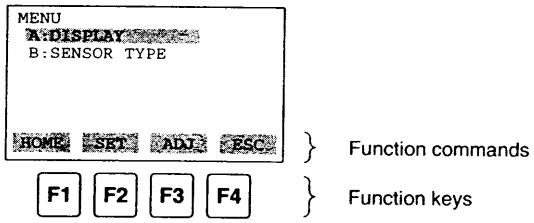
(2) Function Keys

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



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Function Command List

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

* Available on BT200-P00 (with printer).

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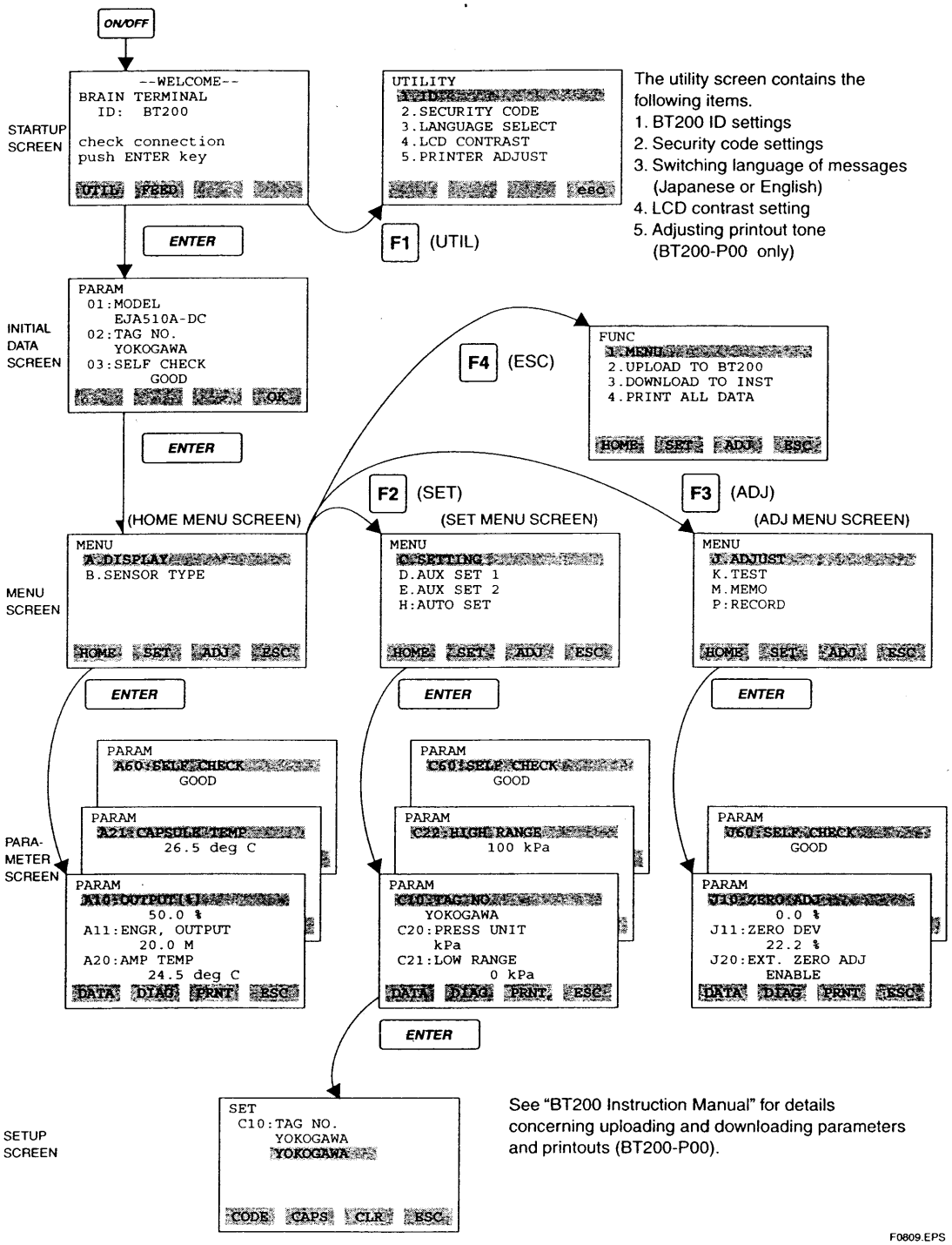
8.2.3 Calling Up Menu Addresses Using the Operating Keys



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

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

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8.3 Setting Parameters Using the BT200

8.3.1 Parameter Summary

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

No.	Item	Description	Rewritability	Remarks	Default Value	Applicability F	P	L
01	MODEL	Model+capsule type	–			o	o	o
02	TAG NO.	Tag number	–	16 alphanumerics		o	o	o
03	SELF CHECK	Self-diagnostic result	–	GOOD/ERROR		o	o	o
A	DISPLAY	Measured data display	–	Menu name		o	o	o
A10	OUTPUT (%)	Output (in %)	–	–5 to 110%*3		o	o	o
A11	ENGR. OUTPUT	Output (in engineering units)	–	–19999 to 19999		o	o	o
A20	AMP TEMP	Amplifier temperature	–	Unit specified in D30		o	o	o
A21	CAPSULE TEMP	Capsule temperature	–	Unit specified in D30		o	o	o
A30	STATIC PRESS	Static pressure	–	Unit specified in D31*1		o	–	o
A40	INPUT	Input (indicated in engineering DP unit)	–	–32000 to 32000		o	o	o
A60	SELF CHECK	Self-diagnostic messages	–	GOOD/ERROR, CAP MODULE FAULT, AMP MODULE FAULT, OUT OF RANGE, OUT OF SP RANGE*1, OVER TEMP (CAP), OVER TEMP (AMP), OVER OUTPUT, OVER DISPLAY, ILLEGAL LRV, ILLEGAL HRV, ILLEGAL SPAN, and ZERO ADJ OVER		o	o	o
B	SENSOR TYPE	Sensor type	–	Menu name		o	o	o
B10	MODEL	Model+span	–	16 uppercase alphanumerics		o	o	o
B11	STYLE NO.	Style number	–			o	o	o
B20	LRL	Lower range-limit	–	–32000 to 32000		o	o	o
B21	URL	Upper range-limit	–	–32000 to 32000		o	o	o
B30	MIN SPAN	Minimum span	–	–32000 to 32000		o	o	o
B40	MAX STAT.P.	Maximum static pressure*4	–			o	–	o
B60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
C	SETTING	Setting data	–	Menu name		o	o	o
C10	TAG. NO.	Tag number	o	16 alphanumerics	As specified when ordered.	o	o	o
C20	PRESS UNIT	Measurement range units	o	Selected from mmH_2O, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, gf/cm^2, kgf/cm^2, inH_2O, inHg, ftH_2O, psi, or atm	As specified when ordered.	o	o	o
C21	LOW RANGE	Measurement range, lower range value	o	–32000 to 32000(but within measurement range)	As specified when ordered.	o	o	o
C22	HIGH RANGE	Measurement range, higher range value	o	–32000 to 32000(but within measurement range)	As specified when ordered.	o	o	o
C30	AMP DAMPING	Damping time constant	o	Selected from 0.2*2, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0, 32.0, or 64.0 sec.	2.0 s	o	o	o
C40	OUTPUT MODE	Output mode and integral indicator mode	o	Selected from OUT:LIN; DSP:LIN, OUT:LIN; DSP:SQR, OUT:SQR; DSP:SQR	As specified when ordered. If not specified, OUT: LIN; DSP: LIN.	o	–	–
C60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
D	AUX SET 1	Auxiliary setting data 1	–	Menu name		o	o	o
D10	LOW CUT	Low cut	o	0.0 to 20.0%	10.0%	o	o	o
D11	LOW CUT MODE	Low cut mode	o	LINEAR/ZERO	LINEAR	o	o	o
D20	DISP SELECT	Display selection	o	NORMAL %/USER SET, USER & %/INP PRES, PRES & %	As specified when ordered.	o	o	o
D21	DISP UNIT	Engineering unit for display	o	8 uppercase alphanumerics		o	o	o
D22	DISP LRV	Engineering range, lower range value	o	–19999 to 19999	As specified when ordered.	o	o	o
D23	DISP HRV	Engineering range, higher range value	o	–19999 to 19999	As specified when ordered.	o	o	o

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No.	Item	Description	Rewritability	Remarks	Default Value	Applicability F	P	L
D	AUX SET 1	Auxiliary setting data 1	–	Menu name		o	o	o
D30	TEMP UNIT	Temperature setting units	o	deg C/deg F	deg C	o	o	o
D31	STAT. P. UNIT	Static pressure setting units	o	Selected from mmH_2O, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, gf/cm^2, kgf/cm^2, inH_2O, inHg, ftH_2O, psi, or atm	As specified when ordered. If not specified, MPa.	o	–	o
D40	REV OUTPUT	Output reversal	o	NORMAL/REVERSE	If not specified, NORMAL.	o	o	o
D45	H/L SWAP	Impulse piping accessing direction	o	NORMAL/REVERSE	NORMAL	o	–	–
D52	BURN OUT	CPU error	–	HIGH/LOW, –5 to 110%*3	HIGH	o	o	o
D53	ERROR OUT	Hardware error	o	HOLD/HIGH/LOW, –5 to 110%*3	HIGH	o	o	o
D60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
E	AUX SET 2	Auxiliary setting data 2	–	Menu name		o	o	o
E30	BI DIRE MODE	Bidirectional mode	o	OFF/ON	OFF	o	–	–
E60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
H	AUTO SET	Automatic setup	–	Menu name		o	o	o
H10	AUTO LRV	Automatic measurement range lower range value setup	o	–32000 to 32000	Displays the same data as C21.	o	o	o
H11	AUTO HRV	Automatic measurement range higher range value setup	o	–32000 to 32000	Displays the same data as C22.	o	o	o
H60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
J	ADJUST	Adjustment data	–	Menu name		o	o	o
J10	ZERO ADJ	Automatic zero adjustment	o	–5 to 110.0%*3		o	o	o
J11	ZERO DEV.	Manual zero adjustment	o			o	o	o
J20	EXT. ZERO ADJ	External zero-adjustment screw permission	o	ENABLE/INHIBIT		o	o	o
J60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
K	TEST	Tests	–	Menu name		o	o	o
K10	OUTPUT in %	Test output % setting	o	–5 to 110.0%*3 Displays 'ACTIVE' while executing		o	o	o
K60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
M	MEMO	Memo	–	Menu name		o	o	o
M10	MEMO 1	Memo	o	8 uppercase alphanumerics		o	o	o
M20	MEMO 2	Memo	o	8 uppercase alphanumerics		o	o	o
M30	MEMO 3	Memo	o	8 uppercase alphanumerics		o	o	o
M40	MEMO 4	Memo	o	8 uppercase alphanumerics		o	o	o
M50	MEMO 5	Memo	o	8 uppercase alphanumerics		o	o	o
M60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o
P	RECORD	History of the errors	–			o	o	o
P10	ERROR REC 1	Last error	o	Display the error		o	o	o
P11	ERROR REC 2	One time before	o	Display the error		o	o	o
P12	ERROR REC 3	Two time before	o	Display the error		o	o	o
P13	ERROR REC 4	Three time before	o	Display the error		o	o	o
P60	SELF CHECK	Self-diagnostic messages	–	Same as A60		o	o	o

*1: In case of Model EJA120A, static pressure cannot be measured. The display is always 0 MPa, but this is not a measured value.
*2: When Optional code /F1 is specified, substitute the value with 0.1.
*3: When Optional code /F1 is specified, substitute the value –5 with –2.5.
*4: See MWP(max. working pressure) on the nameplate. B40 shows an approximate value of maximum pressure for the capsule.

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8.3.2 Parameter Usage and Selection

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

IMPORTANT

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

Table 8.3.1 Parameter Usage and Selection

Setup Item	Description
Tag No. setup ▶ P.8-7	Sets the Tag No. (using 16 alphanumeric characters). Note: Up to 8 alphanumerics (upper case letters) can be used in the BT100.
Calibration range setup ▶ P.8-7	Sets the calibration range for 4 to 20 mA DC. Sets three data items: range unit, input value at 4 mA DC (LRV), and input value at 20 mA DC (HRV). Note: LRV and HRV can be specified with range value specifications up to 5 digits (excluding any decimal point) within the range of –32000 to 32000.
Damping time constant setup ▶ P.8-8	Adjusts the output response speed for 4 to 20 mA DC. Can be set in 9 increments from 0.2 to 64 s.
Output signal low cut mode setup ▶ P.8-9	Used mainly to stabilize output near 0% if output signal is the square root mode. Two modes are available: forcing output to 0% for input below a specific value, or changing to proportional output for input below a specific value.
Integral indicator scale range and unit setup ▶ P.8-10	Sets the following 5 types of integral indicator scale ranges and units: % scale indicator, user set scale indicator, alternate indication of user set scale and % scale, input pressure display, alternate indication of input pressure and % scale When using the user set scale, 4 types of data can be set: user set scale setting, unit (BT200 only), display value at 4 mA DC (LRV), and display value at 20 mA DC (HRV). Note: LRV and HRV can be specified with range value specifications up to 5 digits (excluding any decimal point) within the range of –19999 to 19999.
Unit setup for displayed temperature ▶ P.8-11	Sets a unit for temperatures displayed on the BT200.
Operation mode (normal/reverse signal) setup ▶ P.8-12	Reverses the direction for 4 to 20 mA DC output relative to input. Reverse mode is used for applications in which safety requires that output be driven toward 20 mA if input is lost.
Output status display/setup when a CPU failure ▶ P.8-12	Displays the status of 4 to 20 mA DC output when a CPU failure. The parameter of the standard unit is fixed to the high limit value.
Output status setup when a hardware error occurs ▶ P.8-12	Sets the status of the 4 to 20 mA DC output when an abnormal status is detected with the capsule or the amplifier as the result of self-diagnosis. One of the following statuses; last held, high limit, and low limit values, can be selected.
Range change (while applying actual inputs) ▶ P.8-12	Range for 4 to 20 mA DC signal is set with actual input applied. Sets 20 mA DC output precisely with respect to user's reference instrument output. Note that DPharp is calibrated with high accuracy before shipment, so span should be set using the normal range setup.
Zero point adjustment ▶ P.8-13	Adjusts zero point. This can be done either using the external zero-adjustment screw on the transmitteror using the BT200.
Test output (fixed current output) setup ▶ P.8-14	Used for loop checks. Output can be set freely from –5% to 110% in 1% steps.
User memo fields ▶ P.8-14	Allows user to enter up to 5 items of any desired text in up to 8 uppercase alphanumeric characters per item.

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8.3.3 Setting Parameters

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

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

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

• Example: Set a Tag No. to FIC-1a

<When power is off>

Press the ON/OFF key to turn on the BT200.

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

check connection
push ENTER key
```

Connect DPharp and BT200 using a communication cable and press the ENTER key.

```
PARAM
 01:MODEL
   EJA110A-DM
 02:TAG NO.
   YOKOGAWA
 03:SELF CHECK
      GOOD
```

Displays the name of connected DPharp model, TAG NO. and diagnostics information. Press the F4 (OK) key after confirmation.

```
MENU
 A:DISPLAY SETTING
 B:SENSOR TYPE
```

Press the F2 (SET) key to display the SET menu panel.

```
MENU
 C:SETTING
 D:AUX SET 1
 E:AUX SET 2
 H:AUTO SET
```

Select C: SETTING and press the ENTER key.

```
MENU
 C10:TAG NO.
   YOKOGAWA
 C20:PRESS UNIT
      kPa
 C21:LOW RANGE
      0 kPa
```

Select C10: TAG NO. and press the ENTER key.

```
SET
 C10:TAG NO.
   YOKOGAWA
```

Set the new TAG NO. (FIC-1a).

SHIFT + 9 F	FOKOGAWA
SHIFT + 5 J	FIKOGAWA
SHIFT + 8 D	FICOGAWA
W _ X	FIC-GAWA
M 1 N	FIC-1AWA
F2 + SHIFT + 7 B	FIC-1aWA
Y Z SPACE Y Z SPACE	FIC-1a␣␣

```
SET
 C10:TAG NO.
   YOKOGAWA
   FIC-1a
```

Set TAG NO. and press the ENTER key.

When you have made an entry mistake, return the cursor < using the key, then reenter.

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```
SET
 C10:TAG NO.
   YOKOGAWA
   FIC-1a
 PRINTER OFF
 F2:PRINTER ON
```

This is the panel for confirming set data. The set data items flash. When all items have been confirmed, press the ENTER again. (To go back to the setting panel, press the F3 (NO) key.

```
SET
 C10:TAG NO.
   FIC-1a
```

The DPharp TAG NO. was overwritten. Press the F4 (OK) key to return to the parameter panel. Press the F3 (NO) key to return to the setting panel.

```
PARAM
 C10:TAG NO.
   FIC-1a
 C20:PRESS UNIT
   kPa
 C21:LOW RANGE
        0 kPa
```

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(2) Calibration Range Setup

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

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

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

```
SET
 C20:PRESS UNIT
    mmH2O
  < mmWG >
  < mmHG >
  < Torr >
  < kPa >
```

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

```
SET
 C20:PRESS UNIT
    kPa
```

Press the F4 (OK) key.

mmH$_2$O
mmAq
mmWG
mmHg
Torr
Pa
hPa
kPa
MPa
mbar
bar
gf/cm^2
kgf/cm^2
inH$_2$O
inHg
ftH$_2$O
psi
atm

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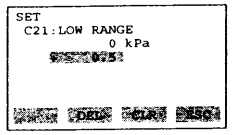
b. Setting Calibration Range Lower Range Value and Higher Range Value (C21: LOW RANGE, C22: HIGH RANGE)

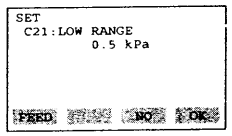
These range values are set as specified in the order before the instrument is shipped. Follow the procedure below to change the range.

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

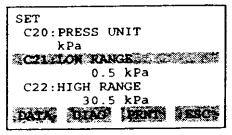
• Example 1: With present settings of 0 to 30 kPa, set the lower range value to 0.5 kPa.



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



Press the [F4] (OK) key.



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

(Span = Higher range value – Lower range value)

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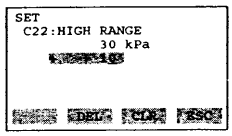
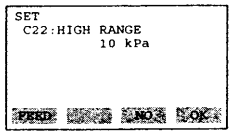
- Note, however, that changing the higher range value does not cause the lower range value to change. Thus, changing the higher range value also changes the span.
- Calibration range can be specified with range value specifications up to 5 digits (excluding any decimal point) for low or high range limits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

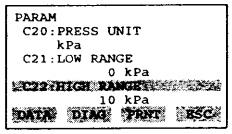
• Example 2: With present settings of 0 to 30 kPa, set the Higher range value to10 kPa.



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



Press the [F4] (OK) key.



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

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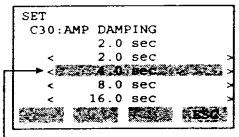
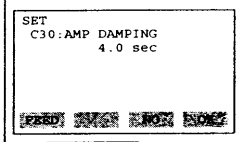
(3) Damping Time Constant Setup (C30: AMP DAMPING)

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

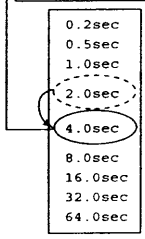
• Example: Change from 2.0 sec to 4.0 sec.



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



Press the [F4] (OK) key.



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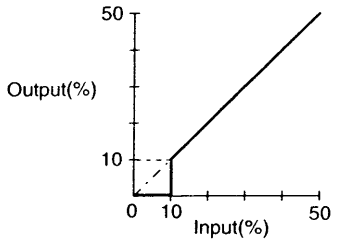
Note: The damping time constant set here is the damping time constant for the amplifier assembly. The damping time constant for the entire transmitter is the sum of the values for the amplifier assembly and for the capsule assembly. For the capsule assembly damping time constant (fixed), see the "General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

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

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

● LOW CUT at 10%



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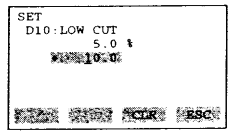
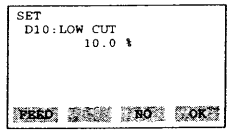
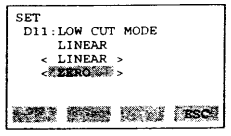
• Example: Change the low cut setting range from 5% to 10%, and the low cut mode from LINEAR to ZERO.



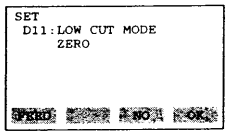
Set "10."
Press the [ENTER] key twice to enter the setting.



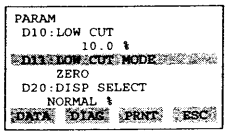
Press the [F4] (OK) key.
Next, the [D11: LOW CUT MODE] setting panel is displayed.



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



Press the [F4] (OK) key.



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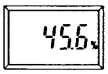
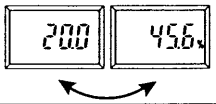
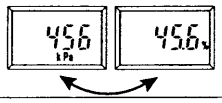
(5) Integral Indicator Scale Setup

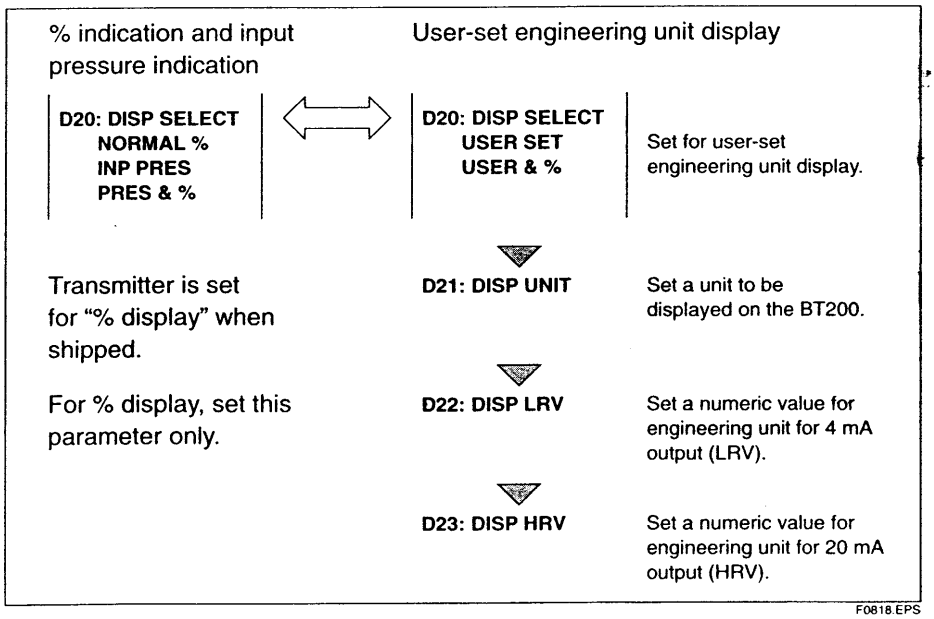
The following 5 displays are available for integral indicators.

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

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

T0808.EPS

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



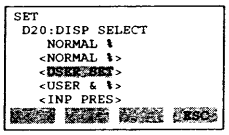
F0818.EPS

a. Display Selection (D20: DISP SELECT)

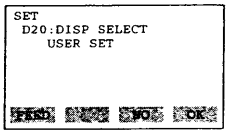
Follow the instructions given to the below to change the range of integral indication scales.

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

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



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



Press the F4 (OK) key.

The "%" disappears from the integral indicator display.

F0819.EPS

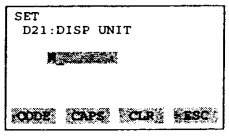
b. Setting User-set Engineering Unit (D21: DISP UNIT)

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

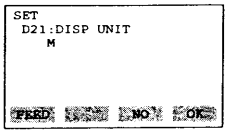
Follow the procedure below to change this setting.

This parameter need not be set for % display.

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



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



Press the F4 (OK) key.

F0820.EPS

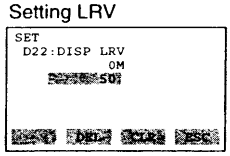
c. Lower and Higher Range Value Setup in Engineering Unit (D22: DISP LRV, D23: DISP HRV)

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

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

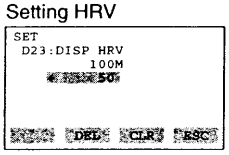
• Example: Set lower range value (LRV) to **–50** and higher range value (HRV) to **50**.

Setting LRV

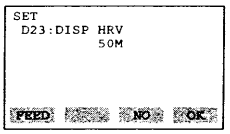


Set "–50."
Press the ENTER key twice to enter the setting.

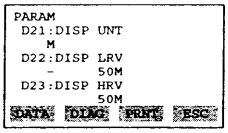
Setting HRV



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



Press the F4 (OK) key.

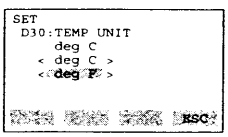


F0821.EPS

(6) Unit Setup for Displayed Temperature (D30: TEMP UNIT)

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

• Example: Change the unit for the temperature display.



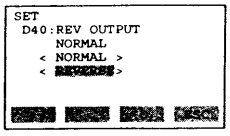
Use the ^ or v key to select "deg F."
Press the ENTER key twice to enter the setting.

F0822.EPS

(7) Operation Mode Setup (D40: REV OUTPUT)

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

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



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

F0823.EPS

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

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

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

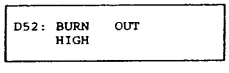
Standard specifications

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

Optional code/C1

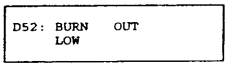
The parameter is set to LOW. If a failure, output which is –5% or lower is generated. The parameter **D53: ERROR OUT** is set to LOW from the factory.

• Example: Standard specifications



pin (CN4) position: H

• Example: Optional code/C1



pin (CN4) position: L

F0824.EPS

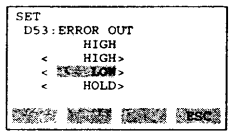
(9) Output Status Setup when a Hardware Error Occurs (D53: ERROR OUT)

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

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

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

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



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

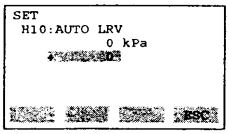
F0825.EPS

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

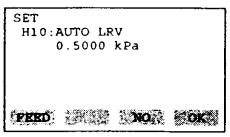
This feature allows the lower and higher range values to be set up automatically with the actual input applied. If the lower and higher range values are set, **C21: LOW RANGE** and **C22: HIGH RANGE** are changed at this same time.

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

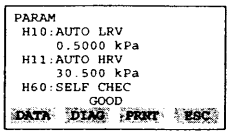
• Example 1: When changing the lower range value to 0.5 kPa for the present setting of 0 to 30 kPa, take the following action with input pressure of 0.5 kPa applied.



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



Press the [F4] (OK) key.

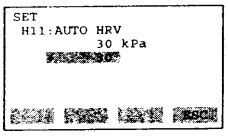


The higher range value is changed keeping the span constant.
Parameters **C21** and **C22** are changed at the same time.

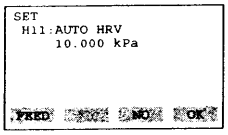
F0826.EPS

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

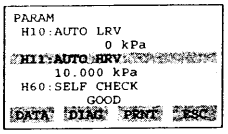
• Example 2: When the higher range value is to be changed to 10 kPa with the present setting of 0 to 30 kPa, take the following action with an input pressure of 10 kPa applied.



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



Press the F4 (OK) key.



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

F0827.EPS

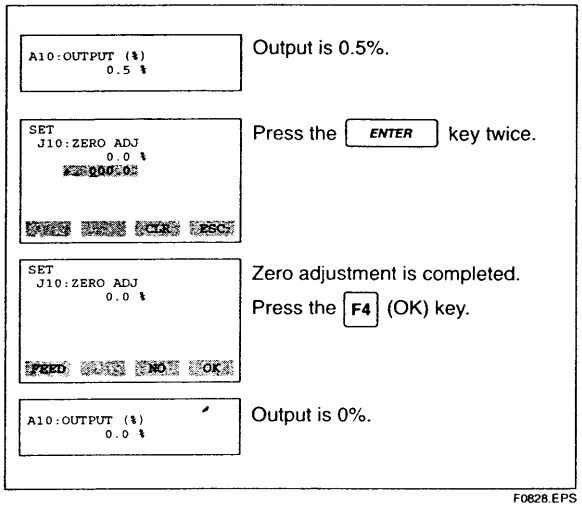
(11) Zero Point Adjustment (J10: ZERO ADJ, J11: ZERO DEV, J20: EXT ZERO ADJ)

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

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

T0809.EPS

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



F0828.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 glass gauge.

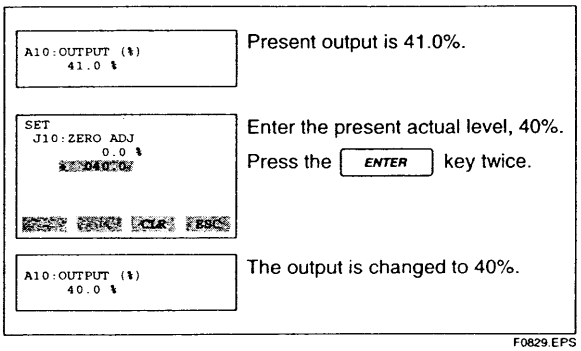
[Example]

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

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

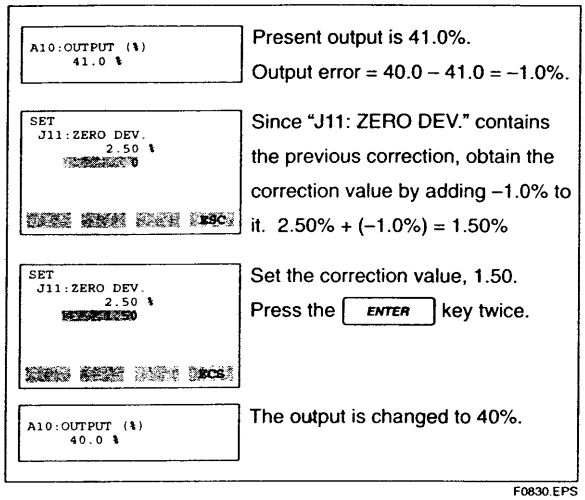
$$= \frac{130-50}{250-50} \times 100 = 40.0\%$$

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



F0829.EPS

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



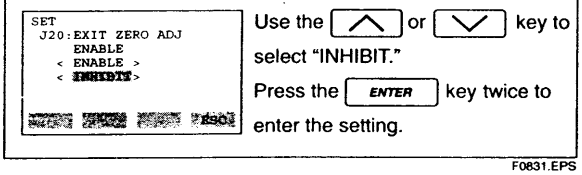
F0830.EPS

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

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

Follow the procedure below to enable or inhibit zero point adjustment from the zero-adjustment screw on the transmitter.
This is set to "ENABLE" when the instrument is shipped.

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



F0831.EPS

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

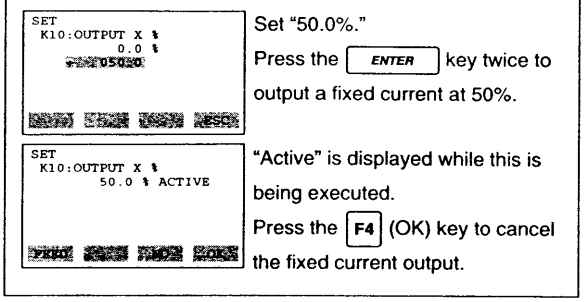
Turn the zero-adjustment screw on the outside of the transmitter case using a slotted screwdriver. Turn the screw to the right to increase the zero point or to the left to decrease the zero output; the zero adjusts in increments of 0.01% of the range setting.
Note that the amount of adjustment to the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

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

(12) Test Output Setup (K10: OUTPUT X%)

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

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



F0832.EPS

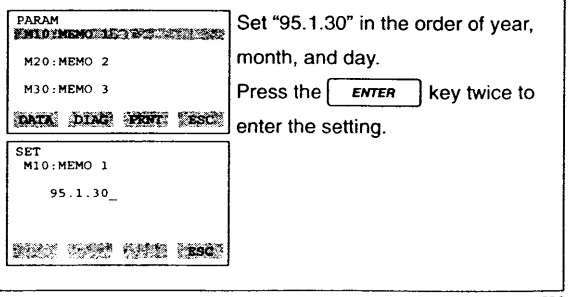
IMPORTANT

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

(13) User Memo Fields (M: MEMO)

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

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



F0833.EPS

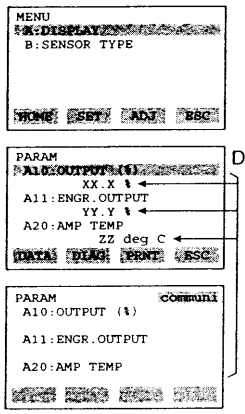
8.4 Displaying Data Using the BT200

8.4.1 Displaying Measured Data

The BT200 can be used to display measured data.

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

• Example: Display output.



Display "A10: OUTPUT (%)."

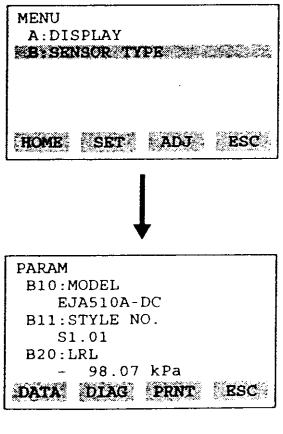
Data is updated automatically at 7-second intervals.

F0834.EPS

8.4.2 Display Transmitter Model and Specifications

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

• Example: View transmitter model name.



Press ENTER.

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

F0835.EPS

8.5 Self-Diagnostics

8.5.1 Checking for Problems

(1) Identifying Problems with BT200

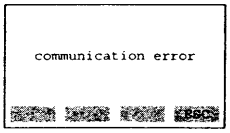
The following four areas can be checked.

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

See examples below.

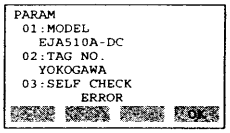
• Example 1: Connection errors

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

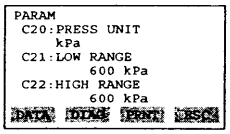


Since communications will be unsuccessful if there is a problem in the connection to the BT200, the display at the left will appear.
Recheck the connection.
Press the F4 (OK) key.

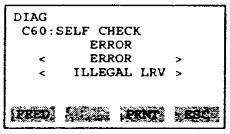
• Example 2: Setting entry errors



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



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



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

F0836.EPS

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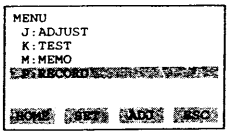
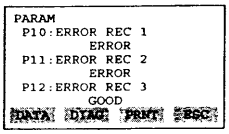
18.4

• Example 3: Checking the history of the errors

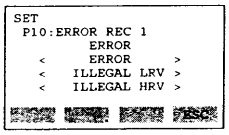


Connect the BT200 to the transmitter, and call item "P."



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

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



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

<(a) SETUP PANEL>

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

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

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

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(2) Checking with Integral Indicator

NOTE

If an error is detected in the self-diagnostic, an error number is displayed on the integral indicator. If there is more than one error, the error number changes at two-second intervals. See Table 8.5.1 regarding the error numbers.

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Figure 8.5.1 Identifying Problems Using the Integral Indicator

8.5.2 Errors and Countermeasures

The table below shows a summary of error messages.

Table 8.5.1 Error Message Summary

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

*1: For Model EJA510A and EJA530A, this error code appears when an illegal overpressure is applied to the pressure sensor in addition to the capsule problem. The Er. 01 will remain even if the normal input pressure is regained.

*2: For Model EJA510A and EJA530A, restart the power to the transmitter. Then if no error code appears, perform necessary adjustments such as zero-adjustment to continue the operation. If the error code still exists, replace the capsule assembly.

*3: For Model EJA120A, static pressure cannot be measured. The display is always 0 MPa, but this is not a measured value.

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9. MAINTENANCE

9.1 Overview

WARNING

Since the accumulated process fluid may be toxic or otherwise harmful, take appropriate care to avoid contact with the body, or inhalation of vapors even after dismounting the instrument from the process line for maintenance.

Maintenance of the transmitter is easy due to its modular construction. This chapter describes the procedures for calibration, adjustment, and the disassembly and reassembly procedures required for component replacement.

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

IMPORTANT

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

9.2 Calibration Instruments Selection

Table 9.2.1 shows the instruments required for calibration. Select instruments that will enable the transmitter to be calibrated or adjusted to the required accuracy.

The calibration instruments should be handled carefully so as to maintain the specified accuracy.

9.3 Calibration

Use the procedure below to check instrument operation and accuracy during periodic maintenance or trouble-shooting.

1) Connect the instruments as shown in Figure 9.3.1 and warm up the instruments for at least five minutes.

IMPORTANT

- To adjust the transmitter for highest accuracy, make adjustments with the power supply voltage and load resistance including leadwire resistances set close to the conditions under which the transmitter is installed.
- If the measurement range 0% point is 0 kPa or shifted in the positive direction (suppressed zero), the reference pressure should be applied as shown in the figure.
  If the measurement range 0% point is shifted in the negative direction (elevated zero), the reference pressure should be applied using a vacuum pump.

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

Table 9.2.1 Instruments Required for Calibration

Name	Yokogawa-recommended Instrument	Remarks
Power supply	Model SDBT or SDBS distributor	4 to 20 mA DC signal
Load resistor	Model 2792 standard resistor [250 Ω ±0.005%, 3 W]	
	Load adjustment resistor [100 Ω ±1%, 1 W]	
Voltmeter	Model 2501 A digital multimeter Accuracy (10V DC range): ±(0.002% of rdg + 1 dgt)	
Digital manometer	Model MT220 precision digital manometer 1) For 10 kPa class Accuracy: ±(0.015% of rdg + 0.015% of F.S.) ..... for 0 to 10 kPa ±(0.2% of rdg + 0.1% of F.S.) ..... for -10 to 0 kPa 2) For 130 kPa class Accuracy: ±0.02% of rdg ..... for 25 to 130 kPa ±5digits ..... for 0 to 25 kPa ±(0.2% of rdg + 0.1% of F.S.) ..... for -80 to 0 kPa 3) For 700 kPa class Accuracy: ±(0.02% of rdg + 3digits) ..... for 100 to 700 kPa ±5 digits ..... for 0 to 100 kPa ±(0.2% of rdg + 0.1% of F.S.) ..... for -80 to 0 kPa 4) For 3000 kPa class Accuracy: ±(0.02% of rdg + 10 digits) ..... for 0 to 3000 kPa ±(0.2% of rdg + 0.1% of F.S.) ..... for -80 to 0 kPa 5) For 130 kPa abs class Accuracy: ±(0.03% of rdg + 6 digits) ..... for 0 to 130 kPa abs	Select a manometer having a pressure range close to that of the transmitter.
Pressure generator	Model 7674 pneumatic pressure standard for 200 kPa {2 kgf/cm^2}, 25 kPa {2500 mmH_2O} Accuracy: ±0.05% of F.S.	Requires air pressure supply.
	Dead weight gauge tester 25 kPa {2500mmH_2O} Accuracy: ±0.03% of setting	Select the one having a pressure range close to that of the transmitter.
Pressure source	Model 6919 pressure regulator (pressure pump) Pressure range: 0 to 133 kPa {1000 mmHg}	Prepare the vacuum pump for negative pressure ranges.

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

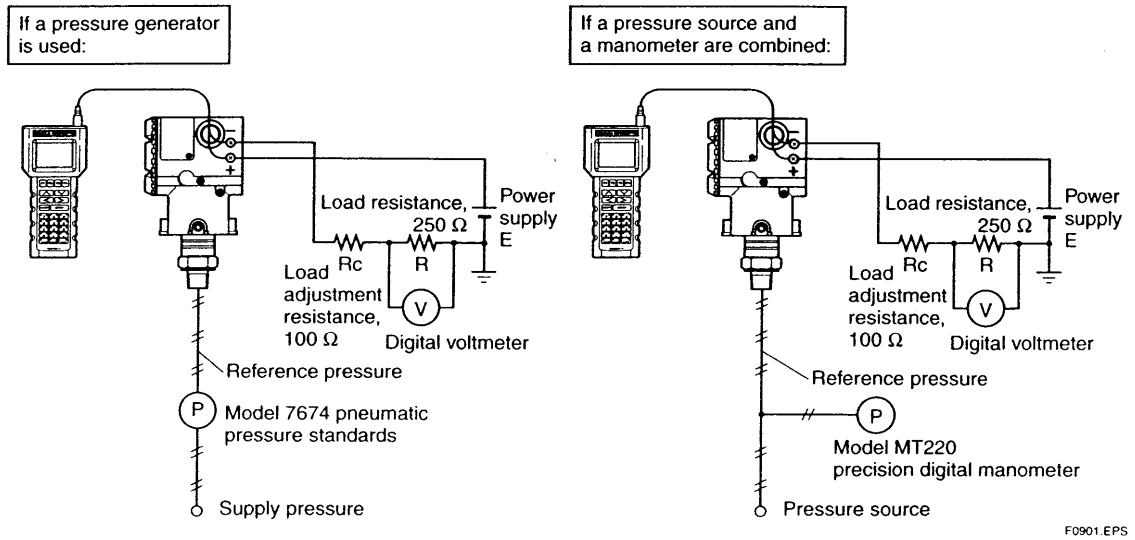

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Figure 9.3.1 Instrument Connections

9.4 Disassembly and Reassembly

CAUTION

Precautions for CENELEC and SAA Flameproof Type Transmitters

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

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

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

Always turn OFF power and shut off and release pressures before disassembly. Use proper tools for all operations. Table 9.4.1 shows the tools required.

Table 9.4.1 Tools for Disassembly and Reassembly

Tool	Quantity	Remarks
Phillips screwdriver	1	JIS B4633, No. 2
Slotted screwdriver	1	
Allen wrenches	2	JIS B4648 One each, nominal 3 and 5 mm Allen wrenches
Wrench	1	Width across flats, 17 mm
Torque wrench	1	
Adjustable wrench	1	
Socket wrench	1	Width across flats, 16 mm
Socket driver	1	Width across flats, 5.5 mm
Tweezers	1	

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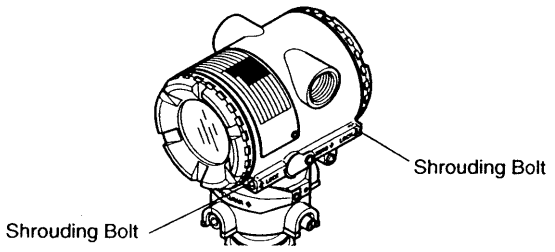

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Figure 9.4 Shrouding Bolts

9.4.1 Replacing the Integral Indicator

CAUTION

Cautions for Flameproof Type Transmitters

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

This subsection describes the procedure for replacing an integral indicator. (See Figure 9.4.1)

■ Removing the Integral Indicator

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

■ Attaching the Integral Indicator

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

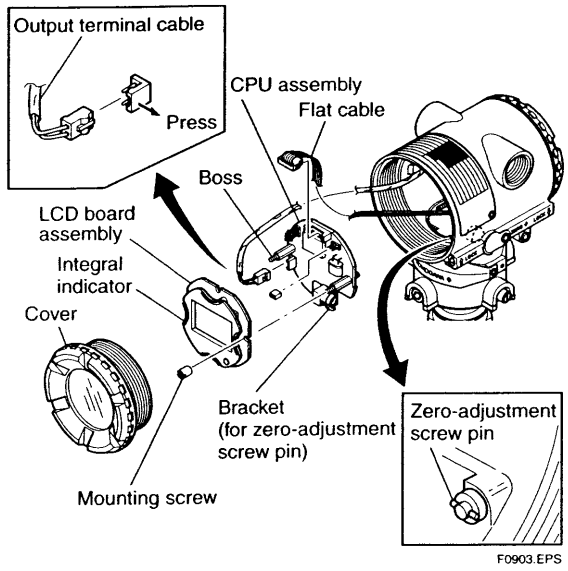

Figure 9.4.1 Removing and Attaching LCD Board Assembly and CPU Assembly

9.4.2 Replacing the CPU Board Assembly

This subsection describes the procedure for replacing the CPU assembly. (See Figure 9.4.1)

■ Removing the CPU Assembly

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

NOTE

Be careful not to apply excessive force to the CPU assembly when removing it.

■ Mounting the CPU Assembly

1) Connect the flat cable (with black connector) between the CPU assembly and the capsule.
2) Connect the output terminal cable (with brown connector).

NOTE

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

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

NOTE

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

5) Replace the cover.

9.4.3 Cleaning and Replacing the Capsule Assembly

This subsection describes the procedures for cleaning and replacing the capsule assembly. (See Figure 9.4.2.)

CAUTION

Cautions for Flameproof Type Transmitters

Users are prohibited by law from modifying the construction of a flameproof type transmitter. If you wish to replace the capsule assembly with one of a different measurement range, contact Yokogawa.

The user is permitted, however, to replace a capsule assembly with another of the same measurement range. When doing so, be sure to observe the following.

- The replacement capsule assembly must have the same part number as the one being replaced.

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

■ Removing the Capsule Assembly

IMPORTANT

Exercise care as follows when cleaning the capsule assembly.

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

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

■ Reassembling the Capsule Assembly

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

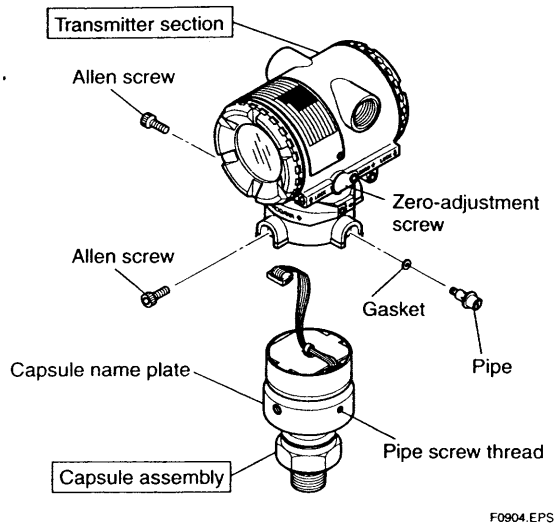


Figure 9.4.2 Removing and Mounting the Capsule Assembly

9.5 Troubleshooting

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

9.5.1 Basic Troubleshooting

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

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

This transmitter is equipped with a self-diagnostic function which will be useful in troubleshooting; see Section 8.5 for information on using this function.

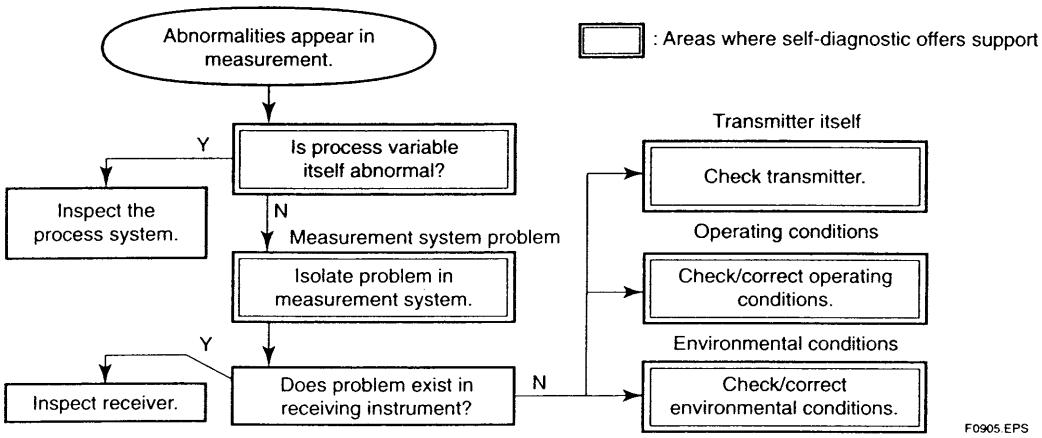
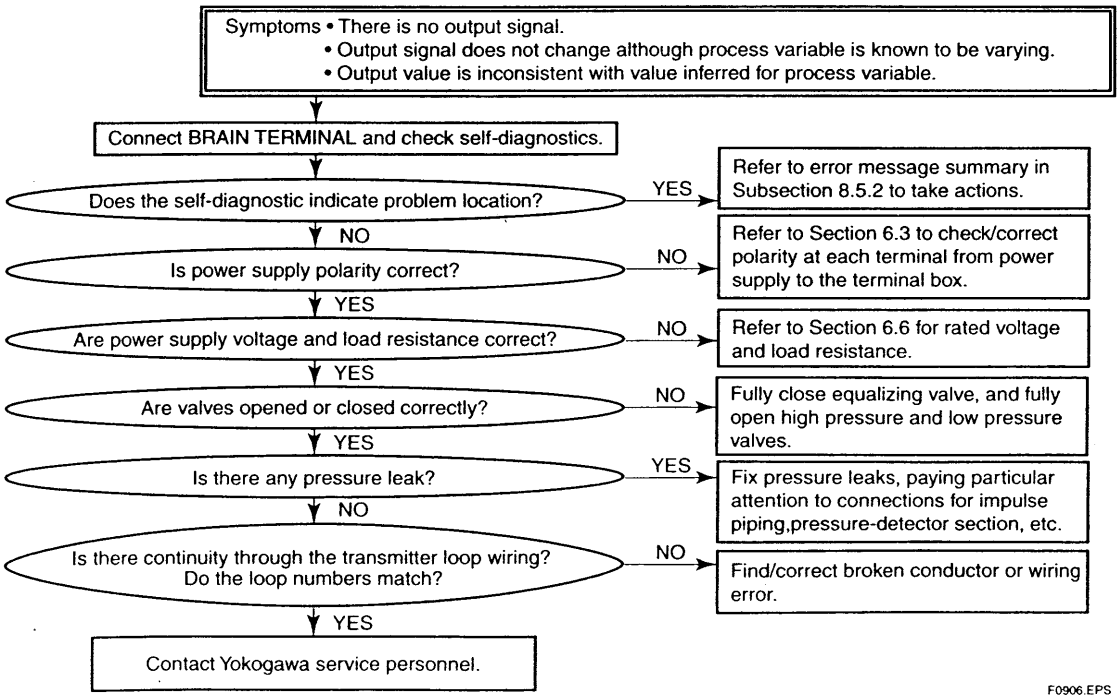
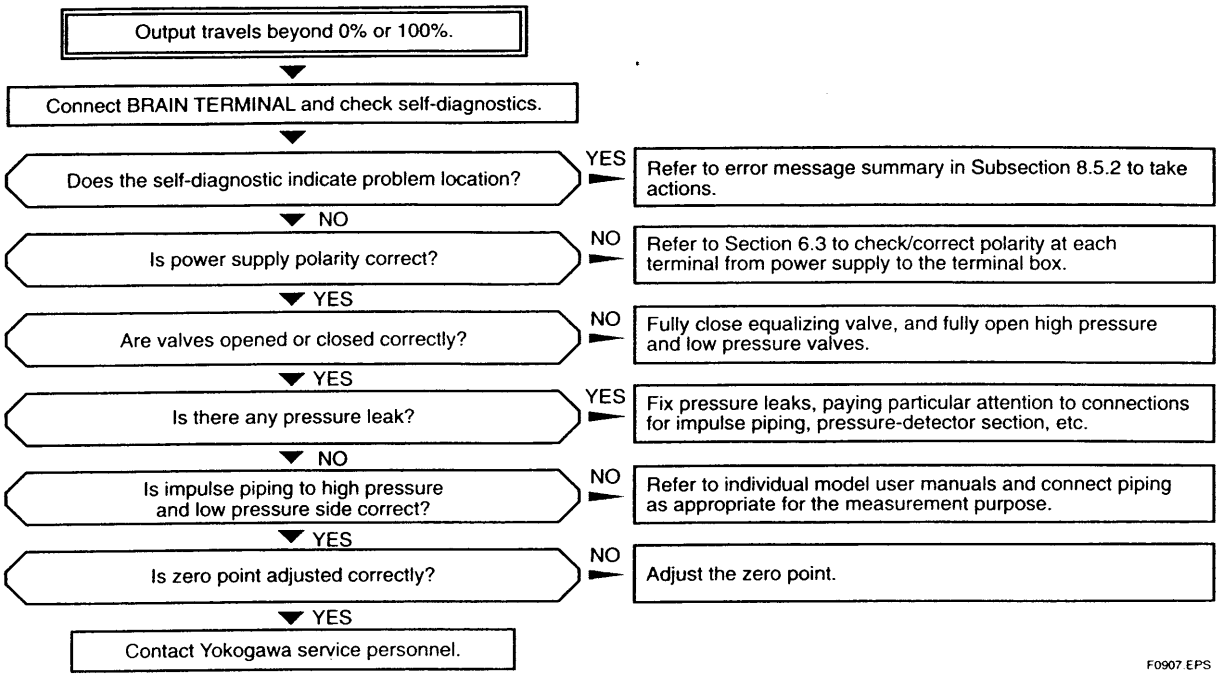


Figure 9.5.1 Basic Flow and Self-Diagnostics

9.5.2 Troubleshooting Flow Charts





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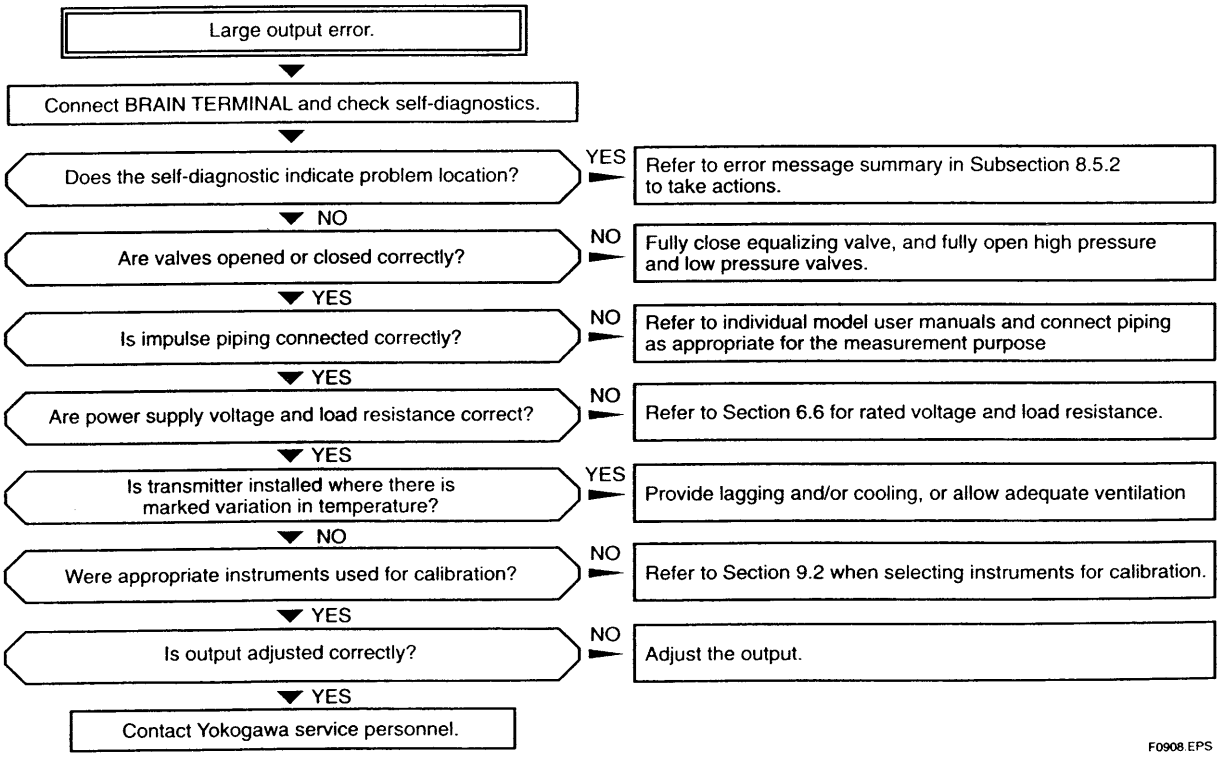

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10. GENERAL SPECIFICATIONS

10.1 Standard Specifications

● Performance Specifications

See General Specifications sheet, GS 01C21F01-E.

● Functional Specifications

Span & Range Limits

EJA510A and EJA530A:

Measurement Span and Range		MPa	psi (/D1)	bar (/D3)	kgf/cm²(/D4)
A	Span	10 to 200 kPa	1.45 to 29	0.1 to 2	0.1 to 2
	Range	0 to 200 kPa	0 to 29	0 to 2	0 to 2
B	Span	0.1 to 2	14.5 to 290	1 to 20	1 to 20
	Range	0 to 2	0 to 290	0 to 20	0 to 20
C	Span	0.5 to 10	72.5 to 1450	5 to 100	5 to 100
	Range	0 to 10	0 to 1450	0 to 100	0 to 100
D	Span	5 to 50	720 to 7200	50 to 500	50 to 500
	Range	0 to 50	0 to 7200	0 to 500	0 to 500

Values in absolute for EJA510A. T1001.EPS

Zero Adjustment Limits:

Zero can be fully elevated or suppressed, within the Lower and Upper Range Limits of the capsule.

External Zero Adjustment:

External zero is continuously adjustable with 0.01% incremental resolution of span. Span may be adjusted locally using the digital indicator with range switch.

Output:

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

Damping Time Constant (1st order):

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

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

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Ambient Temperature Limits:

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

Process Temperature Limits:

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

Maximum Overpressure:

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

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Working Pressure Limits (Silicone Oil)
Maximum Pressure Limit:

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

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Minimum Pressure Limit:

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

● Installation

Supply & Load Requirements:

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

Supply Voltage "◇":

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

EMC Conformity Standards: CE , N200

EN61326, AS/NZS 2064

Communication Requirements:

BRAIN

Communication Distance;

Up to 2 km (1.25 miles) when using CEV polyethylene-insulated PVC-sheathed cables.
Communication distance varies depending on type of cable used.

Load Capacitance;

0.22 μF or less (see note)

Load Inductance;

3.3 mH or less (see note)

Input Impedance of communicating device;

10 kΩ or more at 2.4 kHz.

Note: For general-use and Flameproof type.
For Intrinsically safe type, please refer to 'Optional Specifications.'

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HART

Communication Distance;

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

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

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

● Physical Specifications

Wetted Parts Materials:

· Diaphragm and Process connector;
See 'Model and Suffix Codes.'

Non-wetted Parts Materials:

Housing;
Low copper cast-aluminum alloy with polyurethane paint (Munsell 0.6GY3.1/2.0)

Degrees of Protection
IP67, NEMA4X, JIS C0920 immersion proof

Cover O-rings;
Buna-N

Data plate and tag;
SUS304

Fill Fluid;
Silicone or Fluorinated oil (optional)

Weight:
1.6 kg (3.5 lb) without integral indicator and mounting bracket.

Connections:
See 'Model and Suffix Codes.'

<Settings When Shipped>

Tag Number	As specified in order *1
Output Mode	'Linear'
Display Mode	'Linear'
Operation Mode	'Normal' unless otherwise specified in order
Damping Time Constant	'2 sec.'

Calibration Range Lower Range Value	As specified in order
Calibration Range Higher Range Value	As specified in order
Calibration Range Units	Selected from mmH_2O, mmAq, mmWG, mmHg, Torr, Pa, hPa, kPa, MPa, mbar, bar, gf/cm^2, kgf/cm^2, inH_2O, inHg, ftH_2O, psi, or atm.(Only one unit can be specified)

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

10.2 Model and Suffix Codes

● Model EJA510A and EJA530A

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

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10.3 Optional Specifications

Item	Description	Code
Factory Mutual (FM)	FM Explosionproof Approval 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)	**FF1**
	FM Intrinsically safe Approval Intrinsically Safe for Class I, Division 1, Groups A, B, C & D, Class II, Division 1, Groups E, F & G and Class III, Division 1 Hazardous Locations. Nonincendive for Class I, Division 2, Groups A, B, C & D, Class II, Division. 2, Groups E, F & G, and Class III, Division 1 Hazardous Locations. Enclosure: "NEMA 4X", Temp. Class: T4, Amb. Temp.: –40 to 60 °C (–40 to 140 °F) Intrinsically Safe Apparatus Parameters [Groups A, B, C, D, E, F and G] Vmax=30 V, Imax=165 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 μH [Groups C, D, E, F and G] Vmax=30 V, Imax=225 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 μH	**FS1**
	Combined FF1and FS1	**FU1**
CENELEC ATEX	CENELEC ATEX (KEMA) Flameproof Approval II 2G EExd IIC T4, T5, T6 Amb. Temp.: T5; –40 to 80 °C (–40 to 176 °F), T4 and T6; –40 to 75°C(–40 to 176°F) Max. process Temp.: T4; 120 °C (248 °F), T5; 100 °C (212 °F), T6; 85 °C (185 °F)	**KF2**
	CENELEC ATEX (KEMA) Intrinsically safe Approval II 1G EEx ia IIC T4, Amb. Temp.: –40 to 60 °C(–40 to 140 °F) Ui=30 V, Ii=165 mA, Pi=0.9 W, Ci=22.5 nF, Li=730 μH	**KS2**
	Combined KF2, KS2, Type n, and Dust Approval Type n: II 3G Ex nL IIC T4, Amb. Temp.: –40 to 60°C (–40 to 140°F) Ui=30 V, Ci=22.5 nF, Li=730 μH Dust: II 1D Maximum surface temperature T65°C (Tamb.: 40°C), T85°C (Tamb.: 60°C), and T105°C (Tamb.: 80°C)	**KU2**
Canadian Standards Association (CSA)	CSA Explosionproof Approval Explosionproof for Class I, Division 1, Groups B, C and D Dustignitionproof for Class II/III, Division 1, Groups E, F and G Division2 'SEALS NOT REQUIRED' , Temp. Class : T4, T5, T6 Encl Type 4x Max. Process Temp.: T4; 120 °C (248 °F), T5; 100 °C (212 °F), T6; 85 °C (185 °F) Amb. Temp.:–40 to 80 °C (–40 to 176 °F)	**CF1**
	CSA Intrinsically safe Approval Class I, Groups A, B, C and D Class II and III, Groups E, F and G Encl Type 4x, Temp. Class: T4, Amb. Temp.: –40 to 60 °C (–40 to 140 °F) Vmax=30 V, Imax=165 mA, Pmax=0.9 W, Ci=22.5 nF, Li=730 μH	**CS1**
	Combined CF1 and CS1	**CU1**
Standards Association of Australia (SAA)	SAA Flameproof, Intrinsically safe and Non-sparking Approval Ex d IIC T4/T5/T6, IP67 class I, Zone 1, 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) Ex ia IIC T4, IP67 class I, Zone 0 Ex n IIC T4, IP67 class I, Zone 2 Ui=30 V DC, Ii=165 mA DC, Wi=0.9 W, Amb. Temp.: –40 to 60 °C (–40 to 140 °F)	**SU1**

T1007.EPS

Item		Description		Code
Painting	Color change	Amplifier cover only		P□
	Coating change	Epoxy resin-baked coating		X1
Lightning protector		Transmitter power supply voltage: 10.5 to 32 V DC (10.5 to 30 V DC for intrinsically safe type, 9 to 32 V DC for Fieldbus communication type.) Allowable current: Max. 6000 A (1×40 μs), Repeating 1000 A (1×40 μs) 100 times		A
Oil-prohibited use		Degrease cleansing treatment		K1
		Degrease cleansing treatment and with fluorinated oil filled capsule. Operating temperature: –20 to 80°C		K2
Calibration units		P calibration (psi unit)	(See Table for Span and Range Limits.)	D1
		bar calibration (bar unit)		D3
		M calibration (kgf/cm² unit)		D4
Fast response		Update time: 0.125 sec or less, see GS for the response time.		F1
Failure alarm down-scale *1		Output status at CPU failure and hardware error is –5%, 3.2 mA or less.		C1
NAMUR NE43 compliant *1		Output signal limits: 3.8 mA to 20.5 mA	Failure alarm down-scale: output status at CPU failure and hardware error is –5%, 3.2 mA or less.	C2
			Failure alarm up-scale: output status at CPU failure and hardware error is 110%, 21.6 mA or more.	C3
Stainless steel amplifier housing		Amplifier housing material; SCS14A stainless steel (equivalent to SUS316 cast stainless steel or ASTM CF-8M)		E1
Stainless steel tag plate		JIS SUS304 stainless steel tag plate wired onto transmitter		N4
High Accuracy type		High Accuracy (Applicable only for Model EJA530A)		HAC
European Pressure Equipment Directive		PED 97/23/EC CATEGORY: III, Module: H, Type of Equipment: Pressure Accessory - Vessel, Type of Fluid: Liquid and Gas, Group of Fluid: 1 and 2		PE3
Mill Certificate		Process connector		M15
Pressure test/ Leak test Certificate		Test Pressure: 200 kPa (2 kgf/cm²)	Nitrogen (N_2) Gas Retention time: 10 minutes	T05
		Test Pressure: 2 MPa (20 kgf/cm²)		T06
		Test Pressure: 10 MPa (100 kgf/cm²)		T07
		Test Pressure: 50 MPa (500 kgf/cm²)		T08

T1008.EPS

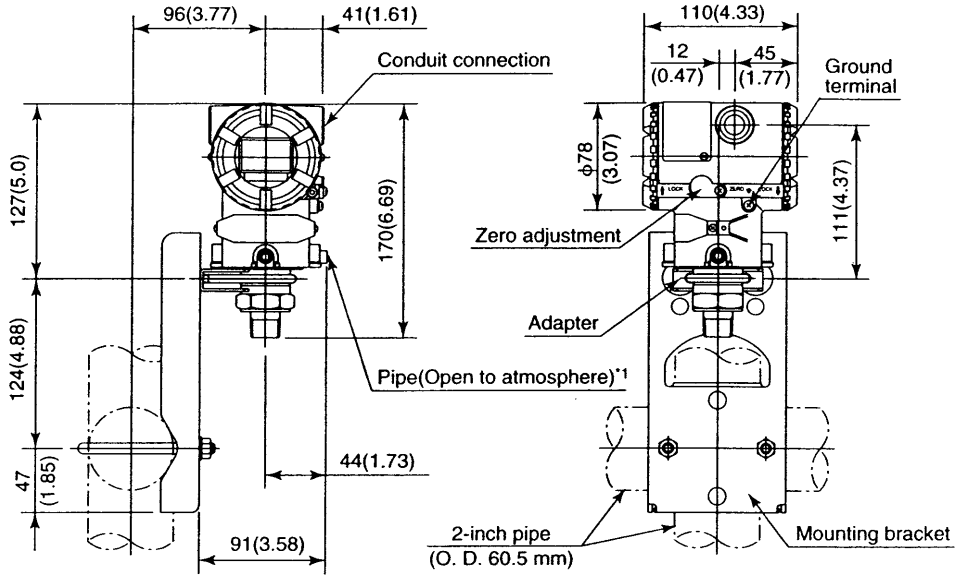
*1: Applicable for Output signal code D and E. The hardware error indicates faulty amplifier or capsule. When combining with Optional code F1, output status for down-scale is –2.5%, 3.6 mA DC or less.

10.4 Dimensions

● Model EJA510A and EJA530A [Style: S2]

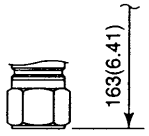
◆ With Process Connection code 7

Unit: mm(Approx. inch)

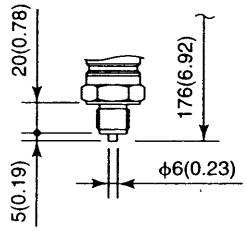


*1: Applied to Model EJA530A with Measurement span code A, B, and C.

◆ For Process Connection code 4



◆ For Process Connection code 8 and 9

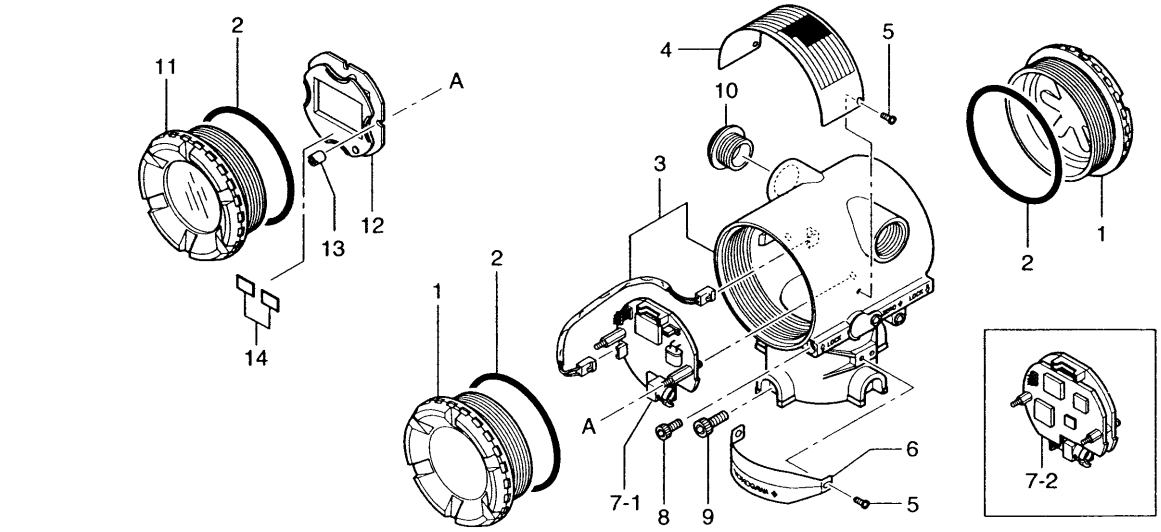


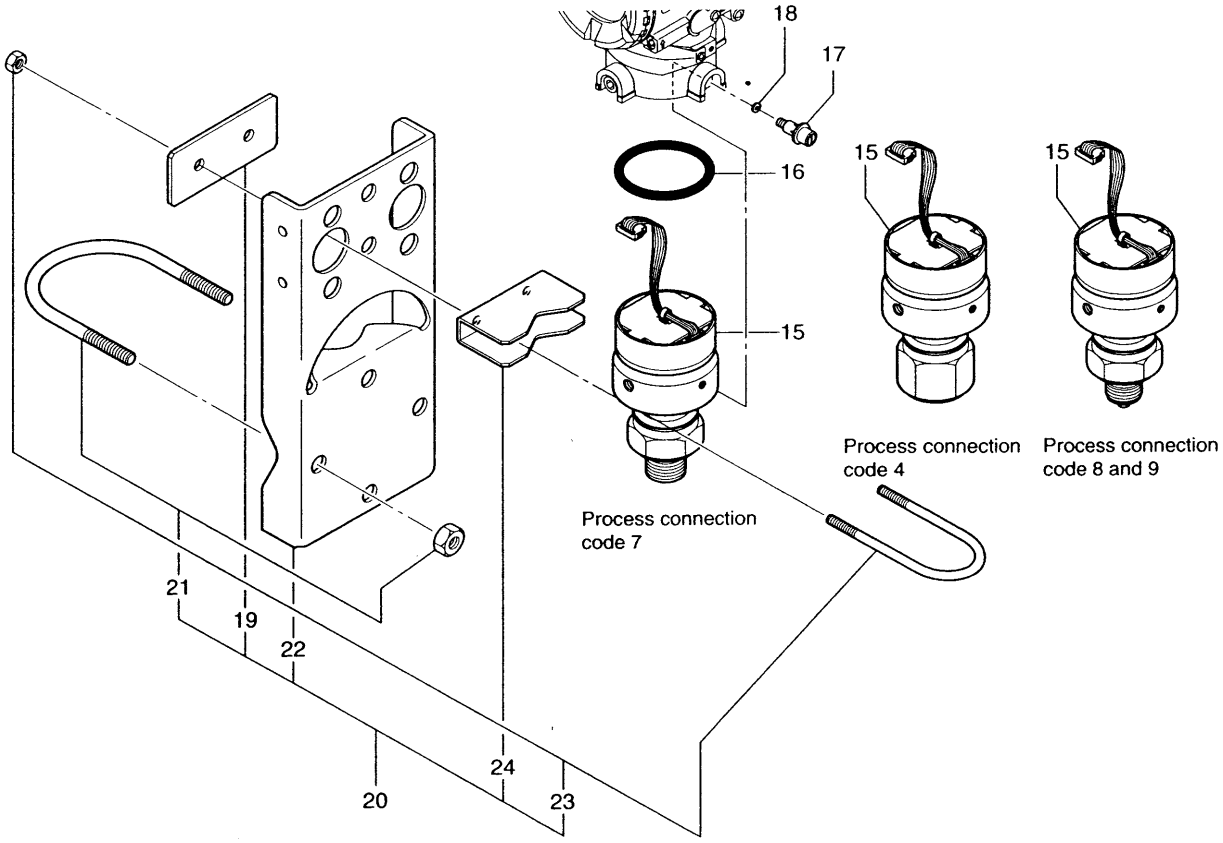
F1001.EPS

Customer Maintenance Parts List

Model EJA510A and EJA530A
Absolute and Gauge
Pressure Transmitter

DPharp





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18.4

CMPL 01C21F01-01E
4th Edition: Aug. 2002(YK)

Item	Part No.	Qty	Description
1	Bellow	2	Cover
	F9341RA		Cast-aluminum alloy
	F9341RJ		SCS14A stainless steel
2	F9341JP	2	O-ring
3	Below	1	Case Assembly (Note 1)
	F9341AA		Cast-aluminum alloy for G1/2
	F9341AC		Cast-aluminum alloy for G1/2 (two electrical connections)
	F9341AE		Cast-aluminum alloy for 1/2 NPT (two electrical connections)
	F9341AH		Cast-aluminum alloy for M20 (two electrical connections)
	F9341AJ		Cast-aluminum alloy for Pg13.5 (two electrical connections)
	F9341AR		SCS14A stainless steel for 1/2 NPT (two electrical connections)
4	F9341KA	1	Name Plate
5	Bellow	4	Screw
	F9300AG		For cast-aluminum alloy case assembly
	F9303JU		For SCS14A stainless steel case assembly
6	F9341KL	1	Tag Plate
7-1	Below	1	CPU Assembly
	F9342AB		For BRAIN protocol version
	F9342AL		For HART protocol version
	F9342AF		For BRAIN protocol version (Optional code /F1)
	F9342AM		For HART protocol version with write protection switch (Optional code /F1)
7-2	F9342BF	1	For FOUNDATION Fieldbus protocol version
	F9342BG		For FOUNDATION Fieldbus protocol version with PID/LM function (Optional code /LC1)
8	Y9406ZU	2	Cap Screw
9	Y9612YU	2	Screw
10	Below	1	Plug
	F9340NW		For Pg13.5
	F9340NX		For M20
	G9330DK		For G1/2
	G9612EB		For 1/2 NPT
11	Bellow	1	Cover Assembly (For integral indicator)
	F9341FM		Cast-aluminum alloy
	F9341FJ		SCS14A stainless steel
12	Below	1	LCD Board Assembly
	F9342BL		Without range-setting switch
	F9342BM		With range-setting switch
13	F9342MK	2	Mounting Screw
14	F9300PB	2	Label
15	—	1	Capsule Assembly (See Table 1.)(Note 2)
16	F9300AJ	1	O-ring
17	Below	1	Pipe (for EJA530A with Measurement Span code A, B, and C)
	F9385XK		Polypropylene resin
	F9385XM		SUS316 Stainless Steel (Optional code /E1)
18	F9385XL	1	O-ring (for EJA530A with Measurement Span code A, B, and C)
19	F9385XZ	1	Plate, SUS304 Stainless Steel
20	Below	1	Bracket Assembly
	F9385XV		SECC carbon steel
	F9385XT		SECC carbon steel (for epoxy resin-baked coating)
	F9385XU		SUS304 stainless steel
21	D0117XL-A	1	U-bolt/Nut Assembly (L), SUS304 Stainless Steel
22	Below	1	Bracket
	F9270AX		SECC carbon steel
	F9300TN		SECC carbon steel (for epoxy resin-baked coating)
	F9300TE		SUS304 Stainless Steel
23	F9385XW	1	U-bolt/Nut Assembly (S), SUS304 Stainless Steel
24	F9385XY	1	Adapter, SUS304 Stainless Steel

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

Table 1. Capsule Assembly Part Number (Item 15)

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

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

REVISION RECORD

Title: Model EJA510A and EJA530A Absolute Pressure and Gauge Pressure Transmitter

Manual No.: IM 01C21F01-01E

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

REVISION RECORD.EPS

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18:4

YOKOGAWA ◆

YOKOGAWA ELECTRIC CORPORATION

Headquarters
2-9-32, Nakacho, Musashino-shi, Tokyo, 180-8750 JAPAN

Branch Sales Offices
Nagoya, Osaka, Hiroshima, Fukuoka, Sapporo, Sendai, Ichihara, Toyoda, Kanazawa, Takamatsu, Okayama, and Kitakyusyu.

YOKOGAWA CORPORATION OF AMERICA

Headquarters
2 Dart Road, Newnan, Georgia. 30265, U.S.A.
Phone : 1-770-253-7000
Fax : 1-770-254-0928

YOKOGAWA EUROPE B. V.

Headquarters
Databankweg 20 Amersfoort 3821 AL, THE NETHERLANDS
Phone : 31-334-64-1611 Fax : 31-334-64-1610

Branch Sales Offices / Wien (Austria), Zaventem (Belgium), Ratingen (Germany), Madrid (Spain), Runcorn (United Kingdom), Milano (Italy), Velizy Villacoublay (France), Johannesburg (Republic of South Africa), Budapest (Hungary), Stockholm (Sweden)

YOKOGAWA AMERICA DO SUL S.A.

Praca Acapulco, 31 - Santo Amaro. Sao Paulo/SP - BRAZIL
Phone : 55-11-5681-2400 Fax : 55-11-5681-4434

YOKOGAWA ELECTRIC ASIA PTE. LTD.

Head Office
5 Bedok South Road, 469270 SINGAPORE
Phone : 65-6241-9933 Fax : 65-6241-2606

YOKOGAWA ELECTRIC KOREA CO., LTD.

Head Office
395-70, Shindaebang - dong, Dongjak - ku, Seoul, 156-714 KOREA
Phone : 82-2-3284-3016 Fax : 82-2-3284-3016

YOKOGAWA AUSTRALIA PTY. LTD.

Head Office (Sydney)
Centrecourt D1, 25-27 Paul Street North, North Ryde,
N.S.W.2113, AUSTRALIA
Phone : 61-2-9805-0699 Fax : 61-2-9888-1844

YOKOGAWA INDIA LTD.

Head Office
40 / 4 Lavelle Road, Bangalore 560 001, INDIA
Phone : 91-80-2271513 Fax : 91-80-2274270

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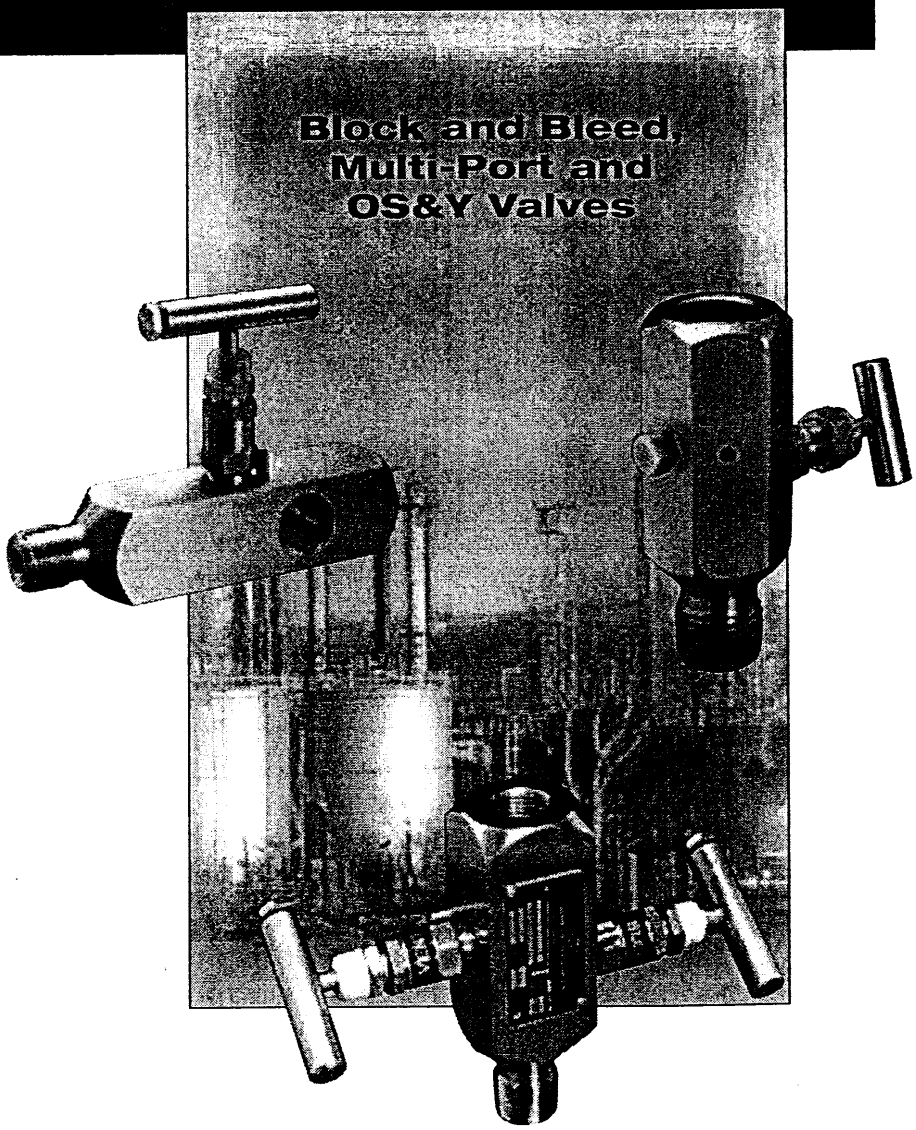
18.4

Anderson Greenwood Instrumentation Products - Gauge Valves

Total Flow Control Solutions™



tyco / Flow Control

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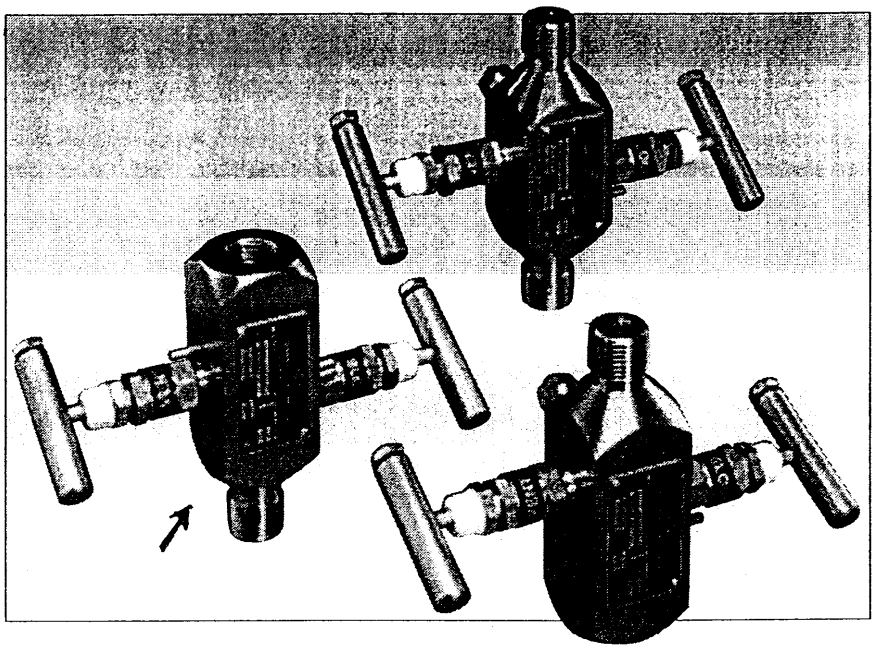
18.5

Block and Bleed Gauge Valves – M25 and M251

Product Overview

The M25 and M251 are two-valve single outlet gauge valves that combine isolating, calibrating, and venting facilities in a single compact unit. These valves enable gauges, pressure transmitters, or switches to be reliably installed and serviced, by reducing potential leak points.

The vent port is threaded 1/4-inch NPT on all valves and is fitted with a plug. This facilitates installation of exhaust piping/tubing on hazardous services, which in turn contributes to operator safety.



Features and Benefits

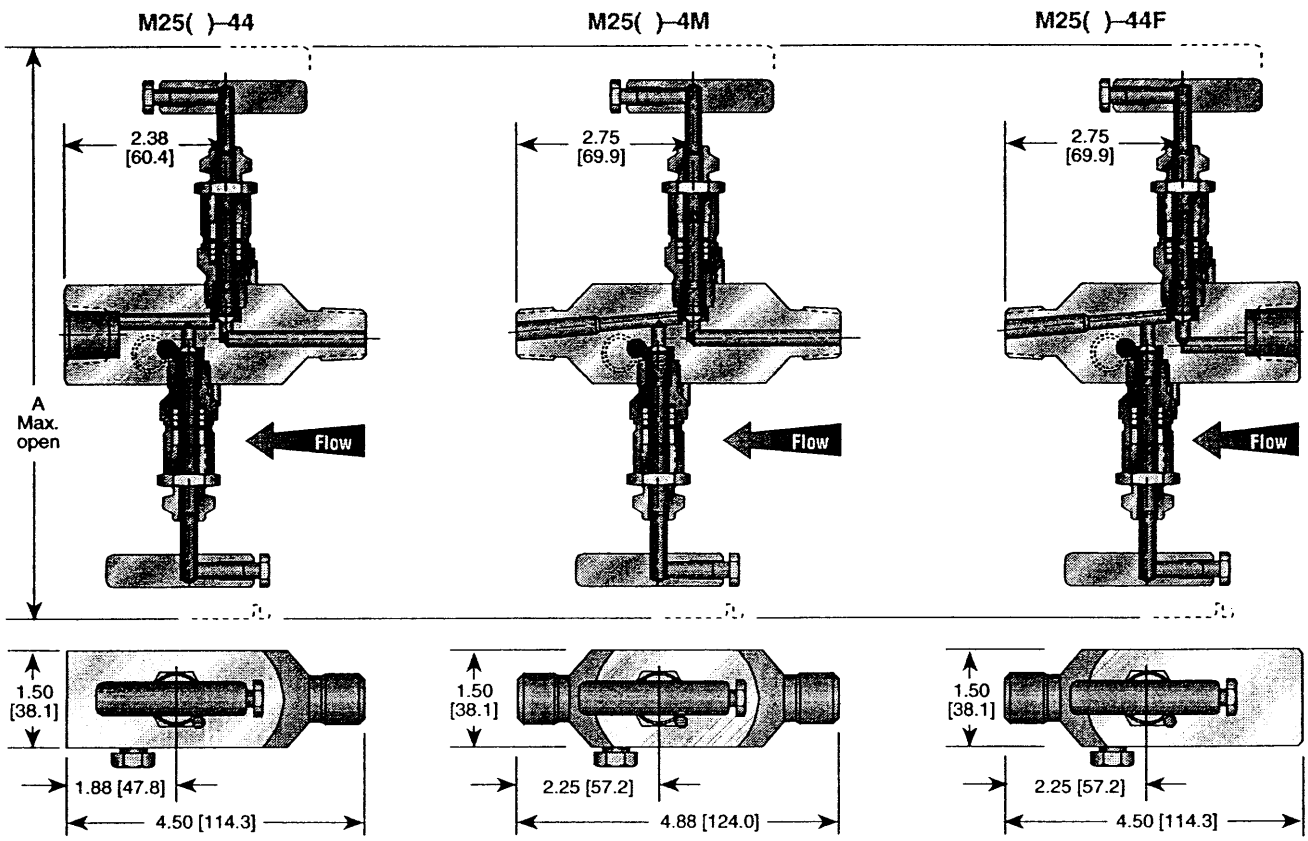
- **Compact design** requires minimum space for operation and installation. Lower valve weight increases strength at the process connection and reduces gauge whip.
- **Cost savings** from reduced number of components required for instrument installation, also decreases possible leak points.
- **Easy instrument check calibration** using 1/4-inch FNPT vent/test port.
- **Ball end stem** eliminates seat galling, provides bubble-tight shutoff and long life. The hardened, non-rotating ball ensures perfect alignment closure.
- **Packing below threads** prevents lubricant washout, thread corrosion, and keeps solids from entering the thread area, which can cause galling. It also prevents process contamination.
- **Adjustable packing** adjusts easily – loosen jam nut, tighten bushing slightly, then retighten jam nut. Decreases packing replacement downtime and increases valve life.
- **Safety back seating** prevents stem blowout or accidental removal while in operation and provides a metal-to-metal secondary stem seal while in the full open position.
- **Dust cover** prevents lubricant washout and keeps contaminants (dirt, rain, etc.) out of bonnet assembly.
- **Panel mount** (optional) affords opportunity to use high quality products in racks or panels.
- **Chrome plating of 316 SS** prevents galling or freezing of stem threads when similar metals mate. CS valves use a 303 SS stem.
- **Rolled threads** provide additional thread strength. The stem, bonnet, and male NPT threads are rolled, not cut.
- **Mirror stem finish** burnished to a 16 RMS finish in the packing area enables smooth stem operation and extends packing life.
- **Body-to-bonnet seal** is metal-to-metal in constant compression, isolating the bonnet threads from process fluid corrosion. Eliminates possible tensile breakage of bonnet, and gives a reliable seal point.
- **Bonnet lock pin** is another safety feature which prevents the accidental separation of the bonnet from the body. However, normal valve maintenance and repair are still easily accomplished.

2

18.5

Block and Bleed Gauge Valves – M25 and M251 Specifications

Dimensions, inches [mm]



Standard Materials

Valve	Body	Bonnet	Stem	Ball	Packing
CS[1]	A105 CS	A108 CS	A581-303 SS	17-4 PH	Teflon®
CS[1]	A105 CS	A105 CS	A581-303 SS	17-4 PH	GRAFOIL® Low Emissions Graphite
SS	A479-316 SS	A479-316 SS	A276-316 SS	316 SS	Teflon®
SS	A479-316 SS	A479-316 SS	A276-316 SS	316 SS	GRAFOIL® Low Emissions Graphite
SG[2]	A479-316 SS	A479-316 SS	Monel® 400	Monel® K500	Teflon®
SG[2]	A479-316 SS	A479-316 SS	Monel® 400	Monel® K500	GRAFOIL® Low Emissions Graphite
SG3[3]	Hastelloy® C-276	Hastelloy® C-276	Hastelloy® C-276	Stellite	Teflon®
SG3[3]	Hastelloy® C-276	Hastelloy® C-276	Hastelloy® C-276	Monel®	GRAFOIL® Low Emissions Graphite

Pressure and Temperature Ratings

Teflon® Packing

CS, SS, SG SG3	6000 psig @ 200°F [414 barg @ 93°C]	4000 psig @ 500°F [276 barg @ 260°C]

GRAFOIL® and Low Emissions Graphite Packing

CS, SS, SG SG3	6000 psig @ 200°F [414 barg @ 93°C]	1500 psig @ 850°F [103 barg @ 454°C]
SS, SG SG3	6000 psig @ 200°F [414 barg @ 93°C]	1500 psig @ 1000°F [103 barg @ 538°C]

Notes

1. CS is zinc-cobalt plated to prevent corrosion.
2. SG (Sour Gas) meets the requirements of NACE MR0175-2002.
3. SG3 (Sour Gas) meets the requirements of NACE MR0175-2003.

3/

18.5

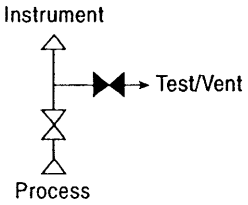
Block and Bleed Gauge Valves – M25 and M251 Specifications

Dimensions, inches [mm]

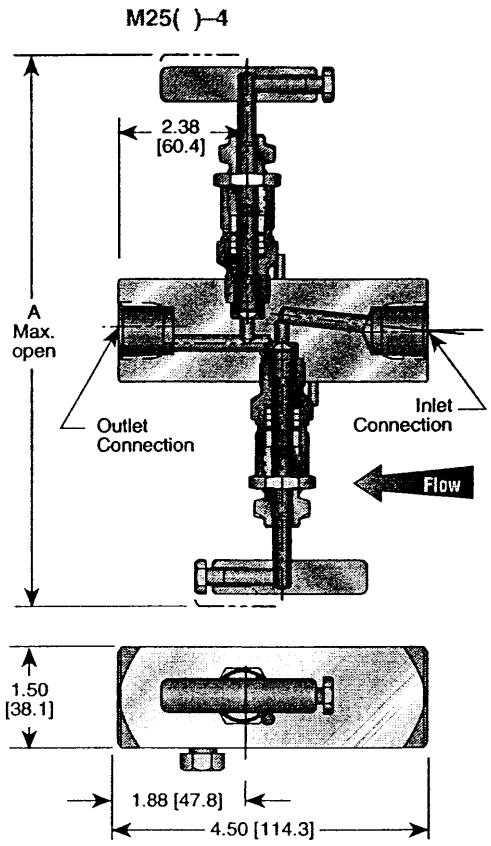
Packing	A
Low Emissions (E) GRAFOIL® (H)	8.14 [206.8]
Teflon® (V) M251 only	6.84 [173.7]

Notes

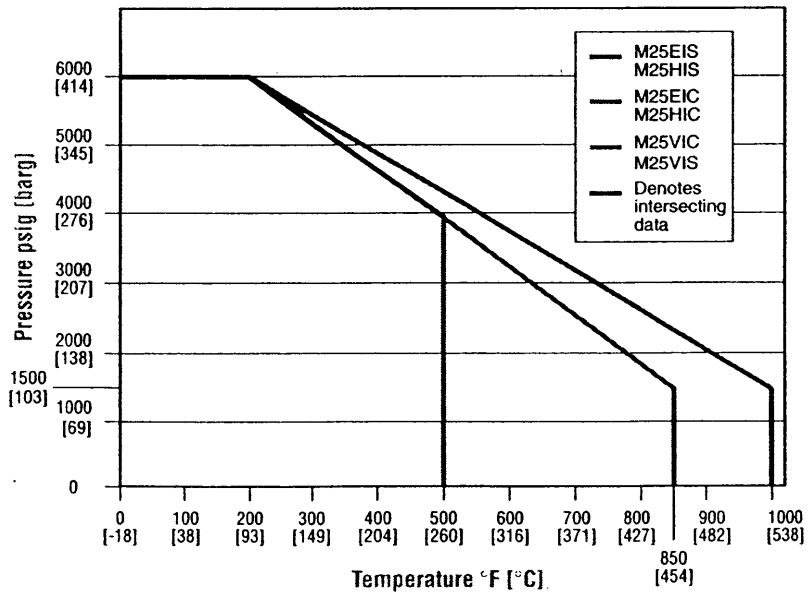
1. Approximate valve weight M25( )–44 and M25( )–44F 3.6 lb [1.63 kg]. M25( )–4M 3.8 lb [1.72 kg]. Valve C_v 0.52 maximum.
2. M25( )–4 body length 4.5-inch [114.3].
3. For Hastelloy® and SG3 call factory for dimensions and weights.



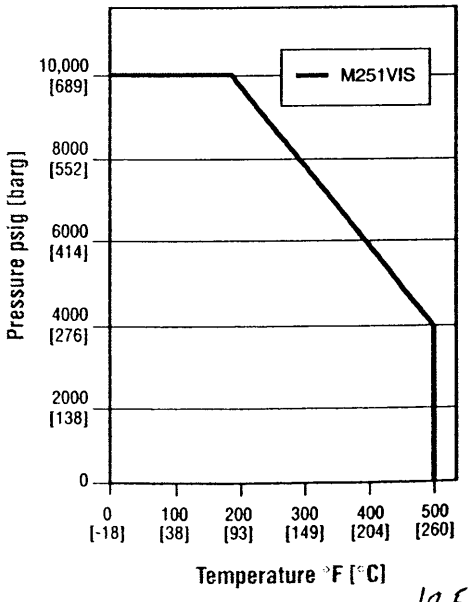
Dimensions, inches [mm]



Pressure vs. Temperature – M25



Pressure vs. Temperature – M251



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18.5

Block and Bleed Gauge Valves – M25 and M251 Specifications

Ordering Information

M25 V I S – 44C – SG

Model Number

M25, (M251)

Packing

(V) – Teflon®
H – GRAFOIL®
E – Low Emissions Graphite

Seat Material

(I) – Integral

Body Material[1]

C – CS
(S) – 316 SS
M – Monel®
J – Hastelloy®

Connections (Inlet/Outlet)[2]

4M – 1/2-inch MNPT x 1/2-inch MNPT
(44) – 1/2-inch MNPT x 1/2-inch FNPT
44F – 1/2-inch FNPT x 1/2-inch MNPT
46 – 3/4-inch MNPT x 1/2-inch FNPT
4 – 1/2-inch FNPT x 1/2-inch FNPT (body length 4.5-inch [114.5 mm])

C – Male plain end (CS is black oxide coated)

Options

(BL) – Bonnet Lock Device (patent protected)
CLC – Chlorine Cleaning
HD – Hydrostatic Testing (100%)(MSS-SP-61)
OC – Oxygen Cleaning
SG – Sour Gas meets the requirements of NACE MR0175-2002 (SS only)
SP – Special Requirements - please specify
AM – AGCO Mount
SG3 – Sour Gas meets the requirements of NACE MR0175-2003

Notes

1. For other body materials, consult factory.
2. Consult factory for other optional connections.

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18.5

Chapter 19 PLANT FLOW TRANSMITTER

MANUFACTURER/DISTRIBUTOR:

PROVAN
2315, HALPERN
ST-LAURENT,QUE. H4S 1S3
PH:514-332-3230 FAX:3552

19.1 MAGNETIC FLOW METER

19.1.1 AXFA14C-E2-21/CF1/SCT "REMOTE HEAD"

19.1.2 19.2 #AXF150C-E2AL1-CA11-21B/CF1 "FLOW TUBE"

END OF CHAPTER 19

<<Contents>> <<Index>>

General Specifications

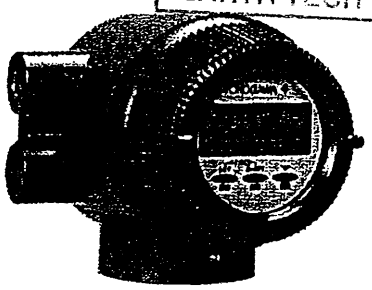
GS 01E20C02-01E-A

AXFA14 Magnetic Converter for Remote Flowtube

The AXFA14 magnetic converter has been developed based on Yokogawa's decades long experience in magnetic flowmeters. The AXFA14 continues the tradition of high quality and reliability that has become synonymous with the Yokogawa name and in addition features an even higher level of performance and increased functionality.

Retaining all the features and functions of the Admag series of converters, in addition the AXFA14 offers an enhanced dual frequency excitation method as an option for difficult applications as well as new diagnostics to detect electrode coating. Combined with a flowtube utilizing the optional replaceable electrode design, the user benefits through the ability to schedule maintenance for reduced process downtime and in turn a lower total cost of ownership.

Note: The "Dual Frequency Excitation Method" is Yokogawa's unique technology.



AXFA14C-E2-21/CF1/SC1

■ FEATURES

• Optional enhanced dual frequency excitation method

The user can select a 165 Hz high frequency component for very high concentration slurries to ensure greater stability and quicker response.

• Minimum fluid conductivity of 1 μS/cm

With the newly designed AXF flow converter, improvements to the input circuit now permit the measurement of fluids with conductivity as low as 1μS/cm.

• Diagnostics to detect insulating coatings on the electrodes

By constantly monitoring the change in the impedance of the electrode circuit due to the build-up of insulating coatings, the AXF converter will display 4 different levels of coating and provide an alarm function.

• Improved accuracy specification

The standard performance specification for AXF is 0.35% of reading. Also available is an optional high accuracy calibration rated at 0.2% of reading.

• Three line display with infrared switches

The LCD indicator employs a large, backlit, full dot matrix display. One to three lines are available and these can be programmed to indicate a wide variety of display possibilities, including a bar graph for flow rate indication and a graphical representation of the extent to which the electrodes may be coating. Infrared switches permit programming through the glass without the need to open the enclosure cover.

• High speed pulse output

The pulse output can be programmed up to 10,000 pulses/second for high-speed applications such as short batch processes.

• "Easy Setup" Parameters

The most frequently used parameters are arranged in one location for easy, quick access.

CONTENTS

YOKOGAWA ◆

Yokogawa Corporation of America
2 Dart Road, Newnan, Georgia 30265-1094
Tel.: 770-254-0400 Fax.: 770-254-1337

GS 01E20C02-01E-A

3rd Edition Nov. 2003

1/

19.1.1

■ STANDARD SPECIFICATIONS

Excitation Method
- Standard dual frequency excitation:
  Size 2.5 to 400 mm (0.1 to 16 in.)
  Combined with AXF Remote Flowtube
- Enhanced dual frequency excitation:
  Size 25 to 200 mm (1.0 to 8.0 in.)
  Combined with AXF Remote Flowtube
  (Option code HF2)

Input Signal:
One Status Input: Dry contact
Load resistance: 200 Ω or less (ON), 100 kΩ or more (OFF)

Output Signals(*1):
- One Current Output: 4 to 20 mA DC (load resistance: 0 to 750 Ω, including cable resistance)
- One Pulse Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
  Output rate 0.0001 to 10,000 pps (pulse/second)
- One Alarm Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
- Two Status Outputs (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)

Communication Signals:
BRAIN or HART communication signal
(Superimposed on the 4 to 20 mA DC signal)

Communication Line Conditions:
Load resistance: 250 to 600 Ω (including cable resistance)
Distance from power line: 15 cm (6 in.) or more (Parallel wiring should be avoided.)

BRAIN:

Communication Distance:
Up to 2 km (1.25 miles), when polyethylene insulated PVC-sheathed cables (CEV cables) are used.
Communication distance varies depending on the type of cable and wiring used.

Load Capacitance: 0.22 µF or less

Load Inductance: 3.3 mH or less

Input Impedance of Communicating Device:
10 kΩ or more (at 24 kHz)

HART:

Communication Distance:
Up to 1.5 km (0.9 mile), when using multiple twisted pair cables. Communication distance varies depending on the type of cable used.

Note 1: See "Terminal Wiring" on page 6 for possible input/output combinations.

Cable Length for Specific Applications:
Use the following formula to determine the cable length for specific applications:

$$L = \frac{65\times10^6}{(R\times C)} - \frac{(Cf+10{,}000)}{C}$$

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

Note: HART is a registered trademark of the HART Communication Foundation.

Data Security During Power Failure:
Data (parameters, totalizer value, etc.) storage by EEPROM. No back-up battery required.

Indicator:
Full dot-matrix LCD (32×132 pixels)

Lightning Protector:
A lightning protector is built into the excitation current output, the current output, pulse/alarm/status input and output terminals. If option code A is selected, the lightning protector is built into the power terminals.

Protection:
IP67, NEMA4X

Coating:
Case and Cover: Polyurethane corrosion-resistant
Coating Color: Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Converter Material:
Case and Cover: Aluminum alloy

Mounting: 2 inch pipe

Electrical Connection:
ANSI 1/2 NPT female

Terminal Connection:
M4 size screw terminal

Grounding:
Grounding resistance 100 Ω or less
When option code A is selected, Class C grounding (grounding resistance 10 Ω or less) shall be applied.
* In case of explosion proof type, the protective grounding must be connected to a suitable IS grounding system.

Converter Interchange:
In instances where the AXFA14 converter has been paired with a remote AXF flowtube and the converter is changed to the AXFA11 converter, a flow calibration must be performed to arrive at the meter factors for the new combination.

Functions

How to Set Parameters:
The indicator's LCD and three infra-red switches enable users to set parameters without opening the case cover. Parameters can also be set by means of the HHT.

Displayed Languages:
English or Japanese.
German, French, Italian, Spanish are under development.

Instantaneous Flow Rate/Totalized Value Display Functions (for models with an indicator):
The full dot-matrix LCD enables user selection of displays from one line to three lines for:
- Instantaneous flow rate
- Instantaneous flow rate (%)
- Instantaneous flow rate (bar graph)
- Current output value (mA)
- Totalized value
- Tag No.
- Results of electrode coating diagnostics

Totalizer Display Function:
For forward/reverse ranges, the totalized values of the flow direction (forward or reverse) and the flow rate are displayed on the indicator together with the units. The difference values between the forward and reverse flow rate totalized values can be displayed. The reverse flow rate is not counted for a forward single range.

Damping Time Constant:
Time constant can be set from 0.1 second to 200.0 seconds (63% response).

Span Setting Function:
Span flows can be set in units such as volume flow rate, mass flow rate, time, or flow rate value. The velocity unit can also be set.
Volume Flow Rate Unit: kcf, cf, mcf, Mgal (US), kgal (US), gal (US), mgal (US), kbbl (US)*, bbl (US)*, mbbl (US)*, µbbl (US)*, Ml (megaliter), m^3, kl (kiloliter), l (liter), cm^3
Mass Flow Rate Unit (Density must be set.): klb (US), lb (US), t (ton), kg, g
Velocity Unit: ft, m (meter)
Time Unit: s (sec), min, h (hour), d (day)
* "US Oil" or "US Beer" can be selected

Pulse Output:
Scaled pulse can be output by setting a pulse weight.
Pulse Width: Duty 50% or fixed pulse width (0.05, 0.1, 0.5, 1, 20, 33, 50, 100 ms) can be selected.
Output Rate: 0.0001 to 10,000 pps (pulse/second)

Multi-range Function:
Status input enables the switching of up to two ranges. For automatic range switching, the status of up to four ranges can be shown via status outputs and on the indicator.

Forward and Reverse Flow Measurement Functions:
Flows in both forward and reverse directions can be measured. The status is shown via status outputs and on the indicator during the reverse flow measurement.

Totalization Switch:
If a totalized value becomes equal to or greater than the set value, a status output is generated..

Preset Totalization:
A parameter setting or status input enables a totalized value to be reset to a preset value or zero.

0% Signal Lock:
Status input fixes the instantaneous flow rate display, current output, pulse output, and flow rate totalization to 0%.

Alarm Selection Function:
Alarms are classified into System Alarms (hard failures), Process Alarms (such as 'Empty Pipe', 'Signal Overflow' and 'Coating Alarm'), Setting Alarms, and Warnings. Whether alarms should be generated or not can be selected for each item. The current output generated for an alarm can be selected from among 2.4 mA or less, fixed to 4 mA, 21.6 mA or more, or HOLD.

Alarm Output:
Alarms are generated only for the items selected via the 'Alarm Selection Function' if relevant failures occur.

Self Diagnostics Functions:
If alarms are generated, details of the System Alarms, Process Alarms, Setting Alarms and Warnings are displayed together with descriptions of countermeasures.

Flow Upper/Lower Limit Alarms:
If a flow rate is greater or smaller than the set value, this alarm is generated. In addition, two upper limits (H, HH) and two lower limits (L, LL) can be set.
If a flow rate is greater or smaller than any of the set values, the status is output.

Electrode Coating Diagnostics Function:
This function enables monitoring of the coating of insulating substances on the electrodes. Depending on the status, users are notified by a warning or an alarm via status outputs. If replaceable electrodes are used, they can be removed and cleaned if coating occurs.

■ HAZARDOUS AREA CLASSIFICATION

FM:

Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
Excitation Circuit: 140V max
Enclosure: NEMA 4X
Temp. Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)
Note: Installation shall be in accordance with the manufacturer's instructions and National Electric code, ANSI/NFPA-70.

CSA:

For CSA C22.2 Series

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division 1, Group E, F & G.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

For CSA E79 Series

Flame proof for Zone 1, Ex d IIC T6

Excitation Circuit: 140V max
Enclosure: Type 4X, IP66, IP67
Temp. Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

■ STANDARD PERFORMANCE

Reference Conditions:

Similar to BS EN 29104 (1993); ISO9104 (1991)

- Fluid temperature: +10°C to +30°C (+50°F to +86°F)
- Ambient temperature: +20°C to +30°C (+68°F to +86°F)
- Warm-up time: 30 min
- Straight runs
  Upstream > 10 × DN
  Downstream > 5 × DN
- Properly grounded
- Properly centered

Accuracy (Combined with AXF Remote Flowtube at reference conditions)

Pulse Output:

PFA/Ceramics Lining:

Size mm (in.)	Flow Velocity V m/s (ft/s)	Standard Accuracy (Calibration code B)	Flow Velocity V m/s (ft/s)	High grade Accuracy (Calibration code C)
2.5 (0.1) to 15 (0.5)	V < 0.3 (1)	1.0 mm/s	—	
	0.3 ≦ V ≦ 10 (1) (33)	0.35% of Rate		
25 (1.0) to 200 (8.0)	V < 0.15 (0.5)	0.5 mm/s	V < 0.15 (0.5)	0.5 mm/s
	0.15 ≦ V ≦ 10 (0.5) (33)	0.35% of Rate	0.15 ≦ V < 1 (0.5) (3.3)	0.18% of Rate + 0.2mm/s
			1 ≦ V ≦ 10	0.2% of Rate
250 (10) to 400 (16)	V < 0.15 (0.5)	0.5 mm/s	—	
	0.15 ≦ V ≦ 10 (0.5) (33)	0.35% of Rate		

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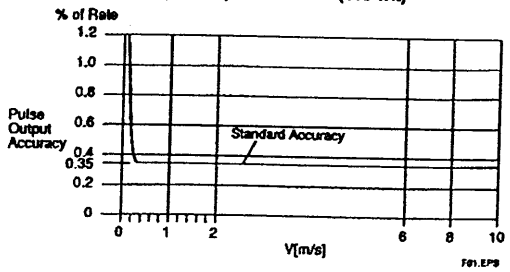
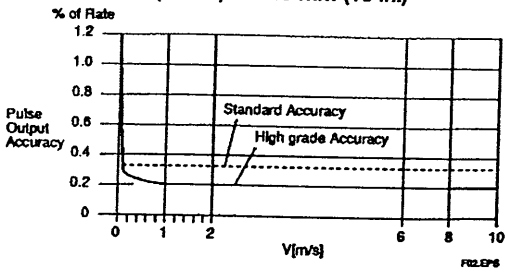
Size 2.5 mm (0.1 in.) to 15 mm (0.5 in.)



Size 25 mm (1.0 in.) to 400 mm (16 in.)

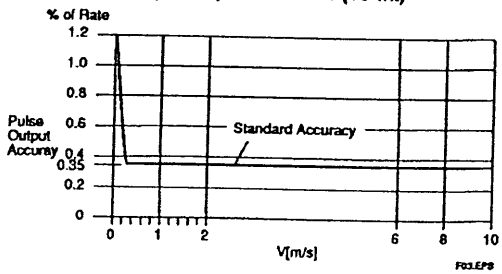


Polyurethane Lining

Size mm (in.)	Flow Velocity V m/s (ft/s)	Standard Accuracy (Calibration code B)
25 (1.0) to 400 (16)	V < 0.3 (1.0)	1.0 mm/s
	0.3 ≦ V ≦ 10 (1.0) (33)	0.35% of Rate

T02.EPS

Size 25 mm (1.0 in.) to 400 mm (16 in.)



Enhanced dual frequency excitation (Combined with AXF Remote Flowtube Optional code HF2):
Standard Accuracy +1 mm/s

Current Output: Plus 0.05% of Span

Repeatability:
0.1% of Rate (V ≥ 1 m/s (3.3 ft/s))
0.05% of Rate + 0.5 mm/s (V < 1 m/s (3.3 ft/s))

Maximum Power Consumption:
Combined with AXF Remote Flowtube: 12 W

Insulation Resistance (*1):
100 MΩ between power terminals and ground terminal at 500 V DC
100 MΩ between power terminals and each output/status input terminal at 500 V DC
20 MΩ between ground terminal and each output/status input terminal at 100 V DC
20 MΩ between output/status input terminals at 100 V DC

Withstand Voltage (*1):
1350 V AC between power terminals and ground terminal for two seconds
160 V AC between excitation terminals and ground terminal for two seconds
200 V AC between excitation terminals and each output/status input terminal for two seconds

⚠ CAUTION

*1: Before performing the Insulation Resistance Test or the Voltage Breakdown Test, disconnect the ground terminal if the power terminal has a lightning protector (option code A). Following the relevant test, wait for more than 10 seconds after the power supply has been turned off before removing the cover. After testing, be sure to use a resistance for discharge and return the short bar to its correct position. Screws must be tightened to a torque of 1.18 N-m or more. After closing the cover, the power supply can be restored.

Safety Requirement Standards:
EN61010
- Altitude at installation site: Max. 2000 m above sea level
- Installation category based on IEC1010:
  Overvoltage category II ("II" applies to electrical equipment which is supplied from a fixed installation-like distribution board.)
- Pollution degree based on IEC1010
  Pollution degree 2 ("Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to a normal indoor atmosphere.)

EMC Conformity Standards:
EN61326
EN61000-3-2, EN61000-3-3
AS/NZS 2064

■ NORMAL OPERATING CONDITIONS

Ambient Temperature: –40°C to +60°C (–40°F to +140°F)
- Indicator's operating range: –20°C to +60°C (–4°F to +140°F)
- Maximum temperature is 50°C for Power Supply Code 2.

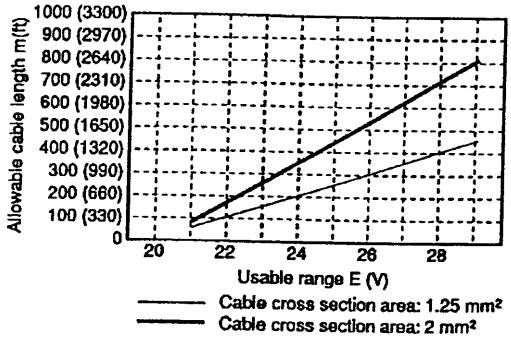
Ambient Humidity: 0 to 100%
Lengthy continuous operation at 95% or more is not recommended.

Power Supply

Power supply code 1:
- AC specifications
  Rated power supply: 100 to 240 V AC, 50/60 Hz
  (Operating voltage range: 80 to 264 V AC)
- DC specifications
  Rated power supply: 100 to 120 V DC
  (Operating voltage range: 90 to 130 V DC)

Power supply code 2:
- AC specifications
  Rated power supply: 24 V AC, 50/60 Hz
  (Operating voltage range: 20.4 to 28.8 V AC)
- DC specifications
  Rated power supply: 24 V DC
  (Operating voltage range: 20.4 to 28.8 V DC)

Supplied Power and Cable Length for Power Supply Code 2



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Vibration Conditions:
Level of vibration in conformity with IEC 60068-2-6 (SAMA31. 1-1980)
1 G or less (frequency 500 Hz or less)
Note: Avoid locations with much vibration (with a vibration frequency of 500 Hz or more), which may cause damage to the equipment.

■ ACCESSORIES

Fuse (T2.0A, 250 V): 1 pc.
*Time lag fuse
Mounting bracket: 1 set
Hexagonal wrench: 1 pc.

■ MODEL AND SUFFIX CODE

AXFA14 Magnetic Flowmeter Remote Converter:

Model	Suffix Code		Description
AXFA14			Magnetic Flowmeter Remote Converter
Use	C		Explosion proof type For Remote Flowtube of Size 2.5 to 400 mm (0.1 in. to 16 in.)
Output Signal and Communication	-D		4 to 20 mA DC, BRAIN Communication
	-E		4 to 20 mA DC, HART Communication
Power Supply	1		100 V to 240 V AC or 100 to 120 V DC
	2		24 V AC/DC
Electrical Connection	-2		ANSI 1/2 NPT female
Indicator (*1)		1	With Indicator (Horizontal)
		2	With Indicator (Vertical)
		N	None
Option		/	Optional code (See the Table of Optional Specifications)

*1: 1 2 N

T03.EPS

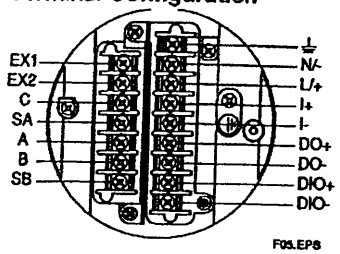
over

Signal Cable:

Note:
- The cable is constructed with double shielding over the two conductors, and uses heat-resistant vinyl as the outer covering material.
  Finished diameter: 10.5 mm (0.41 in.)
  Maximum temperature: +80°C (+175°F)
- Not neccessary to order the above cable for submersible type flowtube because the flowtube is wired with 30 m (98 ft) cable.
- Excitation cable is supplied by the customer.

Recommended Excitation, Power and Output Cable:
Use polyvinyl chloride insulated and sheathed control cable or Polyvinyl chloride insulated and sheathed portable power cables.
- Outer Diameter: 6.5 to 12 mm (0.26 to 0.47 in.)
- Nominal Cross Section: 0.5 to 2.5 mm²

● Terminal Configuration



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● Terminal Wiring

Terminal Symbols	Description
EX1	Excitation current Output
EX2	
C	Flow singal input
SA	
A	
B	
SB	

Terminal Symbols	Description
⏚	Functional grounding
N/–	Power supply
L/+	
I+	Current output 4 to 20mA DC
I–	
DO+	Pulse output/ Alarm output/ Status output
DO–	
DIO+	Alarm output/ Status output/ Status input
DIO–	
⏚	Protective grounding (Outside of the terminal)

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19.1.1

■ OPTIONAL SPECIFICATIONS FOR AXFA14 REMOTE CONVERTER

o : Available –: Not available

Item	Specification		General-Purpose use	Explosion proof	Code
Lightning Protector	A lightning protector is built into the power terminals.		o	o	A
Burn Out Down	The output level is set to 0 mA during a CPU failure and is set 2.4 mA or less during an alarm. Standard products are delivered with a setting 25 mA during a CPU failure and 21.6 mA or more during an alarm.		o	o	C1
NAMUR NE43 Compliant	Output signal limits: 3.8 to 20.5 mA	Failure alarm down-scale: Output status at a CPU failure or an alarm is 2.4 mA (–10%) or less.	o	o	C2
		Failure alarm up-scale. Output status at a CPU failure or an alarm is 21.6 mA (110%) or more.	o	o	C3
Active Pulse Output	Active pulses are output in order to drive an external electromagnetic or electronic counter directly using the converter's internal power supply. (Nullifies the standard transistor contact pulse output.) Output voltage: 24 V DC ±20% Pulse specifications: • At the drive current of 30 to 150 mA Pulse rate: 0.0001 to 2 pps (pulse/second); Pulse width: 20, 33, 50, or 100 ms		o	o	EM
Stainless Steel Mounting Bracket	Provided with a JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel mounting bracket in lieu of the standard carbon steel bracket.		o	o	SB
Stainless Steel Tag Plate	Screwed JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel tag plate. Choose this option when an SS tag plate is required in addition to the standard nameplate with the tag number inscribed on it.		o	o	SCT
Epoxy Resin Coating	Epoxy resin coating instead of standard polyurethane resin coating. The color is same as standard type.		o	o	X1
FM Approval	Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	o	FF1
CSA Certification	Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	o	CF1

T05.EPS

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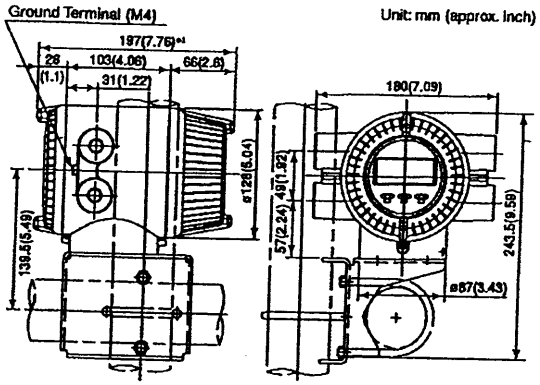
■ EXTERNAL DIMENSIONS

● Remote Converter AXFA14

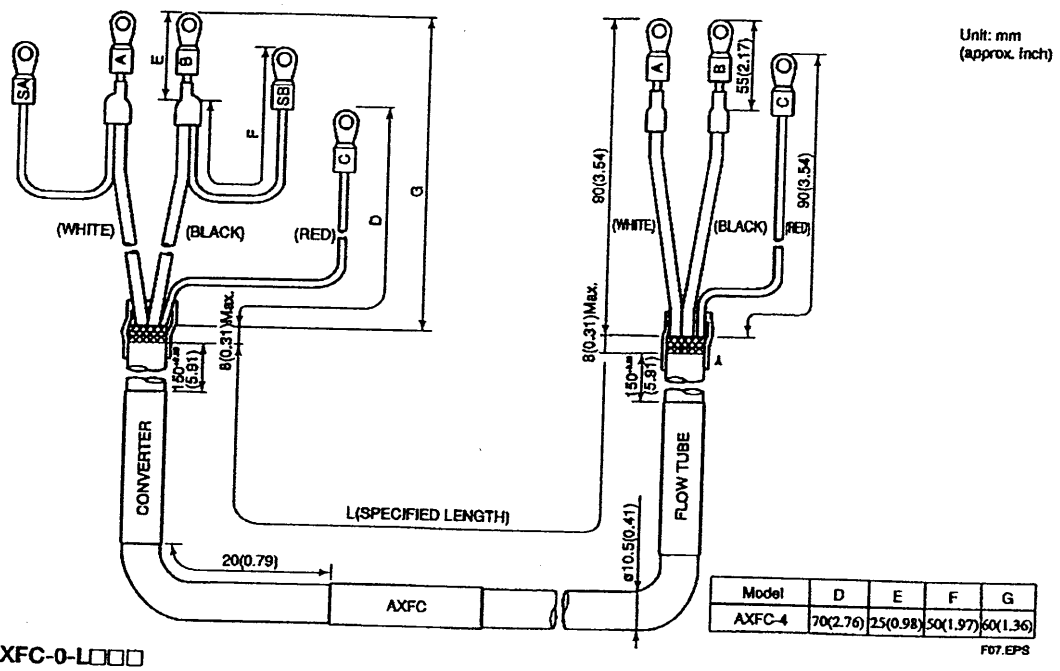


*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
For explosion proof type with indicator, add 5 mm (0.2 inch) to it.

F08.EPS

● Dedicated Signal Cable

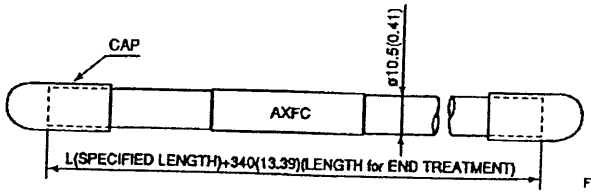
AXFC-4-L□□□



Model	D	E	F	G
AXFC-4	70(2.76)	25(0.98)	50(1.97)	60(1.36)

F07.EPS

AXFC-0-L□□□



F08.EPS

ORDERING INFORMATION

Note 1: When ordering a remote flowtube and/or a remote converter, specify the flow span, unit, pulse weight, and totalizer display pulse weight. These parameters will then be set in the combined converter before shipment.

Note 2: Some options, if ordered, require the relevant specifications be supplied.

1. Model, specification and option codes.
2. Tag number

   Each tag number can be specified up to 16 characters in a combination of letters (upper or lower case), numbers, "-" and ".". If specified, the tag number is inscribed on the product's name plate and tag plate (if optional code SCT is selected). For HART protocol, up to 8 characters can be specified.

Cook, Duncan

From: Brian Shypitka [BShypitka@cbeng.com]
Sent: Thursday, August 11, 2005 3:24 PM
To: duncan.cook@earthtech.ca
Subject: Magmeter
Attachments: AXFA14GeneralSpecs.pdf

Duncan,

As per our conversation the remote transmitter modle is:

AXFA14C-E2-21/CF1/SCT

I have attached spec for this unit. If you have any questions or concerns feel free to contact us.
Regards,

Brian Shypitka
Applications
CB ENGINEERING LTD
Tel: 403-640-3132
Fax: 403-259-3377
Toll Free: 800-992-2364
Toll Free Fax: 888-259-1666
bshypitka@cbeng.com
www.cbeng.com
<<AXFA14GeneralSpecs.pdf>>

User's Manual

AXFA14G/C
Magnetic Flowmeter Remote Converter
[Hardware Edition/Software Edition]

ADMAG AXF™

AXF
Magnetic Flowmeter
Integral Flowmeter
[Software Edition]

IM 01E20C02-01E

CITY OF IQUALUIT
C/O WASTE WATER TREAT.PLANT
C/O POTABLE WATER PLANT
P.O.BOX 460, IQUALUIT,
NUNAVUT, XOA OHO

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YOKOGAWA ◆
Yokogawa Electric Corporation

IM 01E20C02-01E
5th Edition

19.1.1

Contents

5th Edition: May 2005(KP)

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19.1.1

1. INTRODUCTION

This instrument has been adjusted at the factory before shipment.

To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

NOTE

This manual describes the hardware and software configurations of the AXFA14 converter and the software configuration of the AXF integral flowmeter.

The contents of "basic operating procedures", "parameter description", "operation via BRAIN terminal (BT200)", "operation via HART communicator", and "actual operation" for the AXF integral flowmeter are the same as the AXFA14, see Chapter 5 to 9 in this manual.
For the hardware configuration of the AXF integral flowmeter, see the user's manual of the AXF Integral Flowmeter/Remote Flowtube [Hardware Edition] (IM 01E20D01-01E).

■ Regarding This User's Manual

- This manual should be provided to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights are 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 material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors or omissions are found, please inform Yokogawa.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- Please note that this user's manual may not be revised for any specification changes, construction changes or operating part changes that are not considered to affect function or performance.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

NOTE

Please refer to manual IM 01E20D01-01E for information of the AXF Remote Flowtube.

■ Safety and Modification Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.
- The following safety symbol marks are used in this user's manual and instrument.

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

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INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT

Apparatus Certified Under Technical Criteria
(IEC-compatible Standards)

1. General

The following describes precautions on electrical apparatus of flameproof construction (hereinafter referred to as flameproof apparatus) in explosion-protected apparatus.

Following the Labour Safety and Health Laws of Japan, flameproof apparatus is subjected to type tests to meet either the technical criteria for explosionproof electrical machinery and equipment (standards notification no. 556 from the Japanese Ministry of Labour) (hereinafter referred to as technical criteria), in conformity with the IEC Standards, or the "Recommended Practice for Explosion-Protected Electrical Installations in General Industries," published in 1979. These certified apparatus can be used in hazardous locations where explosive or inflammable gases or vapours may be present.

Certified apparatus includes a certification label and an equipment nameplate with the specifications necessary for explosion requirements as well as precautions on explosion protection. Please confirm these precautionary items and use them to meet specification requirements.

For electrical wiring and maintenance servicing, please refer to "Internal Wiring Rules" in the Electrical Installation Technical Standards as well as "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

To meet flameproof requirements, equipment that can be termed "flameproof" must:

(1) Be certified by a Japanese public authority in accordance with the Labour Safety and Health Laws of Japan and have a certification label in an appropriate location on its case, and
(2) Be used in compliance with the specifications marked on its certification label, equipment nameplate and precautionary information furnished.

2. Electrical Apparatus of Flameproof Type of Explosion-Protected Construction

Electrical apparatus which is of flameproof construction is subjected to a type test and certified by the Japanese Ministry of Labour aiming at preventing explosion caused by electrical apparatus in a factory or any location where inflammable gases or vapours may be present. The flameproof construction is of completely enclosed type and its enclosure shall endure explosive pressures in cases where explosive gases or vapours entering the enclosure cause explosion. In addition, the enclosure construction shall be such that flame caused by explosion does not ignite gases or vapours outside the enclosure.

In this manual, the word "flameproof" is applied to the flameproof equipment combined with the types of protection "e", "o", "i", and "d" as well as flameproof equipment.

3. Terminology

(1) Enclosure

An outer shell of an electrical apparatus, which encloses live parts and thus is needed to configure explosion-protected construction.

(2) Shroud

A component part which is so designed that the fastening of joint surfaces cannot be loosened unless a special tool is used.

(3) Enclosure internal volume

This is indicated by:— the total internal volume of the flameproof enclosure minus the volume of the internal components essential to equipment functions.

(4) Path length of joint surface

On a joint surface, the length of the shortest path through which flame flows from the inside to outside of the flameproof enclosure. This definition cannot be applied to threaded joints.

(5) Gaps between joint surfaces

The physical distance between two mating surfaces, or differences in diameters if the mating surfaces are cylindrical.

Note: The permissible sizes of gaps between joint surfaces, the path length of a joint surface and the number of joint threads are determined by such factors as the enclosure's internal volume, joint and mating surface construction, and the explosion classification of the specified gases and vapours.

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4. Installation of Flameproof Apparatus

(1) Installation Area

Flameproof apparatus may be installed, in accordance with applicable gases, in a hazardous area in Zone 1 or 2, where the specified gases are present. Those apparatus shall not be installed in a hazardous area in Zone 0.

Note: Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:
Zone 0: An area in which an explosive gas atmosphere is present continuously or is present for long periods.
Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation.
Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(2) Environmental Conditions

The standard environmental condition for the installation of flameproof apparatus is limited to an ambient temperature range from -20°C to +40°C (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to +60°C as indicated on the instrument nameplates. If the flameproof apparatus are exposed to direct sunshine or radiant heat from plant facilities, appropriate thermal protection measures shall be taken.

5. External Wiring for Flameproof Apparatus

Flameproof apparatus require cable wiring or flameproof metal conduits for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. For metal conduits, attach sealing fittings as close to wiring connections as possible and completely seal the apparatus. All non-live metal parts such as the enclosure shall be securely grounded. For details, see the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

(1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.
- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated form Zone 1 or 2 hazardous location to any different location or non-hazardous location through the protective pipe or duct, apply sealing of the protective pipes in the vicinity of individual boundaries, or fill the ducts with sand appropriately.
- When branch connections of cables, or cable connections with insulated cables inside the conduit pipes are made, a flameproof or increased-safety connection box shall be used. In this case, flameproof or increased-safety cable glands meeting the type of connection box must be used for cable connections to the box.

(2) Flameproof Metal Conduit Wiring

- For the flameproof metal conduit wiring or insulated wires shall be used as recommended by the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry, published in 1994.
- For conduit pipes, heavy-gauge steel conduits conforming to JIS C 8305 Standard shall be used.
- Flameproof sealing fittings shall be used in the vicinity of the wiring connections, and those fittings shall be filled with sealing compounds to complete sealing of the apparatus. In addition, to prevent explosive gases, moisture, or flame caused by explosion form being propagated through the conduit, always provide sealing fittings to complete sealing of the conduit in the following locations:
  (a) In the boundaries between the hazardous and non-hazardous locations.
  (b) In the boundaries where there is a different classification of hazardous location.
- For the connections of the apparatus with a conduit pipe or its associated accessories, G-type parallel pipe threads (JIS B 0202) shall be used to provide a minimum of five-thread engagement to complete tightness. In addition, since these parallel threads do not have sealing property, nonhardening sealant such as liquid gaskets shall thus be applied to those threads for ensuring waterproofness.
- If metal conduits need flexibility, use flameproof flexible fittings.

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6. Maintenance of Flameproof Apparatus

To maintain the flameproof apparatus, do the following. (For details, see Chapter 10 "MAINTENANCE OF EXPLOSION-PROTECTED ELECTRICAL INSTALLATION" in the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry.)

(1) Maintenance servicing with the power on.

Flameproof apparatus shall not be maintenance-serviced with its power turned on. However, in cases where maintenance servicing is to be conducted with the power turned on, with the equipment cover removed, always use a gas detector to check that there is no explosive gas in that location. If it cannot be checked whether an explosive gas is present or not, maintenance servicing shall be limited to the following two items:

(a) Visual inspection
Visually inspect the flameproof apparatus, metal conduits, and cables for damage or corrosion, and other mechanical and structural defects.

(b) Zero and span adjustments
These adjustments should be made only to the extent that they can be conducted from the outside without opening the equipment cover. In doing this, great care must be taken not to cause mechanical sparks with tools.

(2) Repair

If the flameproof apparatus requires repair, turn off the power and transport it to a safety (non-hazardous) location. Observe the following points before attempting to repair the apparatus.

(a) Make only such electrical and mechanical repairs as will restore the apparatus to its original condition. For the flameproof apparatus, the gaps and path lengths of joints and mating surfaces, and mechanical strength of enclosures are critical factors in explosion protection. Exercise great care not to damage the joints or shock the enclosure.

(b) If any damage occurs in threads, joints or mating surfaces, inspection windows, connections between the transmitter and terminal box, shrouds or clamps, or external wiring connections which are essential in flameproofness, contact Yokogawa Electric Corporation.

⚠ CAUTION

Do not attempt to re-process threaded connections or refinish joints or mating surfaces.

(c) Unless otherwise specified, the electrical circuitry and internal mechanisms may be repaired by component replacement, as this will not directly affect the requirements for flameproof apparatus (however, bear in mind that the apparatus must always be restored to its original condition). If you attempt to repair the flameproof apparatus, company-specified components shall be used.

(d) Before starting to service the apparatus, be sure to check all parts necessary for retaining the requirements for flameproof apparatus. For this, check that all screws, bolts, nuts, and threaded connections have properly been tightened.

(3) Prohibition of specification changes and modifications

Do not attempt to change specifications or make modifications involving addition of or changes in external wiring connections.

7. Selection of Cable Entry Devices for Flameproof Type

⚠ CAUTION

The cable glands (cable entry devices for flameproof type) conforming to IEC Standards are certified in combination with the flameproof apparatus. So, Yokogawa-specified cable entry devices for flameproof type shall be used to meet this demand.

References:

(1) Type Certificate Guide for Explosion-Protected Construction Electrical Machinery and Equipment (relating to Technical Standards Conforming to International Standards), issued by the Technical Institution of Industrial Safety, Japan

(2) USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry (1994), issued by the Japanese Ministry of Labour, the Research Institute of Industrial Safet

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IMPORTANT

An IMPORTANT sign denotes that attention is required to avoid damage to the instrument or system failure.

NOTE

A NOTE sign denotes information necessary for essential understanding of operation and features.

⏚ Protective grounding terminal

⏚ Functional grounding terminal
(This terminal should not be used as a protective grounding terminal.)

~ Alternating current

⎓ Direct current

1.1 Using the Magnetic Flowmeter Safely

WARNING

(1) Installation

- Installation of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.
- The magnetic flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the magnetic flowmeter. When moving the magnetic flowmeter, always use a trolley and have at least two people carry it.
- When the magnetic flowmeter is processing hot fluids, the instrument itself may become extremely hot. Take sufficient care not to get burnt.
- Where the fluid being processed is a toxic substance, avoid contact with the fluid and avoid inhaling any residual gas, even after the instrument has been taken off the piping line for maintenance and so forth.
- Do not apply excessive weight, for example, a person stepping on the magnetic flowmeter.
- All procedures relating to installation must comply with the electrical code of the country where it is used.

(2) Wiring

- The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.
- When connecting the wiring, check that the supply voltage is within the range of the voltage specified for this instrument before connecting the power cable. In addition, check that no voltage is applied to the power cable before connecting the wiring.
- The protective grounding must be connected securely at the terminal with the ⏚ mark to avoid danger to personnel.

(3) Operation

- Do not open the cover until the power has been off for at least 10 minutes. Only expert engineer or skilled personnel are permitted to open the cover.

(4) Maintenance

- Maintenance on the magnetic flowmeter should be performed by expert engineer or skilled personnel. No operator shall be permitted to perform any operations relating to maintenance.
- Always conform to maintenance procedures outlined in this manual. If necessary, contact Yokogawa.
- Care should be taken to prevent the build up of dirt, dust or other substances on the display panel glass or data plate. If these surfaces do get dirty, wipe them clean with a soft dry cloth.

(5) Explosion Protected Type Instrument

- Magnetic flowmeters with the model name AXFA14C are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations.
  Be sure to read Chapter 12 "EXPLOSION PROTECTED TYPE INSTRUMENT" before handling the instruments. The description in Chapter 12 is prior to the other description in this user's manual.
  For TIIS flame proof type instruments, be sure to read "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" at the end of this manual.

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- Only trained persons use this instrument in the industiral location.
- The protective grounding ⏚ must be connected to a suitable IS grounding system.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

1.2 Warranty

- The terms of this instrument that are guaranteed are described in the quotation. We will make any repairs that may become necessary during the guaranteed term free of charge.
- Please contact our sales office if this instrument requires repair.
- If the instrument is faulty, contact us with concrete details about the problem and the length of time it has been faulty, and state the model and serial number. We would appreciate the inclusion of drawings or additional information.
- The results of our examination will determine whether the meter will be repaired free of charge or on an at-cost basis.

■ The guarantee will not apply in the following cases:

- Damage due to negligence or insufficient maintenance on the part of the customer.
- Problems or damage resulting from handling, operation or storage that violates the intended use and specifications.
- Problems that result from using or performing maintenance on the instrument in a location that does not comply with the installation location specified by Yokogawa.
- Problems or damage resulting from repairs or modifications not performed by Yokogawa or someone authorized by Yokogawa.
- Problems or damage resulting from inappropriate reinstallation after delivery.
- Problems or damage resulting from disasters such as fires, earthquakes, storms, floods, or lightning strikes and external causes.

1.3 Combination Remote Flowtubes

IMPORTANT

- The AXFA14 Magnetic Flowmeter Converter should be used in combination with the following remote flowtubes:
  AXFA14□⇔AXF002□-P to AXF400□-P
  Other flowtubes (size 500 to 2600 mm) cannot be combined with the AXFA14 converter.
- If the converter combined with the AXF magnetic flowmeter remote flowtube is changed from the AXFA11 to AXFA14 or vice versa, the meter factor of the remote flowtube must be readjusted according to its flow calibration.

CAUTION

In case of combination with the explosion proof type remote flowtube (AXF□□□C-P) for CENELEC ATEX, FM, CSA, and TIIS certification, please see the manual IM 01E20D01-01E. The construction of the instrument, installation, external wiring, maintenance, and repair are strictly restricted, and non-observance or negligence of these restriction would result dangerous condition.

1.4 ATEX Documentation

This procedure is only applicable to the countries in European Union.

GB

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

DK

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

I

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

E

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

NL

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

SF

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

P

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

F

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

D

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

S

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

GR

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

2. HANDLING PRECAUTIONS

This instrument has been inspected carefully at the factory before shipment. When the instrument is delivered, visually check that no damage has occurred during transportation.

Read this section carefully as it contains important information on handling this instrument. Refer to the relevant sections for information not contained in this section. If you have any problems or questions, please contact Yokogawa sales office.

2.1 Checking Model and Specifications

The model code and specifications are found on the data plate located on the outside of the case. Check that the model code and specifications match what you have ordered.

Be sure you have your model number and serial number available when contacting Yokogawa.

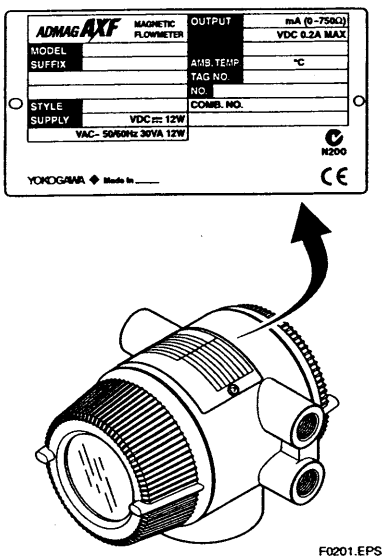

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Figure 2.1.1 Data Plate

2.2 Accessories

Check that the parts shown below are included in the package:

- Spare fuse: 1 piece (Use this spare fuse for this product only)
  (T2.0A, 250 V, T: time-lag fuse)
- Mounting hardware: 1 set
- Hexagonal wrench: 1 piece (nominal size 3 mm)

2.3 Storage Precautions

If the instrument is to be stored for a long period of time after delivery, observe the following points.

- The instrument should be stored in its original packing condition in the storage location.
- Select a storage location that fulfils the following conditions:
  - A place where it will not be exposed to rain or water
  - A place subject to minimal vibrations or shocks
  - Temperature and humidity levels should be as follows:
    Temperature: -30 to 70°C
    Humidity: 5 to 80% RH (no condensation)
    The preferred ambient temperature and humidity levels are 25°C and approximately 65% RH.
- If the AXFA14 converter is transferred to the installation site and stored without being installed, its performance may be impaired due to the infiltration of rainwater and so forth. Be sure to install and wire the AXFA14 as soon as possible after transferring it to the installation location.

2.4 Installation Location Precautions

Select the installation location with consideration to the following items to ensure long-term stable operation of the instrument.

- **Ambient Temperature:**
  Avoid installing the instrument in locations with constantly fluctuating temperatures. If the location is subject to radiant heat from the plant, provide heat insulation or improve ventilation.
- **Atmospheric Condition:**
  Avoid installing the instrument in a corrosive atmosphere. In situations where this is unavoidable, consider ways to improve ventilation and to prevent rainwater from entering and being retained in the conduit pipes.
- **Vibrations or Shocks:**
  Avoid installing the instrument in a place subject to shocks or vibrations.
- **Explosion protected type:**
  Explosion protect types can be installed in hazardous areas according to the types of gases for which they are certified. See the description in Chapter 12 "EXPLOSION PROTECTED TYPE INSTRUMENT" and "INSTALLATION AND OPERATING PRECAUTION FOR TIIS FLAME PROOF EQUIPMENT" in this user's manual.

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3. INSTALLATION

WARNING

Installation of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.

3.1 Installation Location

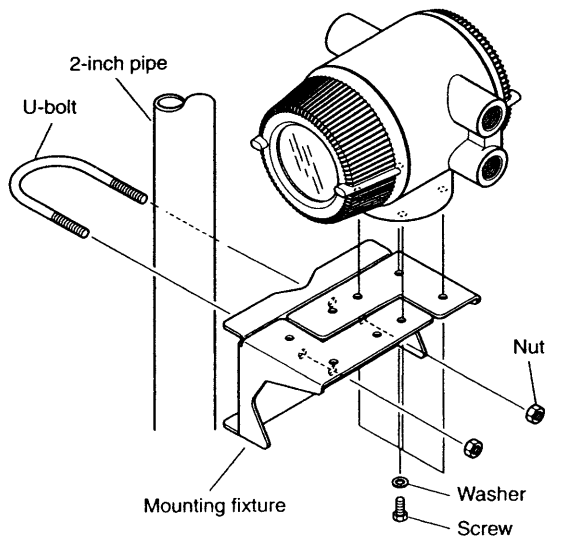
IMPORTANT

Install the instrument in a location where it is not exposed to direct sunlight. For ambient temperature, refer to Chapter 11 "OUTLINE".
The instrument may be used in an ambient humidity where the RH ranges from 0 to 100%. However, avoid long-term continuous operation at relative humidity above 95%.

3.2 Mounting

This instrument can be mounted on a 2-inch pipe in a vertical or horizontal position depending on the installation site.

● Vertical Mounting



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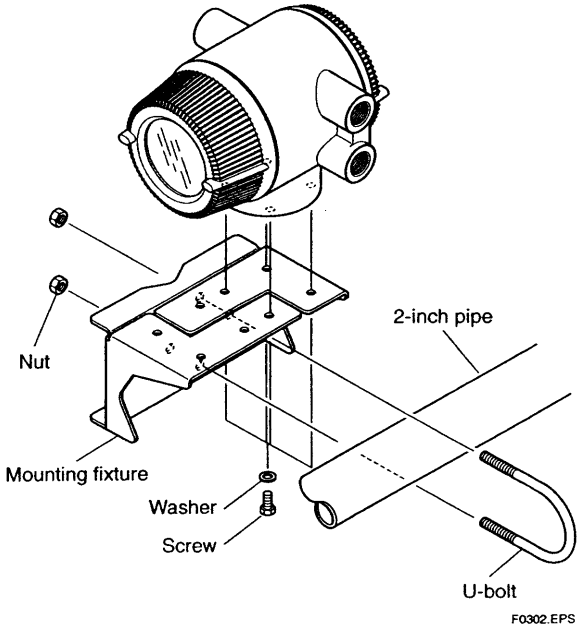
1. Fix the instrument on the mounting fixture using four screws.
2. Fix the mounting fixture with the instrument installed on a 2-inch pipe using a U-bolt.

● Horizontal Mounting



F0302.EPS

1. Fix the instrument casing on the mounting fixture using four screws.
2. Fix the mounting fixture with the instrument installed on a 2-inch pipe using a U-bolt.

Figure 3.2.1 2-inch Pipe Mounting

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4. WIRING

This chapter describes the wiring on the converter side only. For information relating to wiring on the flowtube side, refer to the user's manual of the AXF Remote Flowtube (IM 01E20D01-01E).

⚠ WARNING

The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.

⚠ CAUTION

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

4.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

⚠ CAUTION

- In cases where the ambient temperature exceeds 50°C (122°F), use external heat-resistant wiring with a maximum allowable temperature of 70°C (158°F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables must be routed in separate steel conduit tubes 16 (JIS C 8305) or flexible conduit tubes 15 (JIS C 8309).
- Always route the power and output signal cables in separate steel conduit tubes, except when the power supply voltage is 24 V and four-core cables are used for wiring. Keep conduits or flexible tubes watertight using sealing tape.
- Ground the remote flowtube and the converter separately.
- Cover each shield of the signal cable with vinyl tube or vinyl tape to avoid contact between two shields or between a shield and a case.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- In case of 24V power supply version, it comes with a plug. Use this plug to cover the unused wiring port when wiring the instrument with only one, four-core cable.
- Be sure to turn power off before opening the cover.
- Before turning the power on, tighten the cover securely.
- The terminal box cover is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw, refer to Figure 4.4.1.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw, refer to Figure 4.4.12.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.

4.2 Cables

(1) Dedicated Signal Cable (AXFC)

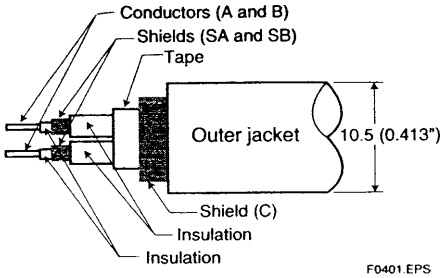

Figure 4.2.1 Dedicated Signal Cable AXFC

The flow signal is transmitted via this dedicated cable. The cable is constructed with double shielding over the two conductors, and heat-resistant vinyl is used for the outer jacket material.

Finished diameter: 10.5 mm (0.413")
Maximum length: 100 m (330 ft)
Maximum temperature: 80°C (176°F)

IMPORTANT

If the cable is longer than required, cut off any extra length rather than coiling it up, and terminate the conductors as shown in Figure 4.2.2. Avoid using junction terminal boards to extend the cable length, as this will interrupt the shielding.

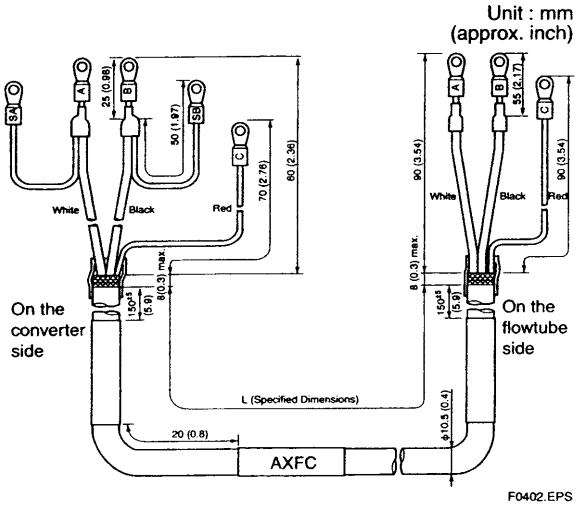

Figure 4.2.2 Treatment of Dedicated Signal Cables

CAUTION

- As crimp terminals A, B, SA, SB and C have their own electrical potentials, securely insulate them so as not to come in contact with one another.
- To prevent a shield from coming in contact with another shield or the case, cover each shield with a vinyl tube or wrap it in vinyl tape.

NOTE

Conductors A and B carry the signal from the electrodes, and C is at the potential of the liquid (signal common). Shields SA and SB are kept at the same potentials as the individual electrodes (these are actively driven shields.) This is done to reduce the effect of the distributed capacitance of the cable at long cable length. Note that, since the signals from the individual electrodes are impedance converted inside the converter, errors will result if they come in contact with any other component. Great care must be taken in the cable end treatment.

(2) Excitation Cable/Power Cable/Output Cable

Use polyvinyl chloride insulated and sheathed control cables (JIS C 3401) or polyvinyl chloride insulated and sheathed portable power cables (JIS C 3312) or the equivalent.

Outer Diameter: 6.5 to 12 mm (0.26 to 0.47 in.)
10.5 or 11.5 mm (0.41 or 0.45 in.) for optional code EG, EU
6 to 12 mm (0.24 to 0.47 in.) for optional code EP
Nominal Cross Section (Single wire): 0.5 to 2.5 mm^2
Nominal Cross Section (Stranded wire): 0.5 to 1.5 mm^2

In case of power cable, Green/Yellow covered conductor shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS. Conform to IEC227, IEC245 or equivalent national authorization.

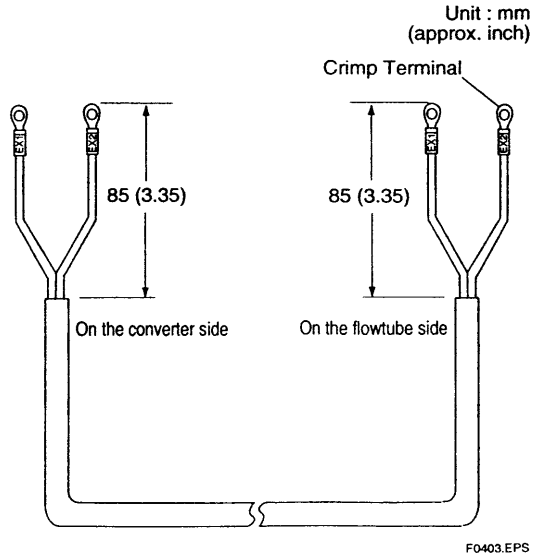

Figure 4.2.3 End Treatment of Excitation Cable

NOTE

- For excitation and power cables, always use a crimp terminal with an insulation cover.
- Use crimp tools from the manufacturer of the crimp terminal you want to use to connect the crimp terminal and cable.
- Use crimp tools that are appropriate for the diameter of the cable to be connected.

4.3 Wiring Ports

This instrument is of watertight construction as stipulated in JIS C0920-1982 (Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment.) It is shipped with a wiring bracket (waterproof gland or waterproof gland with union) or a plastic gland attached, only in cases where an optional specification is selected for the wiring port.
In case of the explosion proof type, refer to chapter 12.

(1) When there are no particular optional specifications

The wiring port is sealed with a cap (not water-proof) that must be removed before wiring. At this time, handle the wiring port in accordance with the JIS C0920-1982 mentioned above.

(2) Wiring using waterproof glands

IMPORTANT

To prevent water or condensation from entering the converter housing, waterproof glands are recommended. Do not over-tighten the glands or damage to the cables may result. Tightness of the gland can be checked by confirming that the cable is held firmly in place.

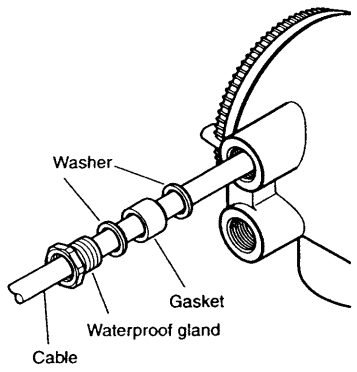

Figure 4.3.1 Waterproof Gland (Optional code EG)

For working on the electric wire tubes or the flexible tubes (PF1/2), remove the waterproof gland and attach them directly to the wiring port.

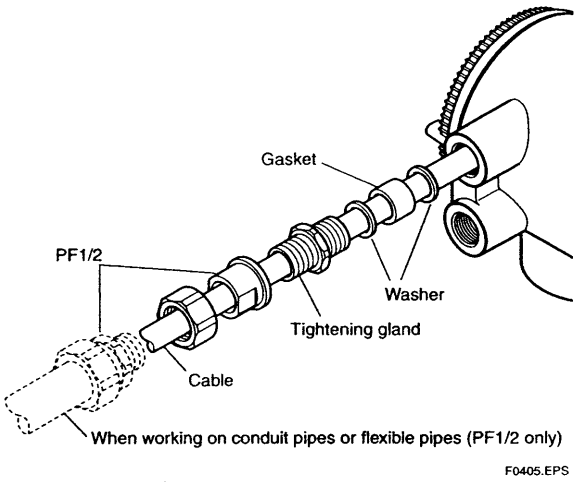

Figure 4.3.2 Waterproof Gland with Union Joint (Optional code EU)

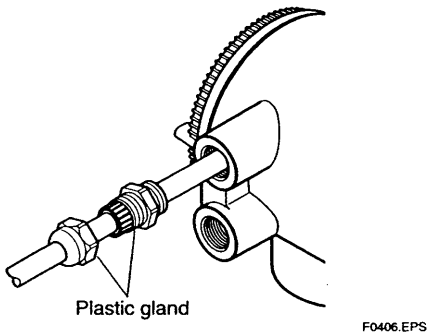

Figure 4.3.3 Plastic Gland (Optional code EP)

(3) Conduit Wiring

When wiring the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.3.4. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

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19.1.1

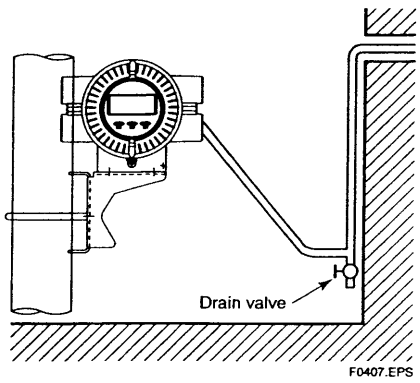

Figure 4.3.4 Conduit Wiring

4.4 Wiring Connections

4.4.1 Removing Cover

Loosen cover locking screw 2 clockwise using a hexagonal wrench (nominal size 3 mm) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is unlocked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

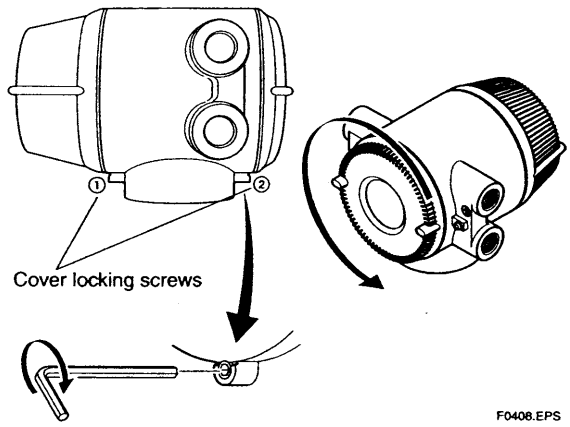

Figure 4.4.1 Removing the Terminal Box Cover

4.4.2 Terminal Configuration

When the cover is removed, the connection terminals will be visible. The terminal configuration labels are attached in the locations shown in Figure 4.4.2.

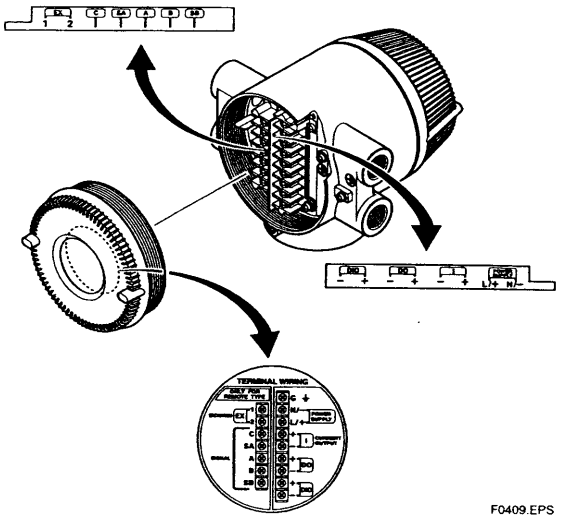

Figure 4.4.2 Terminal Layout Labels Position

The description of the terminal symbols is shown in Table 4.1.1.

Table 4.1.1 Terminal Symbols

Terminal Symbols	Description
EX1 EX2	Excitation current output
C SA A B SB	Flow singal input

Terminal Symbols	Description
⏚	Functional grounding
N/– L/+	Power supply
I+ I–	Current output 4 to 20mA DC
DO+ DO–	Pulse output/ Alarm output/ Status output
DIO+ DIO–	Alarm output/ Status output/ Status input
⏚	Protective grounding (Outside of the terminal)

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4.4.3 Precautions for Wiring of Power Supply Cables

When connecting to the power supply, observe the points below. Failure to comply with these warnings may result in an electric shock or damage to the instrument.

WARNING

- Ensure that the power supply is OFF in order to prevent electric shocks.
- Ensure the protective grounding terminal is grounded before turning the power on.
- Use insulating sleeve crimp terminals (for 4-mm screws) for the power supply wiring and protective grounding wiring.
- Install an external switch or circuit breaker as a means to turn the powe off (capacitance; 15A, conforming to IEC947-1 and IEC947-3). Locate this switch either near the instrument or in other places facilitating easy operation. Affix a "Power Off Equipment" label to this external switch or circuit breaker.

Wiring Procedure

1. Turn the instrument's power off.
2. Wire the power supply cable and the functional grounding cable to the power supply terminals.

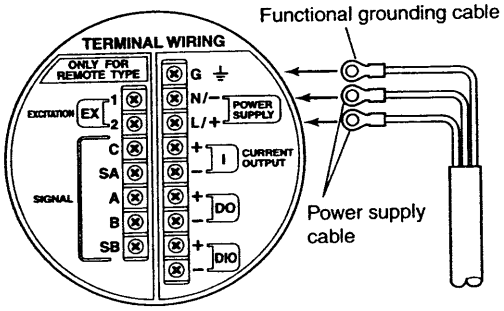


Figure 4.4.3 Electric Cable Wiring

4.4.4 DC Power Connection

When using DC power as the power supply for the converter, give attention to the following points.

(1) Connecting Power Supply

IMPORTANT

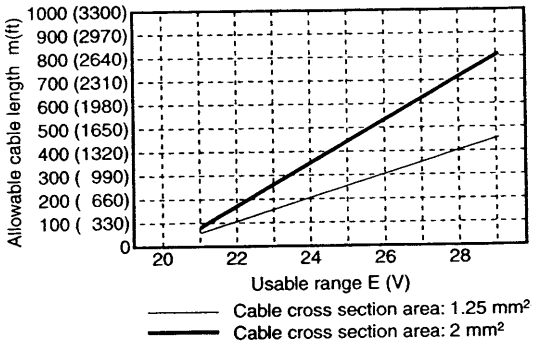
Do not connect power supply with reversed polarities.
L/+ terminal: connect +
N/− terminal: connect −

(2) Required Power Supply Voltages

IMPORTANT

When using a 24 V power supply, the specification for the supply voltage is 24 V (−15% to +20%), but the input voltage of the converter drops due to cable resistance therefore it must be used within the following ranges.

Supply Voltage and Cable Length



(3) Setting Power Supply Frequency

IMPORTANT

Set the local Commercial power frequency in order to eliminate the effect of induction noise from the Commercial power supply.
Refer to "Chapter 6: Parameter Description" in this manual.
Parameter No.: **J30** and **J31**

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19.1.1

4.4.5 Grounding

CAUTION

Be sure to connect the protective grounding of the AXFA14 with a cable of 2mm² or larger cross section in oder to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.
Connect the grounding wire to the ⏚ mark.
The grounding should satisfy Class D requirements (ground resistance, 100 Ω or less).
In case of TIIS Flame proof type, the grounding should satisfy Class C requirements (ground resistance, 10 Ω or less) or class A requirements (ground resistance, 10 Ω or less).
For explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.

IMPORTANT

When optional code A (lighting protector) is selected, the ground should satisfy Class C requirements (grounding resistance, 10 Ω or less).

- The protective grounding terminals ⏚ are located on the inside and outside of the terminal area. Either terminal may be used.
- Use 600V vinyl insulation wires as the grounding wires.

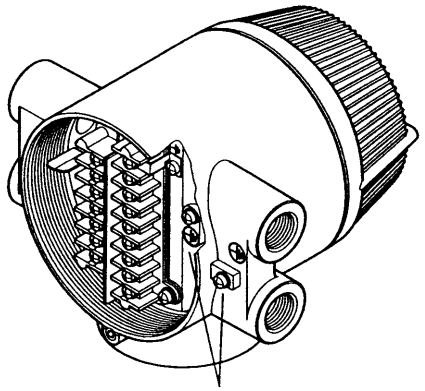


Figure 4.4.4 Protective Grounding Terminal Location

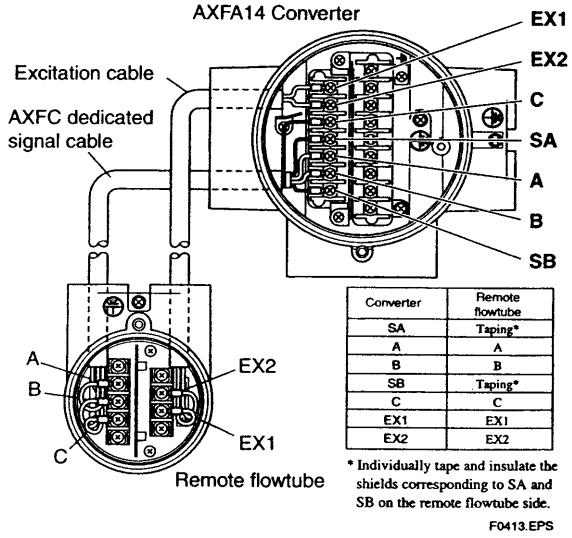
4.4.6 Wiring the Remote Flowtube with the AXFA14 Converter

WARNING

Before wiring, be sure that the power supply for AXFA14 converter has been turned off to prevent an electrical shock.

(1) Connection with the Remote Flowtube (General-Purpose Use, Submersible Type, Sanitary Type, Size 2.5 to 400 mm (0.1 to 16 in.))

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.4.5 Wiring Diagram

(2) Connection with the Remote Flowtube (Explosion proof Type, Size 2.5 to 400 mm (0.1 to 16 in.))

In case of explosion proof type for CENELEC ATEX, FM, CSA, and TIIS certification, connect wiring as shown in the figure below.

In case of the explosion proof type, the protective grounding ⏚ of remote flowtube must be connected to a suitable IS grounding system. In that case, ⏚ (functional grounding terminal) need not be connected.

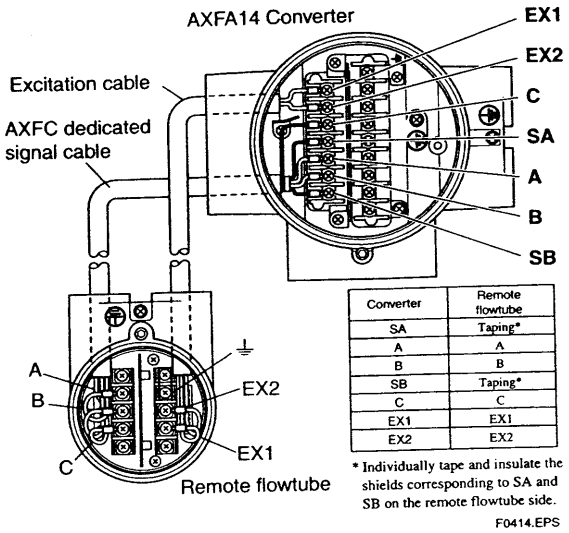


Figure 4.4.6 Wiring Diagram

4.4.7 Connecting to External Instruments

WARNING

Before wiring with external instruments, be sure to turn off the power supply for AXFA14 converter and any external instruments.

Connect the AXFA14 terminal to external instruments, giving attention to the following points.

● 4 to 20 mA DC Current Output

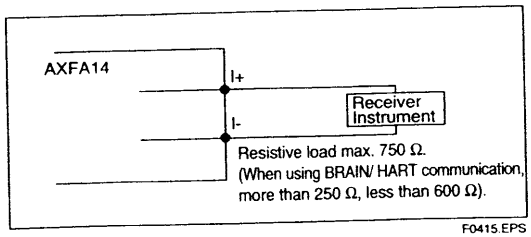


Figure 4.4.7 4 to 20 mA DC Output Connection

● Pulse Output

IMPORTANT

- As this is a transistor contact (insulated type), give attention to proper voltage and polarity when wiring.
- Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.
- When input filter constant of the electronic counter is large in relation to the pulse width, the signal will decrease and the count will not be accurate.
- If the input impedance of the electronic counter is large, an induction noise from the power supply may result in inaccurate counts. Use a shield cable or sufficiently reduce the input impedance of the electronic counter within the electromagnetic flowmeter pulse output specification range.
- The active pulse output (Optional code EM) cannot be used in conjunction with the standard pulse output.
- When the active pulse output (Optional code EM) is selected, do not be short-circuit between the DO+ and DO– terminals to avoid damaging the instrument.
- To avoid communication (BRAIN/ HART) failure, it is recommended to use the shield cable.

NOTE

For pulse output from the DO terminals, parameters must be set. Refer to "Chapter 6: Parameter Description" in this manual.

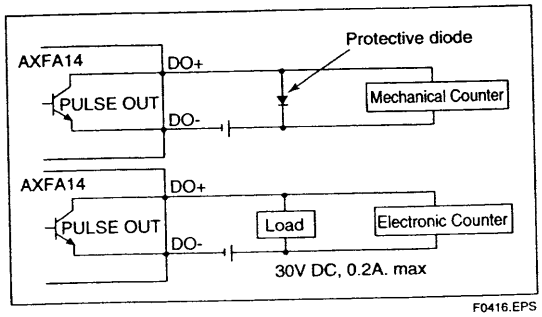


Figure 4.4.8 Pulse Output Connection

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19.1.1

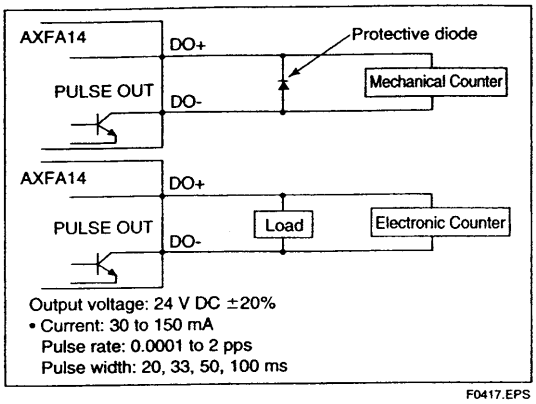


Figure 4.4.9 Active Pulse Output (Optional code EM)

● Status Input

IMPORTANT

Status inputs are designed for use with no-voltage (dry) contacts. Be careful not to connect the status to any signal source carrying voltage. Applying voltage may damage the input circuit.

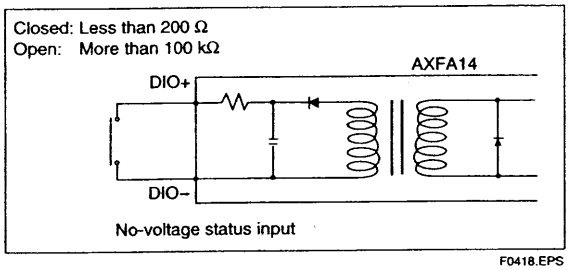


Figure 4.4.10 Status Input Connection

NOTE

For status input to the DIO terminals, parameters must be set. Refer to "Chapter 6: Parameter Description" in this manual.

● Status Output/ Alarm Output

IMPORTANT

Since this is an isolated transistor output, be careful of voltage and polarity when wiring. Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.
This output cannot switch an AC load. To switch an AC load, an intermediate relay must be inserted as shown in Figure 4.4.11.
*The alarm output operates from open (normal) to closed (alarm occurrence) in the default value (as setup upon plant shipment). Changes can be made via the parameter settings.

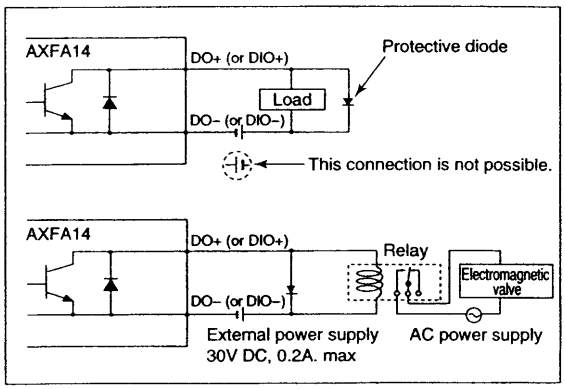


Figure 4.4.11 Status Output/Alarm Output Connection

NOTE

For status and alarm outputs from the DO or DIO terminals, parameters must be set. Refer to "Chapter 6: Parameter Description" in this manual.

4.4.8 Installing the Cover

Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 2 counterclockwise using a hexagonal wrench (nominal size 3 mm) to lock the cover.

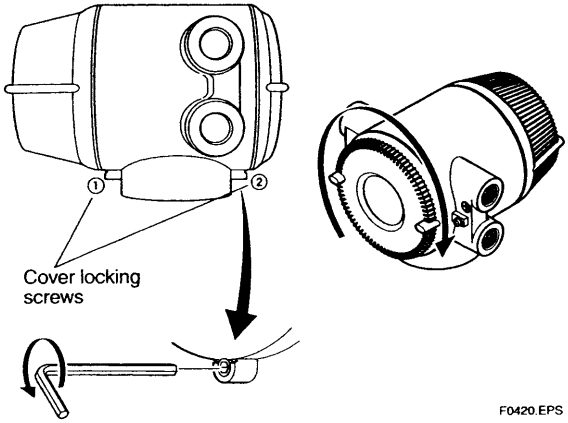


Figure 4.4.12 Installing the Terminal Box Cover

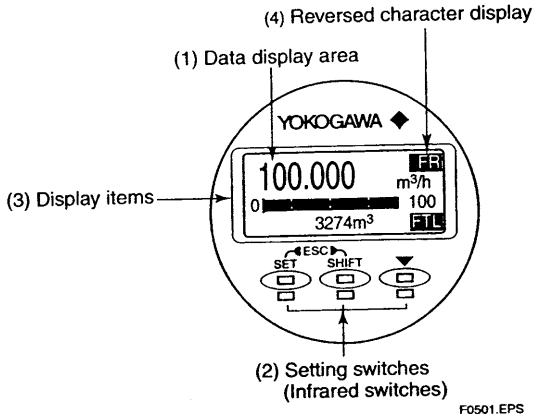
5. BASIC OPERATING PROCEDURES (USING THE DISPLAY UNIT)

The modification of data settings from the display unit can be carried out using the three setting switches (infrared switches) - namely, the SET, SHIFT, and ▼ switches. This chapter will provide a description of basic data configuration and the methods to be used with the three setting switches. The AXFA14 or the AXF integral flowmeter can also be operated using a handheld Brain Terminal (BT200) or a HART Communicator. (Please refer to Chapter 7 for operation via Brain Terminal and Chapter 8 for operation via HART Communicator.)

NOTE

(1) Always use the setting switches with the cover of the AXFA14 or the AXF integral flowmeter closed.
(2) Use these switches with them covered by the glass window.
(3) If dirt, dust or other substances surfaces on the display panel glass, wipe them clean with a soft dry cloth.
(4) The operation with dirty gloves may cause a switch response error.

5.1 Operating Panel Configuration and Functions



(1) Data display area

1st line (Display Select1), 2nd line (Display Select2), and 3rd line (Display Select3) can be displayed using parameter settings. The content corresponding to selected item is shown with the reversed-character on the right of the line.

(2) Setting switch operations

SET: Move the layer down, select, and confirm

SHIFT + SET: Move the layer up
(Press the SET switch while holding down the SHIFT switch)

▼: Move the cursor down (for selection-type parameters) or increase values (for numeric-type parameters)

SHIFT: Move the cursor to the right (for numeric-type parameters)

SHIFT + ▼: Move the cursor up (for selection-type parameters)

(3) Display items

Displayed items and reversed-character indication		Content	Disp Select1	Disp Select2 Disp Select3
Instantaneous flow rate: %	FR	Displays the instantaneous flow rate for the span as a percentage.	○	○
Actual instantaneous flow rate	FR	Displays the actual reading for instantaneous flow rate.	○	○
Instantaneous flow rate: mA	FR	Displays the instantaneous flow rate for the span as a current output value.	○	○
Bar graph indicating instantaneous flow rate	None	Displays the instantaneous flow rate for the span as a percentage using bar graph.	×	○
Totalized forward-direction flow rate	FTL	Displays the totalized value for flow rate in the forward direction.	○	○
Totalized reverse-direction flow rate	RTL	Displays the totalized value for flow rate in the reverse direction.	○	○
Totalized differential flow rate	DTL	Displays the differential totalized value for flow rate between forward totalization and reverse totalization.	○	○
Tag number	TAG	Display the tag number (using up to 16 characters).	×	○
Diagnosis of electrode adhesion	ADH	Displays the adhesion condition in the form of a bar graph. (See the description for parameters K10 through K15 from Chapter 6: Parameter Description for more details.)	×	○
Communication	COM	Displays the communication type.	×	○

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19.1.1

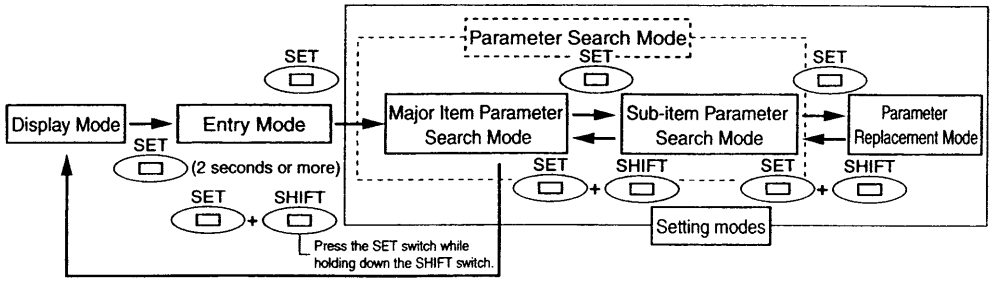
5.2 Display Unit Setting Methods

NOTE

Before changing any settings, be sure to check the corresponding setting details in Chapter 6: Parameter Description.

5.2.1 Display Mode → Setting Mode

Display Mode will be adopted when the power is turned on, and the Setting Mode can be activated using the following procedure.



* The term "mode" is used to refer to a situation where display and setting are possible.

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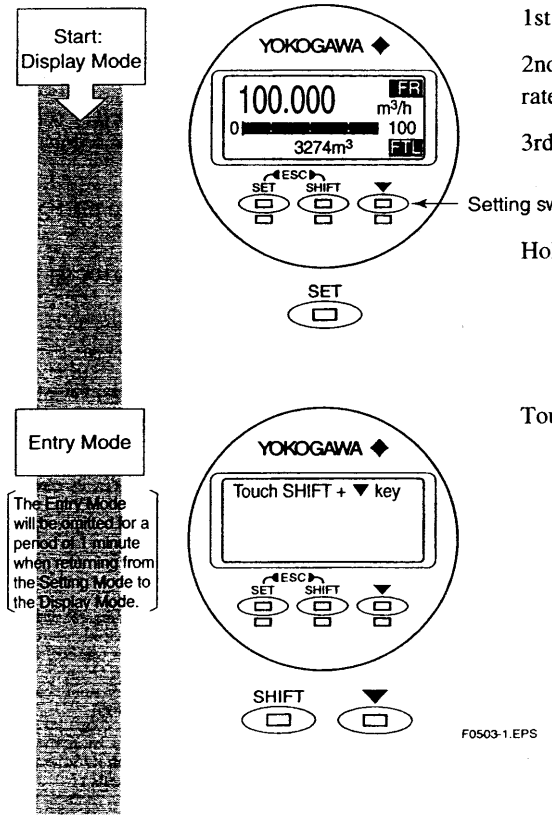
Sample Display: Procedure for moving from Display Mode to Setting Mode



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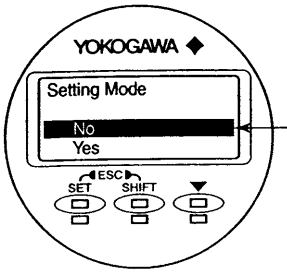
1st line: Actual instantaneous flow rate [FR]

2nd line: Bar graph indicating instantaneous flow rate

3rd line: Totalized forward flow rate [FTL]

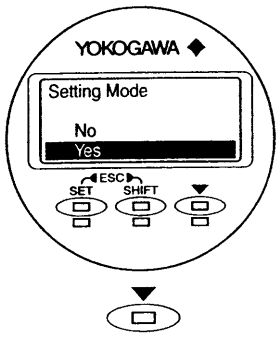
Hold the SET switch for 2 seconds.

Touch SHIFT and ▼ switches simultaneously.

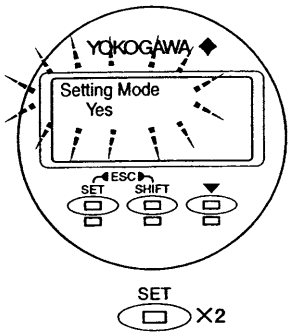


A screen is displayed to confirm whether or not the system is to enter Setting Mode.

The reversed-character (i.e. the cursor position) indicates the item that is currently selected.



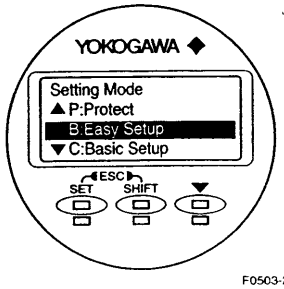
To enter Setting Mode, press the ▼ switch and select [Yes].



Touch the SET switch.

In order to request confirmation, the entire display flashes on and off.

Touch the SET switch once again at this time to fix your selection.



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The system enters Setting Mode.

Parameters to be set can be selected.

This completes the procedure for changing from the Display Mode to the Parameter Search Mode.

Setting Mode

To Parameter Search Mode

5.2.2 Setting Mode

When the Setting Mode has been activated using the procedure from Section 5.2.1, parameters can be selected for setting. If no operations are carried out for a period of 10 minutes in this mode, the system will automatically return to the Display Mode.

Format for Parameter Data

Depending on the type of parameter, data is formatted in one of the following three ways.

Format	Typical display	Content
(i) Selection-type	B21:Base Flow Unit m^3 ▲m^3 ▼kl(Kiloliter)	The desired data item is selected from a predefined list.
(ii) Numeric-type	B23:Flow Span 100 l/min 000100 l/min Rng:0.00001 → 32000	Data is set using the values in each digit and using the decimal point.
(iii) Alphanumeric-type	C10:Tag No FI-1101 FI-1201	Data is composed using alphanumeric characters (in the case of tag numbers, special units, and the like). With this format, setting can be carried out using up to 16 of the characters shown below.

Regarding the alphanumeric-type format (iii), the following alphanumerics are displayed in the following sequence:

```
#%&*+-./0123456789:<>ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghij
klmnopqrstuvwxyz[space]
```

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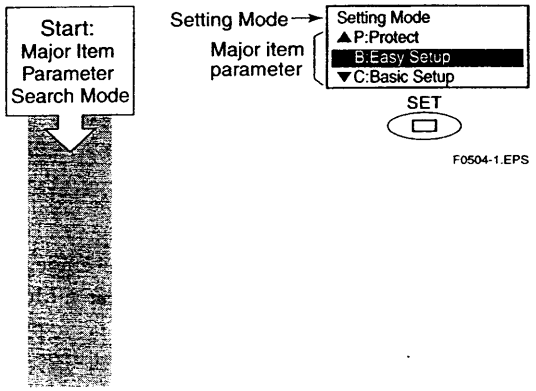
5.3 Parameter Setting Procedure

Once the system is in Setting Mode, the parameters for setting can be selected. Parameters that are frequently used have been grouped together in Easy Setup in Menu B. This section provides a description of the parameter setting procedure using **B: Easy Setup** and **C: Basic Setup**.

For more details regarding parameter content, please refer to Section 6: Parameter Description.

5.3.1 Setting Example for Selection-Type Data: Flow rate units

This example describes the setting of the flow rate units for the selection-type parameter **B21: Base Flow Unit** from m^3 to l (Liter).



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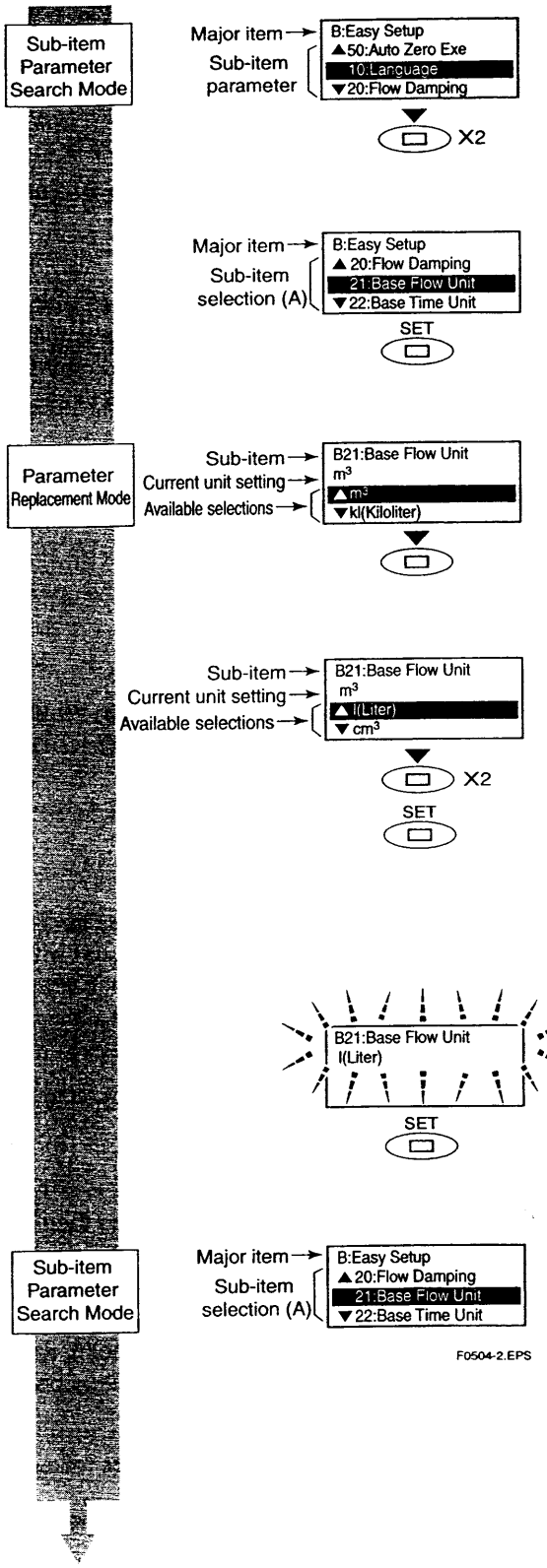
Major Item Parameter Search Mode has been accessed in this screen.

Touch the SET switch to access **B: Easy Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.



Sub-item Parameter Search Mode has been accessed in this screen.

Touch the ▼ switch to move the cursor to **B21: Base Flow Unit**.

The cursor has been moved to **B21: Base Flow Unit** in this screen. (Sub-item selection screen (A))

In this screen, Parameter Replacement Mode has been called up using the SET switch.

Touch the ▼ switch to move the cursor to the unit item for selection. In this example, the ▼ switch is touched twice to select l (Liter)

When l (Liter) has been selected, touch the SET switch.

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix your selection.

The system returns automatically to sub-item selection screen (A).

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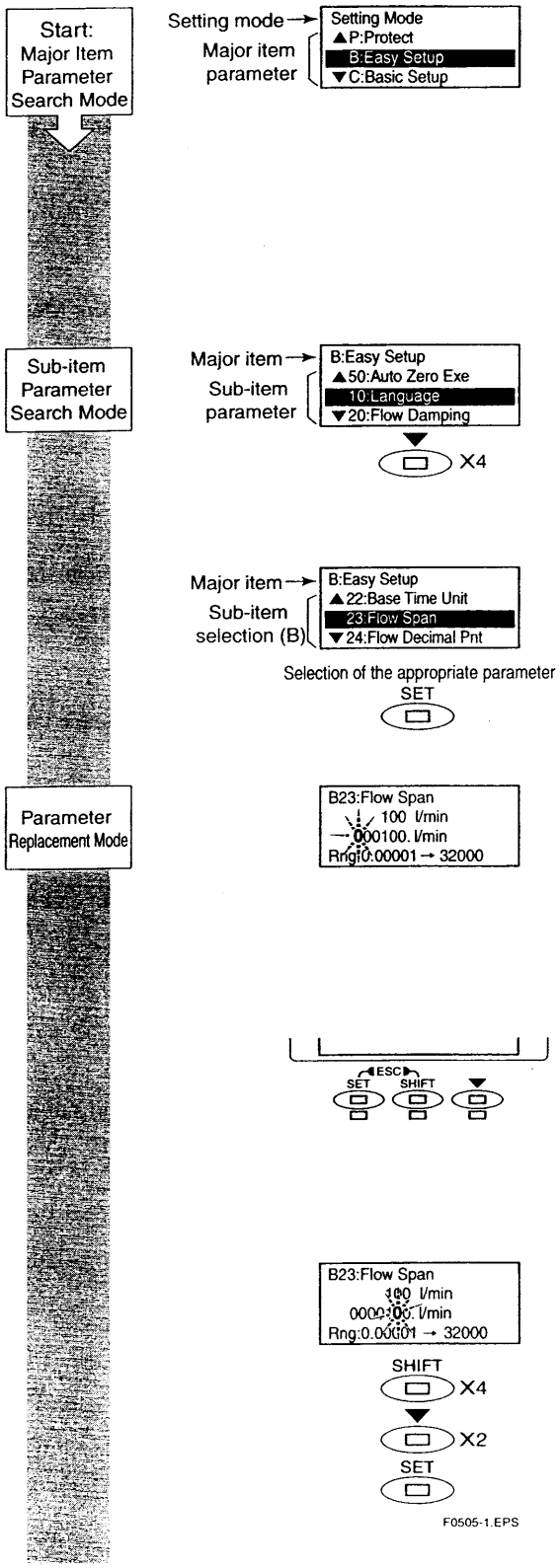
5.3.2 Setting Example for Numeric-Type Data: Flow rate span

This example describes the setting of the flow rate span for the numeric-type parameter **B23: Flow Span** from 100 l/min to 120 l/min.



Setting Mode Condition

Touch the SET switch to access **B: Easy Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.

Sub-Item Parameter Search Mode has been accessed in this screen.

Touch the ▼ switch to move the cursor to **B23: Flow Span**.

The cursor has been moved to **B23: Flow Span** in this screen. (Sub-item selection screen (B))

Touch the SET switch to access Parameter Replacement Mode.

Once Parameter Replacement Mode has been selected, the digit that can be replaced will be flashed on and off. When in this condition, confirm the relevant setting range as displayed at the bottom of the screen and then set the parameter as required.

In this example, the parameter will be set to "120 l/min".

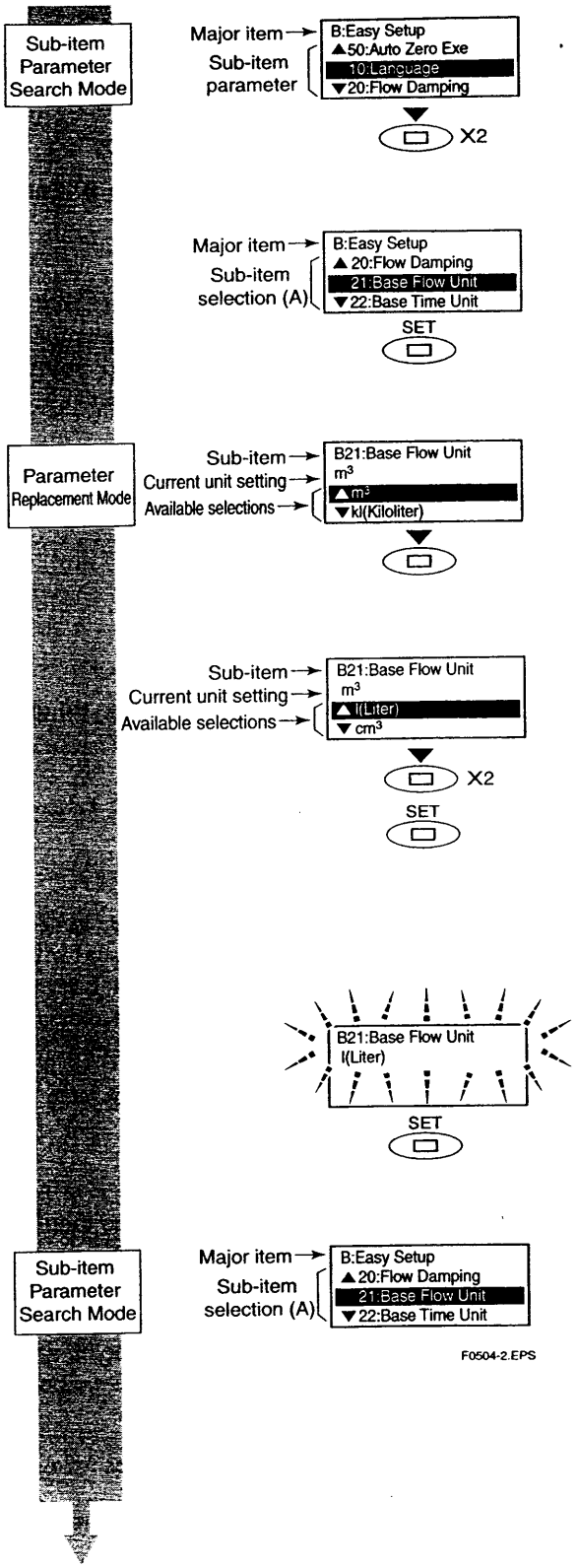
NOTE

When setting a new value, use the SHIFT switch to move from digit to digit, and use the ▼ switch to cycle through values for each individual digit. In addition to digit, it is also possible to select a decimal point, and this allows the position of the decimal point to be changed.

Modify the value to "120 l/min" as follows:

Touch the SHIFT switch to move the cursor to the position for multiples of 10. Then, touch the ▼ switch to change the value at this position from "0" to "2".

When the value of "120" has been setup, touch the SET switch.



Sub-item Parameter Search Mode has been accessed in this screen.

Touch the switch to move the cursor to **B21: Base Flow Unit**.

The cursor has been moved to **B21: Base Flow Unit** in this screen. (Sub-item selection screen (A))

In this screen, Parameter Replacement Mode has been called up using the SET switch.

Touch the switch to move the cursor to the unit item for selection. In this example, the switch is touched twice to select l (Liter)

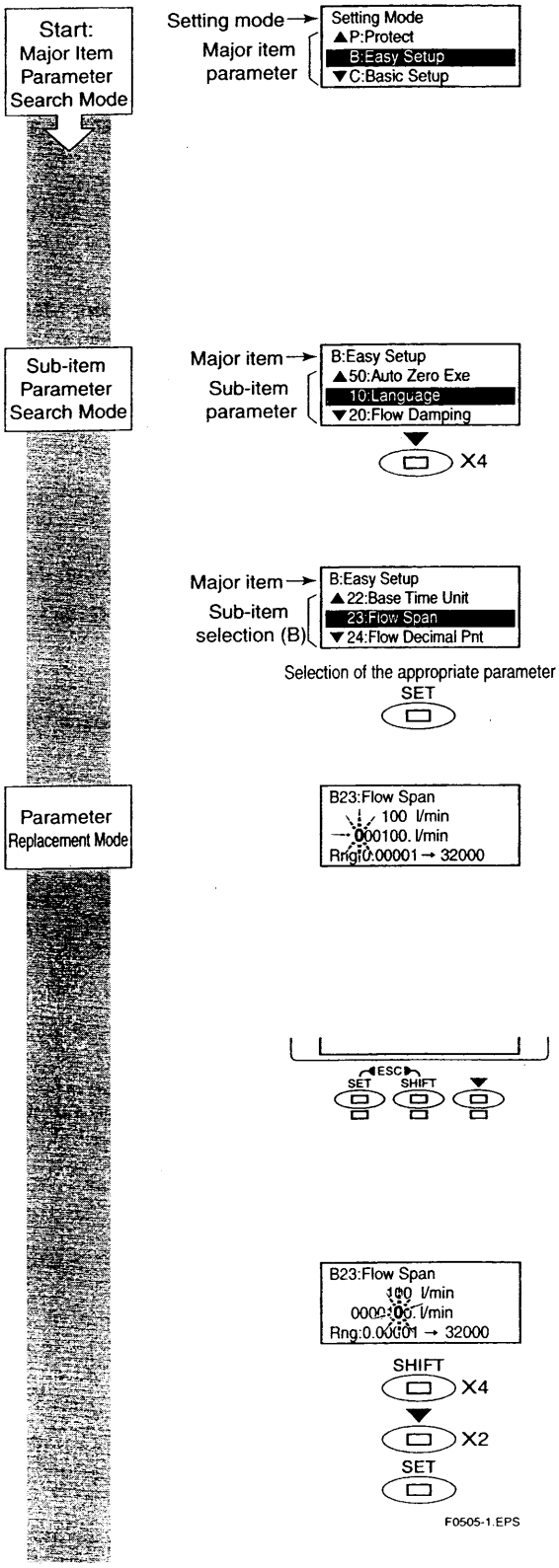
When l (Liter) has been selected, touch the SET switch.

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix your selection.

The system returns automatically to sub-item selection screen (A).

5.3.2 Setting Example for Numeric-Type Data: Flow rate span

This example describes the setting of the flow rate span for the numeric-type parameter **B23: Flow Span** from 100 l/min to 120 l/min.



Setting Mode Condition

Touch the SET switch to access **B: Easy Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.

Sub-Item Parameter Search Mode has been accessed in this screen.

Touch the ▼ switch to move the cursor to **B23: Flow Span**.

The cursor has been moved to **B23: Flow Span** in this screen. (Sub-item selection screen (B))

Touch the SET switch to access Parameter Replacement Mode.

Once Parameter Replacement Mode has been selected, the digit that can be replaced will be flashed on and off. When in this condition, confirm the relevant setting range as displayed at the bottom of the screen and then set the parameter as required.

In this example, the parameter will be set to "120 l/min".

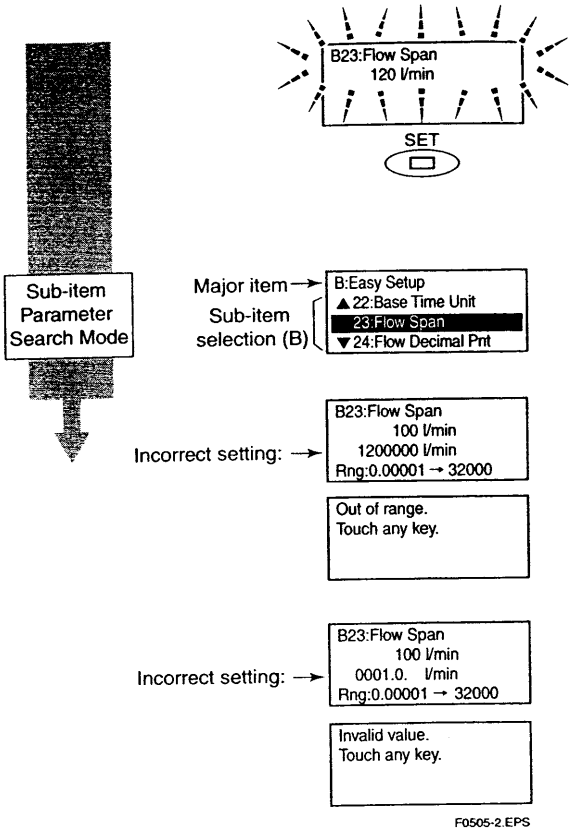
NOTE

When setting a new value, use the SHIFT switch to move from digit to digit, and use the ▼ switch to cycle through values for each individual digit. In addition to digit, it is also possible to select a decimal point, and this allows the position of the decimal point to be changed.

Modify the value to "120 l/min" as follows:

Touch the SHIFT switch to move the cursor to the position for multiples of 10. Then, touch the ▼ switch to change the value at this position from "0" to "2".

When the value of "120" has been setup, touch the SET switch.



When the SET switch is touched, the entire display flashes on and off. Confirm that the setting has been correctly changed to "120", and then fix this value by touching the SET switch once again.

The system returns automatically to sub-item selection screen (B).

NOTE

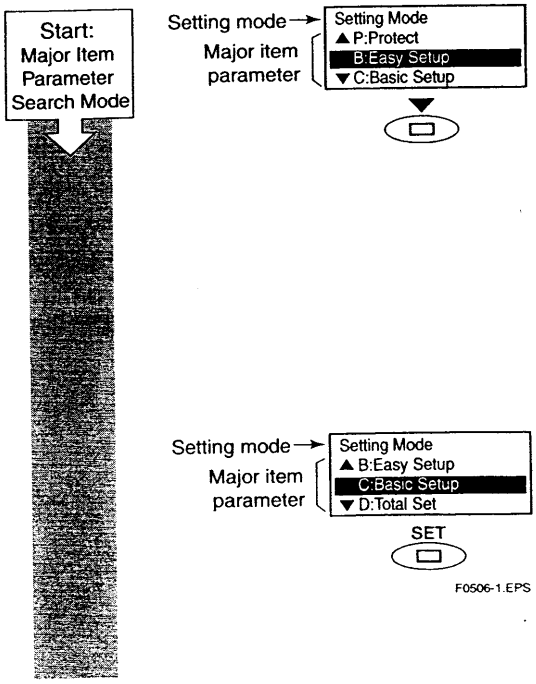
If the input value is outside the valid selection range, the message "Out of range. Touch any key." will be displayed. In such a case, touch any switch to return to Parameter Replacement Mode and redo the setting.

NOTE

If more than one decimal point has been input, the message "Invalid value. Touch any key." will be displayed. In such a case, touch any switch to return to Parameter Replacement Mode and redo the setting.

5.3.3 Setting Example for Alphanumeric-Type Data: Tag number

This example describes the setting of the tag number for the alphanumeric-type parameter **C10: Tag No.** from "FI-1101" to "FI-1201."



Setting Mode Condition

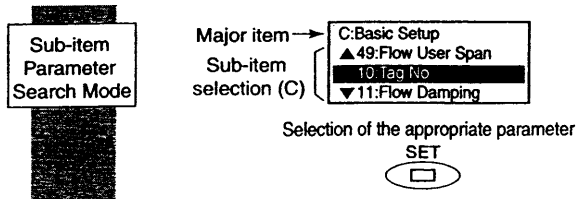
Touch the ▼ switch to access **C: Basic Setup**.

NOTE

The ▲ and ▼ symbols to the left of the parameters indicate that additional setting items to those being currently displayed may also be selected. Use the ▼ switch to cycle through these items.

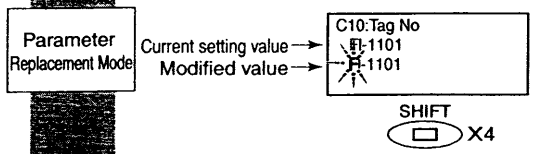
The cursor has been moved to **C: Basic Setup** in this screen.

Touch the SET switch to enter **C: Basic Setup**.

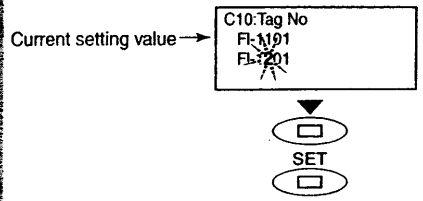


Upon selection of **C: Basic Setup**, the cursor will be positioned at **C10: Tag No**. (Sub-item selection screen (C))

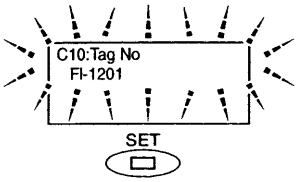
Touch the SET switch to access Parameter Replacement Mode.



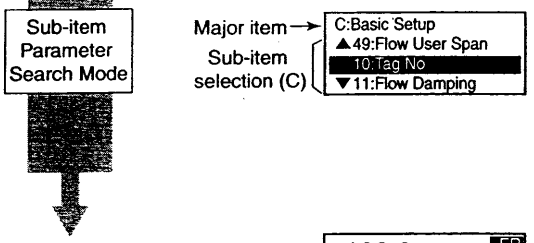
The cursor will flash on and off on the left of the tag number. As "FI-1201" is to be setup in this example, touch the SHIFT switch to move the cursor to the position for multiples of 100.



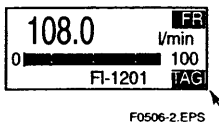
At the position for multiples of 100, touch the ▼ switch to change the "1" to "2". When the setting has been changed to "FI-1201", touch the SET switch.



When the SET switch is touched, the entire display flashes on and off. Confirm that the setting has been correctly changed to "FI-1201", and then fix this setting by touching the SET switch once again.



The system returns automatically to sub-item selection screen (C).



After returning to Display Mode by touching using the (SET and SHIFT) twice as escape switches, it will be possible to confirm the modified content (if Display Select has been setup to display the tag number.)

Indicates selection of Tag No display for B42: Display Select3.

6. PARAMETER DESCRIPTION

6.1 Parameters

With the exception of parameters that were specified by the customer upon ordering, all of the internal parameters will initially be set to default values. Actions such as the modification of display details can then be carried out whenever necessary.

IMPORTANT

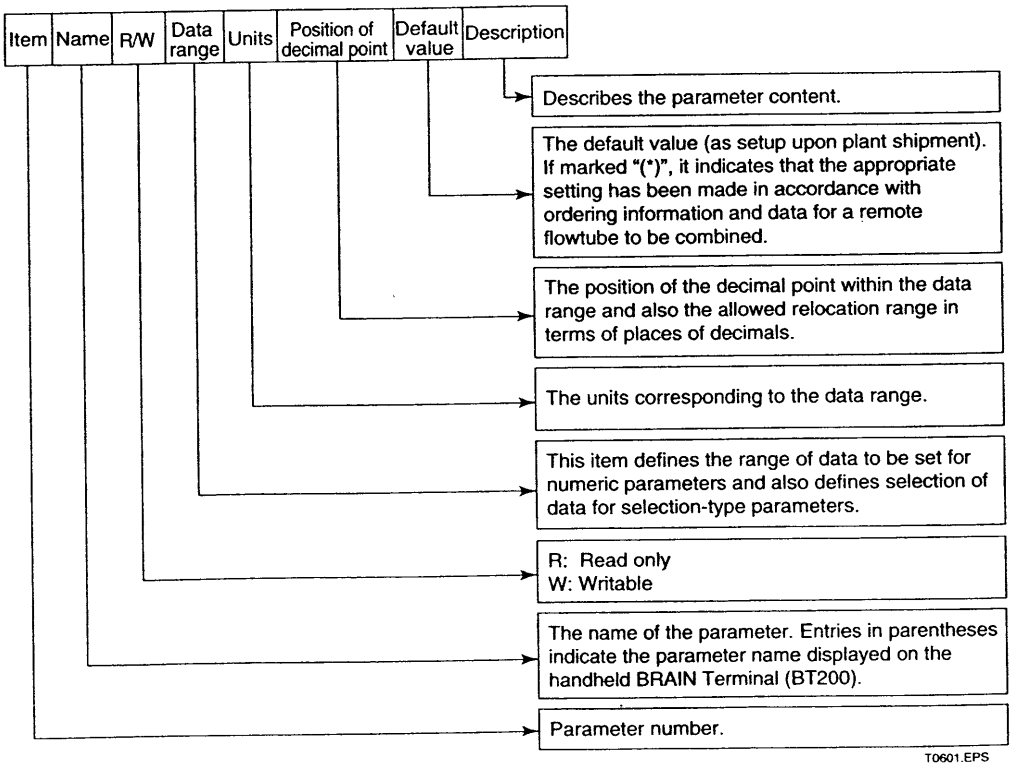
Make sure to keep the instrument's power on at least for 30 seconds after you set the parameters. If you turn the power off immediately after the parameters are set, the settings will be canceled.

NOTE

In order to ensure that correct flow rate data can be acquired, it is crucial that the nominal size, flow rate span, and meter factor of the combined remote flowtube are set. In cases where a remote flowtube is ordered at the same time as the AXFA14, or where the AXF integral flowmeter is ordered, the nominal size and meter factor will be set upon shipment from the manufacturing plant, and these will not require additional setting. If the AXFA14 is ordered separately, the default value will be set for the meter factor; accordingly, it will be necessary to change this setting to the meter factor indicated on your remote flowtube data plate.
If a flow rate span was specified upon ordering, this will be set before shipment. If this is not the case, however, it will be necessary for the appropriate value to be set by the user.

6.2 Parameter Lists

Parameter lists are comprised of the following items.



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6.3 Parameter List Overview

(1) Item A (Menu A): Display items

Menu A contains the instantaneous flow rate, totalization values, and other items relevant to display.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
A00	Display (DISPLAY)						
A10	FR (FLOW RATE (%))	R	-110.0 to 110.0	%	1		For Display Mode only
A20	FR (FLOW RATE)	R	-999999 to 999999	B21/B22 (C40/C41)	0 to 3		For Display Mode only
A21	FR (FLW RATE (mA))	R	2.400 to 21.600	mA	3		For Display Mode only
A30	FTL (TOTAL)	R	0 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A31	RTL (REV TOTAL)	R	0 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A32	DTL (DIF TOTAL)	R	-99999999 to 99999999	B30 (D10)	0 to 7		For Display Mode only
A60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(2) Item B (Menu B): Easy Setup items

Those parameters with a high frequency of use have been grouped together in Menu B. All basic functions can be controlled using only the parameters from this block.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
B00	Easy Setup (EASY SETUP)						
B10	Language (LANGUAGE)	W	English Japanese French German Italian Spanish			English	Selects the language used for the display unit. Linked with H30.
B20	Flow Damping (FLOW DAMPING)	W	0.1 to 200.0	s	1	3.0 s	Sets damping time. Linked with C11.
B21	Base Flow Unit (FLOW UNIT)	W	Ml(Megaliter) m^3 kl (Kiloliter) l (Liter) cm^3 m t kg g kcf cf mcf Mgal (US) kgal (US) gal (US) mgal (US) kbbl (US Oil) bbl (US Oil) mbbl (US Oil) ubbl (US Oil) kbbl (US Beer) bbl (US Beer) mbbl (US Beer) ubbl (US Beer) ft klb (US) lb (US)			m (*)	Selects flow units for the flow rate span. Linked with C40.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
B22	Base Time Unit (TIME UNIT)	W	/d /h /min /s			/s (*)	Selects time units for the flow rate span. Linked with C41.
B23	Flow Span (FLOW SPAN)	W	0.00001 to 32000	B21/B22 (C40 /C41)	0 to 5	1 m/s (*)	Sets flow rate span (with units from B21 and B22). Linked with C42.
B24	Flow Decimal Pnt (FLOW DECIMAL) 300 L/S 1000 m³/h	W	Auto 0 1 2 3			Auto (*)	Selects decimal point position for the display unit's instantaneous flow rate. Linked with C43.
B30	Total Unit (TOTAL UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for totalization display. Linked with D10.
B31	Total Scale (TOTAL SCALE)	W	0 to 32000	B30 (D10)	0 to 5	0 (*)	Sets the flow rate per one pulse as used for the totalization display. Linked with D11.
B32	Pulse Unit (PULSE UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/ Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for pulse output. Linked with E10.
B33	Pulse Scale (PULSE SCALE)	W	0 to 32000	B32 (E10)	0 to 5	0 (*)	Sets the flow rate per one pulse as used for pulse output. Linked with E11.
B40	Display Select1 (DISP SELECT1)	W	Flow Rate(%) Flow Rate Flow Rate(mA) Forward Total Reverse Total Dif Total			Flow Rate	Selects content of the first line for Display Mode. Linked with H10.
B41	Display Select2 (DISP SELECT2)	W	Off Flow Rate(%) Flow Rate Flow Rate(mA) Flow Rate(Bar) Forward Total Reverse Total Dif Total Tag No Adhesion Check Communication			Off	Selects content of the second line for Display Mode. Linked with H11.
B42	Display Select3 (DISP SELECT3)	W	Same as B41 (Display Select2)			Off	Selects content of the third line for Display Mode. Linked with H12.
B50	Auto Zero Exe (AUTOZERO EXE)	W	No Execution Execution			No Execution	Selects whether or not automatic zero adjustment is carried out. Linked with M10.
B60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(3) Item C (Menu C): Basic Setting items

Menu C principally contains the basic setting items for the flowtube.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
C00	Basic Setup (BASIC SETUP)						
C10	Tag No (TAG NO)	W	ASCII 16 characters				Sets Tag number up to 16 characters.
C11	Flow Damping (FLOW DAMPING)	W	0.1 to 200.0	s	1	3.0 s	Sets damping time. Linked with B20.
C20	Measure Mode (MEASURE MODE)	W	Standard DF Enhanced DF			Standard DF	Selects measurement mode for dual frequency excitation
C21	Low MF (LOW MF)	W	0.0100 to 3.0000		4	1.0000 (*)	Sets low-frequency meter factor for standard dual frequency excitation
C22	High MF (HIGH MF)	W	0.0100 to 3.0000		4	1.0000 (*)	Sets high-frequency meter factor for standard dual frequency excitation
C23	Low MF(EDF) (LOW MF(EDF))	W	0.0000 to 3.0000		4	1.0000 (*)	Sets low-frequency meter factor for enhanced dual frequency excitation
C24	High MF(EDF) (HIGH MF(EDF))	W	0.0000 to 3.0000		4	1.0000 (*)	Sets high-frequency meter factor for enhanced dual frequency excitation
C31	Nominal Size Unit (SIZE UNIT)	W	mm inch			mm inch	Selects the nominal size units for the flowtube.
C32	Nominal Size (NOMINAL SIZE)	W	0.99 to 3000.1 0.01 to 120.1	mm inch	0 to 5	100 (*)	Sets flowtube nominal size in selected unit at C31.
C40	Base Flow Unit (FLOW UNIT)	W	Ml(Megaliter) m^3 kl(Kiloliter) l(Liter) cm^3 m t kg g kcf cf mcf Mgal (US) kgal (US) gal (US) mgal (US) kbbl (US Oil) bbl (US Oil) mbbl (US Oil) ubbl (US Oil) kbbl (US Beer) bbl (US Beer) mbbl (US Beer) ubbl (US Beer) ft klb (US) lb (US)			m (*)	Selects flow units for the flow rate span. Linked with B21.
C41	Base Time Unit (TIME UNIT)	W	/d /h /min /s			/s (*)	Selects time units for the flow rate span. Linked with B22.
C42	Flow Span (FLOW SPAN)	W	0.00001 to 32000	C40/C41 (B21 /B22)	0 to 5	1 m/s (*)	Sets flow rate span (with units from C40 and C41). Linked with B23.
C43	Flow Decimal Pnt (FLOW DECIMAL)	W	Auto 0 1 2 3			Auto (*)	Selects decimal point position for the display unit's instantaneous flow rate. Linked with B24.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
C44	Velocity Check (VELOCITY CHK)	R	0.000 to 99.999	m/s	3		Display of the span setting using flow velocity (m/s).
C45	Density Unit (DENSITY UNIT)	W	kg/m^3 lb/gal lb/cf			kg/m^3	Sets units for density when mass flow rate is selected.
C46	Mass Flow Density (MASS DENSITY)	W	0 to 32000	C45	0 to 5	0	Sets density when mass flow rate is selected (with units from C45).
C47	User Span Select (USER SPN SEL)	W	No Yes			No	Selects whether or not special units are used for flow rate units.
C48	Flow User Unit (FL USER UNIT)	W	8 alphanumeric characters				Sets the special flow rate units.
C49	Flow User Span (FL USER SPAN)	W	0.00001 to 32000	C48	0 to 5	100	Sets span when using special flow rate units.
C60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(4) Item D (Menu D): Total Setting items

Menu D contains setting items such as the totalization scale and the forward/reverse totalized values.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
D00	Total Set (TOTAL SET)						
D10	Total Unit (TOTAL UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for totalization display. Linked with B30.
D11	Total Scale (TOTAL SCALE)	W	0 to 32000	D10 (B30)	0 to 5	0 (*)	Sets the flow rate per one pulse as used for totalization display. Linked with B31.
D12	Total Decimal Pnt (TL DECIMAL)	W	0 1 2 3 4 5 6 7			0	Selects position of decimal point for totalization display
D13	Total Low Cut (TOTAL LOWCUT)	W	0 to 100	%	0	3 %	Sets the range in vicinity of 0% within which the totalization display will be halted.
D20	Total Execution (TOTAL EXEC)	W	Start Stop Preset Total Preset Rev Total			Start	Executes "Start" or "Stop" of the totalization function, or executes "Preset Total" or "Preset Rev Total".
D21	Ttl Set Val Lower (TL SET VAL L)	W	0 to 999999		0	0	Sets the totalization preset value in the lower 6 digits of the 8-digit totalized value.
D22	Ttl Set Val Upper (TL SET VAL U)	W	0 to 99		0	0	Sets the totalization preset value in the upper 2 digits of the 8-digit totalized value.
D23	Ttl Switch Lower (TL SWITCH LO)	W	0 to 999999		0	0	Sets the totalization switch value in the lower 6 digits of the 8-digit totalized value.
D24	Ttl Switch Upper (TL SWITCH UP)	W	0 to 99		0	0	Sets the totalization switch value in the upper 2 digits of the 8-digits totalized value.
D30	Ttl User Select (TL USER SEL)	W	No Yes			No	Selects whether or not special units are used as totalized units.
D31	Ttl User Unit (TL USER UNIT)	W	8 alphanumeric characters				Sets the special totalized units.
D60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(5) Item E (Menu E): Pulse Setting items

Menu E contains items relevant to pulse output. This is used to set parameters such as the pulse scale and width.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
E00	Pulse Set (PULSE SET)						
E10	Pulse Unit (PULSE UNIT)	W	n Unit/P u Unit/P m Unit/P Unit/P k Unit/P M Unit/P Pulse/s			Pulse/s (*)	Selects the flow rate unit per one pulse as used for pulse output. Linked with B32.
E11	Pulse Scale (PULSE SCALE)	W	0 to 32000	E10 (B32)	0 to 5	0 (*)	Sets the flow rate per one pulse as used for pulse output. Linked with B33.
E12	Pulse Width (PULSE WIDTH)	W	50% Duty 0.05 ms 0.1ms 0.5 ms 1 ms 20 ms 33 ms 50 ms 100 ms			50% Duty	Selects the pulse width for pulse output.
E13	Pulse Low Cut (PULSE LOWCUT)	W	0 to 100	%	0	3 %	Sets the range in vicinity of 0% within which pulse output will be halted.
E60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Function".

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(6) Item F (Menu F): Status Functions Setting items

Menu F contains items relevant to multiplex range output and other status Input/Output.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
F00	Status Function (STATUS FUNC)						
F20	DO Function (DO FUNCTION)	W	No Function Pulse Output Alarm Output Warning Output Total Switch (O) H/L Alarm (O) HH/LL Alarm (O) Fwd/Rev Rngs (O) Auto 2 Rngs (O) Auto 3 Rngs (O) Auto 4 Rngs (O) Ext 2 Answer (O)			Pulse Output	Selects function for the DO terminal
F21	DIO Function (DIO FUNCTION)	W	No Function Alarm Output Warning Output Total Switch (O) H/L Alarm (O) HH/LL Alarm (O) Fwd/Rev Rngs (O) Auto 2 Rngs (O) Auto 3 Rngs (O) Auto 4 Rngs (O) Ext 2 Answer (O) 0% Singal Lock (I) Ext Auto Zero (I) Ext Ttl Set (I) Ext R Ttl Set (I) Ext 2 Ttl Set (I)			No Function	Selects function for the DIO terminal

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
F22	DO Active Mode (DO ACT MODE)	W	Closed(On) Act Open(Off) Act			Closed(On) Act	Selects whether DO terminal will be set to "On Active" or "Off Active".
F23	DIO Active Mode (DIO ACT MODE)	W	Closed/Short Act Open/Open Act			Closed/Short Act	Selects whether DIO terminal will be set to "Closed/Short Active" or"Open/Open Active".
F30	Forward Span2 (FWD SPAN2)	W	0.00001 to 32000	C40 /C41	0 to 5	1	Sets flow rate span for forward No. 2 range
F31	Forward Span3 (FWD SPAN3)	W	0.00001 to 32000	C40 /C41	0 to 5	1	Sets flow rate span for forward No. 3 range
F32	Forward Span4 (FWD SPAN4)	W	0.00001 to 32000	C40 /C41	0 to 5	1	Sets flow rate span for forward No. 4 range
F33	Reverse Span1 (REV SPAN1)	W	0.00001 to 32000	C40 /C41	0 to 5	1	Sets flow rate span for reverse No. 1 range
F34	Reverse Span2 (REV SPAN2)	W	0.00001 to 32000	C40 /C41	0 to 5	1	Sets flow rate span for reverse No. 2 range
F40	Auto Range Hys (AUTO RNG HYS)	W	0 to 15	%	0	10 %	Sets hysteresis width for automatic range switching
F41	Bi Direction Hys (BI DIREC HYS)	W	0 to 8	%	0	2 %	Sets hysteresis width for forward/reverse switching
F60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Function".

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(7) Item G (Menu G): Alarm Setting items

Menu G contains setting items relevant to alarm output, burnout, alarm record, etc.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
G00	Alarm (ALARM)						
G10	Low Alarm (LOW ALARM)	W	-110 to 110	%	0	-110	Sets level setting value for low flow rate limit (L)
G11	High Alarm (HIGH ALARM)	W	-110 to 110	%	0	110	Sets level setting value for high flow rate limit (H)
G12	Low Low Alarm (LO LO ALARM)	W	-110 to 110	%	0	-110	Sets level setting value for low-low flow rate limit (LL)
G13	High High Alarm (HI HI ALARM)	W	-110 to 110	%	0	110	Sets level setting value for high-high flow rate limit (HH)
G14	H/L Alarm Hys (H/L ALM HYS)	W	0 to 10	%	0	5 %	Sets hysteresis width for high-low flow rate limit alarm
G21	4-20mA Alarm Out (4-20 ALM OUT)	W	2.4mA or Less 4.0mA Hold 21.6mA or More			21.6mA or More	Selects the current output during alarm occurrence.
G22	4-20mA Burn Out (4-20 BURNOUT)	R	High Low			—	Displays the current output during a CPU failure.
G30	Alm-Setting (ALM-SETTING)	W	No Yes			Yes	Selects whether a setting alarm is to be specified as an alarm.
G31	Alm-Sig Over (ALM-SIG OVER)	W	No Yes			Yes	Selects whether a signal overflow alarm is to be specified as an alarm.
G32	Alm-Emp Pipe (ALM-EMP PIPE)	W	No Yes			Yes	Selects whether an empty pipe alarm is to be specified as an alarm.
G33	Alm-HH/LL (ALM-HH/LL)	W	No Yes			No	Selects whether a flow rate high-high or low-low alarm is to be specified as an alarm.
G34	Alm-Adhesion (ALM-ADHESION)	W	No Yes			No	Selects whether an electrode adhesion alarm is to be specified as an alarm.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
G40	Operation Time (OPERATE TIME)	R	0D 00:00 to 99999D 23:59				Operation time
G41	Alm Record1 (ALM RECORD1)	R	10:uP Fault 11:EEPROM Fault 12:A/D(H) Fault 13:A/D(L) Fault 14:A/D(Z) Fault 15:Coil Open 16:EEPROM Dflt 18:Power Off 19:Inst Pwr Fail 28:WDT 30:Sig Overflow 31:Empty Pipe 33:Adhesion Alm				Displays the content of the most recent alarm.
G42	Alm Record Time1 (ALM TIME 1)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the most recent alarm.
G43	Alm Record2 (ALM RECORD2)	R	See G41				Displays the content of the second most recent alarm.
G44	Alm Record Time2 (ALM TIME 2)	R	0D 00:00 to 99999D 23:59				Displays the operation time at occurrence of the second most recent alarm.
G45	Alm Record3 (ALM RECORD3)	R	See G41				Displays the content of the third most recent alarm.
G46	Alm Record Time3 (ALM TIME 3)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the third most recent alarm.
G47	Alm Record4 (ALM RECORD4)	R	See G41				Displays the content of the fourth most recent alarm.
G48	Alm Record Time4 (ALM TIME 4)	R	0D 00:00 to 99999D 23:59				Displays the operation time at the occurrence of the fourth most recent alarm.
G60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(8) Item H (Menu H): Display Setting items

Menu H contains setting items that are relevant to display on the display unit.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
H00	Display Set (DISP SET)						
H10	Display Select1 (DISP SELECT1)	W	Flow Rate(%) Flow Rate Flow Rate(mA) Forward Total Reverse Total Dif Total			Flow Rate(%)	Selects content of the first line for Display Mode. Linked with B40.
H11	Display Select2 (DISP SELECT2)	W	Off Flow Rate(%) Flow Rate Flow Rate(mA) Flow Rate(Bar) Forward Total Reverse Total Dif Total Tag No Adhesion Check Communication			Off	Selects content of the second line for Display Mode. Linked with B41.
H12	Display Select3 (DISP SELECT3)	W	Same as H11 (Display Select2)			Off	Selects content of the third line for Display Mode. Linked with B42.
H20	Display Cycle (DISP CYCLE)	W	200ms 400ms 1s 2s 4s 8s			400ms	Selects the display cycle.
H30	Language (LANGUAGE)	W	English Japanese French German Italian Spanish			English	Selects the language used by the display unit. Linked with B10.
H60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(9) Item J (Menu J): Auxiliary Function Setting items

Menu J contains setting items such as the flow direction, rate limits, and low cut.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
J00	Aux (AUX)						
J10	4-20mA Low Cut (4-20 LOW CUT)	W	0 to 10	%	0	0%	Sets the range in vicinity of 0% within which the current output will be 4 mA.
J11	4-20mA Low Lmt (4-20 LOW LMT)	W	-20.0 to 100.0	%	1	-20.0%	Sets the low limit for current output
J12	4-20mA High Lmt (4-20 HI LMT)	W	0.0 to 120.0	%	1	120.0%	Sets the high limit for current output
J20	Flow Direction (FLOW DIRECT)	W	Forward Reverse			Forward	Selects the flow direction.
J21	Rate Limit (RATE LIMIT)	W	0 to10	%	0	5%	Sets the level to reduce output fluctuation.
J22	Dead Time (DEAD TIME)	W	0 to 15	s	0	0s	Sets the dead time to reduce output fluctuation. When "0" is set, rate limit function is not available.
J23	Pulsing Flow (PULSING FLOW)	W	No Yes			No	Selects whether pulsing flow is to be supported.
J24	T/P Damp Select (T/P DAMP SEL)	W	Damping No Damping			Damping	Selects whether the flow rate value obtained through damping calculation for total/pulse or the instantaneous flow rate value (no damping) for total/pulse is to be used.

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Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
J30	Power Synch (POWER SYNCH)	W	No Yes			Yes	Selects whether or not the internal frequency is to be synchronized with the power supply frequency.
J31	Power Frequency (POWER FREQ)	R/W	47.00 to 63.00	Hz	2	50.00	Displays the power-supply frequency (for Power Synch = "Yes"), or sets the power-supply frequency (for Power Synch="No").
J40	Memo 1 (MEMO 1)	W	ASCII 16 characters				Memo field
J41	Memo 2 (MEMO 2)	W	ASCII 16 characters				Memo field
J42	Memo 3 (MEMO 3)	W	ASCII 16 characters				Memo field
J50	Software Rev No (SOFTWARE REV)	R	—				Software revision number
J60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(10) Item K (Menu K): Diagnostic Function Setting items

Menu K contains items that are relevant to the diagnosis of insulation adhesion to the electrode.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
K00	Diagnosis (DIAGNOSIS)						
K10	Adhesion Check (ADHESION CHK)	W	No Yes			No	Selects whether or not to perform diagnosis of adhesion to the electrode.
K11	Adhesion Level1 (ADH LEVEL1)	W	0.00 to 100.00	M ohm	2	0.10	Sets the resistance value for adhesion Level 1 to the electorode.
K12	Adhesion Level2 (ADH LEVEL2)	W	0.00 to 100.00	M ohm	2	0.50	Sets the resistance value for adhesion Level 2 to the electorode.
K13	Adhesion Level3 (ADH LEVEL3)	W	0.00 to 100.00	M ohm	2	1.00	Sets the resistance value for adhesion Level 3 to the electorode.
K14	Adhesion Level4 (ADH LEVEL4)	W	0.00 to 100.00	M ohm	2	3.00	Sets the resistance value for adhesion Level 4 to the electorode.
K15	Adh Measure Value (ADH MEAS VAL)	R	—	M ohm	2		Displays the resistance value for adhesion to the electrode.
K60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(11) Item M (Menu M): Automatic Zero-Adjustment Function Setting items

Menu M contains items that are relevant to automatic zero adjustment.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
M00	Adjustment (ADJUSTMENT)						
M10	Auto Zero Exe (AUTOZERO EXE)	W	No Execution Execution			No Execution	Selects whether or not automatic zero adjustment is carried out. Linked with B50.
M11	Magflow Zero (MAGFLOW	R/W	-99.999 to 99.999		3	0.000	Displays the result of the automatic zero adjustment, or sets the zero point.
M60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(12) Item N (Menu N): Loop Test Setting items

Menu N contains items that are relevant to the execution of loop testing.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
N00	Test (TEST)						
N10	Test Mode (TEST MODE)	W	Normal Test			Normal	Selects whether mode will be set to "Normal" or "Test".
N11	Test Output Value (TEST OUT VAL)	W	-10 to 110	%	0	0%	Sets the test output value.
N30	Test DO (TEST DO)	W	Open(Off) Closed(On) Pulse			Open(Off)	Selects the test condition for DO terminal.
N31	Test DIO (O) (TEST DIO (O))	W	Input Mode Open(Off) Closed(On)			Input Mode	Selects the test condition for DIO terminal used for output.
N32	Test DIO (I) (TEST DIO (I))	R	Open Short				Displays the test condition for DIO terminal used for input.
N60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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(13) Item P (Menu P): Parameter Protection items

Menu P contains items that are relevant to write protection and passwords.

Item	Name Display unit (BRAIN)	R/W	Data range Display unit /BRAIN	Units	Position of decimal point	Default value (*): Indicated item	Description
P00	Protect (PROTECT)						
P10	Key Code (KEY CODE)	W	0 to 9999			0	Parameter of the display restriction
P20	Write Protect (W PROTECT)	R	No Yes			No	Displays whether or not overwriting of parameter data is prohibited.
P21	Enable Wrt Passwd (ENABLE WRITE)	W	ASCII 8 characters				Sets the correct password so that write protection function will be released.
P22	New Password (NEW PASSWORD)	W	ASCII 8 characters				Sets the password for write protection funcion
P23	Software Seal (SOFT SEAL)	R	Break Keep				Displays whether or not a Joker password was used (Break).
P60	— (SELF CHECK)	R	Good Error				See "6.5 Alarm Functions".

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6.4 Parameter Description

(1) Menu B: Easy Setup items

Those parameters with a high frequency of use have been grouped together in Easy Setup. All basic functions can be controlled using only the parameters from this block. Parameters from Menu B share identical names with those from other menus; however, modification of one such parameter will result in the other being automatically modified.

[B10: Language] Selection of language used for the display unit
→ This setting is linked with that of parameter **H30**.
One of the following languages can be selected for the display unit.

Data Range

Setting item	Description
English	All parameters, alarm messages, etc. displayed in English.
Japanese	All parameters, alarm messages, etc. displayed in Japanese katakana.
French	All parameters, alarm messages, etc. displayed in French.
German	All parameters, alarm messages, etc. displayed in German.
Italian	All parameters, alarm messages, etc. displayed in Italian.
Spanish	All parameters, alarm messages, etc. displayed in Spanish.

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[B20: Flow Damping] Setting of the damping time constant
→ This setting is linked with that of parameter **C11**.
The damping time constant should be modified to suppress an output fluctuation or to change the response time. This time constant has an effect on analog output and on the flow rate display (i.e., actual instantaneous flow rate, %, current value), and in addition, it also affects pulse output and totalization. However, when "No Damping" has been set for **J24: T/P Damp Select**, there will be no effect on pulse output or totalization.

* Time constant: The time required for the output to reach 63.2% from 0%.

[B21: Base Flow Unit] Selection of flow units for the flow rate span
→ This setting is linked with that of parameter **C40**.
This parameter selects the flow units for the flow rate span. (In case of mass flow, the setting of density is also required. Refer to **C46: Mass Flow Density** for more details.)

[B22: Base Time Unit] Selection of time units for the flow rate span
→ This setting is linked with that of parameter **C41**.
This parameter selects the time units for the flow rate span; however, if "m" has been selected for the flow rate units, "/s" is automatically set for this parameter.

[B23: Flow Span] Setting of the flow rate span
→ This setting is linked with that of parameter **C42**.
The span can be set for the forward flow rate in the range 0 to 32,000 (although this does not include 0). The units set using **B21/C40: Base Flow Unit** and **B22/C41: Base Time Unit** will be displayed at this time.

NOTE

If the flow rate units, time units, and flow rate span are specified upon ordering, these parameters will be setup before shipment; however, if this is not the case, it will be necessary for the appropriate values to be set up by the user.

NOTE

Flow rate span is the value for instantaneous flow rate that corresponds to a current output of 20 mA. The following factors should be taken into consideration when deciding on the flow rate span.

- In the case of applications with large variations in flow rate, the maximum flow rate should be set. If a flow rate in excess of the flow rate span was to occur, output would be possible up to an upper limit of 108%, and beyond this, error would occur. Note that the same applies to pulse output and totalization.
- In the case of applications that have a relatively stable flow rate, a flow rate span of 1.5 to 2.0 times larger than the normal flow rate may be considered suitable.
- The flow rate to be adopted should - upon conversion to flow velocity - correspond to a value within the range of 0.1 to 10 m/s. The flow velocity can be confirmed using sizing data or with parameter **C44: Velocity Check**, and in the latter case, the value obtained when span is converted to flow velocity will be displayed.
- Regardless of the position of the decimal point, the largest value that can be set on the display unit is 32,000. Furthermore, it is not possible to set a number of 4 or greater for the highest-order digit. Similarly, if 3 is set for this highest-order digit, it will not be possible to set a

number of 2 or greater for the next digit to the right, regardless of the position of the decimal point.
Example: A value of 333.33 is represented by the character string 33333, and since this exceeds 32000, it cannot be set. In such a case, the value 333.3 should be set instead.

[B24: Flow Decimal Pnt] Setting of the decimal point position for the instantaneous flow rate
→ This setting is linked with that of parameter **C43**.
This parameter sets the position of the decimal point for instantaneous flow rate values in terms of the number of digits. When set using "Auto", the decimal point position will be automatically determined in accordance with the setting value for **B23/C42: Flow Span** as shown below.

Flow Span ≤ 9	Decimal point position: 3 digits
9 < Flow Span ≤ 90	Decimal point position: 2 digits
90 < Flow Span ≤ 900	Decimal point position: 1 digit
900 < Flow Span	Decimal point position: no digits (i.e., no decimal point)

When an item other than "Auto" is set, the selected number of digits for the decimal point position is used.

With the decimal point removed, 6 digits are available for the instantaneous flow rate value, and display is possible up to 999,999. If an overflow occurs as a result of the setting adopted for decimal point position, the warning **84: Disp Over Wng** will be displayed to provide notification of this condition.

Example: When 1000 m³/h is set for B23/C42: Flow Span

Item	Display content for instantaneous flow rate value
Auto	1000 m³/h
0	1000 m³/h
1	1000.0 m³/h
2	1000.00 m³/h
3	With the decimal point removed, 7 digits are not available for the instantaneous flow rate value; therefore, a warning is displayed.

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[B30: Total Unit] Setting of units for totalization scale
→ This setting is linked with that of parameter **D10**.
This parameter selects the flow rate units for use in totalization.

Item	Description
n Unit/P	10^{-9}×FU
u Unit/P	10^{-6}×FU
m Unit/P	10^{-3}×FU
Unit/P	FU
k Unit/P	10^{3}×FU
M Unit/P	10^{6}×FU
Pulse/s	Number of pulses to be counted for one second at 100% output.

FU: Flow rate unit selected in B21/C40: Base Flow Unit.

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[B31: Total Scale] Setting of the totalization scale
→ This setting is linked with that of parameter **D11**.
The flow rate is totalized in individual counts in accordance with this parameter's setting. If 0 is selected, it indicates that the totalization function is not to be used.

NOTE

If a totalization scale is specified upon ordering, this parameter is set up before shipment; however, if this is not the case, it will be necessary for the appropriate value to be set up by the user.

NOTE

- By setting the totalization scale, the totalized value is displayed on the display unit. The totalization scale is determined in accordance with the settings of **B30/D10: Total Unit** and **B31/D11: Total Scale**.
- The maximum value that can be displayed is 99999999, and if this is exceeded, the value 0 is counted once again. However, counting stops at 99999999 when the totalization switch function is used.
- If multiple ranges are being used, the flow rate span for the smallest range becomes the standard for the **D13: Total Low Cut** setting value.
- Totalization for the reverse flow rate and for the differential flow rate is carried out only when "Fwd/Rev Ranges" is selected for **F20: DO Function** or **F21: DIO Function**.
- The totalized units are indicated on the display unit when **B31/D11** is 0.001, 0.01, 0.1, 1, 10, 100, or 1000. In the case of other setting values, the totalized units are not indicated.

Example 1: To count in 1 Ml (mega-liter) steps with flow rate span = 100 m^3/h
Since 1 Ml = 10^3 x m^3, k Unit/P is set for **B30/D10**, and 1 is set for **B31/D11**. "x10^3 m^3" is indicated for the totalized units in the Display Mode.

Example 2: To count in 10 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B30/D10**, and 10 is set for **B31/D11**. "x10^{-2} m^3" is indicated for the totalized units in the Display Mode.

Example 3: To count in 5 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B30/D10**, and 5 is set for **B31/D11**. Since **B31/D11** is not 0.001, 0.01, 0.1, 1, 10, 100, or 1000, there is no indication of totalized units in the Display Mode.

- Setting of totalization scale is not possible when specific selections have been made for **B30/D10: Total Unit**, **B31/D11: Total Scale**, and **B23/C42: Flow Span**. In such a case, a setting alarm will be displayed, and parameters should be changed in accordance with the instructions given.

[B32: Pulse Unit] Setting of the pulse units
→ This setting is linked with that of parameter **E10**.
This parameter selects the flow rate units to be used for pulse output.

Item	Description
n Unit/P	10^{-9}×FU
u Unit/P	10^{-6}×FU
m Unit/P	10^{-3}×FU
Unit/P	FU
k Unit/P	10^{3}×FU
M Unit/P	10^{6}×FU
Pulse/s	Number of pulses to be output for one second at 100% output.

FU: Flow rate unit selected in B21/C40: Base Flow Unit.

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[B33: Pulse Scale] Setting of pulse scale
→ This setting is linked with that of parameter **E11**.
Pulse output is performed in individual counts in accordance with this parameter's setting. If 0 is selected, it indicates that the pulse output function is not to be used.

NOTE

If a pulse scale is specified upon ordering, this parameter is setup before shipment; however, if this is not the case, it will be necessary for the appropriate value to be setup by the user.

NOTE

- By setting the pulse scale, pulse output performs. The pulse scale is determined in accordance with the settings of **B32/E10: Pulse Unit** and **B33/E11: Pulse Scale**.
- If multiple ranges are being used, the flow rate span for the smallest range becomes the standard for the **E13: Pulse Low Cut** setting value.
- Pulse output for the reverse flow rate is carried out only when "Fwd/Rev Ranges" is selected for **F20: DO Function** or **F21: DIO Function**.
- Setting of pulse scale is not possible when specific selections have been made for **B32/E10: Pulse Unit**, **B33/E11: Pulse Scale**, **E12: Pulse Width** and **B23/C42: Flow Span**. In such a case, a setting alarm will be displayed, and parameters should be changed in accordance with the instructions given.

Example 1: To perform pulse output in 1 Ml (mega-liter) steps with flow rate span = 100 m^3/h
Since 1 Ml = 10^3 x m^3, M Unit/P is set for **B32/E10**, and 1 is set for **B33/E11**.

Example 2: To perform pulse output in 10 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B32/E10**, and 10 is set for **B33/E11**.

Example 3: To perform pulse output in 5 l (liter) steps with flow rate span = 100 m^3/h
Since 1 l = 10^{-3} x m^3, m Unit/P is set for **B32/E10**, and 5 is set for **B33/E11**.

[B40: Display Select1] Setting of the first line for display unit
→ This setting is linked with that of parameter **H10**.
This parameter selects the display content of the first line for display unit. The size of the characters which are displayed will depend on the selections made for

B41/H11: Display Select2 and **B42/H12: Display Select3** as described below. (For more details, refer to Chapter 5: Basic Operating Procedures.)

CAUTION

It is not possible to set Display Select1 to "Off".

[B41: Display Select2] Setting of the second line for display unit
→ This setting is linked with that of parameter **H11**. This parameter selects the display content of the second line for display unit. When "Off" is selected, one-line display will be adopted regardless of the setting made for **B42/H12: Display Select 3**.

[B42: Display Select3] Setting of the third line for display unit
→ This setting is linked with that of parameter **H12**. This parameter selects the display content of the third line for display unit. When "Off" is selected for this parameter, two-line display is adopted.

[B50: Auto Zero Exe] Execution of the automatic zero adjustment function
→ This setting is linked with that of parameter **M10**. This parameter executes the automatic zero adjustment function: If "Execution" is selected, this function will be started. "Now Auto Zero Executing..." is indicated while the Auto Zero function is being carried out. The result of the automatic zero adjustment is confirmed using **M11: Magflow Zero**, and if the result exceeds the rated value, the warning **82: Auto Zero Wng** will be displayed. (For more details, refer to Chapter 9: Operation.)

Setting	Function
No Execution	No execution
Execution	Automatic zero adjustment is started.

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(2) Menu C: Basic Setting items

Menu C principally contains the basic setting items for the flowtube.

NOTE

In order to ensure that correct flow rate data can be acquired, it is crucial that the nominal size, flow rate span, and meter factor of the combined remote flowtube are set. In cases where a remote flowtube is ordered at the same time as the AXFA14, or where the AXF integral flowmeter is ordered, the nominal size and meter factor will be set upon shipment from the manufacturing plant, and these will not require additional setting. If the AXFA14 is ordered separately, the default value will be set for the meter factor; accordingly, it will be necessary to set the meter factor indicated on your remote flowtube data plate.
If a flow rate span was specified upon ordering, this will be set before shipment. If this is not the case, however, it will be necessary for the appropriate value to be set by the user.

[C10: Tag No] Setting of the tag number
→ The setting for this parameter corresponds to one of the ordered items.
Up to a maximum of 16 characters can be entered for the display unit. For more details regarding the actual characters that can be used, refer to Section 5.2.2: Setting Mode.

NOTE

If a tag number is specified upon ordering, this parameter is set up before shipment; however, if this is not the case, it will be necessary for the appropriate value to be set up by the user.

[C11: Flow Damping] Setting of the damping time
→ Refer to the description of parameter **B20**.

[C20: Measure Mode] Selection of dual frequency excitation mode

Item	Description
Standard DF	Standard dual frequency excitation
Enhanced DF	Enhanced dual frequency excitation

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Enhanced DF (i.e., enhanced dual frequency excitation) is set to stabilize measurement for difficult applications, such as for high concentration slurries or low conductivity fluid. Note that this parameter is only valid when this product is used in combination with an AXF flowtube, as only supports enhanced dual frequency excitation. (Optional code HF1 or HF2)

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NOTE

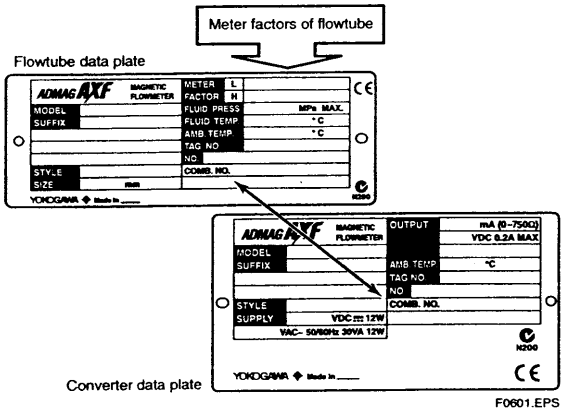
- When this product is used in combination with any flowtube that does not support enhanced dual frequency excitation and "Enhanced DF" is selected, a setting alarm will be displayed. The setting should be returned to "Standard DF" in such a case.
- When dual frequency excitation mode is changed, perform zero adjustment. For details on zero adjustment, refer to chapter 9.

[C21: Low MF] Setting of the low-frequency meter factor
This parameter sets the low-frequency meter factor for standard dual frequency excitation.

[C22: High MF] Setting of the high-frequency meter factor
This parameter sets the high-frequency meter factor for standard dual frequency excitation.

NOTE

Meter Factor Settings



(1) Confirm that the serial number indicated by COMB. NO. on the AXFA14 converter's data plate corresponds with the AXF remote flowtube's serial number.
(2) Set the values that are marked in the METER FACTOR fields on the data plate for the Remote Flowtube.
(3) The meter factors are crucial in ensuring that the electromotive force is correctly in proportion to the flow velocity and are determined at the manufacturing plant by actual-flow calibration.

[C23: Low MF (EDF)] Setting of the low-frequency meter factor for EDF
This parameter sets the low-frequency meter factor as required when Enhanced DF (i.e., enhanced dual frequency excitation) is selected. If "Standard DF" has been selected for **C20: Measure Mode**, neither **C23: Low MF (EDF)** nor **C24: High MF (EDF)** is displayed, and if "Enhanced DF" is selected, the four parameters from **C21** to **C24** will be displayed.

NOTE

For the AXF integral flowmeter, refer to "Section 6.6: Precautions for the AXF integral flowmeter."

[C24: High MF (EDF)] Setting of the high-frequency meter factor for EDF
This parameter sets the high-frequency meter factor as required when Enhanced DF (i.e., enhanced dual frequency excitation) is selected.

[C31: Nominal Size Unit] Setting of the nominal size units
This parameter selects the units used for setting of the nominal size.

[C32: Nominal Size] Setting of the nominal size
This parameter sets the nominal size of flowtube.

[C40: Base Flow Unit] Selection of flow units for the flow rate span
→ Refer to the description of parameter **B21**.

[C41: Base Time Unit] Selection of time units for the flow rate span
→ Refer to the description of parameter **B22**.

[C42: Flow Span] Setting of the flow rate span
→ Refer to the description of parameter **B23**.

[C43: Flow Decimal Pnt] Setting of the decimal point position for the instantaneous flow rate
→ Refer to the description of parameter **B24**.

[C44: Velocity Check] Display of the flow rate span velocity
This parameter displays the flow rate span for the maximum range in m/s units.

[C45: Density Unit] Setting of the density units for mass flow rate
This parameter selects the units for density as required when making settings using **C46: Mass Density**.

[C46: Mass Density] Setting of the density for mass flow rate
This parameter is necessary in situations where t, kg, g, klb or lb has been selected as the mass unit in **B21/C40: Base Flow Unit**. If a mass unit is selected in **B21/C40: Base Flow Unit** and a value of 0 is set for this parameter, the setting alarm "**57: Dens Set Err**" will be displayed. In such a case, ensure that the density is set correctly.

[C47: User Span Select] Selection of the use of special flow rate units
This parameter selects whether or not special units are used for instantaneous flow rate. Actual setting of these units is carried out using **C48: Flow User Unit** and **C49: Flow User Span**.

[C48: Flow User Unit] Setting of the special flow rate units
This parameter is used to select the special units (up to maximum 8 characters in length). These units are displayed when instantaneous flow rate is selected in the Display Mode, and they are displayed for **A20: FLOW RATE** when BRAIN communication is being carried out.

[C49: Flow User Span] Setting of the special flow rate span
This parameter sets the special span to be displayed for 100% output in the maximum range.

NOTE

Example : To set the special flow rate span to 100 dl/s
Since 100 dl (deci-liter)=10 l (liter),
"l (Liter)" is set for **B21/C40: Base Flow Unit**,
"/s" is set for **B22/C41: Base Time Unit**,
"10" is set for **B23/C42: Flow Span**,
"Yes" is set for **C47: User Span Select**,
"dl/s" is set for **C48: Flow User Unit**,
"100" is set for **C49: Flow User Span**.
"100 dl/s" is indicated for 100% output in the Display Mode.

(3) Menu D: Total Setting items

Menu D contains parameters that are relevant to totalization function settings.

[D10: Total Unit] Setting of units for totalization scale
→ Refer to the description of parameter **B30**.

[D11: Total Scale] Setting of the totalization scale
→ Refer to the description of parameter **B31**.

[D12: Total Decimal Pnt] Setting of the decimal point position for the totalization display
This parameter sets the position of the decimal point for totalization display in terms of the number of digits. Except in cases where 0 is selected, the totalized units are not displayed.

Example: When totalized value is 12345678 m^3

Item	Totalization display
0	12345678 m^3
1	1234567.8
2	123456.78
3	12345.678
4	1234.5678
5	123.45678
6	12.345678
7	1.2345678

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[D13: Total Low Cut] Setting of the totalization stop range
This parameter allows the settings to be made that prevent totalization when the flow rate is at or below the low-cut setting value. In cases where there are multiple ranges or forward/reverse ranges, low cut is carried out at the setting value for the smallest span (i.e., an integer between 0 and 10%).
Example: When the first range = 10 m^3/h, the second range = 100 m^3/h, and the Total Low Cut = 3%, no totalization is carried out at flow rates of 0.3 m^3/h or lower.

[D20: Total Execution] Operation setting for the totalization function
This parameter sets "Start" and "Stop" of the totalization function, in addition to performing the preset function for the forward totalized value and the reverse totalized value.
*: The preset function starts the count for totalization from the set value.

Item	Description
Start (initial value)	Starts totalization
Stop	Stops totalization
Preset Total	Sets the preset value for totalization display that has been specified as the forward totalized value. Preset value are determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is sellected, the count for totalization starts from the preset value. Setting of zero as the preset value allows the zero-reset function to be implemented.
Preset Rev Total	Sets the preset value for totalization display that has been specified as the reverse totalized value. Preset value are determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is sellected, the count for totalization starts from the preset value. Setting of zero as the preset value allows the zero-reset function to be implemented.

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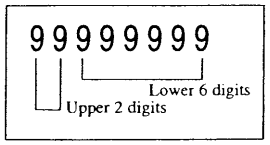
NOTE

Totalization presets can also be set up by using status input. For details regarding the setting method, refer to the descriptions of **F21**.

[D21: Ttl Set Val Lower] Setting of the totalization preset value (lower 6 digits)
This parameter sets a totalization preset value in the lower 6 digits of the 8-digit totalized value. If zero is to be set as the preset value, "000000" should be set here.

[D22: Ttl Set Val Upper] Setting of the totalization preset value (upper 2 digits)
This parameter sets a totalization preset value in the upper 2 digits of the 8-digit totalized value. If zero is to be set as the preset value, "00" should be set here.



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[D23: Ttl Switch Lower] Setting of the totalization switch value (lower 6 digits)
The totalization switch function operates to set the status output terminal (i.e., DO or DIO) to "Closed (On)" when the forward internal totalized value reaches or exceeds the totalization switch value. (For details regarding the setting method for the status output, refer to the descriptions of parameters **F20** and **F21**.)

If this function is set up, the totalization count will stop at 99999999.
D23 sets the lower 6 digits of the 8-digit totalization switch value.

[D24: Ttl Switch Upper] Setting of the totalization switch value (upper 2 digits)
This parameter sets the upper 2 digits of the 8-digit totalization switch value.

[D30: Ttl User Select] Selection of the use of special totalization unit
This parameter specifies whether or not special units are used for totalization unit. Actual setting of these units is carried out using **D31: Ttl User Unit**.

[D31: Ttl User Unit] Setting of special totalization units
Units of up to maximum 8 characters in length can be specified using this parameter. The units set with this parameter are displayed whenever totalization (i.e., FTL, RTL, DTL) is selected in the Display Mode, and they are displayed for **A30: TOTAL, A31: REV TOTAL**, and **A32: DIF TOTAL** when BRAIN communication is being carried out.

NOTE

Example: To count in 1 dl (deci-liter) steps with flow rate span=10 l/s.
Since 1 dl (deci-liter) = 0.1 l (liter),
"l (Liter)" is set for **B21/C40: Base Flow Unit**,
"/s" is set for **B22/C41: Base Time Unit**,
"10" is set for **B23/C42: Flow Span**,
"Unit/P" is set for **B30/D10: Total Unit**,
"0.1" is set for **B31/D11: Total Scale**,
"Yes" is set for **D30: Ttl User Select**,
"dl" is set for **D31: Ttl User Unit**.
"dl" is indicated for the totalized units in the Display Mode and is counted in 1 dl steps.

(4) Menu E: Pulse Setting items

Menu E contains items relevant to pulse output.

NOTE

For pulse output from the DO terminal, set **F20: DO Function** to "Pulse Output."

[E10: Pulse Unit] Setting of the pulse units
→ Refer to the description of parameter **B32: Pulse Unit**

[E11: Pulse Scale] Setting of the pulse scale
→ Refer to the description of parameter **B33: Pulse Scale**

[E12: Pulse Width] Setting of the pulse width
This parameter selects the pulse width (i.e., m/s : millisecond) that is output.

Data Range

Setting	Pulse Rate (pps)	
	Maximum Value	Minimum Value
(0) 50% Duty	11000	0.0001
(1) 0.05ms	10000	(pps: pulses per second)
(2) 0.1ms	5000	
(3) 0.5ms	1000	
(4) 1ms	500	
(5) 20ms	25	
(6) 33ms	15	
(7) 50ms	10	
(8) 100ms	5	

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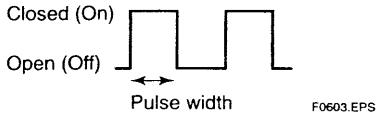
NOTE

*:The pulse width with the exception of "50% Duty" is the "Closed (On)" time for each pulse in case that "Closed (On) Act" is selected for **F22: DO Active Mode**



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A limit applies to the maximum pulse scale that can be set with respect to the pulse width. If a value in excess of this limit is set, a setting alarm will be displayed.

[E13: Pulse Low Cut] Setting of the pulse output stop range
This parameter allows the settings to be made which prevent pulse output when the flow rate is at or below the low-cut setting value. In cases where there are multiple ranges or forward/reverse ranges, low cut is carried out at the setting value for the smallest span (i.e., an integer between 0 and 10%).
Example: When the first range = 10 m^3/h, the second range = 100 m^3/h, and the Pulse Low Cut = 3%, no pulse output is carried out at flow rates of 0.3 m^3/h or lower.

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(5) Menu F: Status Functions Setting items

Menu F contains setting items relevant to status Input/Output functions.

[F20: DO Function] Setting of the function for the DO status output terminal

This parameter sets the function for the DO (status output) terminal.

Setting	Function	Description
No Function	Stops output (i.e., inactive condition)	As no function is set, there is no output.
Pulse Output	Pulse output	Pulse output is carried out.
Alarm Output	Output upon alarm	Refer to Alarms (Section 6.5).
Warning Output	Output upon warning	
Total Switch(O)	Totalization switch output	Status output is carried out when the forward internal totalized value reaches or exceeds the totalization switch value. The totalization switch value is determined using **D23: Ttl Switch Lower** and **D24: Ttl Switch Upper**.
H/L Alarm(O)	H/L alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low flow rate limit (L), or when it equals or exceeds the high flow rate limit (H). These limit values are determined using **G10: Low Alarm** and **G11: High Alarm**.
HH/LL Alarm(O)	HH/LL alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low-low flow rate limit (LL), or when it equals or exceeds the high-high flow rate limit (HH). These limit values are determined using **G12: Low Low Alarm** and **G13: High High Alarm**.To output "HH/LL Alarm" as an alarm, set **G33: Alm-HH/LL** to "Yes."
Fwd/Rev Rngs(O)	Forward/reverse flow rate measurement	When flow is in the reverse direction, switching to the reverse range is carried out automatically, measurement is performed, and status output is carried out.
Auto 2 Rngs(O)	Automatic 2 ranges switching	This function ensures that when the instantaneous flow rate exceeds 100% of the range, transition to the next range is carried out automatically. Status output is carried out upon range switching.
Auto 3 Rngs(O)	Automatic 3 ranges switching (Note 1)	
Auto 4 Rngs(O)	Automatic 4 ranges switching (Note 1)	
Ext 2 Answer(O)	Answerback: 2 ranges switching via external status input	When range switching is carried out in response to external status input, status output is performed in the form of an answerback to indicate the range currently being used.

Note 1: When these functions are selected, two terminals become necessary for status output, the DO and DIO terminals which cannot be used for other functions. Accordingly, the setting for **F20: DO Function** is automatically adopted as the setting for **F21: DIO Function**. (Setting of these two functions is not possible using **F21: DIO Function**.)

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[F21: DIO Function] Setting of the function for the DIO status input/output terminal
This parameter sets the function for the DIO (status input/output) terminal.

Setting	Function	Description
No Function	No function	As no function is set, there is no input and output.
Alarm Output	Output upon alarm	Refer to Alarms (Section 6.5).
Warning Output	Output upon warning	
Total Switch(O)	Totalization switch output	Status output is carried out when the forward internal totalized value reaches or exceeds the totalization switch value. The totalization switch value is determined using **D23: Ttl Switch Lower** and **D24: Ttl Switch Upper**.
H/L Alarm(O)	H/L alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low flow rate limit (L), or when it equals or exceeds the high flow rate limit (H). These limit values are determined using **G10: Low Alarm** and **G11: High Alarm**.
HH/LL Alarm(O)	HH/LL alarm output	Status output is carried out when the instantaneous flow rate equals or falls below the low-low flow rate limit (LL), or when it equals or exceeds the high-high flow rate limit (HH). These limit values are determined using **G12: Low Low Alarm** and **G13: High High Alarm**. To output "HH/LL Alarm" as an alarm, set **G33: Alm-HH/LL** to "Yes."
Fwd/Rev Rngs(O)	Forward/reverse flow rate measurement	When flow is in the reverse direction, switching to the reverse range is carried out automatically, measurement is performed, and status output is carried out.
Auto 2 Rngs(O)	Automatic 2 ranges switching	This function ensures that when the instantaneous flow rate exceeds 100% of the range, transition to the next range is carried out automatically. Status output is carried out upon range switching.
Auto 3 Rngs(O)	Automatic 3 ranges switchings (Note 1)	
Auto 4 Rngs(O)	Automatic 4 ranges switchings (Note 1)	
Ext 2 Answer(O)	Answerback: 2 ranges switching via external status input	When range switching is carried out in response to external status input, status output is performed in the form of an answerback to indicate the range currently being used.
0% Signal Lock(I)	0% signal lock via external status input	Based on the external status input, the instantaneous flow rate indication is forcibly set to 0% (i.e., 4 mA), and both totalization and pulse outputs are halted. This setting has precedence over the output signal whenever an alarm occurs. When the 0% signal lock is canceled, the instantaneous flow rate is restored in accordance with the time constant originally set using **B20/C11: Flow Damping**.
Ext Auto Zero(I)	Automatic zero adjustment via external status input	Automatic zero adjustment is carried out in response to external status input. For more details regarding automatic zero adjustment, refer to Chapter 9: Operation.
Ext Ttl Set(I)	Forward totalization preset via external status input	The totalization display value is preset or reset to zero in accordance with the external status input. The preset value is determined using **D21: Ttl Set Val Lower** and **D22: Ttl Set Val Upper**. In case that "Start" is selected for **D20: Total Execution**, the count for totalization starts from the preset value.
Ext R Ttl Set(I)	Reverse totalization preset via external status input	
Ext 2 Ranges(I)	2 ranges switching via external status input	This function allows the switching of 2 ranges in response to status input for a single direction only.

Note 1: When these functions are selected, two terminals become necessary for status output, the DO and DIO terminals which cannot be used for other functions.

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[F22: DO Active Mode] Setting of the active mode for DO terminal

Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using this parameter. Operating patterns are reversed when the active mode has been set to "Open (Off) Act."

Selected function	Condition of DO terminal	
	Open (Off)	Closed (On)
Pulse Output (see Example 1)	Open (Off) when pulses are output.	Closed (On) when pulses are output.
Alarm Output (see Example 2)	Good (normal)	Alarm status
Warning Output	Good (normal)	Warning status
Total Switch(O) (see Example 3)	Below setting value	Equal or above setting value
H/L Alarm(O)	Normal	H/L alarm status
HH/LL Alarm(O)	Normal	HH/LL alarm status
Fwd/Rev Rngs(O)	Forward direction	Reverse direction

Note: For "Auto 2 Rngs(O)," "Auto 3 Rngs(O)", "Auto 4 Rngs(O)", and "Ext 2 Answer(O)", see the **Multiple ranges setting** section.

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[F23: DIO Active Mode] Setting of the active mode for DIO terminal

Operations are performed in accordance with the following table when the active mode has been set to "Closed/Short Act" using this parameter. Operating patterns are reversed when the active mode has been set to "Open/Open Act."

Selected function	Condition of DIO (O) terminal	
	Open (Off)	Closed (On)
Alarm Output (see Example 2)	Good (normal)	Alarm status
Warning Output	Good (normal)	Warning status
Total Switch(O) (see Example 3)	Below setting value	Equal or above setting value
H/L Alarm(O)	Normal	H/L alarm status
HH/LL Alarm(O)	Normal	HH/LL alarm status
Fwd/Rev Rngs(O)	Forward direction	Reverse direction

Note: For "Auto 2 Rngs(O)," "Auto 3 Rngs(O)", "Auto 4 Rngs(O)", and "Ext 2 Answer(O)", see the **Multiple ranges setting** section.

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Selected function	Condition of DIO (I) terminal	
	Open	Short
0% Signal Lock (I) (see Example 4)	Normal	Signal locked status
Ext Auto Zero (I)	Normal	Start of automatic zero adjustment
Ext Ttl Set (I)	Normal	Forward totalization preset
Ext R Ttl Set (I)	Normal	Reverse totalization preset

Note: For "Ext 2 Ranges(I)," see the **Multiple ranges setting** section.

*: "DIO (O)" indicates DIO function is used for output. "DIO (I)" indicates DIO function is used for input.

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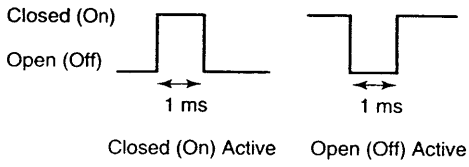
Example 1: When the "Pulse Output" function is selected for the DO terminal and the **E12: Pulse Width** is "1 ms", the following signals are output from the terminal.



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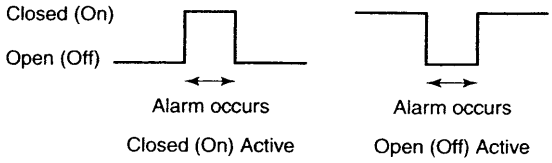
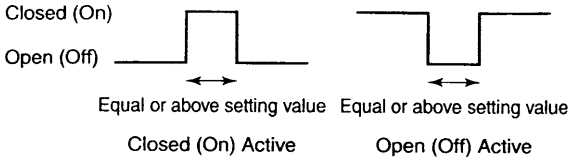
Example 2: When the "Alarm Output" function is selected for the DO or DIO (O) terminal, the following signals are output from the terminal.



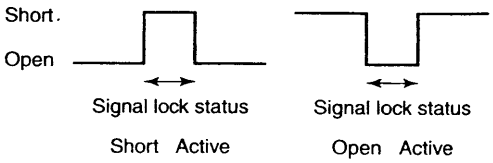
F0604-2.EPS

Example 3: When the "Total Switch (O)" function is selected for the DO or DIO (O) terminal, the following signals are output from the terminal.



F0604-3.EPS

Example 4: When the "0% Signal Lock (I)" function is selected for the DIO (I) terminal, the following signals are input to the terminal.



F0604-4.EPS

NOTE

Multiple ranges setting

Parameters from **F30** to **F41** are used with the automatic multiple ranges and the multiple ranges switching via an external status input. The followings will describe the setting method for each range.

The multiple ranges use the following parameters:

[B23: Flow Span] Setting of the flow rate span (Setting of the forward No.1 range)

[F30: Forward Span 2] Setting of the forward No.2 range

[F31: Forward Span 3] Setting of the forward No.3 range

[F32: Forward Span 4] Setting of the forward No.4 range

[F33: Reverse Span 1] Setting of the reverse No.1 range

[F34: Reverse Span 2] Setting of the reverse No.2 range

[F40: Auto Range Hys] Setting of the automatic multiple ranges hysteresis width.

[F41: Bi Direction Hys] Setting of the forward/ reverse flow measurement hysteresis width

Multiple Ranges Setting 1: Automatic multiple ranges switching

- When the instantaneous flow rate exceeds 100% of the range, transition to the next range (up to four ranges) is carried out automatically. Furthermore, when the flow is in reverse, the reverse range is automatically selected.
- Range switching can be confirmed according to the status of the DO and DIO status output terminals. Refer to Table 6.4.1: Status Output for Automatic Multiple Ranges Switching for details of status output conditions for each range.

Status Output for Automatic Multiple Ranges Switching

Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using **F22: DO Active Mode** or "Closed/Short Act" using **F23: DIO Active Mode**. Operating patterns are reversed when the active mode has been set to "Open (Off) Act" using **F22: DO Active Mode** or "Open/Open Act" using **F23: DIO Active Mode**.

Table 6.4.1 Status Output for Automatic Multiple Ranges Switching

Parameter setting		Function		Status output		
				DO	DIO	
F20	F21				DIO (O)	DIO (I)
No Function	No Function	Forward single range		–	–	–
Fwd/Rev Rngs (O)	No Function	Auto forward/ reverse 1 range	Forward	Open	–	–
			Reverse	Closed	–	–
No Function	Fwd/Rev Rngs (O)		Forward	–	Open	–
			Reverse	–	Closed	–
Auto 2 Rngs (O)	No Function	Auto forward 2 ranges	Forward 1 range	Open	–	–
			Forward 2 range	Closed	–	–
No Function	Auto 2 Rngs (O)		Forward 1 range	–	Open	–
			Forward 2 range	–	Closed	–
Auto 3 Rngs (O)	Auto 3 Rngs (O)	Auto forward 3 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Forward 3 range	Open	Closed	–
Auto 4 Rngs (O)	Auto 4 Rngs (O)	Auto forward 4 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Forward 3 range	Open	Closed	–
			Forward 4 range	Closed	Closed	–
Fwd/Rev Rngs (O)	Auto 2 Rngs (O)	Auto forward/ reverse 2 ranges	Forward 1 range	Open	Open	–
			Forward 2 range	Open	Closed	–
			Reverse 1 range	Closed	Open	–
			Reverse 2 range	Closed	Closed	–
Auto 2 Rngs (O)	Fwd/Rev Rngs (O)		Forward 1 range	Open	Open	–
			Forward 2 range	Closed	Open	–
			Reverse 1 range	Open	Closed	–
			Reverse 2 range	Closed	Closed	–

*: "No Function" is the default value. Only DO or DIO terminals are used for single or dual ranges; accordingly, the unused terminal remains at the default value (i.e., No Function) and can therefore be used for other functions.

*: "DIO (O)" indicates DIO function is used for output.

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Parameter setting sequence (for automatic multiple ranges switching)

F20: DO Function
Select a function.

F21: DIO Function
Select a function.

F22: DO Active Mode
Select whether DO output is to be "Closed (On) Act" or "Open (Off) Act".

F23: DIO Active Mode
Select whether DIO output is to be "Closed/Short Act" or "Open/Open Act".

Select a function (Note 1)
No Function: Output is stopped (other functions may be selected)
Fwd/Rev Rngs(O): Forward/reverse flow rate measurement
Auto 2 Rngs(O): Automatic 2-ranges switching
Auto 3 Rngs(O): Automatic 3-ranges switching
Auto 4 Rngs(O): Automatic 4-ranges switching

Refer to Table 6.4.1 and set **F20** or **F21**.
Note 1: "DIO (O)" indicates DIO function is used for output.

B23: Flow Span Forward No.1 range	**F30: Forward Span 2** Forward No.2 range	**F31:Forward Span 3** Forward No.3 range
F32:Forward Span 4 Forward No.4 range	**F33:Reverse Span 1** Reverse No.1 range	**F34:Reverse Span 2** Reverse No.2 range

Set the spans for the ranges to be used.
No.1 range≦No.2 range≦No.3 range≦No.4 range

If "instantaneous flow rate % (FR)" is selected for Display Mode and **A10: FLOW RATE (%)** is selected for BRAIN communication, the instantaneous flow rate % and following symbols will be displayed only for multiple ranges and forward/reverse flow measurement.
Forward No.1 range: [F1] Reverse No.1 range: [R1]
Forward No.2 range: [F2] Reverse No.2 range: [R2]
Forward No.3 range: [F3]
Forward No.4 range: [F4]

F0605.EPS

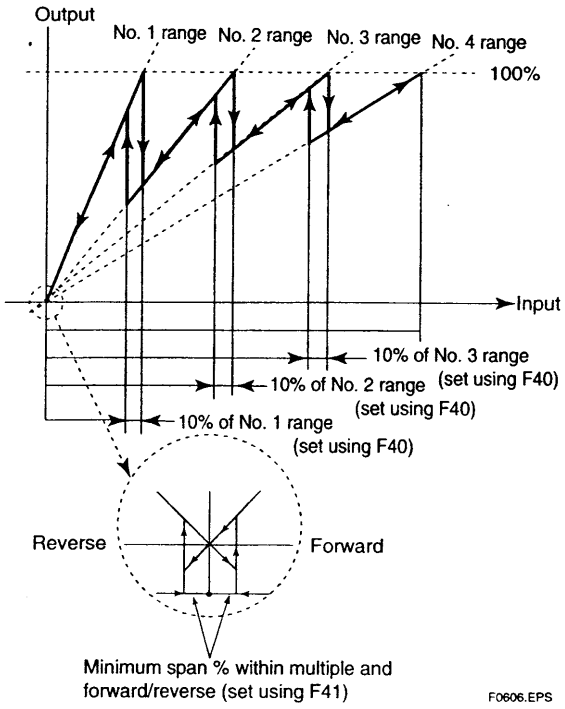


Figure 6.4.1 Multiple Ranges and Hysteresis Widths

NOTE

For more details regarding the setting of hysteresis width, refer to the description of setting parameter for **F40: Auto Range Hys** and **F41: Bi Direction Hys**.

Multiple Ranges Setting 2: Multiple ranges switching via external status input

- For both the forward and reverse directions, switching of up to two ranges can be carried out based on a status input; however, switching between directions is not possible. Switching between forward and reverse ranges is carried out automatically only when the flow direction reverses.
- DIO terminal is used for multiple ranges switching. For more details, refer to Table 6.4.2: Multiple Ranges Switching via External Status Input.

Multiple Ranges Switching via External Status Input

Operations are performed in accordance with the following table when the active mode has been set to "Closed (On) Act" using **F22: DO Active Mode** or "Closed/Short Act" using **F23: DIO Active Mode**. Operating patterns are reversed when the active mode has been set to "Open (Off) Act" using **F22: DO Active Mode** or "Open/Open Act" using **F23: DIO Active Mode**.

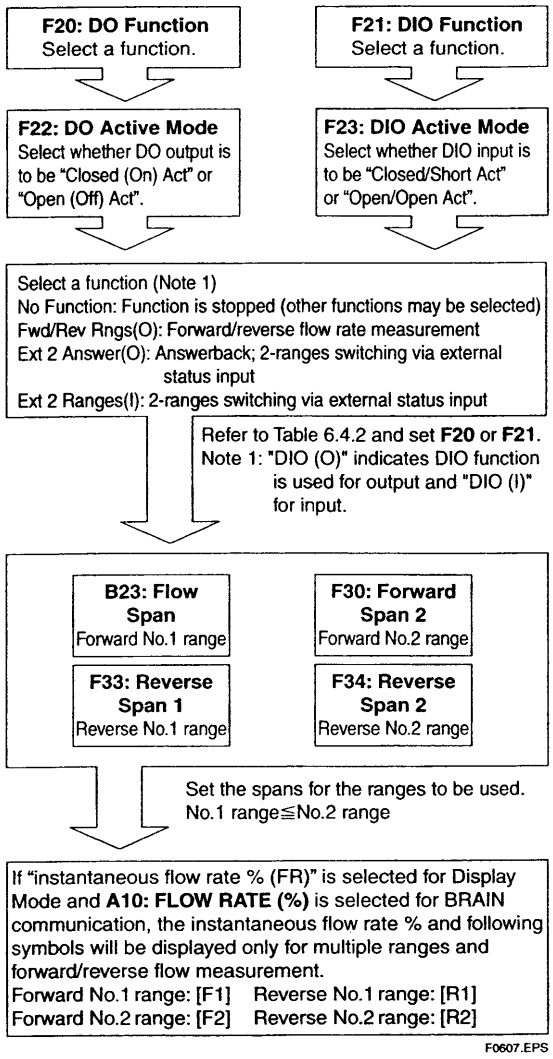
Table 6.4.2 Multiple Ranges Switching via External Status Input

Parameter setting		Function		Status output		
				DO	DIO	
F20	F21				DIO (O)	DIO (I)
No Function	Ext 2 Ranges(I)	External forward 2 ranges	Forward 1 range	–	–	Open
			Forward 2 range	–	–	Short
Fwd/Rev Rngs(O)	Ext 2 Ranges(I)	External forward/ reverse 2 ranges	Forward 1 range	Open	–	Open
			Forward 2 range	Open	–	Short
			Reverse 1 range	Closed	–	Open
			Reverse 2 range	Closed	–	Short
Ext 2 Answer(O)	Ext 2 Ranges(I)	External forward 2 ranges, with answerback	Forward 1 range	Open	–	Open
			Forward 2 range	Closed	–	Short

*: "No Function" is the default value. Only DIO terminal is used for dual ranges; accordingly, the unused DO terminal remains at the default value (i.e., No Function) and can therefore be used for other functions.

*: "DIO (I)" indicates DIO function is used for input. T0628.EPS

Parameter setting sequence (for multiple ranges switching via external status input)



F0607.EPS

[F40: Auto Range Hys] Setting of automatic range-switching hysteresis width

Automatic switching takes place for multiple range switching when 100% of the range is exceeded, and this parameter allows a hysteresis width to be set for this switching.

Refer to Figure 6.4.1: Multiple Ranges and Hysteresis Widths.

[F41: Bi Direction Hys] Setting of forward/reverse flow measurement hysteresis width

This parameter sets the hysteresis for forward/reverse flow rate measurement as a % value of the minimum flow span.

Refer to Figure 6.4.1: Multiple Ranges and Hysteresis Widths.

(6) Menu G: Alarm Setting items

(Refer to Section 6.5: Alarm Functions for more details.)

Menu G principally contains setting items relevant to alarms.

[G10: Low Alarm] Low alarm setting

This parameter sets the low limit (L) alarm value, and this is done using a % value of the maximum span.

- A setting value of -110% indicates that the alarm is disabled.

[G11: High Alarm] High alarm setting

This parameter sets the high limit (H) alarm value, and this is done using a % value of the maximum span.

- A setting value of 110% indicates that the alarm is disabled.

[G12: Low Low Alarm] Low-low alarm setting

This parameter sets the low-low limit (LL) alarm value, and this is done using a % value of the maximum span.

- A setting value of -110% indicates that the alarm is disabled.

[G13: High High Alarm] High-high alarm setting

This parameter sets the high-high limit (HH) alarm value, and this is done using a % value of the maximum span.

- A setting value of 110% indicates that the alarm is disabled.

NOTE

Setting of -110% or 110% results in the corresponding function being disabled; accordingly, settings can be combined to implement only high alarms or low alarms, etc.

Output Example 1

The high-high alarm (HH) is set to 90% or more of the flow rate span; the low-low alarm (LL), to 20% or less; the high alarm (H), to 80% or more; and the low alarm (L), to 30% or less.

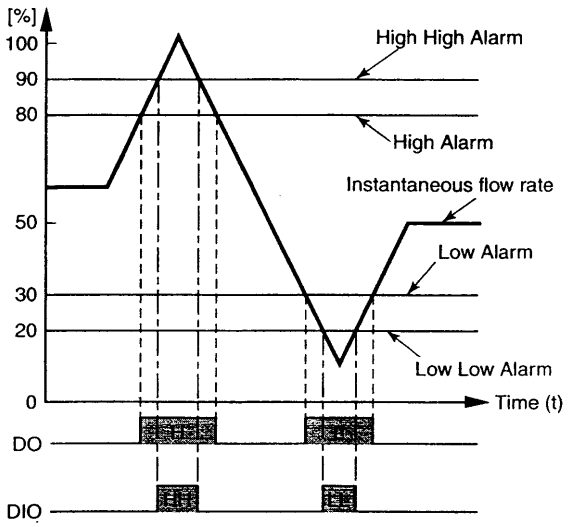
Settings are:

G10: Low Alarm = 30%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 90%



Select "H/L Alarm(O)" for **F20: DO Function**
Select "HH/LL Alarm(O)" for **F21: DIO Function**
Select "Closed (On) Act" for **F22: DO Active Mode**
Select "Closed/Short Act" for **F23: DIO Active Mode**

F0608.EPS

Output Example 2

The high alarm (H) is set to 80% or more of the flow rate span; the low-low alarm (LL), to 20% or less.

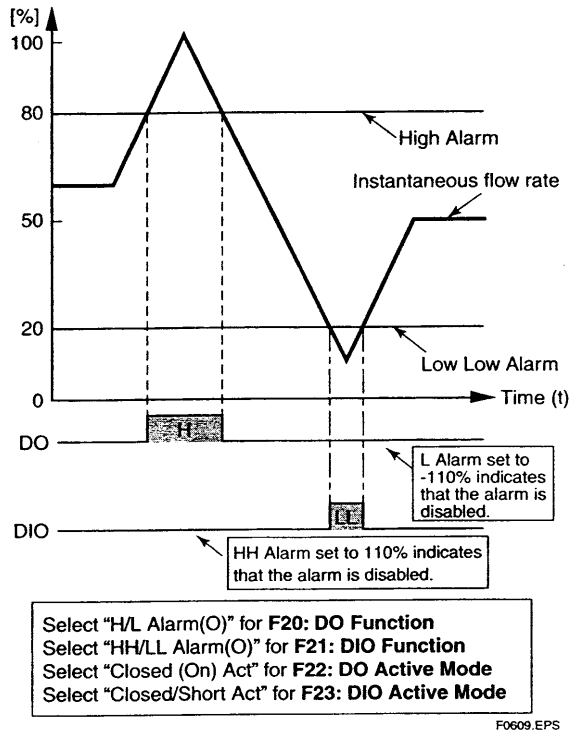
Settings are:

G10: Low Alarm = -110%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 110%



Output Example 3

The high alarm (H) is set to 80% or more of the flow rate span; the high-high alarm (HH), to 90% or more.

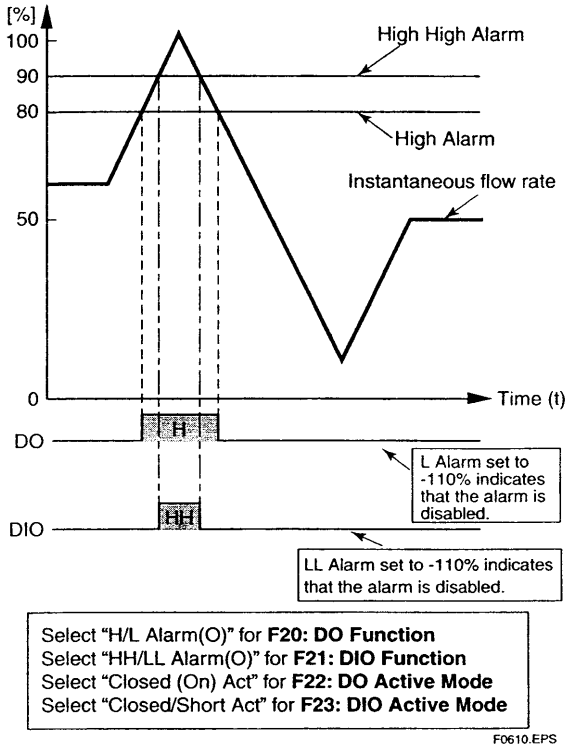
Settings are:

G10: Low Alarm = -110%

G11: High Alarm = 80%

G12: Low Low Alarm = -110%

G13: High High Alarm = 90%



NOTE

- Although the same items can be selected using the DO terminal (selected for **F20**) and the DIO terminal (selected for **F21**), output is identical for both.
- Setting values of -110% and 110% are used to disable corresponding functions; and accordingly, status output can be customized for specific purposes.

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[G14: H/L Alarm Hys] Setting of upper/lower alarm value hysteresis width
This parameter sets the hysteresis width for upper and lower alarm value, using a % value of the maximum span.

Output Example

The hysteresis width is set to 5%.

Settings are:

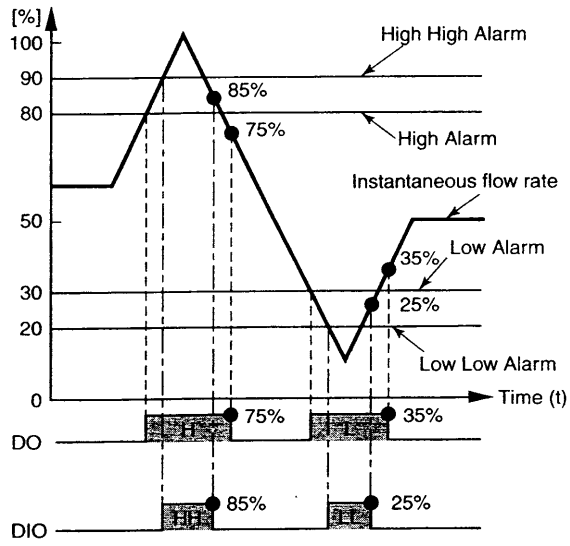
G10: Low Alarm = 30%

G11: High Alarm = 80%

G12: Low Low Alarm = 20%

G13: High High Alarm = 90%

G14: H/L Alarm Hys = 5%



F0611.EPS

[G21: 4-20mA Alarm Out] Setting of the current output during an alarm occurrence
This parameter can be used to set up the current output during alarm occurrence in advance.

Setting	Function
2.4mA or Less	Fixed at 2.4 mA or less
4.0mA	Fixed at 4 mA
Hold	Fixed current value when an alarm occured.
21.6mA or More	Fixed at 21.6 mA or more

T0629.EPS

[G22: 4-20mA Burn Out] Display of the current output during a CPU failure
This parameter displays the current output direction for a CPU failure (i.e., burnout). Note that communication will not be possible if such a failure occurs.
With the standard specification, this is set to High and 25mA is output when a failure occurs. Low is setup for optional code C1, and in such a case, 0mA is output when a failure occurs.

NOTE

The current output direction for a CPU failure (i.e., burnout) can be changed. Refer to selection 10.2.1: Setting of Burnout Switch.

[G30: Alm-Setting] Alarm recognition of "Setting Alarm"
This parameter specifies whether the setting alarm will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0630.EPS

[G31: Alm-Sig Over] Alarm recognition of "Signal Overflow Alarm"
This parameter specifies whether the signal overflow in process alarms will be recognized as an alarm. A signal overflow occurs when there is an error in the input signal.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0631.EPS

[G32: Alm-Emp Pipe] Alarm recognition of "Empty Pipe Alarm"
This parameter specifies whether the empty pipe (flowtube is not filled with fluid) in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0632.EPS

[G33: Alm-HH/LL] Alarm recognition of "HH/LL Alarm"
(Refer to the descriptions of **G12** and **G13** for more details regarding HH and LL alarms.)
This parameter specifies whether HH/LL alarm in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0633.EPS

NOTE

To set "HH/LL Alarm" as an alarm, it is necessary to set "HH/LL Alarm(O)" according to **F20: DO Function** or **F21: DIO Function**, and set **G12: Low Low Alarm** or **G13: High High Alarm** as well.

[G34: Alm-Adhesion] Alarm recognition of "Adhesion Alarm"
This parameter specifies whether the electrode adhesion alarm in process alarms will be recognized as an alarm.

Setting	Function
No	Not recognized as an alarm
Yes	Recognized as an alarm

T0634.EPS

NOTE

The AXFA14 or the AXF integral flowmeter has three different type of alarm (i.e., system alarms, process alarms, and setting alarms). For setting alarms and process alarms, settings are made with **G30**, **G31**, **G32**, **G33** and **G34** to specify whether these will be recognized as an alarm. Refer to Section 6.5: Alarm Functions for more details regarding the content of each alarm and the effect of alarm recognition on output.

[G40: Operation Time] Display of operation time
This parameter is used to display the operation time. The operation time is the total time that is counted while the device works actually.
When the power supply is off, the operation time is not counted.
For example, "1D23:45" indicates an operation time of 1 day, 23 hours, and 45 minutes.

[G41: Alm Record1] Alarm record1
This parameter is used to display the most-recent alarm, and the alarms that can be displayed are as follows.

Alarm Items

Item	Description
: 16 space characters (i.e., no display)	No issuing of alarms
10 : uP Fault	Microprocessor (CPU) failure
11 : EEPROM Fault	EEPROM failure
12 : A/D(H) Fault	A/D converter failure (at high frequency
13 : A/D(L) Fault	A/D converter failure (at low frequency side)
14 : A/D(Z) Fault	A/D converter failure (detection of adhesion)
15 : Coil Open	Flowtube coil is open-circuit
16 : EEPROM Dflt	EEPROM returns to default values
18 : Power off	Power supply is off.
19 : Inst Pwr Fail	Instantaneous power fail for tens of milliseconds. After this fail is released, outputs reach the previous value immediately.
28 : WDT	The return from excessive instantaneous noise. After the noise is released, output return the normal condition.
30 : Sig Overflow	Input signal error
31 : Empty Pipe	Flowtube is not filled with fluid
33 : Adhesion Alm	Insulation adhered to electrode

T0635.EPS

NOTE

Records for "30: Sig Overflow" are kept only when **G31** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected). Records for "31: Empty Pipe" are kept only when **G32** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected). Records for "33: Adhesion Alm" are kept only when **G34** specifies that this condition is to be recognized as an alarm (i.e., "Yes" is selected).

[G42: Alm Record Time1] Display the operation time of alarm record1
This parameter is used to display the operation time at which the alarm indicated by **G41: Alm Record1** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

[G43: Alm Record2] Alarm record2
This parameter is used to display the second most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G44: Alm Record Time2] Display the operation time of alarm record2
This parameter is used to display the operation time at which the alarm indicated by **G43: Alm Record2** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

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19.1.1

[G45: Alm Record3] Alarm record3
This parameter is used to display the third most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G46: Alm Record Time3] Display the operation time of alarm record3
This parameter is used to display the operation time at which the alarm indicated by **G45: Alm Record3** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

[G47: Alm Record4] Alarm record4
This parameter is used to display the fourth most-recent alarm, and the alarms that can be displayed are the same as those for **G41: Alm Record1**.

[G48: Alm Record Time4] Display the operation time of alarm record4
This parameter is used to display the operation time at which the alarm indicated by **G47: Alm Record4** was occurred. For example, "1D23:45" indicates that an alarm was occured at the operation time of 1 day, 23 hours, and 45 minutes.

(7) Menu H: Display Setting items

Menu H contains setting items relevant to the display unit.

[H10: Display Select1] Setting of the first line for display unit
→ Refer to the description for parameter **B40**
This parameter selects the display content of the first line for display unit.

[H11: Display Select2] Setting of the second line for display unit
→ Refer to the description for parameter **B41**
This parameter selects the display content of the second line for display unit.

[H12: Display Select3] Setting of the third line for display unit
→ Refer to the description for parameter **B42**
This parameter selects the display content of the third line for display unit.

[H20: Display Cycle] Setting of the display cycle
This parameter sets the cycle for the display-response speed of display unit. Settings should be made in accordance with the measurement environment by, for example, setting a longer display cycle when using the equipment in low temperatures.

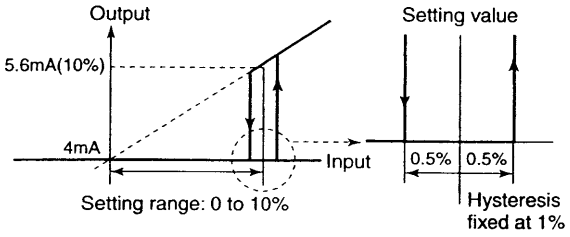
[H30: Language] Selection of language used for the display unit
→ Refer to the description for parameter **B10**
This parameter can be used to select the language for the display unit.

(8) Menu J: Auxiliary Function Setting items

Menu J contains setting items such as the flow direction, rate limits, and current output limits.

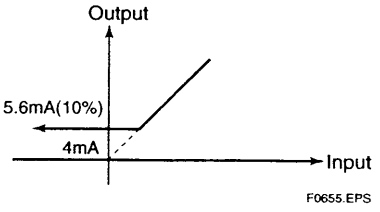
[J10: 4-20mA Low Cut] Setting of the low-cut range for current output
This parameter is used to force current output to 0% (i.e., 4mA) in the vicinity of 0% output, and setting for the current (4 to 20 mA) output low cut is made using a percentage of the smallest flow rate span. However, the low cut function will be terminated if this parameter is set to 0%.

Example: Situation where low cut is set to 10%



[J11: 4-20mA Low Lmt] Setting of the low limit for current output
This parameter is used to restrict low current portions of current (4 to 20mA) output, and it is initially set to -20%. Setting should be performed when a higher value is required for the lower limit.

Example: Situation where low limit is set to 10%



NOTE

If "2.4mA or less" has been set for **G21:4-20mA Alarm Out**, 2.4mA or less will be output upon an alarm occurrence, regardless of the low limit setting.

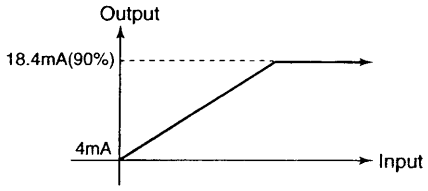
NOTE

- If the setting value for the low limit is not less than the high limit value (as set using **J12: 4-20mA High Lmt**), the setting alarm "4-20 Lmt Err" will be displayed.
- This parameter has no effect on pulse output or the totalization function.

[J12: 4-20mA High Lmt] Setting of the high limit for current output

This parameter is used to restrict high current portions of current (4 to 20mA) output, and it is initially set to 120%. Setting should be performed when a lower value is required for the higher limit.

Example: Situation where high limit is set to 90%



F0656.EPS

NOTE

If "21.6mA or more" has been set for **G21:4-20 mA Alarm Out**, 21.6mA or more will be output upon an alarm occurrence, regardless of the high limit setting.

[J20: Flow Direction] Setting of the flow direction

Upon shipment from the manufacturing plant, the system is setup such that flow in the same direction, as shown by the direction of the arrow mark on the flowtube, will be measured as forward flow; however, this parameter can be used to set "Reverse" so that flow in the opposite direction to the arrow mark will be treated as forward.

Note: This function does not apply to measurement in both the forward and reverse directions, although this can be setup using by selecting "Fwd/Rev Rngs(O)" from either **F20: DO Function** or **F21: DIO Function**.

Setting	Function
Forward	Forward direction corresponds with arrow mark.
Reverse	Forward direction is opposite to arrow mark.

T0638.EPS

[J21: Rate Limit] Setting of the rate limit value

- This parameter is used in situations where sudden noise cannot be eliminated by increasing the damping time constant.
- In situations where step signals or sudden noise signals caused by slurries or the like are entered, this parameter is used to set the standard for determining whether an input corresponds to a flow measurement or noise. Specifically, this determination is made using upper and lower rate limits and using the dead time.
- Rate limit values are set using a percentage of the smallest range. The range of deviation per one calculation cycle should be input.

[J22: Dead Time] Setting of dead time

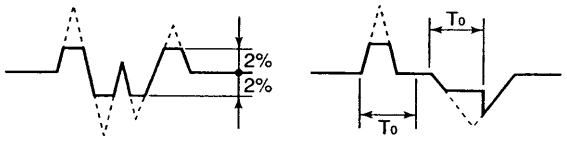
This parameter sets the time for application of the rate limit, and if a value of 0 is set, the rate limit function will be terminated.

NOTE

Determining rate limit value and dead time

Rate limit value:
Determines the level for output fluctuation cutoff. For example, if this is set to 2%, noise above 2% will be eliminated as shown in the diagram.

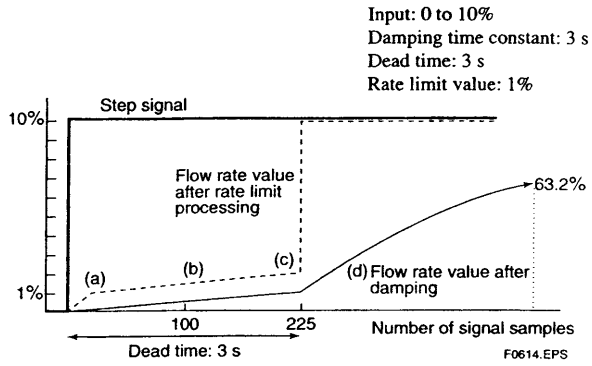
Dead time (T_0):
This is to be determined using the output fluctuation width. If noise exceeds the dead time as shown in the diagram below, the dead time should be made longer.



F0613.EPS

- Signal processing method:
  A fixed upper and lower limit value is setup with respect to the primary delay response value for the flow rate value obtained during the previous sampling, and if the currently sampled flow rate is outside these limits, then the corresponding limit is adopted as the current flow rate value. In addition, if signals which breach the limits in the same direction occur over multiple samples (i.e., within the dead time), it is concluded that the corresponding signal is a flow rate signal.

Example 1: Step input



(1) In comparison with the previous value at (a), it is determined that the signal is in excess of the rate limit value and the response becomes 1%. However, the actual output applies damping, and therefore the output turns out to be as indicated by the solid line.

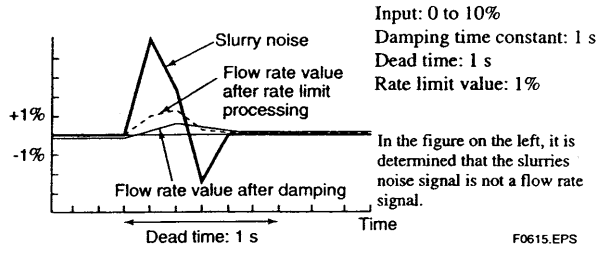
(2) Subsequent flow values within the dead time zone correspond to signals of post-damping flow value + rate limit value (1%).

(3) Since input signals do not return to within the rate limit value during the dead time, it is determined at (c) that this signal is a flow rate signal.

(4) The output signal becomes a damped curve and compliance with the step signal begins.

Three seconds after determination of a flow rate signal in the above figure, a level of 63.2% is reached.

Example 2: Slurry noise



[J23: Pulsing Flow] Selection of pulsing flow support

In a situation where pulsating flow causes error in the average flow value, due to the application of a plunger pump, this parameter provides functionality whereby calculation is controlled and variations in flow rate are followed.

Setting	Function
No	Normal
Yes	Support for pulsing flow

T0637.EPS

[J24: T/P Damp Select] Setting of damping operation

This parameter is used to select that the flow rate value obtained through damping calculation for totalization and pulse output or the instantaneous flow rate value (no damping) for totalization and pulse output.

Setting	Function
Damp	Damping
No Damp	No damping

T0653.EPS

[J30: Power Synch] Setting of power synchronization

This parameter sellects whether or not the internal frequency is to be synchronized with that of the power supply.

Setting	Function
No	Not synchronized
Yes	Synchronized

T0639.EPS

[J31: Power Frequency] Setting of power frequency

When "Yes" (i.e., in synchrony) has been selected for **J30: Power Synch**, this parameter is used to display the power supply frequency. If "No" (i.e., not synchronized) has been selected, the power supply frequency is to be specified.

IMPORTANT

In situations where a DC power supply is used for converters, set the local commercial power frequency in area where the converter is installed.
Set "No" for **J30: Power Synch** and the local commercial power frequency for **J31: Power Frequency**.

		Size 2.5 mm (0.1 in.) to 400 mm (16 in.)
AC power supply	J30	Power synchronous (Yes)
	J31	No setting
DC power supply	J30	Power asynchronous (No)
	J31	Local commercial power frequency

T0642-1.EPS

[J40: Memo 1] Setting of memo 1

[J41: Memo 2] Setting of memo 2

[J42: Memo 3] Setting of memo 3

These parameters are used with the memo function, and up to 16 characters can be set for each.

[J50: Software Rev No] Display of software revision
This parameter is used to display the software's revision number.

(9) Menu K: Diagnostic Function Setting items

Menu K contains items that are relevant to the diagnosis of insulation adhesion to the electrode.

[K10: Adhesion Check] Setting of adhesion diagnostic function
This parameter selects whether or not the adhesion diagnostic function will be carried out.

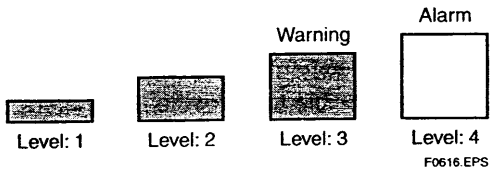
Setting	Function
No	Halt the adhesion diagnostic function
Yes	Carry out the adhesion diagnostic function

T0640.EPS

NOTE

Adhesion Diagnostic Function

- This function diagnose adhesion using electrode resistance values.
- When "Adhesion check" has been set for **B41/H11: Display Select 2** or **B42/H12: Display Select 3**, the diagnose adhesion is indicated on the display unit using four different levels.
- If the judgment value for Level 3 is exceeded, a warning is displayed; and if the value for Level 4 is exceeded, an alarm is displayed.
- Available conductivity for this function is limited to:
  Nominal size 10 mm or smaller: 30 μS/cm
  Nominal size 15 mm or larger: 10 μS/cm
  Make sure to use the adhesion diagnostic function with the greater conductivity than the above mentioned value.



F0616.EPS

[K11: Adhesion Level1] Setting the resistance value for adhesion diagnostic level1
This parameter sets the resistance value (in M ohm) for judgment of Level 1.

[K12: Adhesion Level2] Setting the resistance value for adhesion diagnostic level2
This parameter sets the resistance value (in M ohm) for judgment of Level 2.

[K13: Adhesion Level3] Setting the resistance value for adhesion diagnostic level3
This parameter sets the resistance value (in M ohm) for judgment of Level 3.
*: The warning **80: Adhesion Wng** is displayed when the adhension level reaches Level 3.
*: If "Warning Output" has been selected for **F20: DO Function** or **F21: DIO Function**, then status output will be performed when the adhesion level reaches Level 3.

[K14: Adhesion Level4] Setting the resistance value for adhesion diagnostic level4
This parameter sets the resistance value (in M ohm) for judgment of Level 4.
*: The process alarm **33: Adhesion Alm** is displayed when the adhension level reaches Level 4.
*: Alarm output will be preformed if "Alarm Output" has been selected for **F20: DO Function** or **F21: DIO Function**, and "Yes" for **G34: Alm-Adhesion**.

[K15: Adh Measure Value] Displays the resistance value for adhesion diagnose
This parameter displays the value measured using the adhesion diagnostic function (in M ohm).
When "No" is selected for **K10: Adhesion Check**, this parameter displays the indetermination value.

(10) Menu M: Automatic Zero Adjustment Function Setting items

Menu M contains items that are relevant to automatic adjustment of the zero point.

[M10: Auto Zero Exe] Execution of automatic zero adjustment function
→ Refer to the description of parameter **B50**.

[M11: Magflow Zero] Results of automatic zero adjustment
This parameter is used to display the results obtained from **B50/M10: Auto Zero Exe**. Specifically, the correction value displayed, and it is also possible to directly enter correction value.

(11) Menu N: Loop Test Setting items

Menu N contains items that are relevant to loop testing.

[N10: Test Mode] Setting for loop test execution

Setting	Function
Normal	No execution of loop testing.
Test	Loop testing is started

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IMPORTANT

(1) Test output has priority over flow rate measurement signals. When carrying out flow rate measurements, be sure to always return to "Normal".
(2) Upon entry to the Test Mode, all output terminals will simultaneously adopt test condition.
(3) "Normal" will be restored when the power is turned off or when 30 minutes have elapsed since entry to Test Mode.
(4) In Test Mode, the warning **83: Fix Cur Wng** will be displayed as a warning message. (For more details, refer to Section 6.5 Alarm Functions.)

[N11: Test Output Value] Setting for test output values

During loop testing, current output (4 to 20mA), totalization, and pulse will be output in accordance with this parameter's setting, and values can be set when "Test" has been selected for **N10: Test Mode**. With multiple ranges or when performing forward/reverse flow measurements, setting should be done using a percentage of the maximum range.

[N30: Test DO] Setting for DO terminal condition during testing

This parameter sets the condition of the DO terminal during loop testing. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Open (Off)	DO terminal in Open (Off) condition
Closed (On)	DO terminal in Closed (On) condition
Pulse	Outputs pulses as were specified with Menu E.*

T0642.EPS

*: If the pulse scale is 0 pps or there is a pulse setting error, the DO terminal is "Open (Off)."

[N31: Test DIO (O)] Setting for the DIO terminal condition during testing

This parameter sets the condition of the DIO terminal during loop testing. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Input mode	Must be set when **N32: Test DIO (I)** is used to display the condition of the DIO terminal.
Open (Off)	DIO terminal in Open (Off) condition
Closed (On)	DIO terminal in Closed (On) condition

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[N32: Test DIO (I)] Display for DIO terminal condition during testing

This parameter is used to display the condition of the DIO terminal. Setting is possible when "Test" has been selected for **N10: Test Mode**.

Setting	Function
Open	DIO terminal in Open condition
Short	DIO terminal in Short condition

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(12) Menu P: Parameter Protection items

Menu P contains items that are relevant to write protection and passwords.

[P10: Key Code] Parameter of the display restriction

This parameter restricts access to the Service Mode.

NOTE

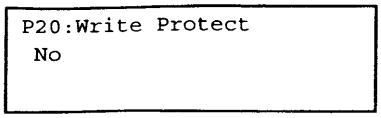
Write Protect function

- The parameters **P20** through **P23** are set when using the write protect function. Specifically, this function responds to a hardware switch or the setting of a software password, and it protects parameters from being overwritten.
- If the hardware switch is set to "Protect", it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to "Enable".
- For more details regarding hardware switch settings, refer to Section 10.2.2: Setting of Write Protect Switch.

[P20: Write Protect] Setting of password to release the write protection function

This parameter is used to indicate whether or not write protection is currently on.

Default setting (Enable)



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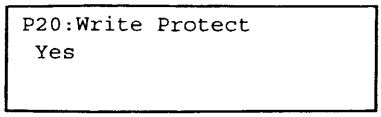
Write protection (Protect)



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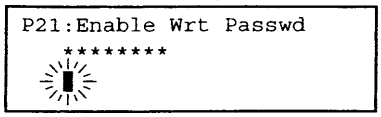
[P21: Enable Wrt Passwd] Setting of password to release the write protection function
When the correct password is input, write protection will be released for a period of 10 minutes; furthermore, this period will be extended by a further 10 minutes each time a parameter is overwritten.



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The cursor will flash when entering Parameter Replacement Mode, and the password set with **P22: New Password** should be input at this time.

[P22: New Password] Setting of a new password
This parameter sets the password required for the release of write protection. When set, it will be possible to make write protect settings on the software side.

Default setting

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The default setting for this parameter is a string of 8 spaces (i.e., Enable), and thus, the password field will be empty. When the cursor is flashing, the password should be input. Press the SET key twice to confirm the password. The display will then change to "********".

After password setting

F0621.EPS

To change a password, first of all use the password originally set with **P21: Enable Wrt Passwd** to release the write protect function, and then set the new password. Alternatively, if it is desired to return to the condition where no password is set, enter a string of 8 spaces.

[P23: Software Seal] Display the software seal
When the joker password has been used to release write protection, this parameter displays "Break", and when protection is cancelled using the password set using **P22: New Password**, it returns to "Keep".

NOTE

If you should forget your password, the joker password can be used to temporarily release write protection function. To obtain the joker password, please contact your nearest YOKOGAWA sales office.

6.5 Alarm Functions

6.5.1 Alarm Levels

Alarms are classified into the following four different types based on level.

Alarm	Level	Description
System alarm	Major breakdown	Device breakdown or inability to obtain correct measurements. Replacement will be required.
Process alarm	Intermediate level break down	Device is normal but process-related errors make correct measurement impossible. Maintenance or the like will be required.
Setting alarm	Minor breakdown	Device is normal but errors have been made in the setting of parameters. Functions not related to the incorrect settings are operating normally. The incorrect settings must be corrected.
Warning	Warning	Device and measurements are normal but a warning is occurred.

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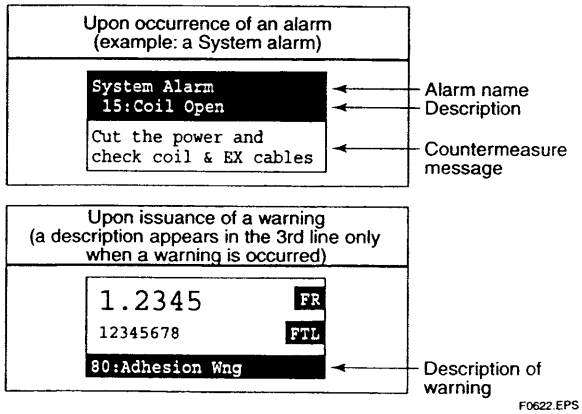
When an alarm has been occurred, the corresponding alarm name, description, and suitable countermeasure will be displayed on the display unit. The normal Display Mode and Alarm Mode may be displayed alternatively. When a warning has been issued, the corresponding content will be shown in the third line in the Display Mode.



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6.5.2 Alarm Selection

The display and output differs depending on the alarm levels. Certain types of alarm may or may not be recognized as alarms, according to the settings of certain parameters. The parameters that are relevant to this function as follows.

[F20: DO Function] Setting of the function for the DO status output terminal

[F21: DIO Function] Setting of the function for the DIO status input/output terminal

[F22: DO Active Mode] Setting of the active mode for DO terminal

[F23: DIO Active Mode] Setting of the active mode for DIO terminal

[G21: 4-20mA Alarm Out] Setting of the current output during an alarm occurring.

[G30: Alm-Setting] Alarm recognition of "Setting Alarm"

[G31: Alm-Sig Over] Alarm recognition of "Signal Overflow Alarm"

[G32: Alm-Emp Pipe] Alarm recognition of "Empty Pipe alarm"

[G33: Alm-HH/LL] Alarm recognition of "HH/LL Alarm" (Refer to the descriptions of **G12** and **G13** for more details regarding HH and LL alarms.)

[G34: Alm-Adhesion] Alarm recognition of "Adhesion Alarm"

[G41: Alm Record1] Alarm record1

[G43: Alm Record2] Alarm record2

[G45: Alm Record3] Alarm record3

[G47: Alm Record4] Alarm record4

(1) Display and output condition for system alarms

		Alarm description	Alarm output	4-20 mA output	Totalization	Pulse	Display unit	Alarm record
	Normal		Closed (On)	Normal	Normal	Normal	Display Mode	No
10	μP Fault	Microprocessor(CPU)failure	Open (Off)	0mA or 25mA (*)	Indetermination	Stopped	Indetermination	Indetermination
11	EEPROM Fault	EEPROM failure						
12	A/D(H) Fault	A/D converter failure	Open (Off)	Fixed (G21 selection)	Stopped	Stopped	Alarm Mode (display of system alarm message)	Recorded
13	A/D(L) Fault							
14	A/D(Z) Fault							
15	Coil Open	Flowtube coil is open-circuit						
16	EEPROM Dflt	EEPROM default values						

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode**, or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.
*The output value is performed in accordance with the setting of the burnout switch. For information about this switch, see Section 10.2.1.

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(2) Display and output condition for process alarms

		Alarm description	Selection (parameter number)	Alarm output	4-20 mA output	Totalization	Pulse output	Display unit	Alarm record
30	Sig Overflow	Input signal error	YES (G31)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G31)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No
31	Empty Pipe	Flowtube is not filled with fluid	YES (G32)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G32)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No
32	HH/LL Alm	HH/LL Alarm	YES (G33)	Open (Off)	Normal operation	Normal operation	Normal operation	Alarm Mode (Message)	No
			NO (G33)	Closed (On)				Display Mode	
33	Adhesion Alm	Electrode adhesion alarm	YES (G34)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (Message)	Recorded
			NO (G34)	Closed (On)	Continuous (*)	Continuous (*)	Continuous (*)	Display Mode	No

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode** or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.
*: Although outputs are continuous, output values are not guaranteed.

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(3) Display and output condition for setting alarm occurrences

		Alarm description	Selection (parameter number)	Alarm output	4-20 mA output	Totali-zation	Pulse output	Display unit	Alarm record
50	Span > 10m/s	Span flow velocity setting is 11 m/s or more	NO (G30)	Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
51	Span < 0.1m/s	Span flow velocity setting is 0.05 m/s or less							
52	TTL>10000p/s	Totalization rate is 11000 pps or more		Closed (On)	Normal operation	Stopped	Normal operation	Alarm Mode (message)	No
53	TTL<0.0001p/s	Totalization rate is 0.00005 pps or more							
54	4-20 Lmt Err	The condition [4-20 low limit (J11) < 4-20 high limit (J12)] is not satisfied.		Closed (On)	Fixed	Normal operation	Normal operation	Alarm Mode (message)	No
55	Multi Rng Err	The condition [No. 1 range < No. 2 range < No. 3 range < No. 4 range] is not satisfied for multiple ranges.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
56	H/L HH/LL Set	The condition [High Alarm (G11) - Low Alarm (G10) > H/L Alarm Hys (G14)] or the condition [High High Alarm (G13) - Low Low Alarm (G12) > H/L Alarm Hys (G14)] is not satisfied.		Closed (On)	Normal operation	Normal operation	Normal operation	Alarm Mode (message)	No
57	Dens Set Err	Mass units have been selected for Base Flow Unit (C40) but density is set to 0.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
60	PLS >10000p/s	Pulse rate is 11000 pps or more with 50% duty.		Closed (On)	Normal operation	Normal operation	Stopped	Alarm Mode (message)	No
		Pulse rate is 10000 pps or more with 0.05 ms selection.							
61	PLS > 5000p/s	Pulse rate is 5000 pps or more with 0.1 ms selection.							
62	PLS > 1000p/s	Pulse rate is 1000 pps or more with 0.5 ms selection.							
63	PLS > 500p/s	Pulse rate is 500 pps or more with 1 ms selection.							
64	PLS > 25p/s	Pulse rate is 25 pps or more with 20 ms selection.							
65	PLS > 15p/s	Pulse rate is 15 pps or more with 33 ms selection.							
66	PLS > 10p/s	Pulse rate is 10 pps or more with 50 ms selection.							
67	PLS > 5p/s	Pulse rate is 5 pps or more with 100 ms selection.							
70	PLS<0.0001p/s	Pulse rate is 0.00005 pps or less.							
71	Meas Mod Set	Measure Mode (C20) is set to Enhanced DF without selecting an optional code HF1 or HF2.		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
72	Size Set Err	A value of 3000.1 mm or more is set for Nominal Size (C32).		Closed (On)	Fixed	Stopped	Stopped	Alarm Mode (message)	No
73	Adh Set Err	The condition [Level:1< Level:2<Level:3<Level:4] is not satisfied for adhesion diagnostic level.		Closed (On)	Normal operation	Normal operation	Normal operation	Alarm Mode (message)	No
	Occurring of any alarm from 50 through 73	-	YES (G30)	Open (Off)	Fixed	Stopped	Stopped	Alarm Mode (message)	No

Note: • Alarm is output only when **F20: DO Function** or **F21: DIO Function** is set to "Alarm Output."
• The operation when "Open (Off) Act" is set for **F22: DO Active Mode** or "Open/Open Act" is set for **F23: DIO Active Mode** is shown in above table.
• 4-20mA output upon the occurrence of an alarm will be fixed at the value selected with **G21: 4-20mA Alarm Out**.

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6.5.3 Alarms & Warning Messages

System Alarms (Device breakdown or inability to obtain correct measurements.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
10:uP Fault	Contact nearest office or service center	Microprocessor (CPU) failure	Contact your nearest Yokogawa office or service center.
11:EEPROM Fault	Contact nearest office or service center	EEPROM failure	
12:A/D(H) Fault	Contact nearest office or service center	A/D converter failure	
13:A/D(L) Fault	Contact nearest office or service center		
14:A/D(Z) Fault	Contact nearest office or service center		
15:Coil Open	Cut the power and check coil & EX cable	Flowtube coil is open-circuit	Turn off the AXFA14 power supply and examine the excitation cable for breakage. If there is no breakage, contact your nearest Yokogawa office or service center. In case of the AXF integtal flowmeter, the excitation cable cannot be examined. Contact your nearest Yokogawa office or service center.
16:EEPROM Dflt	Contact nearest office or service center	EEPROM default values	Contact your nearest Yokogawa office or service center.

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Process Alarms (Device is normal but process-related errors make correct measurement impossible.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
30:Sig Overflow	Check signal cable and grounding	Input signal error	Carry out an investigation as follows: • Check the signal cable for breakage. • Check for contact between signal cable, power cable, and excitation cable. • Check for stray currents in the fluid. • Check the grounding.
31:Empty Pipe	Fill flow tube with fluid	Flowtube is not filled with fluid	Fill the flowtube with fluid.
32:HH/LL Alm	Check the flow rate and setting value	Flow rate alarm for greater than High-High limit value or less than Low-Low limit value.	Check the flow rate and setting value of High High limit and Low Low limit.
33:Adhesion Alm	Clean electrodes	Electrode adhesion alarm	Clean the electrodes.

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Setting Alarms (Device is normal but errors have been made in the setting of parameters.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
50:Span > 10m/s	Check parameter C40, C41, and C42	Span flow velocity setting is 11 m/s or more	Check whether parameters C40, C41, and C42 are correct. In case that multiple range or forward and reverse flow measurement functions is used, check whether parameters F30 through F34 are correct.
51:Span < 0.1m/s	Check parameter C40, C41, and C42	Span flow velocity setting is 0.05 m/s or less	
52:TTL>10000p/s	Check parameter D10 and D11	Totalization rate is 11000 pps or more	Check whether parameters D10 and D11 are correct.
53:TTL<0.0001p/s	Check parameter D10 and D11	Totalization rate is 0.00005 pps or more	
54:4-20 Lmt Err	Check parameter J11and J12	The condition [4-20 low limit (J11) < 4-20 high limit (J12)] is not satisfied.	Check whether parameters J11 and J12 are correct.
55:Multi Rng Err	Check parameter F30 to F34	The condition [No. 1 range < No. 2 range < No. 3 range < No. 4 range] is not satisfied for multiple ranges.	Check whether parameters F30 through F34 are correct.
56:H/L HH/LL Set	Check parameter G10 to G14	The condition [High Alarm (G11) – Low Alarm (G10) > H/L Alarm Hys (G14)] or the condition [High High Alarm (G13) – Low Low Alarm (G12) > H/L Alarm Hys (G14)] is not satisfied.	Check whether parameters G10 through G14 are correct.
57:Dens Set Err	Check parameter C40, C45, and C46	Mass units have been selected for Base Flow Unit (C40) but density is set to 0.	Check whether parameters C40, C45, and C46 are correct.
60:PLS > 10000p/s	Check parameter E10, E11, and E12	Pulse rate is 11000 pps or more with 50% duty. Pulse rate is 10000 pps or more with 0.05 ms selection.	Check whether parameters E10, E11, and E12 are correct.
61:PLS > 5000p/s	Check parameter E10, E11, and E12	Pulse rate is 5000 pps or more with 0.1 ms selection.	
62:PLS > 1000p/s	Check parameter E10, E11, and E12	Pulse rate is 1000 pps or more with 0.5 ms selection.	
63:PLS > 500p/s	Check parameter E10, E11, and E12	Pulse rate is 500 pps or more with 1 ms selection.	
64:PLS > 25p/s	Check parameter E10, E11, and E12	Pulse rate is 25 pps or more with 20 ms selection.	
65:PLS > 15p/s	Check parameter E10, E11, and E12	Pulse rate is 15 pps or more with 33 ms selection.	
66:PLS > 10p/s	Check parameter E10, E11, and E12	Pulse rate is 10 pps or more with 50 ms selection.	
67:PLS > 5p/s	Check parameter E10, E11, and E12	Pulse rate is 5 pps or more with 100 ms selection.	
70:PLS<0.0001p/s	Check parameter E10, E11, and E12	Pulse rate is 0.00005 pps or less.	
71:Meas Mod Set	Check parameter C20	Measure Mode (C20) is set to Enhanced DF without selecting an optional code HF1 or HF2.	Check whether parameter C20 is correct.
72: Size Set Err	Check parameter C32	A value of 3000.1 mm or more is set for Nominal Size (C32).	Check whether parameter C32 is correct.
73: Adh Set Err	Check parameter K11 to K14	The condition in Adhesion detection level, Level:1<Level:2<Level:3<Level:4 is not satisfied.	Check whether parameter K11, K12, K13 and K14 are correct.

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Setting Alarms (Device and measurements are normal but a warning is issued.)			
Display unit/BRAIN (□60) content	Alarm countermeasure message on display unit	Alarm description	Countermeasure
80:Adhesion Wng	–	Slight adhesion to electrodes.	Clean and check the electrodes. Refer to parameter K13.
82:Auto Zero Wng	–	Results of automatic zero adjustment are higher than the rated values.	Carry out adjustment as follows: • Check if the flowtube is filled with fluid. • Check if the flow velocity is completely zero. • Check the condition of grounding.
83:Fix Cur Wng	–	The current value is fixed.	Confirm whether the flow rate is in excess of the upper limit (108%) or below the lower limit (-8%), or whether upon entry to the Test Mode or not.
84:Disp Over Wng (only for display unit)	–	Overflow in the display digits during instantaneous flow rate display.	Check whether parameter C43 is correct.
90:Disp SW Wng (only for display unit)	–	Display unit switches are not operating.	Investigate whether the display unit cover is fitted or whether the cover's glass surface is dirty.

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19.1.1

6.6 Precautions for the AXF Integral Flowmeter

Although the AXF integral flowmeter's software configurations are the same as the AXFA14, care must be taken in setting the following parameters:

[C31: Nominal Size Unit] Setting of the nominal size units
[C32: Nominal Size] Setting of the nominal size

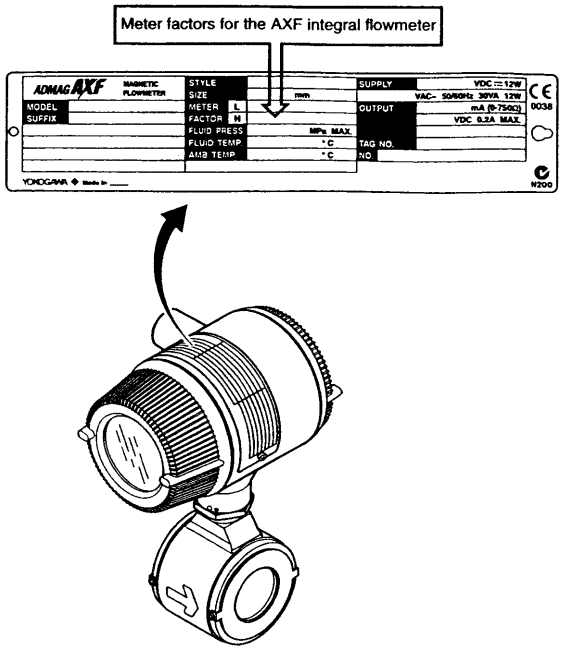
NOTE

The nominal size unit, nominal size and meter factor have been properly set upon shipment from the manufacturing plant. Do not change these parameters.

[C21: Low MF] Setting of the low-frequency meter factor
[C22: High MF] Setting of the high-frequency meter factor
[C23: Low MF (EDF)] Setting of the low-frequency meter factor for enhanced DF (i.e., enhanced dual frequency excitation)
[C24: High MF (EDF)] Setting of the high-frequency meter factor for enhanced DF (i.e., enhanced dual frequency excitation)

NOTE

Setting the meter factor



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(1) Confirm that the meter factors indicated on your AXF integral flowmeter's data plate has been set to the parameters.
(2) The meter factors are crucial in ensuring that the electromotive force is correctly in proportion to the flow velocity and are determined at the manufacturing plant by actual-flow calibration.

NOTE

For the hardware configuration of the AXF integral flowmeter, see the user's manual of the AXF Integral Flowmeter [Hardware Edition] (IM 01E20D01-01E).

7. OPERATION VIA BRAIN TERMINAL (BT200)

NOTE

This chapter describes the AXFA14 converter as an example. The same attention must be paid to the AXF integral flowmeter.

7.1 BT200 Basic Operations

7.1.1 Key Layout and Display

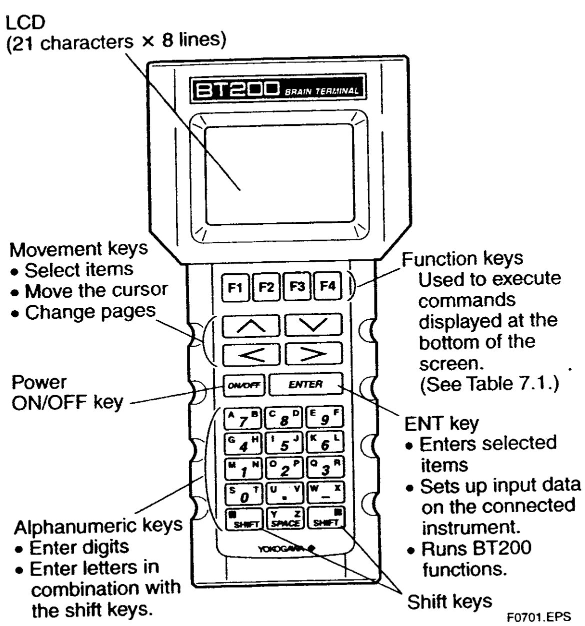
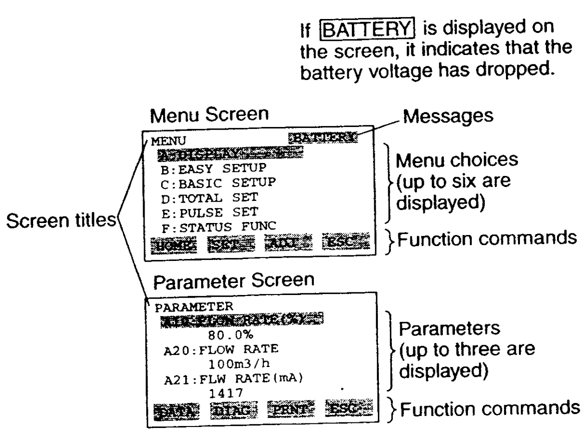


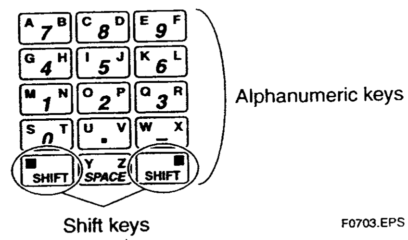
Figure 7.1 Key Layout



7.1.2 Key Descriptions

(1) Alphanumeric keys and shift keys

You can use the alphanumeric keys in conjunction with the shift keys to enter letters, digits, and symbols.



a) Entering digits, symbols, and spaces [i.e., 0-9, period (.), hyphen (-), underscore (_)]

Simply press the required alphanumeric key.

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

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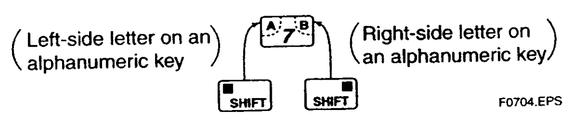
b) Entering letters (i.e., A through Z)

Press an alphanumeric key following a shift key to enter the letter shown on the same side as the shift key. The shift key must be pressed for each letter being input.



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

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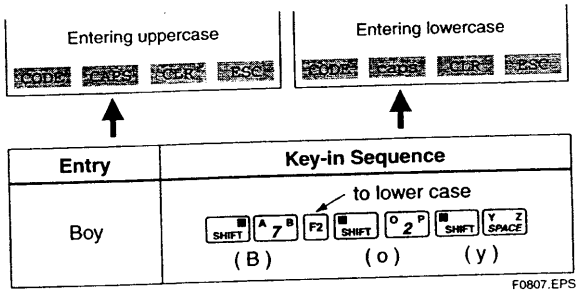
Use the function key [F2] CAPS to select between uppercase and lowercase (for letters only). The case toggles between uppercase and lowercase each time you press [F2] CAPS.



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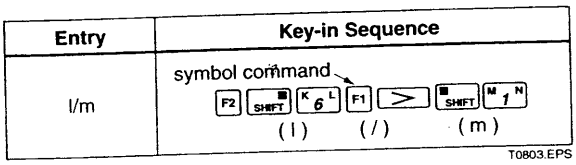
Use the function key [F1] CODE to enter symbols. The following symbols will appear in sequence, one at a time, at the cursor each time you press [F1] CODE:

/ . – , + *) (' & % $ # " !

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



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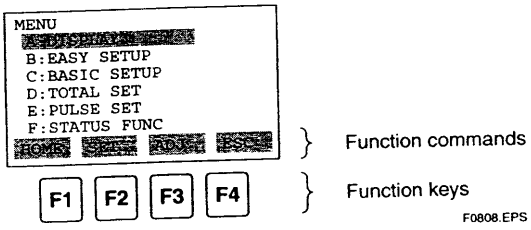
(2) Function Keys

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



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Function Command List

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

* Available on BT200-P00 (with printer).

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7.2 AXFA14 Operation Using a BT200

This section describes procedures for setting parameters using a BRAIN Terminal (BT200). For more details regarding AXFA14 functions, refer to Chapter 6: Parameter Description; and for more details regarding BT200 operation methods, refer to the BT200 User's Manual (IM IC0A11-01E).

7.2.1 BT200 Connection

Connection to a 4 to 20 mA DC signal line

The communication signal is superimposed onto the 4 to 20 mA DC analog signals to be transmitted.

AXFA14 terminals

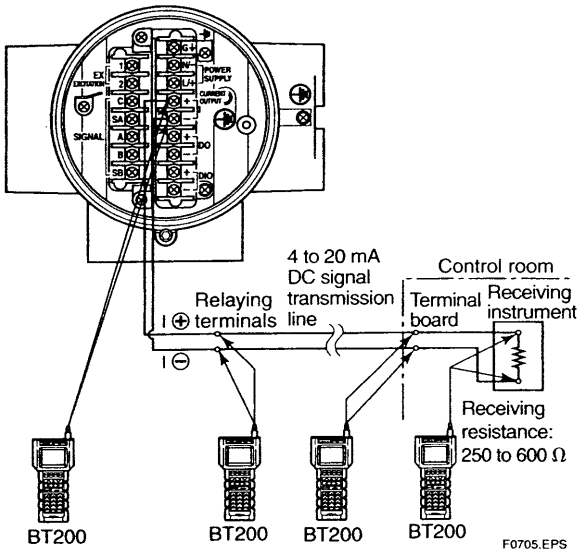

Figure 7.2 Connecting the BT200

IMPORTANT

Restrictions exist with regard to the distance over which communication is possible. (See Chapter 11: Outline.)

IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

IMPORTANT

After approximately 5 minutes of inactivity, the Auto Power-Off function will operate to turn your BT200 off.

NOTE

In case of BT200, the parameters are displayed in English only.
Even if the language with the exception of English is selected at **B10/H30: Language**, the parameters are displayed in English upon BT200.

7.2.2 The data update and upload/ download function of BT200

(1) The data update of BT200

When the following parameters are displayed, the measured data is updated automatically every seven seconds.

Item	Name (BRAIN)	Item	Name (BRAIN)
A10	FLOW RATE (%)	G42	ALM TIME 1
A20	FLOW RATE	G43	ALM RECORD2
A21	FLW RATE (mA)	G44	ALM TIME 2
A30	TOTAL	G45	ALM RECORD3
A31	REV TOTAL	G46	ALM TIME 3
A32	DIF TOTAL	G47	ALM RECORD4
C44	VELOCITY CHK	G48	ALM TIME 4
G22	4-20 BURNOUT	N32	TEST DIO (I)
G40	OPERATE TIME	P20	W PROTECT
G41	ALM RECORD1	P23	SOFT SEAL

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(2) Upload/download function of BT200

Upload function is used when the parameters of one AXFA14 are copied to the BT200. And download function is used when the parameters copied to the BT200 are set to another AXFA14.
For details, refer to BT200 User's Manual (IM 1C0A11-01E).
The targeted parameters for upload and download are following.

Item	Name (BRAIN)	Item	Name (BRAIN)
C11/B20	FLOW DAMPING	D10/B30	TOTAL UNIT
C31	SIZE UNIT	D11/B31	TOTAL SCALE
C32	NOMINAL SIZE	E10/B32	PULSE UNIT
C40/B21	FLOW UNIT	E11/B33	PULSE SCALE
C41/B22	TIME UNIT	H10/B40	DISP SELECT1
C42/B23	FLOW SPAN	H11/B41	DISP SELECT2
C43/B24	FLOW DECIMAL	H12/B42	DISP SELECT3

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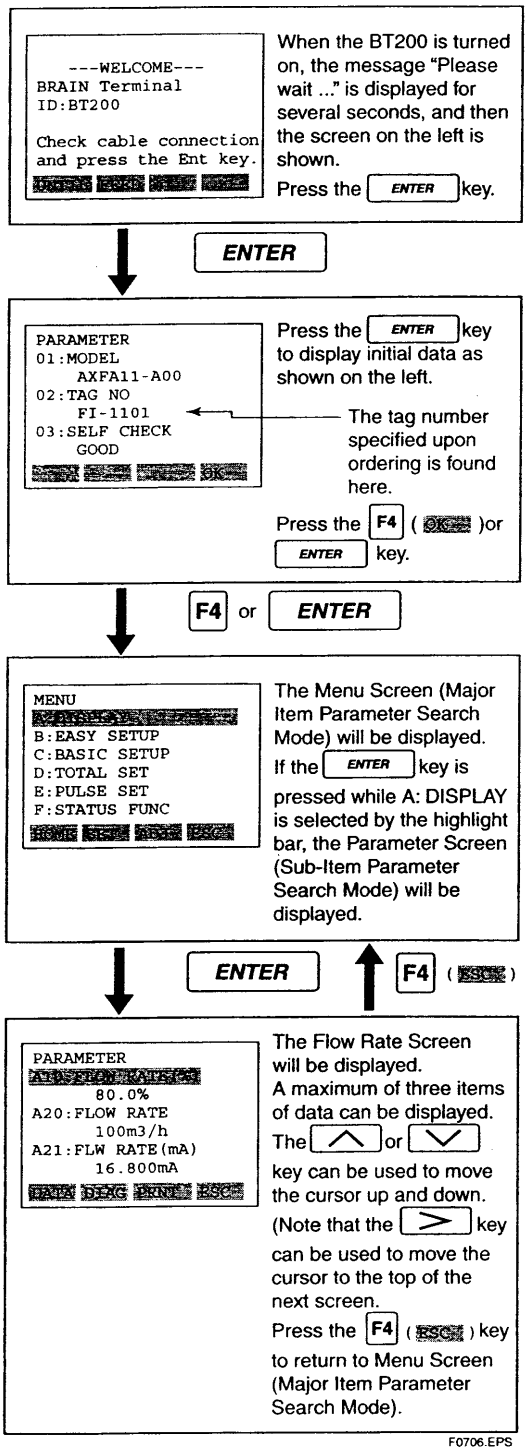
7.2.3 BT200 Screens & Flow Rate Data Display

Use the following procedure to display flow rate data on the BT200.

- The display of flow rate data is updated every 5 seconds.



7.3 Parameter Setting Using a BT200

This section describes the procedure for setting of parametes using a BT200.

IMPORTANT

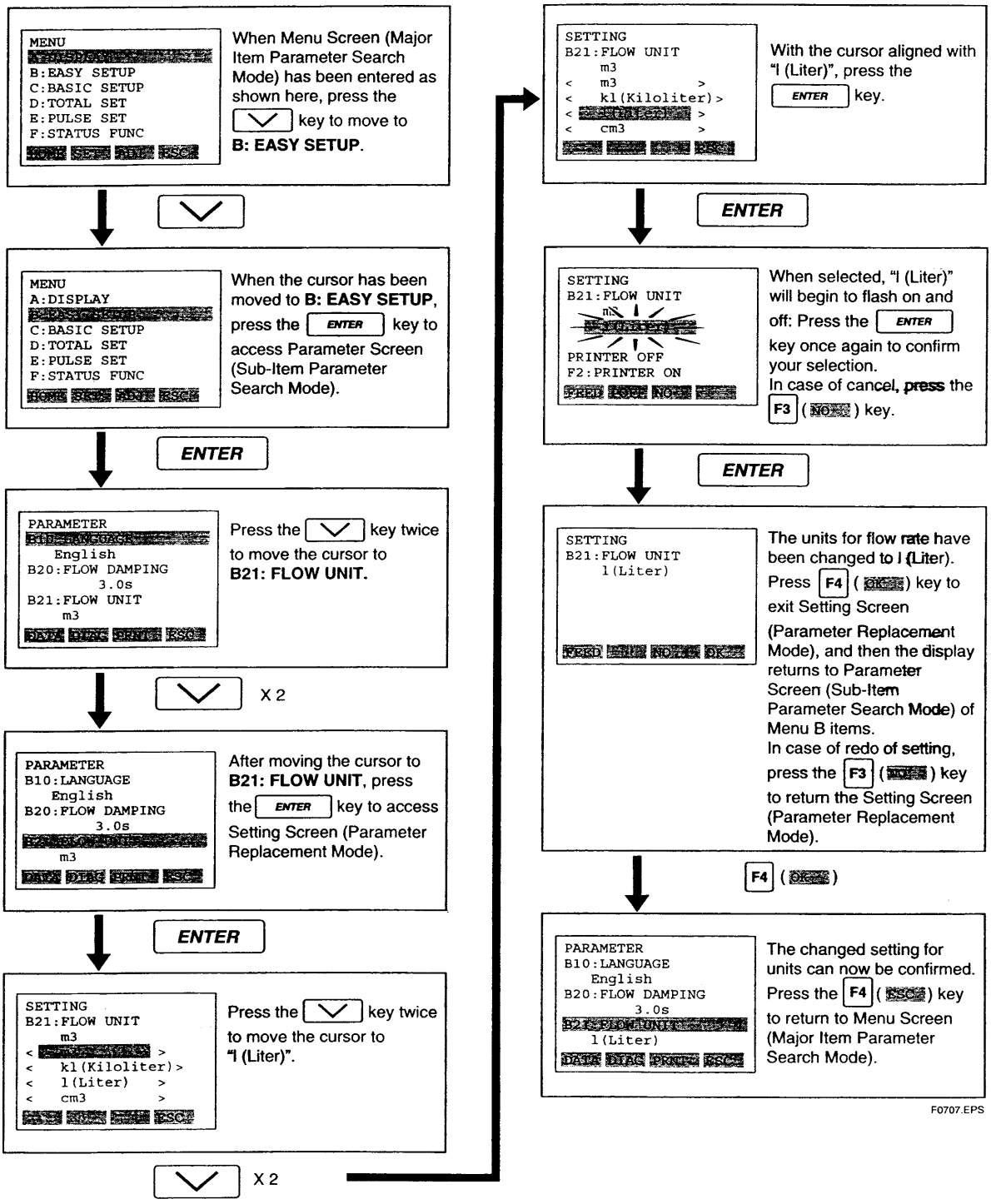
If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.

NOTE

Before updating any setting, remember to always check the data content you want to change as described in Chapter 6: Parameter Description.

7.3.1 BT200 Setting of Selection-Type Data: Flow rate units

In this example, the flow rate units specified by the selection-type parameter **B21: Flow Unit** are changed from m^3 to l (Liter).



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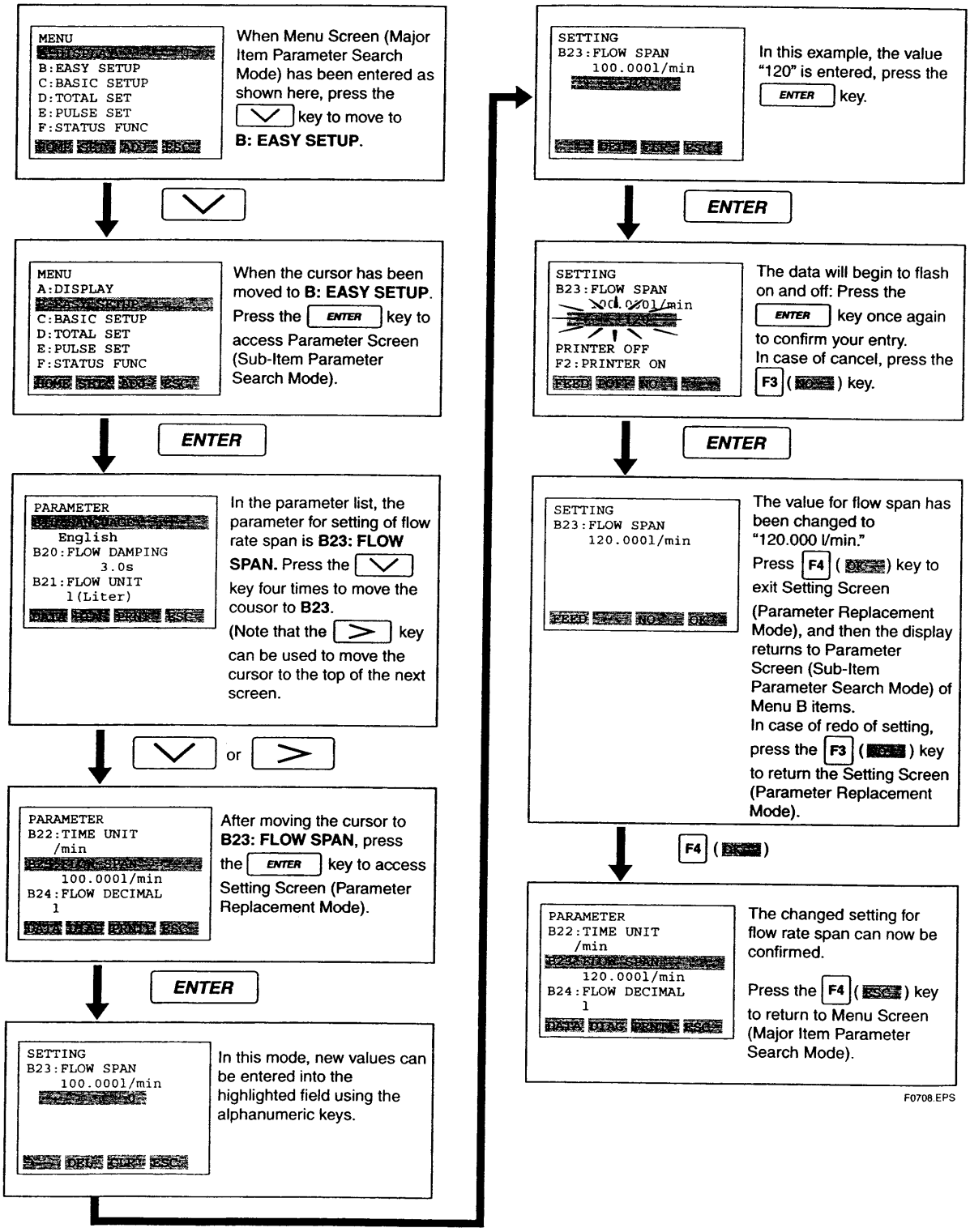
7.3.2 BT200 Setting of Numeric-Type Data: Flow rate span

In this example, the flow rate span specified by the numeric-type parameter **B23: Flow Span** is changed from 100.000 l/min. to 120.000 l/m.



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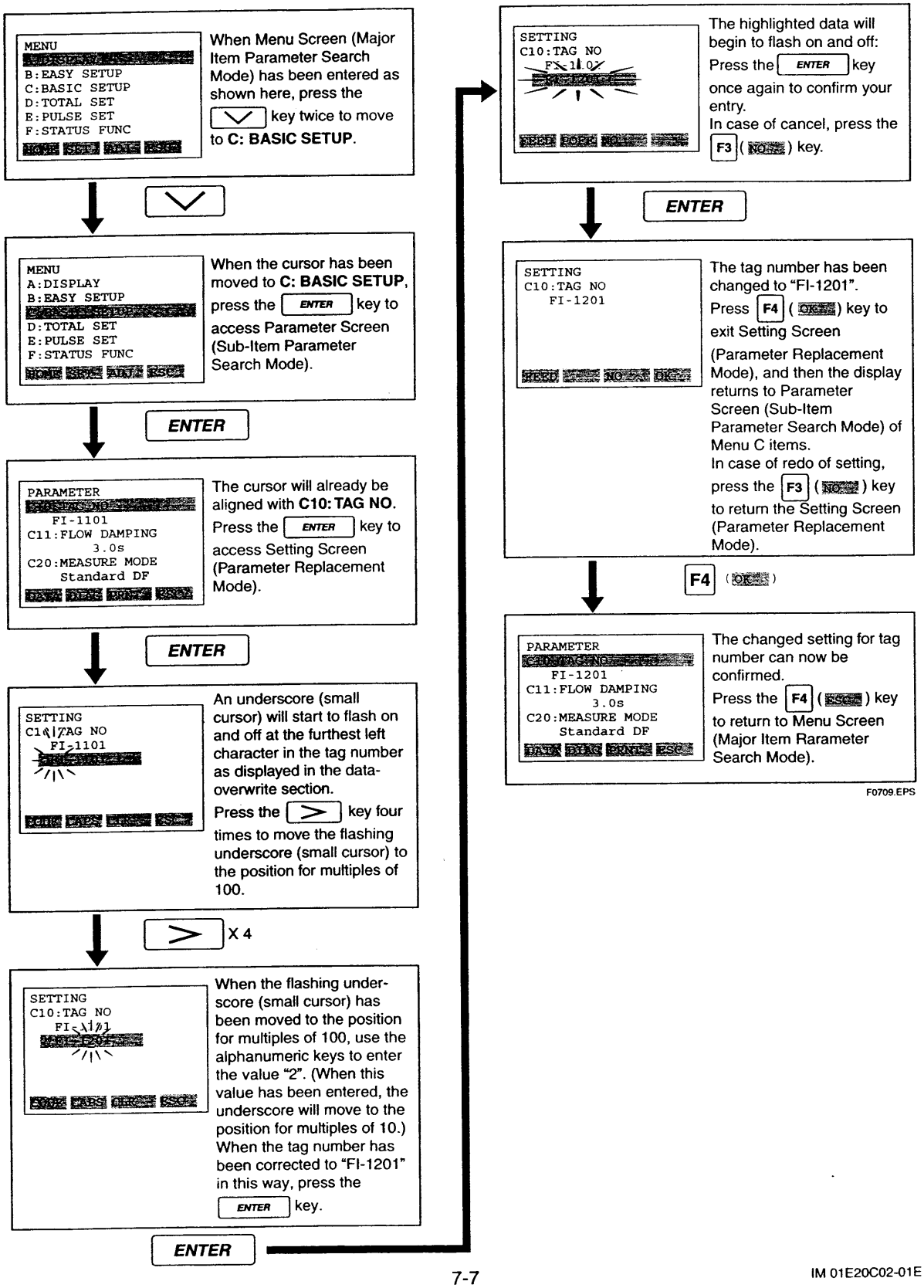
7.3.3 BT200 Setting of Alphanumeric-Type Data: Tag number

In this example, the tag number specified by the alphanumeric-type parameter **C10: TAG NO** is changed from "FI-1101" to "FI-1201".



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8. OPERATION VIA HART COMMUNICATOR

NOTE

This chapter describes the AXFA14 converter as an example. The same attention must be paid to the AXF integral flowmeter.

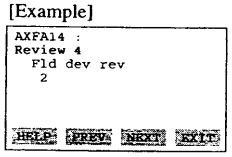
CAUTION

Matching of communicator DD and instrument DD

Before using the Model 275 HART Communicator, check that the DD (Device Description) installed in the communicator matches to that of the instruments to be set up. To check the DD in the instrument or the HART Communicator, follow the steps below. If the correct DD is not installed in the communicator, you must upgrade the DD at the official HART programming sites. For communication tools other than Model 275 HART Communicator, contact the respective vendors for upgrade information.

1. Checking the DD in the instrument
   1) Connect the communicator to the instrument to be set up.
   2) Open "Device Setup" and press [→].
   3) Select "Review" and press [→].
   4) Select "Review 4" and press [→].
   5) By pressing [NEXT] or [PREV], locate "Fld dev rev" to show the DD of the instrument.

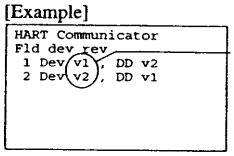
[Example]



"The instrument DD is Version 2"

2. Checking the DD in Model 275 HART Communicator.
   1) Turn on only the communicator alone.
   2) Select "Utility" from the main menu and press [→].
   3) Select "Simulation" and press [→].
   4) Select "YOKOGAWA" from the manufacturers list by pressing [↓] and then pressing [→] to enter selection.
   5) Select the model name of the instrument (i.e. AXFA14) by pressing [↓] and then press [→] to show the DD of the communicator.

[Example]



Versions 1 and 2

"The communicator DD supports Versions 1 and 2."

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NOTE

In case of HART Communicator, the parameters are displayed in English only. Even if the language with the exception of English is selected at "**Language**" setting display, the parameters are displayed in English upon HART Communicator.

8.1 Conditions of Communication Line

8.1.1 Interconnection between AXFA14 and HART Communicator

The HART Communicator can interface with the AXFA14 from the control room, the AXFA14 site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 230 Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the AXFA14, and the connections must be non-polarized. Figure 8.1.1 illustrates the wiring connections for a direct interface at the AXFA14 site. The HART Communicator can be used for remote access from any terminal strip as well.

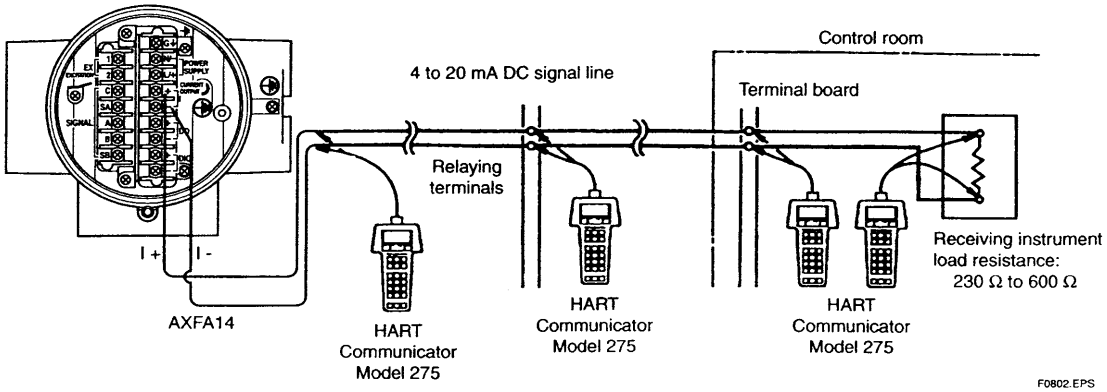

Figure 8.1.1 Interconnection Diagram

8.1.2 Communication Line Requirements

Specifications for Communication Line:

Load resistance: 230 to 600 Ω (including cable resistance)
Minimum cable size: 24 AWG, (0.51 mm diameter)
Cable type: Single pair shielded or multiple pair with overall shield
Maximum twisted-pair length: 6,500 ft (2,000 m)
Maximum multiple twisted-pair length: 3,200 ft (1,000 m)
Use the following formula to determine cable length for a specific application:

$$L = \frac{65\times10^6}{(R\times C)} - \frac{(C_f+10{,}000)}{C}$$

where: L = length in feet or meters
R = resistance in ohms, current sense resistance
C = cable capacitance in pF/ft or pF/m
C_f = 15,000 pF

8.2 Basic Operation of the HART Communicator (Model 275)

8.2.1 Keys and Functions

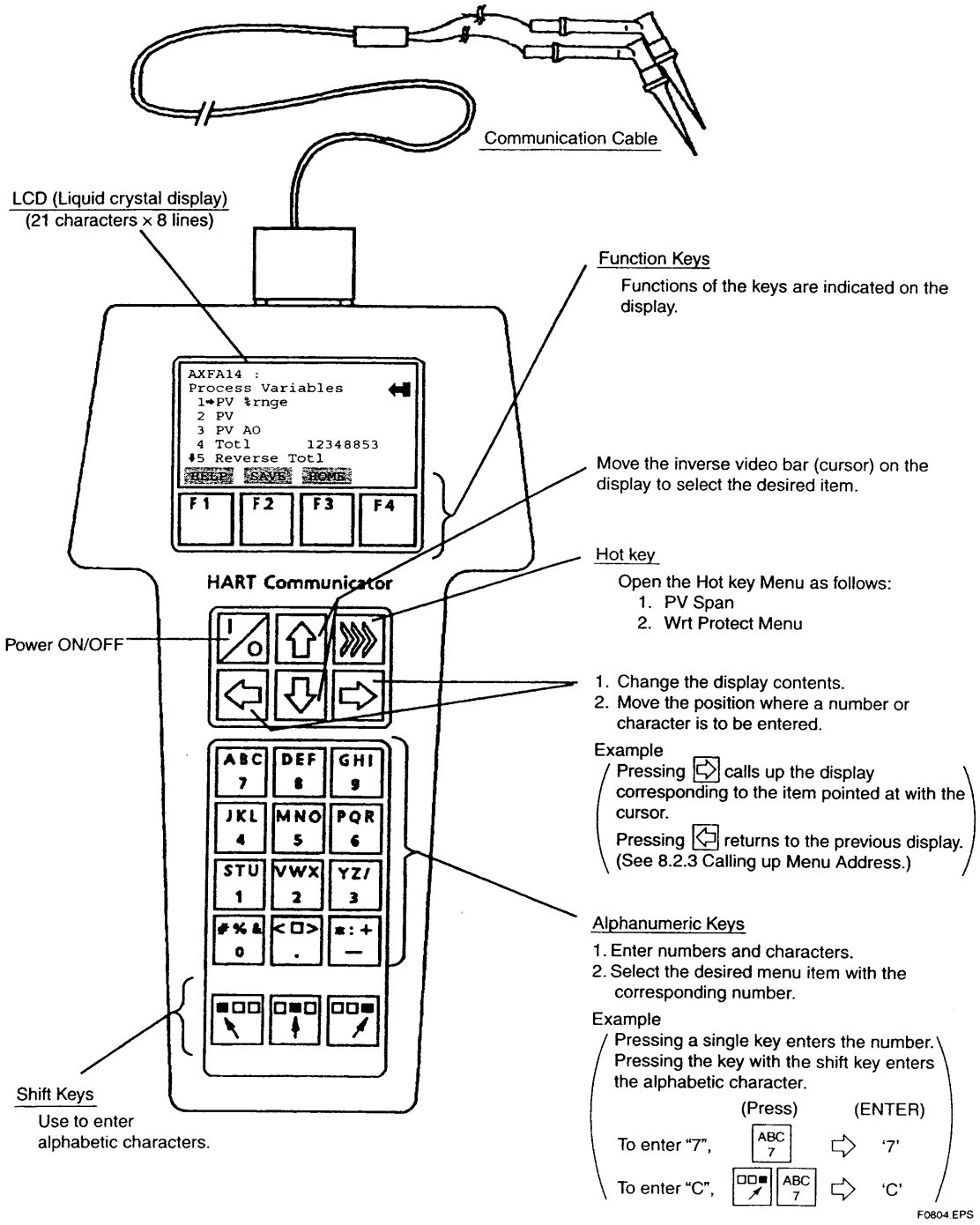

Figure 8.2.1 HART Communicator

8.2.2 Display

The HART Communicator automatically searches for the AXFA14 on the 4 to 20 mA loop when it is turned on. When the HART Communicator is connected to the AXFA14, it displays the "**Online**" menu as shown below.
(If AXFA14 is not found, the communicator displays the message "No Device Found. Press OK...." Press the OK 'F4' function key and the main menu appears. Please retry after confirming the connection with the AXFA14.)

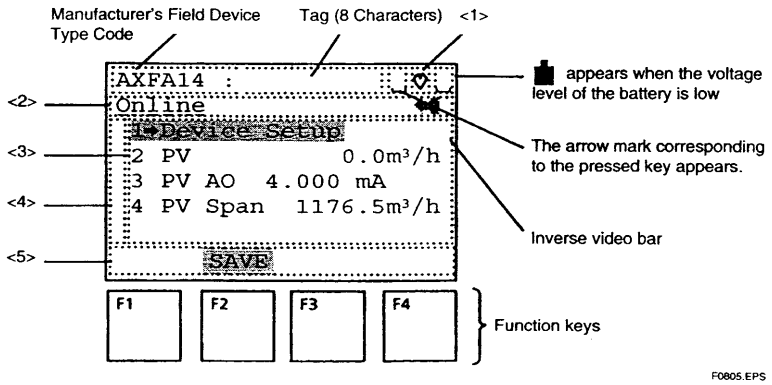

Figure 8.2.2 Display

<1> ♡ appears and flashes during communication between the HART Communicator and the AXFA14. In Burst Mode*, ♥ appears.

<2> The current display menu title appears.

<3> Each item in menu <2> appears.

<4> ↓ and/or ↑ appear when the items are scrolled out of the display.

<5> On any given menu, the label appearing above a function key indicates the function of that key for the current menu.

* Refer to "8.3.4.7 Burst Mode".

8.2.3 Calling Up Menu Addresses

The 8.3.5 Menu Tree shows the configuration of the "**Online**" menu which is needed for operation with the HART Communicator. The desired item can be displayed with ease by understanding the menu configuration.

When the HART Commnicator is connected to the AXFA14, the "**Online**" menu will be displayed after the power is turned on (see figure 8.2.2). Open the desired item as follows:

Key Operation

There are two ways of selecting the desired menu item.

1. Use the [⇩] or [⇧] key to select the desired item, and then press the [⇨] key.

- To return to the previous display, press the [⇦] key, **EXIT (F4), ESC (F3)** or **ABORT (F3).**

NOTE

Setting parameters on the display unit of the AXFA14 is not possible during HART Communication.

8.2.4 Entering, Setting and Sending Data

The data which are input with the keys are set in the HART Communicator by pressing **ENTER (F4)**. Then, by pressing **SEND (F2)**, the data are sent to the AXFA14. Note that the data are not set in the AXFA14 if **SEND (F2)** is not pressed. All the data set with the HART Communicator is held in, memory unless power is turned off, so every data can be sent to the AXFA14 at one lot.

8.3 Parameters

8.3.1 Parameter Configuration

The parameters of the HART Communicator are constructed hierarchically. The menu tree for the "**Online**" menu is shown in the 8.3.3 Menu Tree.

See "Chapter 6. Parameter Description" about the function of each parameter. Note the differences between the parameters on the AXFA14 display and those on HART Communicator.

The "**Online**" menu summary is shown below.

Table 8.1.3 Online Menu Summary

No.	Display Item	Contents
1	Device Setup	Set parameters for AXFA14.
2	PV	Display process value in engineering unit.
3	PV AO	Display analog output in mA.
4	PV Span	Display set span in engineering unit.

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8.3.2 Data Renewing

There are two methods to load the AXFA14 data from/to the HART Communicator – periodic data renewing and discretionary data renewing.

(1) Periodic Data Renewing

The following data are renewed in 0.5 to 2 second cycles.

PV, PV AO, PV % rnge, Totl, Reverse Totl, Dif Totl, Power Frequency, Velocity Check, Operation Time, Alm Record1, Alm Record Time1, Alm Record2, Alm Record Time2, Alm Record3, Alm Record Time3, Alm Record4, Alm Record Time4, Test DIO (I), Write protect

(2) Discretionary Data Renewing

The following data can be loaded from/to the AXFA14. Upload can be done with **SAVE (F2)** on any the "**Online**" menu selection, and download can be done on the **Saved Configuration** menu in the "**Offline**" menu. (Refer to HART Communicator Manual.)

PV Damping, Nominal Size Unit, Nominal Size, Base Flow Unit, Base Time Unit, PV Span, Flow Decimal Pnt, Density Unit, Mass Flow Density, User Span Select, Flow User Unit, Flow User Span, Total Unit, Total Scale, Total Decimal Pnt, Total Low Cut, Total Execution, Ttl Set Val Lower, Ttl Set Val Upper, Ttl Switch Lower, Ttl Switch Upper, Ttl User Select, Ttl User Unit, Pulse Unit, Pulse Scale, Pulse Width, Pulse Low Cut, DO Function, DIO Function, DO Active Mode, DIO Active Mode, Forward Span2, Forward Span3, Forward Span4, Reverse Span1, Reverse Span2, Auto Range Hys, Bi Direction Hys, Low Alarm, High Alarm, Low Low Alarm, High High Alarm, H/L Alarm Hys, 4-20mA Alarm Out, Alm-Setting, Alm-Sig Over, Alm-Emp Pipe, Alm-HH/LL, Alm-Adhesion, Display Select1, Display Select2, Display Select3, Display Cycle, Language, 4-20mA Low Cut, 4-20mA Low Lmt, 4-20mA High Lmt, Flow Direction

NOTE

Data changed with the HART Communicator is sent to the AXFA14 by pressing **SEND (F2)** of the HART Communicator.

8.3.3 Checking for Problems

The self-diagnostic function of the AXFA14 is explained in Section 6.5 "Alarm Functions". By using the HART Communicator, it is also possible to carry out this function in the "Test/Status" parameter. Test for each error.

* Open the "**Test/Status**" setting display.

1. Device Setup → 2. Diag/Service → **1. Test/Status**

8.3.4 Setting Parameters

As mentioned in Section 5.2.2 "Setting Mode," the AXFA14's parameters are divided into three types:

i. Selection type
ii. Numeric type
iii. Alphanumeric type

This section describes how to set these parameters using a HART communicator.

NOTE

All three parameters must be set to obtain a correct signal.
Nominal size, flow rate span and meter factor must be set.

8.3.4.1 Example of Setting Selection-Type Data: Base Flow Unit

This example describes the setting of the flow rate units for the selection-type parameter "Base Flow Unit" from m^3 to l (Liter).

Open the "**Base Flow Unit**" setting display.

1. Device Setup → 3. Easy Setup → **3. Base Flow Unit**

1
```
AXFA14 : FI-1100
Base Flow Unit
↑ m3
  Kl(Kiloliter)
  l(Liter)
↓ cm3
        SEND  ENTER
```
↓ ×2 — Select "**l (Liter)**".

2
```
AXFA14 : FI-1100
Easy Setup
 1 Language
 2 PV Damping
 3 Base Flow Unit  l
 4 Base Time Unit   /h
 5 PV Span
      SEND  HOME
```
F4 (ENTER) — Press **ENTER (F4)**.

3
```
AXFA14 : FI-1100
Easy Setup
 1 Language
 2 PV Damp
 3 Base Flow Unit  l
 4 Base Time Unit   /h
 5 PV Span
      SAVE  HOME
```
F2 (SEND) — Press **SEND (F2)** to set the data into the AXFA14.

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19.1.1

8.3.4.2 Example of Setting Numeric-Type Data: PV Span

This example describes the setting of the flow rate span for the numeric-type parameter "PV Span" from 100 l/min to 120 l/min.

There are two ways to open the "PV Span" setting display. Following the menu tree configration, "PV Span" is opened as follows:

To open "PV Span" using the "Hot key", proceed as follows:

1. Device Setup → 3. Easy Setup → **5. PV Span**

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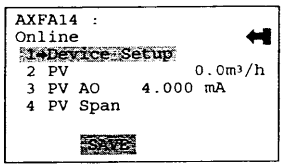
NOTE

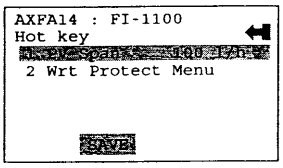
The "Hot key" can be used to set the easy call up parameters, "PV Span" (Flow Span) and "Wrt Protect Menu" (Write protect function).

Open the "**PV Span**" setting display.

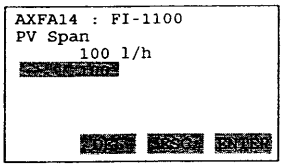
Hot key → **1. PV Span**

1 

Press **Hot key**.

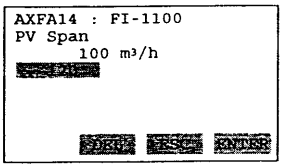
2 

Select "**PV Span**".

3 

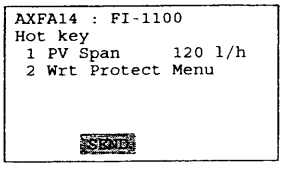
'120'

Enter "120" with alphanumeric keys.

4 

F4
(ENTER)

Press **ENTER (F4)**.

5 

F2
(SEND)

Press **SEND (F2)** to set the data into the AXFA14.

Return to the previous display by pressing  or  .

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8.3.4.3 Example of Setting Alphanumeric-Type Data: Tag Number

This example describes the setting of the tag number for the alphanumeric-type parameter '**Tag**' from "FI-1101" to "FI-1201".

1. Device Setup → 4. Detailed Setup → 1. Basic Setup → **1. Tag**

	Display	Operation	
1	AXFA14 : FI-1101 Basic Setup 1➡Tag FI-1101 2 PV Damping 3 MF Set 4 Select Flow Tube ⬍5 Nominal Size Unit HELP SAVE HOME	⇨ or STU 1	Select "**Tag**".
2	AXFA14 : FI-1101 Tag FI-1101 FI-1101 HELP DEL ESC ENTER		The display for the Tag setting appears. (The default value of "Tag" is blank.)
3	AXFA14 : FI-1101 Tag FI-1101 FI-1201 HELP DEL ESC ENTER	⇨ ×4	Move the cursor to "1". Then press "**2**" to change the Tag No. "FI-1101" to "FI-1201".
4	AXFA14 : FI-1101 Basic Setup 1➡Tag FI-1201 2 PV Damping 3 MF Set 4 Select Flow Tube ⬍5 Nominal Size Unit HELP SEND HOME	F4 (ENTER)	Press **ENTER (F4)** .
5	AXFA14 : FI-1201 Basic Setup 1➡Tag FI-1201 2 PV Damping 3 MF Set 4 Select Flow Tube ⬍5 Nominal Size Unit HELP SEND HOME	F2 (SEND)	Press **SEND (F2)** to set the data into the AXFA14. Press **HOME (F3)**, and return to the "**Online**" menu.

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NOTE

In case of HART protocol, up to 8 characters can be set with "**Tag**".

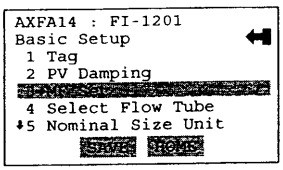
8.3.4.4 Example 1 of Other Settings: Meter Factor

The "**Meter Factor**" is engraved on the data plate of the combined flowtube.

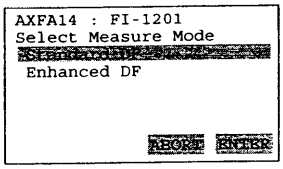
The meter factor is required to compute the correct electromotive force proportional to the fluid velocity, and is determined by actual flow-test calibration at the factory.

Open the "**MF**" setting display:

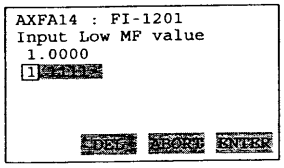
1. Device Setup → 4. Detailed Setup → 1. Basic Setup → **3. MF Set**

1 

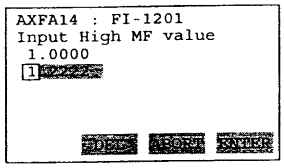
[⇨] or [YZ/ 3] Select " **MF Set** ".

2 

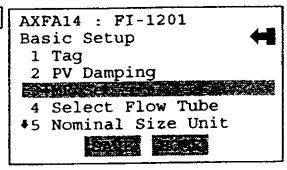
[STU 1] or [F4] (ENTER) Select " Standard DF ".

3 

[F4] (ENTER) Enter "1.1111" with alphanumeric keys.
Press **ENTER (F4)**.

4 

[F4] (ENTER) Enter "1.2222" with alphanumeric keys.
Press **ENTER (F4)**.

5 

[F3] (HOME) Press **HOME (F3)**, and return to the "**Online**" menu.

F0812.EPS

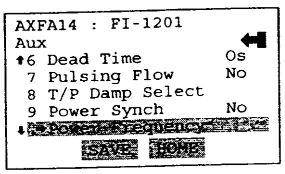
8.3.4.5 Example 2 of Other Settings: Power Frequency (For DC version only)

IMPORTANT

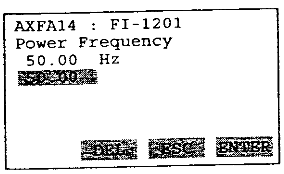
In a situation where a DC power supply is used for converters, set the local commercial power frequency in area where the converter is installed. The flowmeter is set to 50.00 Hz at the factory.
Set "No" for "**Power Synch**" and the local commercial power frequency for "**Power Frequency**".

Open the "**Power freq**" setting display:

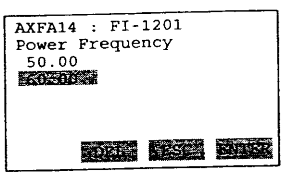
[1. Device Setup] → [4. Detailed Setup] → [4. Function Set] → [5. Aux] → [**Power Frequency**]
([⇩] ×9)

1


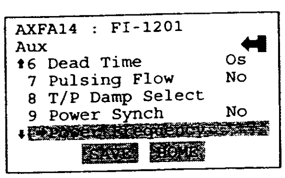
[⇨] Select "**Power Frequency**".

2


'60.0' Enter "60.00" with alphanumeric keys.

3


[F4] (ENTER) Press **ENTER (F4)**.

4


[F2] (SEND) Press **SEND (F2)** to set the data into the AXFA14.

[F3] (HOME) Press **HOME (F3)**, and return to the "**Online**" menu.

F0813.EPS

100

19.1.1

8.3.4.6 Example 3 of Other Settings: Trim Analog Output

Fine output adjustment is carried out with "**D/A trim**" or "**Scaled D/A trim**".

- **D/A trim**

  "**D/A trim**" is to be carried out if the calibration digital ammeter does not read exactly 4.000 mA and 20.000 mA with output signals of 0% and 100%.
- **Scaled D/A trim**

  "**Scaled D/A trim**" is to be carried out if the output is adjusted using a voltmeter or other types of meters with a 0% to 100% scale.

IMPORTANT

When "**D/A trim**" or "**Scaled D/A trim**" is carried out, the warning message "**83: Fix Cur Wng**" is displayed on the display unit.

Example 1: For adjustments using an ammeter (capable of measuring ±1uA.)

F0814-1.EPS

Open the "**Output trim**" display:

1. Device Setup → 2. Diag/Service → 2. Adjustment → **3. D/A trim**

1
```
AXFA14 : FI-1201
Adjustment
 1 Auto Zero Exe
 2 Magflow Zero
 3 D/A trim
 4 Scaled D/A trim

      SAVE  HOME
```
→ Select "**D/A trim**".

2
```
AXFA14 : FI-1201
WARN-Loop should be
removed from
automatic control

            ABORT  OK
```
F4 (OK) — Press **OK (F4)**.

3
```
AXFA14 : FI-1201
Connect reference
meter

            ABORT  OK
```
F4 (OK) — Connect an ammeter (capable of measuring ±1μA), and press **OK (F4)**.

4
```
AXFA14 : FI-1201
Setting fld dev
output to 4mA

            ABORT  OK
```
F4 (OK) — Press **OK (F4)**, and the AXFA14 outputs an output signal of 0%.

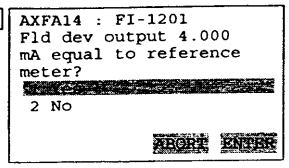
5
```
AXFA14 : FI-1201
Enter meter value
        4.0000

HELP  DEL  ABORT  ENTER
```
'4.115' F4 (ENTER)

Ammeter reading: 4.115

Enter the ammeter's reading of **4.115**, and press **ENTER (F4)**. (The output of the AXFA14 changes.)

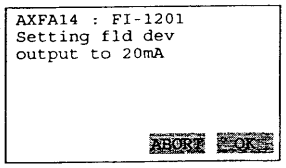
F0814-2.EPS

6


F4 (ENTER)

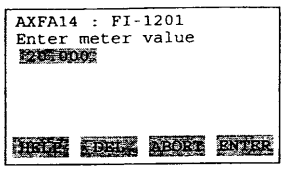
Ammeter reading: 4.000

Because the reading on the ammeter is 4.000 mA, select "**Yes**" and press **ENTER (F4)**.
If the reading is not 4.000 mA, select "**No**".
Repeat step 5 until the ammeter reads 4.000 mA.

7


F4 (OK)

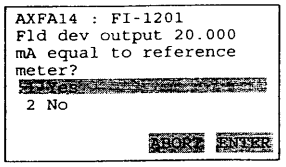
Press **OK (F4)**, and the AXFA14 outputs an output signal of 100%.

8


'19.050'
F4 (ENTER)

Ammeter reading: 19.050

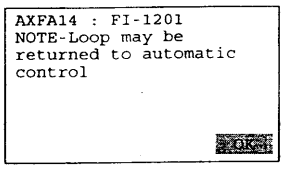
Carry out the same procedures as those described in 5.

9


F4 (ENTER)

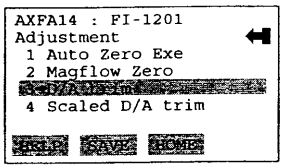
Ammeter reading: 20.000

"**Returning fld dev to original output**" appears.

10


F4 (OK)

Press **OK (F4)**.

11


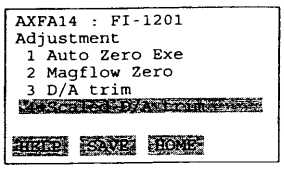
F3 (HOME)

Press **HOME (F3)**, and return to the "**Online**" menu.

F0814-3.EPS

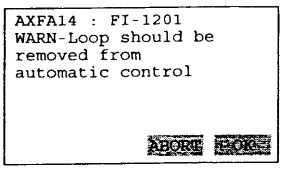
Example 2: For adjustments using a voltmeter

F0816-1.EPS

1


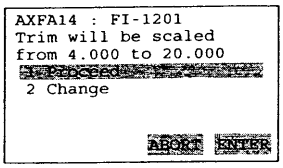
JKL 4

Select the "**4. Scaled D/A trim**".

2


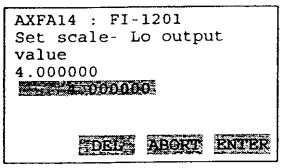
F4 (OK)

Press **OK (F4)**.

3


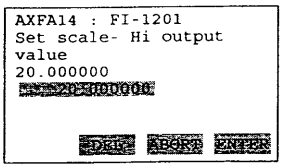
VWX 2

Select "**Change**".
The same operations as for "**D/A trim**" are required when selecting "**Proceed**".

4


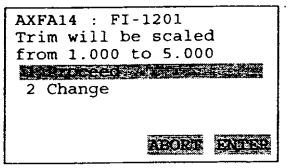
'1' F4 (ENTER)

Enter the reading value on the meter when the signal is 4 mA. In this case, enter the value of the voltage across a 250 Ω resistor (1 V), and press **ENTER (F4)**.

5


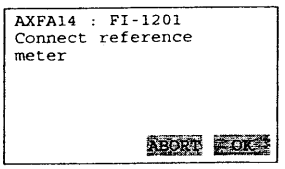
'5' F4 (ENTER)

Enter the reading value on the meter when the signal is 20 mA. Then, enter "**5**" (5 V), and press **ENTER (F4)**.

6


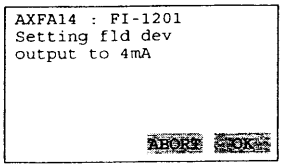
STU 1 or F4 (ENTER)

Select "**Proceed**" and press **ENTER (F4)**.

7


F4 (OK)

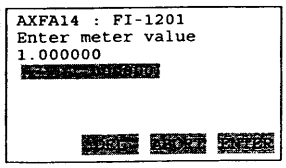
Connect the voltmeter, and press **OK (F4)**.

8


F4 (OK)

Press **OK (F4)**. The output signal of 0% is output.

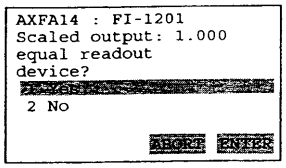
F0816-2.EPS

9


'1.01'
F4
(ENTER)

Voltmeter reading: 1.010

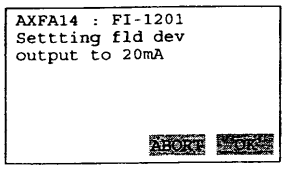
Enter the voltmeter's reading of 1.010, and press **ENTER (F4)**.
(The output of the AXFA14 changes.)

10


F4
(ENTER)

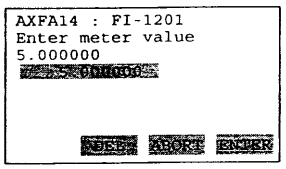
Voltmeter reading: 1.000

Because the reading on the voltmeter is 1.000, select "**Yes**" and press **ENTER (F4)**.
If the reading is not 1.000, select "**No**".
Repeat step 9 until the voltmeter reads 1.000 V.

11


F4
(OK)

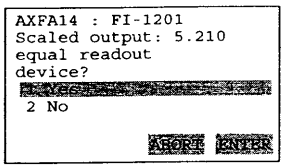
Press **OK (F4)**. The output signal of 100% is output.

12


'5.21'
F4
(ENTER)

Voltmeter reading: 5.210

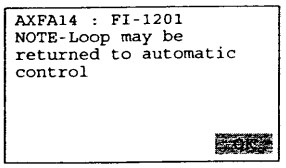
Enter the voltmeter's reading of 5.210, and press **ENTER (F4)**.

13


F4
(ENTER)

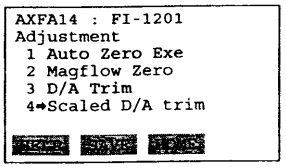
Voltmeter reading: 5.000

Select "**Yes**" and press **ENTER (F4)**.
"**Returning fld dev to original output**" appears.

14


F4
(OK)

Press **OK (F4)**.

15


F3
(HOME)

Press **HOME (F3)**, and return to the "**Online**" menu.

F0816-3.EPS

IMPORTANT

D/A trim should be executed only at single range mode. If D/A trim is executed at Bi direction mode, it is possible that the current output becomes 108%.

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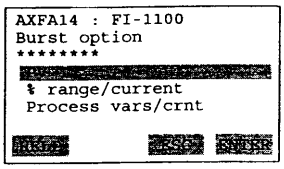
8.3.4.7 Example 4 of Other Settings: Burst Mode

The AXFA14 continuously sends its stored data when the "**Burst mode**" is set to "On". Any one of instantaneous flow rate, output in %, totalization values or current output can be selected and sent. The data is sent intermittently as a digital signal when the AXFA14 is set in the "**Burst mode**".

Setting of Burst Mode

Open the "**Burst option**" display:

1. Device Setup → 4. Detailed Setup → 5. HART Output → **4. Burst option**



F4 (ENTER)

F2 (SEND)

Select the type of data to be sent.

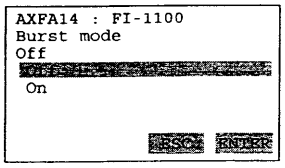
- Instantaneous flow rate (PV)
- Output in % and current output (% range/current)
- Instantaneous flow rate, totalization value* and current output (Process vars/crnt)

  * "Totl", "Reverse Totl" or "Dif Totl"

Call up "**Burst mode**" display.

5. HART Output → **3. Burst mode**

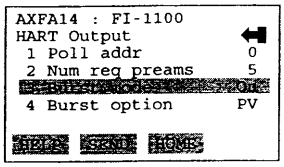
1



↓ F4 (ENTER)

Select "**On**" and press **ENTER (F4)**.

2



F2 (SEND)

Press **SEND (F2)**.

F0817.EPS

Exiting Burst Mode

Open the "**Burst mode**" display, and select "**Off**".

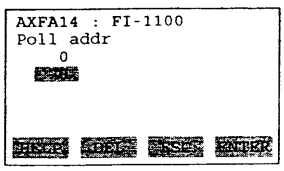
8.3.4.8 Example 5 of Other Settings: Multidrop Mode

Field devices in "**Multidrop Mode**" refers to the connection of several field devices on a single communication line. Up to 15 field devices can be connected when set to the multidrop mode. To activate multidrop communication, the field device address must be changed to a number from 1 to 15. This change deactivates the 4 to 20 mA output and changes it to 4 mA.

Setting of Multidrop Mode

Open the "**Poll addr**" display:

1. Device Setup → 4. Detailed Setup → 5. HART Output → **1. Poll addr**



'1'

F4 (ENTER)

F2 (SEND)

Set the polling address (a number from 1 to 15) and press **ENTER (F4)**.

Then, press **SEND (F2)** to send the data.

F0818.EPS

Open the "**Auto Poll**" display:

5. HART Output → Online Menu → Main Menu → ⇦ → 4. Utility → 1. Configure Communication → **1. Polling**

F3 : HOME

1
```
AXFA14 : FI-1201
HART Output
2 Num req preams      5
3 Burst mode         On
4 Burst option       PV
```
F3 (HOME)

Return to the "**Online**" menu with **HOME (F3)**.

2
```
AXFA14 : FI-1201
Online
 1 Device Setup
 2 PV              20m3/h
 3 PV AO             20mA
 4 PV Span         20m3/h
```
⇦

Return to the "**Main**" menu with a "previous" key.

3
```
HART Communicator
 1 Offline
 2 Online
 3 Frequency Device
 4 Utility
```
JLK 4

Select "**4. Utility**".

4
```
HART Communicator
Utility
 2 System Information
 3 Listen for PC
 4 Storage Location
 5 Simulation
```
STU 1 or ⇨

Select "**1. Configure Communication**".

5
```
HART Communicator
Configure Communica
 2 Contrast
 3 Off Time
 4 Ignore diagnostics
 5 Delete Configs
```
STU 1 or ⇨

Select "**1. Polling**".

6
```
HART Communicator
Polling
Never Poll
 Ask Before Polling
 Always Poll
 Digital Poll
```
⇩ ×3, F4 (ENTER)

Select "**Digital Poll**" and press **ENTER (F4)**.

F0819.EPS

NOTE

1. If "Never Poll" is selected in "Polling" when the address is assigned, the "Online Menu" cannot be called up and displayed. Be sure to select "Digital Poll" in "Polling" after assigned the polling address.
2. When the same polling address is assigned for two or more field devices in multidrop mode, communication with these field devices is disabled.

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Example: Communication when set in the multidrop mode.

F0820-1.EPS

1
```
HART Communicator
Online
2  2: FIC-2A
3  3: PIC-1A
```

The HART Communicator searches for field devices that are set in the multidrop mode when the HART Communicator is turned on.
When the HART Communicator is connected to one of these field devices, tag will be displayed.

2
```
AXFA14 : FI-1201
Online
2 PV
3 PV AO
4 PV Span
```

Select the desired field device. After that, normal communication with the selected field device is possible. The communication speed, however, is slow in this case.

3
```
HART Communicator
1 Offline
3 Frequency Device
4 Utility
```

To communicate with another field device, open display 3, and select "**Online**".

Display 1 will appear. Repeat the above operation.

F0820-2.EPS

Exiting Multidrop Mode

First, open the "**Poll addr**" display, and assign the address to **0**.
Then, open the "**Polling**" display, and select "**Never Poll**".

NOTE

If the above exiting method is carried out in the reverse order, the "Online" menu cannot be called up.

8.3.4.9 Example 6 of Other Settings: Write Protection

The "**Write Protection**" function is used to inhibit parameter changes to the AXFA14. For a more detailed description, refer to Chapter 6. Parameter Description, and Chapter 9.Maintenance.

NOTE

When the write protection function is activated, data setting changes in all parameters of the AXFA14 are inhibited and cannot be changed using either the HART Communicator or the AXFA14 front panel key switches.

Setting Password

Example: Set the password to "**1 2 3 4**"

F0821-1.EPS

Open "**Wrt Protect Menu**" in the **Hot key** Menu.

Hot key → 2. Wrt Protect Menu → **3. New Password**

1

```
AXFA14 : FI-1201
Hot key
 1 PV Span          1 m/s
 2 Wrt Protect Menu

      SAVE
```

VWX 2 or ⇨ — Select "**Wrt Protect Menu**".

2

```
AXFA14 : FI-1201
Wrt Protect Menu
 1 Write protect       No
 2 Enable Wrt 10min
 3 New Password
 4 Software Seal     Keep

HELP  SAVE
```

YZ / 3 — Select "**New Password**".

3

```
AXFA14 : FI-1201
Enter new password to
change state of write
protect

        DEL   ABORT  ENTER
```

Enter "**1 2 3 4**" and press **ENTER (F4)**.

STU 1 | VWX 2 | YZ / 3 | JKL 4

F4 (ENTER)

4

```
AXFA14 : FI-1201
Re-enter new password
within 30 seconds:
 1234

        DEL   ABORT  ENTER
```

STU 1 | VWX 2 | YZ / 3 | JKL 4

F4 (ENTER)

Enter "**1 2 3 4**" again and press **ENTER (F4)**.

5

```
AXFA14 : FI-1201
Change to new
password
```

6

```
AXFA14 : FI-1201
It changed the state
of protection related
password.

                    OK
```

F4 (OK) — Press **OK (F4)**.

7

```
AXFA14 : FI-1201
Wrt Protect Menu
 1 Write protect   Yes
 2 Enable Wrt 10min
 3 New Password
 4 Software Seal   Keep
```

⇦ ×2 — Press ⇦ twice, and return to the "**Online**" menu.

F0821-2.EPS

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Changing Password

Example: Change the password from "**1 2 3 4**" to "**6 7 8 9 A**".

F0822-1.EPS

Open "**Wrt Protect Menu**" in the **Hot key** Menu.

Hot key → 2. Wrt Protect Menu → **2. Enable Wrt 10min**

1
```
AXFA14 : FI-1201
Enter current
password to enable to
write for 10
minutes:
[redacted]
[redacted] ABORT [redacted]
```
"1 2 3 4"
F4 (ENTER)

Enter the password and press **ENTER (F4)**.

2
```
AXFA14 : FI-1201
Release the write
protection for 10
minutes.
ABORT [redacted]
```
F4 (OK)

Press **OK (F4)**.
Write protect status is released for 10 minutes.

3
```
AXFA14 : FI-1201
If you wish to
release completely,
you have to change
password to all of
spaces.
ABORT [redacted]
```
F4 (OK)

Press **OK (F4)**.

4
```
AXFA14 : FI-1201
Wrt Protect Menu
 1 Write protect  No
 2 Enable Wrt 10min
[redacted]
 4 Software Seal  Keep
[redacted]
```
⇨ or YZ/3

Select "**New Password**".

5
```
AXFA14 : FI-1201
Enter new password to
change state of write
protect
[redacted]
[redacted] ABORT [redacted]
```
"6 7 8 9 A"
F4 (ENTER)

Enter "**6 7 8 9 A**" and press **ENTER (F4)**.

6
```
AXFA14 : FI-1201
Re-enter new Password
write 30 seconds:
 6789A
[redacted]
[redacted] ABORT [redacted]
```
"6 7 8 9 A"
F4 (ENTER)

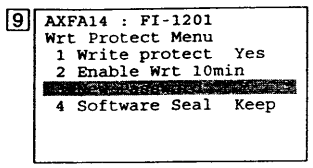
Enter "**6 7 8 9 A**" again and press **ENTER (F4)**.

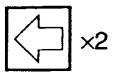
7
```
AXFA14 : FI-1201
Change to New
password
```

8
```
AXFA14 : FI-1201
It changed the state
of protection related
password.
[redacted]
```
F4 (OK)

Press **OK (F4)**.

F0822-2.EPS





Press ⇦ twice, and return to the "**Online**" menu.

F0822-3.EPS

NOTE

1. "**Enable Wrt 10min**" releases write protection status for 10 minutes. While write protection status is released, it is possible to enter a new password after selecting "**New Password**". It will not be possible after the 10 minutes have elapsed.
2. To release write protection status completely, enter 8 spaces in the "**New Password**". This causes the "**Write protect**" status to change from "**Yes**" to "**No**".
3. If the power supply to either the AXFA14 or the HART Communicator are turned off and then on again within 10 minutes after exiting write protection status, the enabled write protection status becomes defunct.

* "**Joker password**" and "**Software Seal**"
When you forget the password that you have input, it is possible to release the mode for 10 minutes by setting a joker password in "**Enable Wrt 10 min**". This joker password can be obtained by contacting your Yokogawa sales office.
If this joker password is used, the status shown in the parameter "**Software Seal**" is changed from "**Keep**" to "**Break**". Press Hot key and select "**Wrt Protect Menu**". Current status is shown in "**Software Seal**".
This status will be returned from "**Break**" to "**Keep**" by registering a new password.

8.3.4.10 Other Functions and Operations

Set any other required parameters in the same way as those previous. Refer to the following document for operation information.

Product Manual for the HART Communicator: MAN 4250

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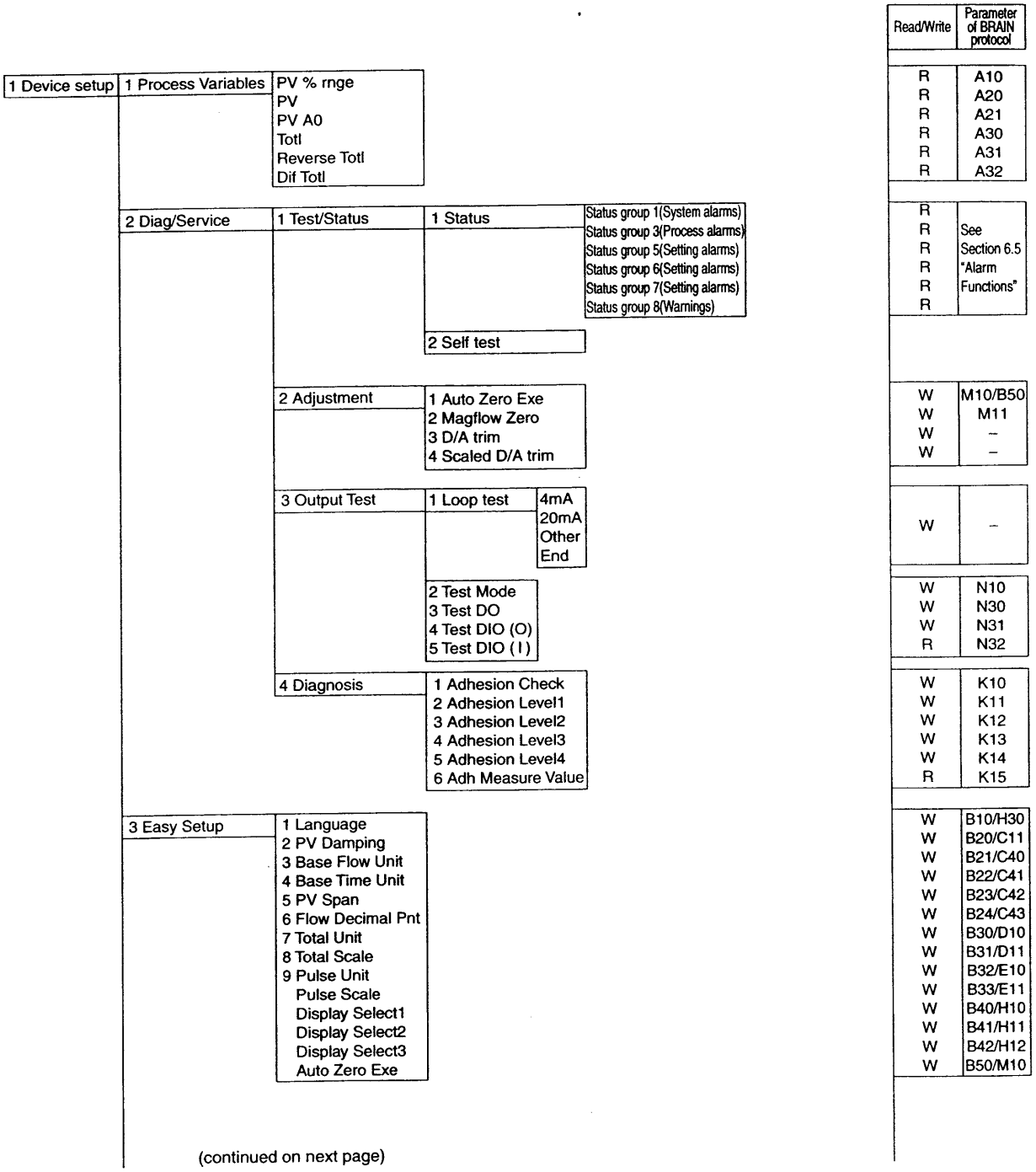
8.3.5 Menu Tree



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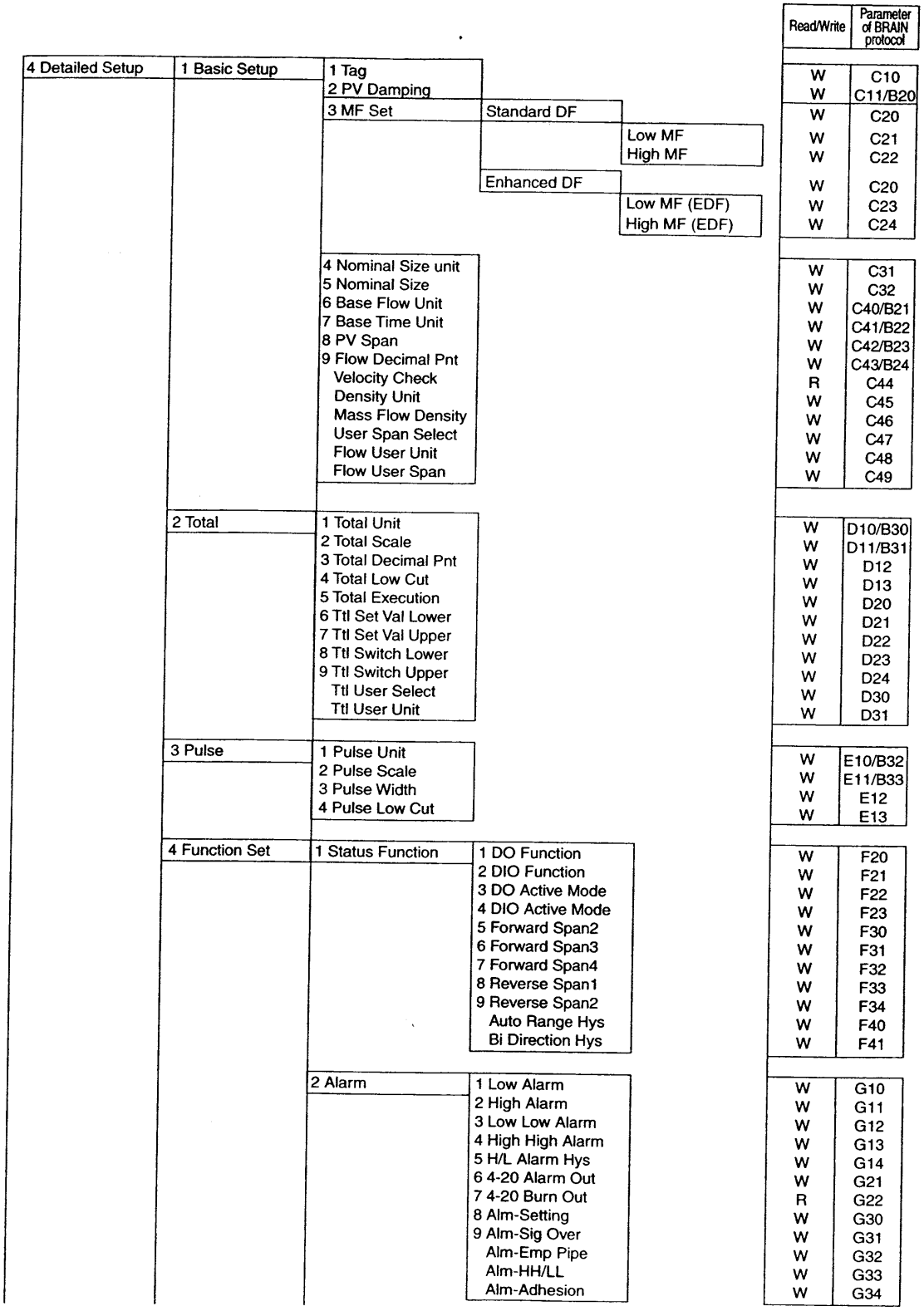
F0823-1.EPS



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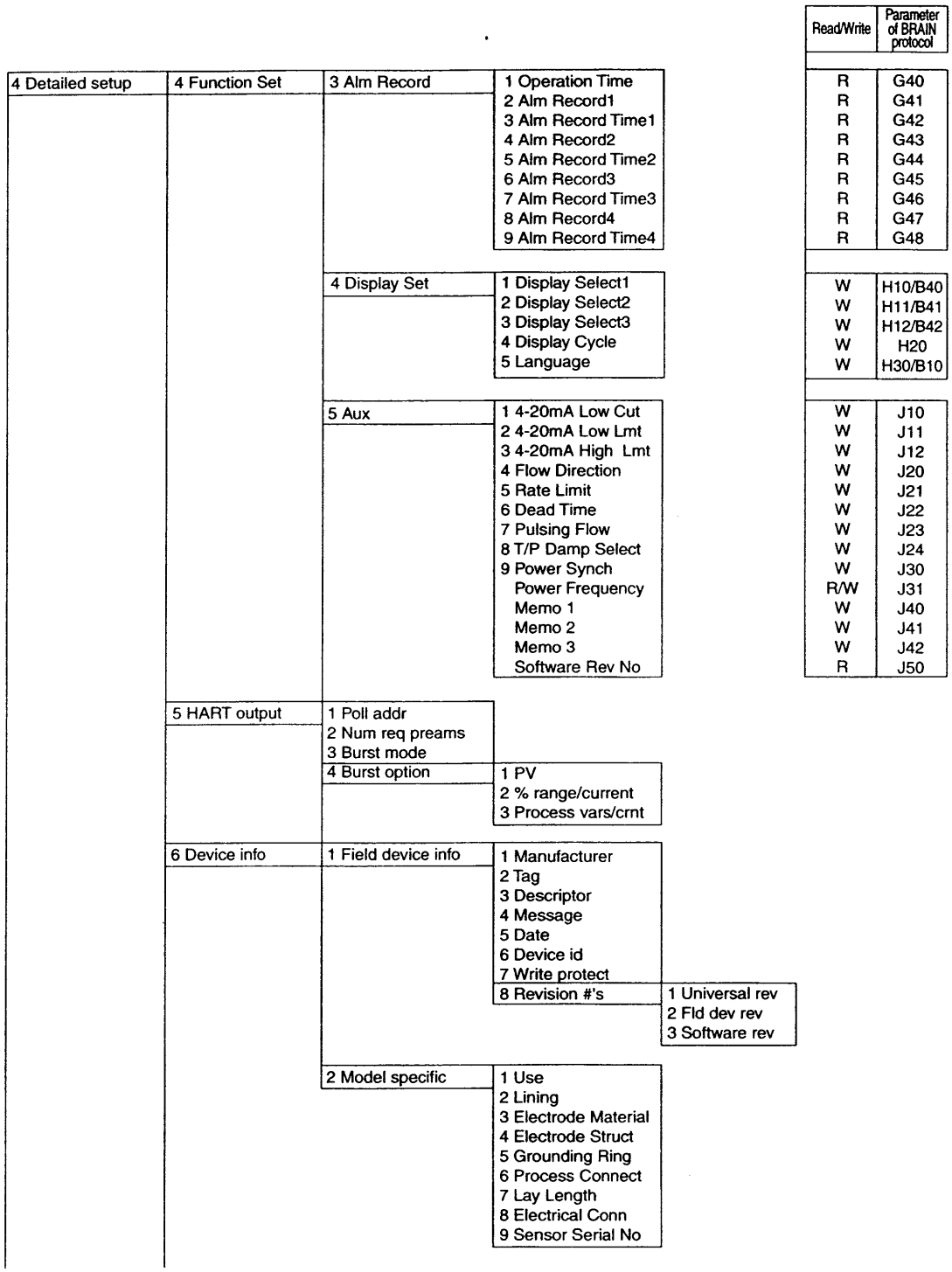

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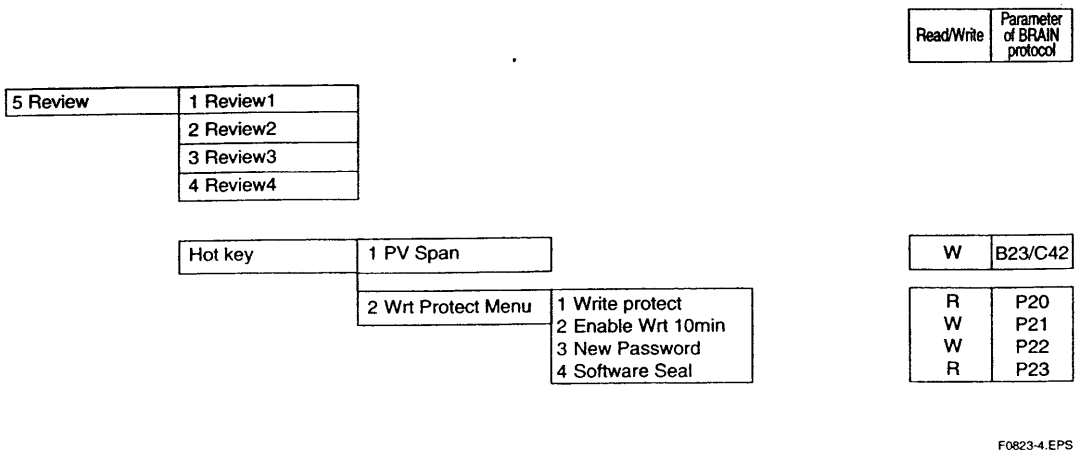
F0823-3.EPS



F0823-4.EPS

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9. ACTUAL OPERATION

After you have installed the flowtube into the process piping, wired the input/output terminals, set up the required parameters, and performed a pre-operation zero adjustment, the magnetic flowmeter should output an accurate flow signal from its terminals as soon as flow of the fluid to be measured begins. This section describes zero adjustment and the corresponding procedures.

9.1 Pre-operation Zero Adjustment

Zero adjustment is carried out to ensure that the output for zero flow is 0% (i.e., 4 mA). Although adjustment to zero is performed at the manufacturing plant prior to shipment, this procedure must be carried out once again following the installation of piping in order to match the magnetic flowmeter to its operating conditions.

This section describes the zero adjustment procedure using display unit switches from the converter and using the external status input; accordingly, one of these methods should be selected and implemented.

IMPORTANT

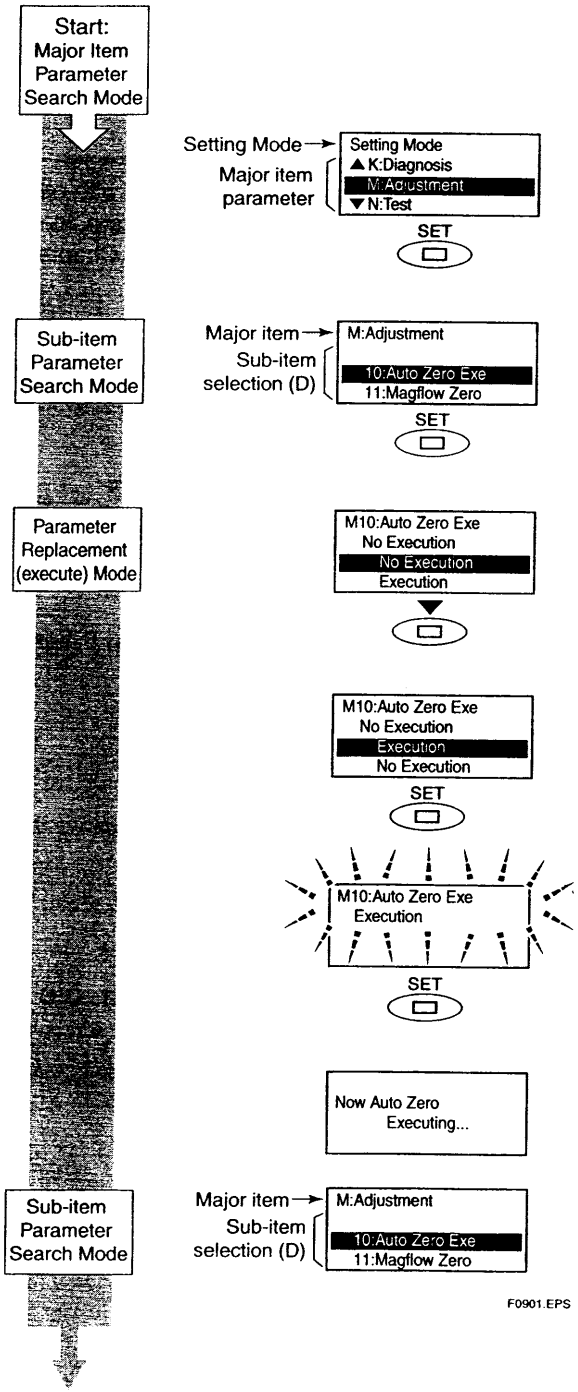
- Zero adjustment should be carried out before actual operation. Note that setting and update functions cannot be carried out during this procedure (i.e., for approximately 30 seconds).
- Zero adjustment should only be carried out when the flowtube has been filled with fluid and the fluid velocity is completely zero by closing the valve.
- Each time that the fluid being measured is changed, it will be necessary for zero adjustment to be carried out for the new fluid.

9.1.1 Zero Adjustment Using Display Unit Switches

This section describes the procedure for zero adjustment using the display unit switches. (For more details regarding setting methods using these switches, refer to Chapter 5: Basic Operating Procedures.)

The parameters for zero adjustment are **B50/M10: Auto Zero Exe** (and either of these can be used to carry out this procedure). For more details regarding these parameters, refer to Chapter 6: Parameter Description.

The parameter **M10: Auto Zero Exe** will be used in the following description.



F0901.EPS

Once in Setting Mode, use the ▼ switch to move the cursor to **M: Adjustment.**

Touch the SET switch to access Sub-item Parameter Search Mode.

Upon selection of **M: Adjustment**, the cursor will be positioned at **M10: Auto Zero Exe**. (Sub-item selection (D))
Touch the SET switch to access Parameter Replacement Mode.

Touch the ▼ switch to move the cursor to "Execution".

Touch the SET switch to select the "Execution".

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix selection of the automatic zero adjustment function.

Auto zero adjustment function is being executed (about 30 seconds).

When zero adjustment function has been completed, the system returns automatically to the sub-item selection screen (D).

NOTE

The results of **M10: Auto Zero Exe** can be displayed using **M11: Magflow Zero**. Alternatively, if the results of the automatic zero adjustment exceed the rated value, the warning **82: Auto Zero Wng** will be displayed.

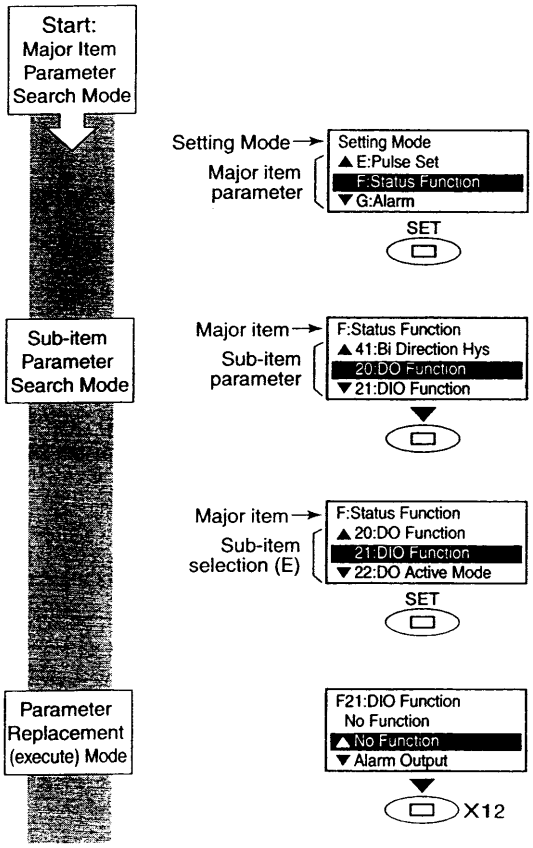
9.1.2 Zero Adjustment via External Status Input

This section describes the procedure for zero adjustment via external status input. (For more details regarding external status input, refer to Chapter 6: Parameter Description.)

CAUTION

In certain cases where the multiple range function is being used with other status inputs, it may not be possible to perform settings for automatic zero adjustment. For more details, refer to the description of multiple ranges from Chapter 6: Parameter Description.

In order to carry out zero adjustment via external status input, it will be necessary to set "Ext Auto Zero (I)" using **F21: DIO Function**. The following describes the setting procedure:



Once in Setting Mode, use the ▼ switch to move the cursor to **F: Status Function**.

Touch the SET switch to access Sub-item Parameter Search Mode.

Touch the ▼ switch once to move the cursor to **F21: DIO Function**.

The cursor has been moved to **F21: DIO Function** in this screen. (Sub-item selection screen (E))
Touch the SET switch to access Parameter Replacement Mode.

Touch the ▼ switch twelve times to move the cursor to "Ext Auto Zero (I)".

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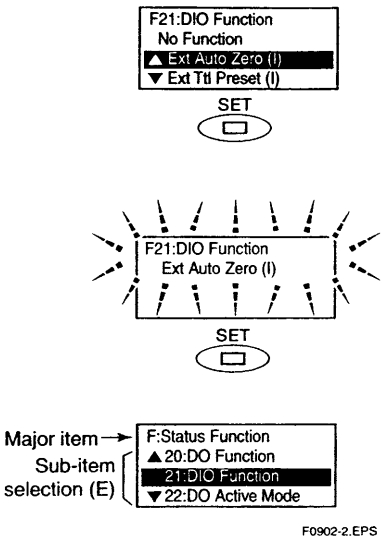
Sub-item Parameter Search Mode



F0902-2.EPS

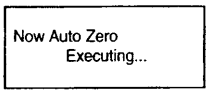
Touch the SET switch to select "Ext Auto Zero (Zero adjustment via external status input)".

In order to request confirmation, the entire display flashes on and off. Touch the SET switch once again at this time to fix selection of the automatic zero adjustment function.

The system returns automatically to sub-item selection screen (E).

Zero adjustment will be started if the DIO terminals are shorted (when the active mode has been set to "Closed/Short Act" using **F23: DIO Active Mode**).

This process will end after approximately 30 seconds.



F0902-3.EPS

Auto zero adjustment function is being executed. (about 30 seconds.)

NOTE

When the DIO terminals continue to be shorted, this zero adjustment is automatically repeated.

10. MAINTENANCE

10.1 Components Replacement

⚠ WARNING

- Component replacement and the associated operations must be carried out by expert engineer or skilled personnel and not by operators.
- Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.

⚠ CAUTION

- Explosion protected type must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
- The display cover is locked by the special screw. In case of opening the display cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover.

IMPORTANT

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

10.1.1 Fuse Replacement

⚠ CAUTION

Be sure to turn off the power before performing fuse replacement. Also be sure to use the spare fuse that was supplied with the product, or ones supplied by Yokogawa's sales or service offices.

The fuse holder is located on the farthest circuit board from the front.

(1) Remove the amplifier assembly by following the procedures shown in Section 10.1.3 "Amplifier Replacement."

(2) The fuse can be seen after step (1). Remove the fuse from the fuse holder.

(3) Push a new fuse into the holder until it clicks.

(4) Reinstall the amplifier assembly by following the procedures shown in Section 10.1.3.

Spare fuses are shipped with the instrument.

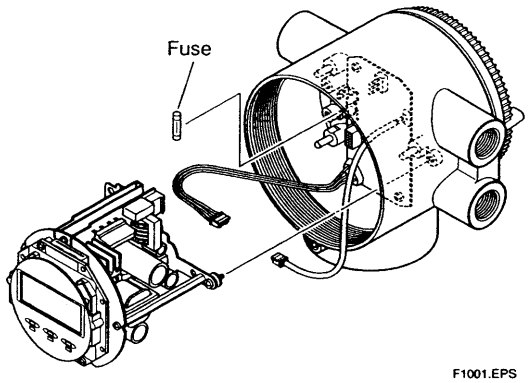


Figure 10.1.1 Fuse Replacement

10.1.2 Display Unit Replacement

10.1.2.1 Removing the Display Unit

(1) Turn off the power.

(2) Loosen cover locking screw 1 clockwise using a hexagonal wrench (nominal size 3) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is locked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

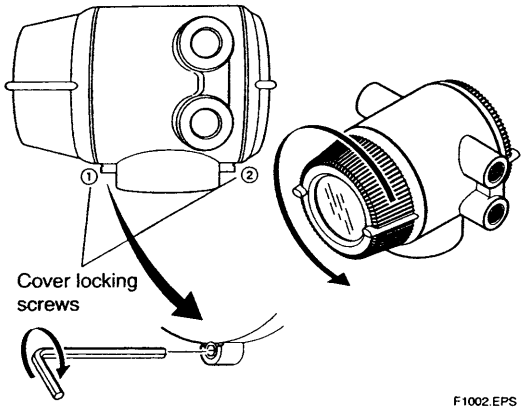


Figure 10.1.2 Removing the Display Cover

(3) Hold the display unit with your hand and remove the two mounting screws. Remove the connector of the display unit by pulling it to the left, taking care not to damage it (refer to Figure 10.1.3).

10.1.2.2 Assembling the Display Unit

(1) Align the display unit with the protrusion of the connector facing the amplifier assembly and then make the required connection.

(2) Secure the display unit using its two mounting screws.

(3) Replace the cover by following the procedures used to remove it in the reverse order.

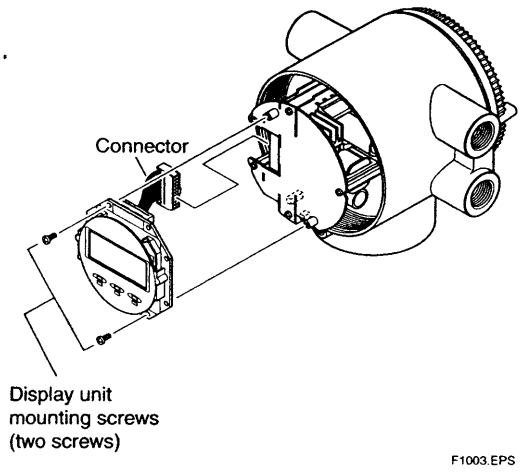


Figure 10.1.3 Removing and Assembling the Display Unit

10.1.2.3 Changing the Display Unit Orientation 90 Degrees

(1) Hold the display unit with your hand and remove the two mounting screws.

(2) Turn the display unit 90 degrees clockwise and confirm the assembling position, taking care of the connector and wire of the display unit.

(3) Secure the display unit using its two mounting screws.

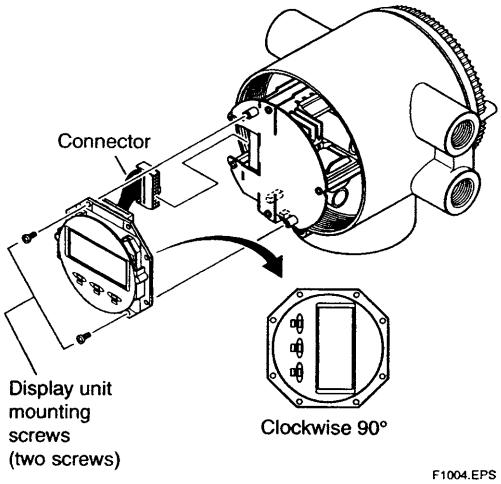


Figure 10.1.4 Assembling the Display Unit

10.1.2.4 Installing the Cover

(1) Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 1 counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

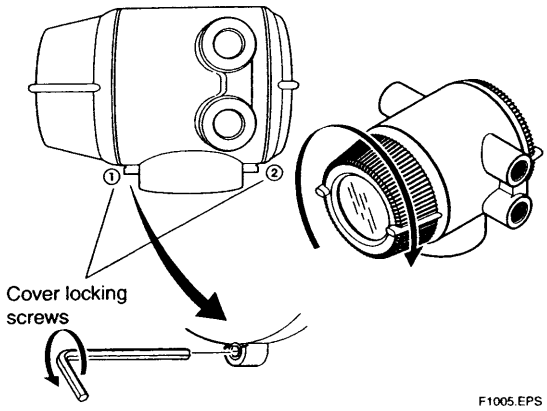


Figure 10.1.5 Installing the Display Cover

10.1.3 Amplifier Replacement

IMPORTANT

In case of amplifier replacement, it is necessary to perform the parameter resetting.
For parameters, refer to Chapter 6: Parameter Description.

10.1.3.1 Removing the Amplifier Assembly

(1) Turn off the power.

(2) Remove the cover.

(3) Remove wiring connectors 1 and 2 (refer to Figure 10.1.6) from the amplifier assembly. Remove them carefully, without applying excessive force.

(4) Loosen the three mounting screws while holding the assembly with your hand.

(5) Pull the assembly straight out.

10.1.3.2 Assembling the Amplifier Assembly

(1) To replace the amplifier assembly, follow the procedures used to remove it in the reverse order.

(2) Replace the assembly by pushing it in, taking care not to damage the amplifier mounting connectors on the circuit board.

(3) Carefully connect wiring connectors 1 and 2 to the amplifier assembly, making sure that the connectors' directions are correct. Let wiring connector 2 pass along the amplifier side of the rod.

(4) Tighten the three mounting screws while holding the assembly with your hand.

(5) Replace the cover, taking care not to entangle the cables of the wiring connectors.

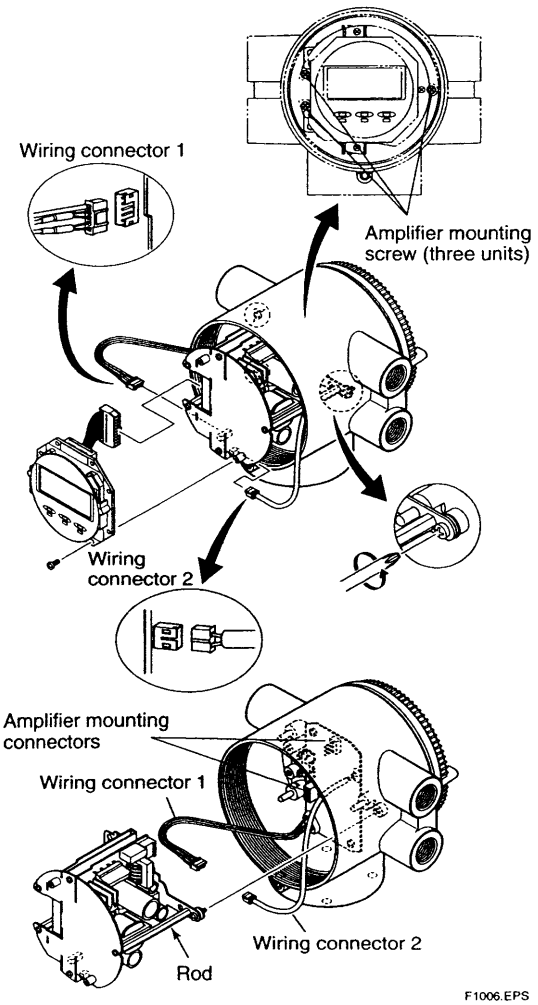


Figure 10.1.6 Assembling the Amplifier

10.2 Setting of Switches

10.2.1 Setting of Burnout Switch

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing plant, the burnout direction is set to High (i.e., 25 mA); however, in cases where the optional code C1 has been specified, the output direction will be set to Low (i.e., 0 mA).

Modification of the burnout direction must be carried out using the setting switch from the amplifier's CPU board (i.e., Switch 1) (See Figure 10.2.1).

Table 10.2.1 Output Setting Pins for Burnout

Position of Pin	Burnout Direction	Burnout Output	Remarks
Low High	High	25 mA	Set to High before shipment
Low High	Low	0 mA	Set to Low for optional code C1

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NOTE

On the amplifier's CPU board, the burnout setting switch (i.e., Switch 1) and the write protect switch (i.e., Switch 2) are located adjacent to each other. Accordingly, special care should be taken when making switch settings.

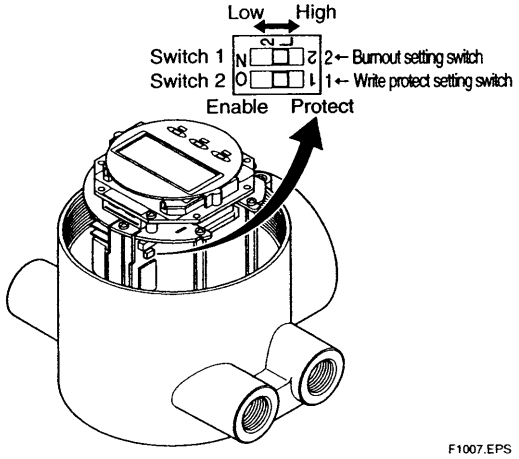

Figure 10.2.1 Switch Configuration

10.2.2 Setting of Write Protect Switch

By setting the write protect function to "Protect" it is possible to prevent the overwriting of parameters. Write protection can be carried out using either the hardware switch on the CPU board (i.e., Switch 2) or software parameter settings. If either of these items is set to "Protect," the overwriting of parameters will be prohibited.

NOTE

If the hardware switch is set to "Protect," it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to "Enable."

For more details regarding usage of the write protect function and the software's parameter switches, refer to "Chapter 6: Parameter Description" in this user's manual.

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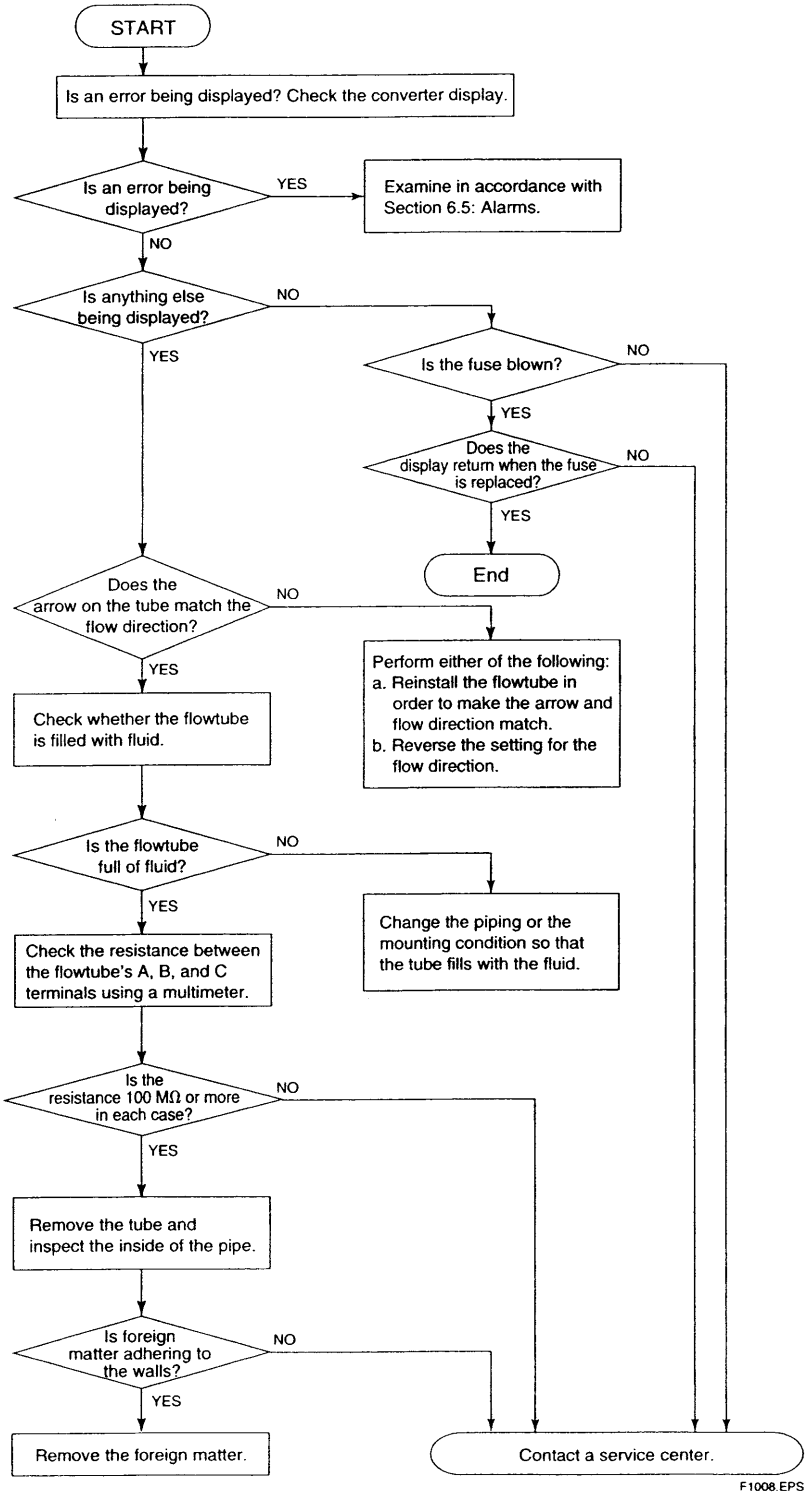
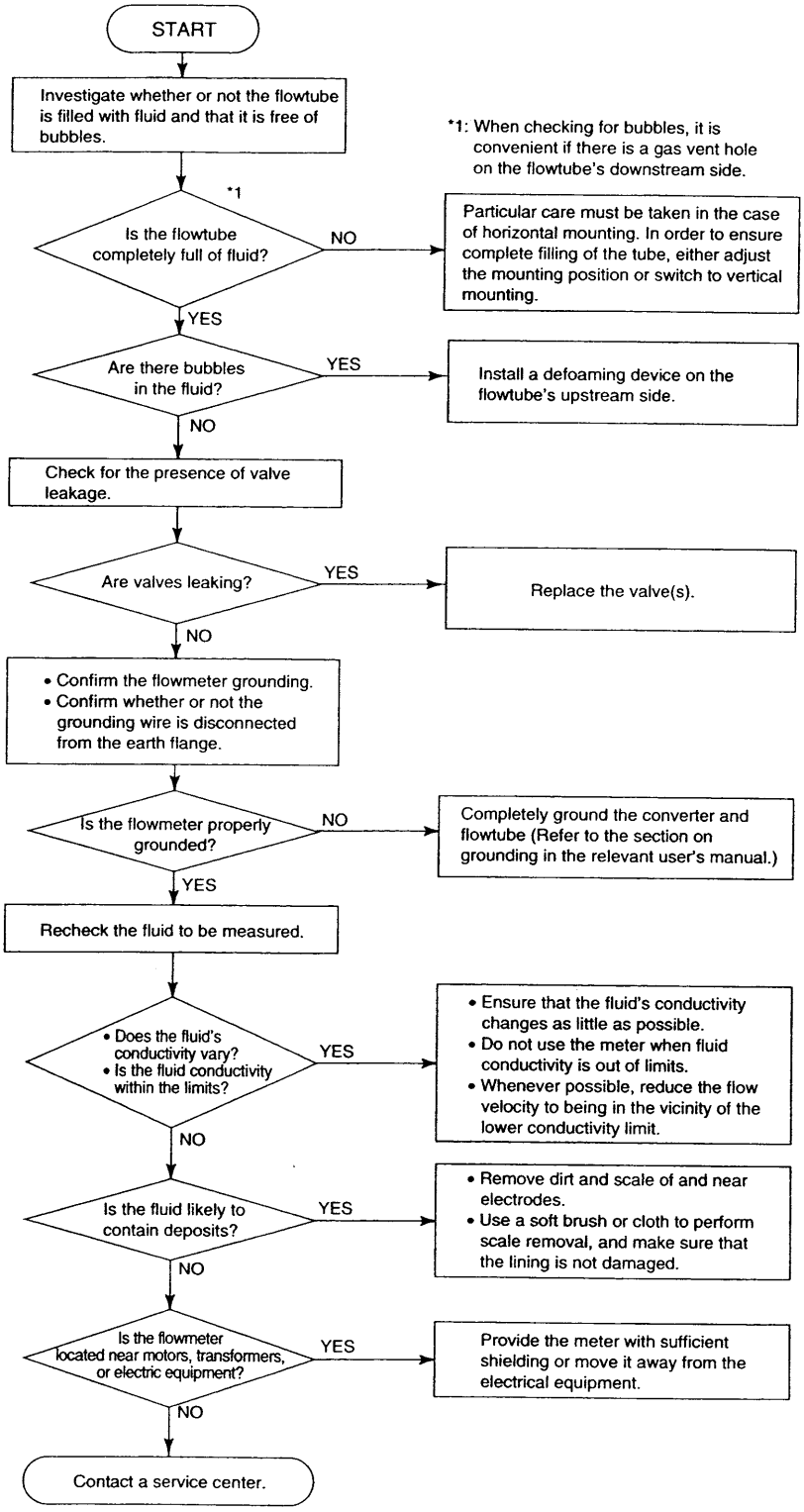
10.3 Troubleshooting

Although magnetic flowmeters rarely require maintenance, failures may occur when the instrument is not operated correctly. This section describes troubleshooting procedures where the cause of the breakdown is identified through receiver indication.

10.3.1 No Indication



10.3.2 Unstable Zero



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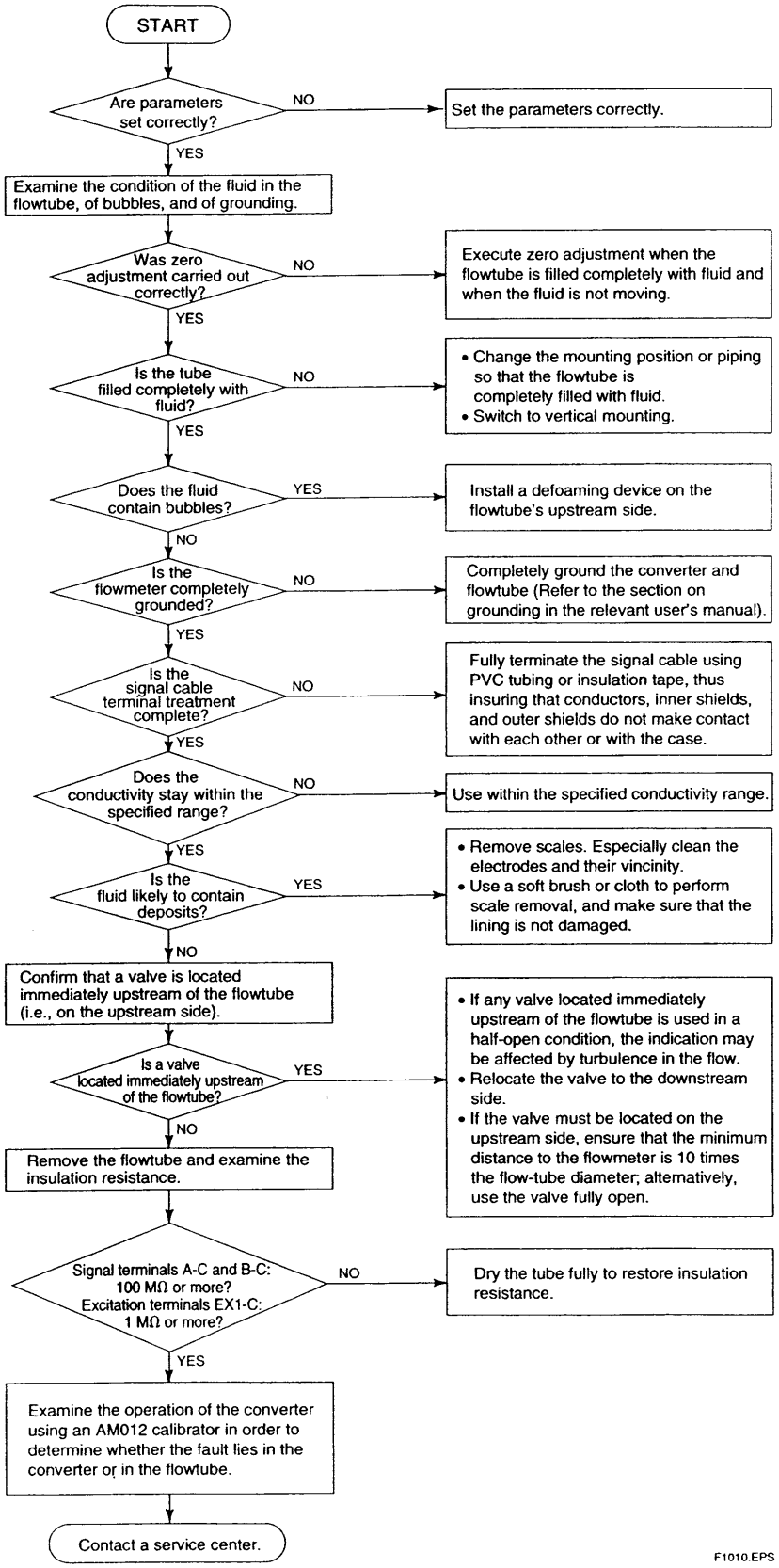
10.3.3 Disagreement Between Indication and Actual Flow



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11. OUTLINE

■ STANDARD SPECIFICATIONS

● Converter

*1: Select two points from: one pulse output, one alarm output, one status input, or two status outputs.
*2: For models without an indicator, the hand-held terminal is necessary to set parameters.

Excitation Method: (Combined with AXF Remote Flowtube)
- Standard dual frequency excitation:
  Size 2.5 to 400 mm (0.1 to 16 in.)
- Enhanced dual frequency excitation:
  Size 25 to 200 mm (1.0 to 8.0 in.)
  (Optional code HF1 or HF2)

Input Signal (*1):
One Status Input: Dry contact
Load resistance: 200 Ω or less (ON), 100 kΩ or more (OFF)

Output Signals:
- One Current Output: 4 to 20 mA DC (load resistance: 750 Ω maximum, including cable resistance)
- One Pulse Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
  Output rate: 0.0001 to 10,000 pps (pulse/second)
- One Alarm Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
- Two Status Outputs (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)

Communication Signals:
BRAIN or HART communication signal
(Superimposed on the 4 to 20 mA DC signal)
Distance from power line: 15 cm (6 in.) or more (Parallel wiring should be avoided.)

BRAIN:

Communication Distance:
Up to 2 km (1.25 miles), when polyethylene insulated PVC-sheathed cables (CEV cables) are used. Communication distance varies depending on the type of cable and wiring used.

Load Resistance:
250 to 600 Ω (including cable resistance)

Load Capacitance: 0.22 μF or less

Load Inductance: 3.3 mH or less

Input Impedance of Communicating Device:
10 kΩ or more (at 24 kHz)

HART:

Communication Distance:
Up to 1.5 km (0.9 mile), when using multiple twisted pair cables. Communication distance varies depending on the type of cable used.

Load Resistance:
230 to 600 Ω (including cable resistance)

Cable Length for Specific Applications:
Use the following formula to determine the cable length for specific applications:

$$L = \frac{65\times10^6}{(R\times C)} - \frac{(Cf+10{,}000)}{C}$$

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

Note: HART is a registered trademark of the HART Communication Foundation.

Data Security During Power Failure:
Data (parameters, totalizer value, etc.) storage by EEPROM. No back-up battery required.

Indicator (*2):
Full dot-matrix LCD (32×132 pixels)

Lightning Protector:
The lightning protector is built into the excitation current output, the current output, the signal common, pulse/alarm/status input and output terminals. When optional code A is selected, the lightning protector is built into the power terminals.

Protection:
General-purpose Use/Sanitary Type/TIIS Flame proof type:
IP66, IP67, JIS C0920 immersion-proof type
Explosion proof type except TIIS:
In case of explosion proof type except TIIS, refer to description of "Enclosure" in "HAZARDOUS AREA CLASSIFICATION".

Coating:
Case and Cover: Polyurethane corrosion-resistant
Coating Color: Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Converter Material:
Case and Cover: Aluminum alloy

Mounting/Shapes:
- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 ×1.5 female
  JIS G1/2 (PF1/2) female
- Terminal Connection: M4 size screw terminal

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19.1.1

Grounding:

Grounding resistance 100 Ω or less
When optional code A is selected, grounding resistance 10 Ω or less shall be applied.

* In case of explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.
* In case of TIIS Flame proof type, refer to description of "HAZARDOUS AREA CLASSIFICATION".

Combined Remote Flowtube:

- AXFA14 Converter can be combined with size 2.5 to 400 mm (0.1 to 16 in.) of AXF Remote Flowtube.
- If a combined converter is changed from AXFA14 to AXFA11 or vice versa, a new meter factor must be adjusted by flow calibrations.
- In case that size 250 mm (10 in.) or larger is used in low conductivity or high concentration slurries, please use the AXFA11 Converter.

Functions

How to Set Parameters (*2):

The indicator's LCD and three infra-red switches enable users to set parameters without opening the case cover. Parameters can also be set by means of the HHT(Hand-held terminal).

Displayed Languages (*2):

Users can choose a language from among English, Japanese, German, French, Italian, Spanish.

Instantaneous Flow Rate/Totalized Value Display Functions (for models with an indicator) (*2):

The full dot-matrix LCD enables user selections of displays from one line to three lines for:

- Instantaneous flow rate
- Instantaneous flow rate (%)
- Instantaneous flow rate (bar graph)
- Current output value (mA)
- Totalized value
- Tag No.
- Results of electrode adhesion diagnostics

Totalizer Display Function (*2):

The flow rate is counted one pulse at a time according to the setting of totalization pulse weights. For forward and reverse flow measurement functions, the totalized values of the flow direction (forward or reverse) and the flow direction are displayed on the indicator together with the units. The difference of totalized values between the forward and reverse flow rate can be displayed. Totalization for the reverse flow rate is carried out only when "Forward and reverse flow measurement functions" is selected.

Damping Time Constant (*2):

Time constant can be set from 0.1 second to 200.0 seconds (63% response).

Span Setting Function (*2):

Span flows can be set in units such as volume flow rate, mass flow rate, time, or flow rate value. The velocity unit can also be set.

Volume Flow Rate Unit: kcf, cf, mcf, Mgal (US), kgal (US), gal (US), mgal (US), kbbl (US)*, bbl (US)*, mbbl (US)*, µbbl (US)*, Ml (megaliter), m^3, kl (kiloliter), l (liter), cm^3

Mass Flow Rate Unit (Density must be set.): klb (US), lb (US), t (ton), kg, g

Velocity Unit: ft, m (meter)

Time Unit: s (sec), min, h (hour), d (day)

* "US Oil" or "US Beer" can be selected.

Pulse Output (*1)(*2):

Scaled pulse can be output by setting a pulse weight.

Pulse Width: Duty 50% or fixed pulse width (0.05, 0.1, 0.5, 1, 20, 33, 50, 100 ms) can be selected.

Output Rate: 0.0001 to 10,000 pps (pulse/second)

Multi-range Function (*1)(*2):

- Range switching via status input
  Status input enables the switching of up to two ranges.
- Automatic range switching
  When the flow rate exceeds 100 % of the range, transition to the next range (up to four ranges) is carried out automatically. Range switching can be confirmed by status outputs and indicator.

Forward and Reverse Flow Measurement Functions (*1)(*2):

Flows in both forward and reverse directions can be measured. The reverse flow measurement can be confirmed by status output and indicator.

Totalization Switch (*1)(*2):

The status output is carried out when output if a totalized value becomes equal to or greater than the set value.

Preset Totalization (*1)(*2):

The parameter setting or status input enables a totalized value to be preset to a setting value or zero.

0% Signal Lock (*1)(*2):

Status input forcibly fixes the instantaneous flow rate display, current output, pulse output, and flow rate totalization to 0%.

Alarm Selection Function (*2):

Alarms are classified into System Alarms (hard failures), Process Alarms (such as 'Empty Pipe', 'Signal Overflow' and 'Adhesion Alarm'), Setting Alarms, and Warnings. Whether alarms should be generated or not can be selected for each item.

The current output generated for an alarm can be selected from among 2.4 mA or less, fixed to 4 mA, 21.6 mA or more, or HOLD.

Alarm Output (*1)(*2):

Alarms are generated only for the items selected via the 'Alarm Selection Function' if relevant failures occur.

Self Diagnostics Functions (*2):

If alarms are generated, details of the System Alarms, Process Alarms, Setting Alarms and Warnings are displayed together with concrete descriptions of counter-measures.

Flow Upper/Lower Limit Alarms (*1)(*2):

If a flow rate becomes greater or smaller than the set value, this alarm is generated. In addition, two upper limits (H, HH) and two lower limits (L, LL) can be set.

If a flow rate becomes greater or smaller than any of the set values, the status is output.

Electrode Adhesion Diagnostics Function (*1) (*2):

This function enables monitoring of the adhesion level of insulating substances to the electrodes. Depending on the status of adhesion, users are notified by a warning or an alarm via status outputs. If replaceable electrodes are used, they can be removed and cleaned when adhesion occurs.

■ HAZARDOUS AREA CLASSIFICATION

FM:

Applicable Standard: FM3600, FM3615, FM3810, ANSI/NEMA 250
Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: NEMA 4X
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

Note: Installation shall be in accordance with the manufacturer's instructions and National Electric code, ANSI/NFPA-70.

CENELEC ATEX (KEMA):

Applicable Standard: EN 50014, EN 50018, EN 50281-1-1, EN 60529, EN 61010-1
Certificate: KEMA 03ATEX2435

CENELEC ATEX (KEMA) Flame proof Type

Group: II
Category: 2G
EEx d IIC T6
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

CENELEC ATEX (KEMA) Type of Protection "Dust"

Group: II
Category: 1D
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Maximum surface temperature: T75°C (+167°F)
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

CSA:

Applicable Standard:
For CSA C22.2 Series;
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 1010.1
For CSA E79 Series;
CAN/CSA-E79-0, CAN/CSA-E79-1,
Certificate: 1481213

For CSA C22.2 Series

Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: Type 4X
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

For CSA E79 Series

Flame proof for Zone 1, Ex d IIC T6

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

TIIS:

- Certificate: C16678
- Construction: Ex d IIC T6
  : Explosion proof
- Ambient Temperature: –20°C to 60°C (power supply code 1)
  : –20°C to 50°C (power supply code 2)
- Maximum power supply voltage: 250V AC/130V DC
- Grounding: JIS Class C (grounding resistance 10Ω or less) or JIS Class A (grounding resistance 10Ω or less)

*In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

■ STANDARD PERFORMANCE

Reference Conditions:

Similar to BS EN 29104 (1993); ISO9104 (1991)
- Fluid temperature: 20°C ±10°C (+68°F ±18°F)
- Ambient temperature: 25°C ±5°C (+77°F ±9°F)
- Warm-up time: 30 min
- Straight runs
  Upstream > 10 × DN
  Downstream > 5 × DN
- Properly grounded
- Properly centered

Accuracy (Combined with AXF Remote Flowtube at reference conditions)

Pulse Output:

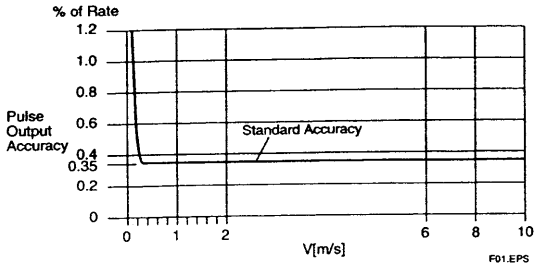
PFA/Ceramics Lining:

Size mm (in.)	Flow Velocity V m/s (ft/s)	Standard Accuracy (Calibration code B)	Flow Velocity V m/s (ft/s)	High grade Accuracy (Calibration code C)
2.5 (0.1) to 15 (0.5)	V < 0.3 (1)	±1.0 mm/s	—	
	0.3 ≦ V ≦ 10 (1) (33)	±0.35% of Rate		
25 (1.0) to 200 (8.0)	V < 0.15 (0.5)	±0.5 mm/s	V <0.15 (0.5)	±0.5 mm/s
	0.15 ≦ V ≦ 10 (0.5) (33)	±0.35% of Rate	0.15 ≦ V <1 (0.5) (3.3)	±0.18% of Rate ±0.2mm/s
			1 ≦ V ≦10 (3.3) (33)	±0.2% of Rate
250 (10) to 400 (16)	V < 0.15 (0.5)	±0.5 mm/s	—	
	0.15 ≦ V ≦ 10 (0.5) (33)	±0.35% of Rate		

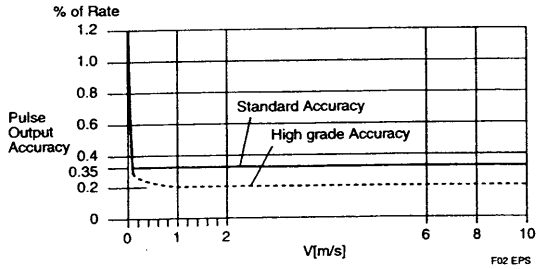
T01.EPS

Enhanced dual frequency excitation (Option code HF2):
Standard accuracy ± 1 mm/ s

Size 2.5 mm (0.1 In.) to 15 mm (0.5 In.)



Size 25 mm (1.0 in.) to 400 mm (16 in.)



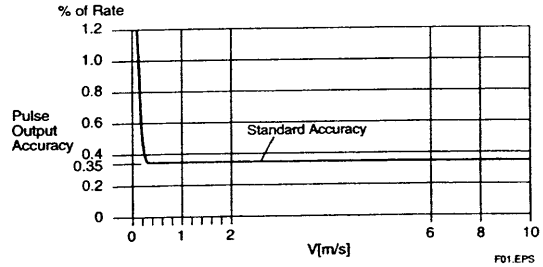
Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber Lining

Size mm (in.)	Flow Velocity *V* m/s (ft/s)	Standard Accuracy (Calibration code B)
25 (1.0) to 400 (16)	$V < 0.3$ (1.0)	±1.0 mm/s
	$0.3 \leqq V \leqq 10$ (1.0) (33)	±0.35% of Rate

T02 EPS

Enhanced dual frequency excitation (Optional code HF2): Standard accuracy ± 1 mm/ s

Size 25 mm (1.0 in.) to 400 mm (16 in.)



Current Output: Pulse output accuracy plus ±0.05% of Span

Repeatability:

±0.1% of Rate (V ≧ 1 m/s (3.3 ft/s))

±0.05% of Rate ±0.5 mm/s (V < 1 m/s (3.3 ft/s))

Maximum Power Consumption:

Combined with AXF Remote Flowtube: 12 W

Insulation Resistance(*1) :

Between power supply terminals and ground terminal: 100MΩ at 500V DC

Between power supply terminals and input/output/ excitation current terminals : 100MΩ at 500V DC

Between ground terminal and input/output/excitation current terminals: 20MΩ at 100V DC

Between input/output/excitation current terminals :20MΩ at 100V DC

Withstand Voltage(*1) :

Between power supply terminals and ground terminal: 1390V AC for 2 seconds

Between power supply terminals and input/output terminals: 1390V AC for 2 seconds

Between excitation current terminal and ground terminal: 160V AC for 2 seconds

Between excitation current terminal and input /output terminals: 200V AC for 2 seconds

⚠ CAUTION

*1: When performing the Insulation Resistance Test or the Withstand Voltage Test, please obey the following caution.

- Following the relevant test, wait for more than 10 seconds after the power supply has been turned off before removing the cover.
- Remove all wires from terminals before testing.
- When the power terminal has a lighting protector (optional code A), remove the short bar at the ground terminal.
- After testing, be sure to discharge by using a resistance and return all wires and the short bar to its correct position.
- Screws must be tightened to a torque of 1.18 N-m or more.
- After closing the cover, the power supply can be restored.

Safety Requirement Standards:

EN61010-1

- Altitude at installation site: Max. 2000 m above sea level
- Installation category based on IEC1010: Overvoltage category II ("II" applies to electrical equipment which is supplied from a fixed installation-like distribution board.)
- Pollution degree based on IEC1010 Pollution degree 2 ("Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to a normal indoor atmosphere.)

EMC Conformity Standards:

EN61326

EN61000-3-2, EN61000-3-3

AS/NZS CISPR11

■ NORMAL OPERATING CONDITIONS

Ambient Temperature: –40°C to +60°C (–40°F to +140°F)
- Indicator's operating range: –20°C to +60°C (–4°F to +140°F)
- Maximum temperature should be 50°C in the case of power supply code 2.

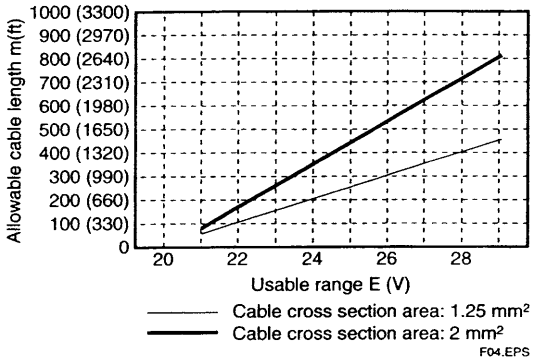
Ambient Humidity: 0 to 100%
Lengthy continuous operation at 95% or more is not recommended.

Power Supply

Power supply code 1:
- AC specifications
  Rated power supply: 100 to 240 V AC, 50/60 Hz
  (Operating voltage range: 80 to 264 V AC)
- DC specifications
  Rated power supply: 100 to 120 V DC
  (Operating voltage range: 90 to 130 V DC)

Power supply code 2:
- AC specifications
  Rated power supply: 24 V AC, 50/60 Hz
  (Operating voltage range: 20.4 to 28.8 V AC)
- DC specifications
  Rated power supply: 24 V DC
  (Operating voltage range: 20.4 to 28.8 V DC)

Supplied Power and Cable Length for Power Supply Code 2



F04.EPS

Vibration Conditions:
Level of vibration in conformity with IEC 60068-2-6 (SAMA31. 1-1980)
1 G or less (frequency 500 Hz or less)
Note: Avoid locations with much vibration (with a vibration frequency of 500 Hz or more), which may cause damage to the equipment.

■ ACCESSORIES

Fuse (T2.0A, 250 V): 1 pc.
*Time lag fuse
Mounting bracket: 1 set
Hexagonal wrench: 1 pc.

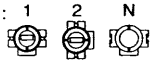
■ MODEL AND SUFFIX CODE

AXFA14 Magnetic Flowmeter Remote Converter:

Model	Suffix Code	Description
AXFA14		Magnetic Flowmeter Remote Converter
Use (*2)	G	General-Purpose Use For AXF Remote Flowtube of Size 2.5 to 400 mm (0.1 in. to 16 in.)
	C	Explosion proof Type For Remote Flowtube of Size 2.5 to 400 mm (0.1 in. to 16 in.)
Output Signal and Communication	-D	4 to 20 mA DC, BRAIN Communication
	-E	4 to 20 mA DC, HART Communication
Power Supply	1	100 V to 240 V AC or 100 to 120 V DC
	2	24 V AC/DC
Electrical Connections (*3)	-0	JIS G1/2 female
	-2	ANSI 1/2 NPT female
	-4	ISO M20 × 1.5 female
Indicator (*1)(*4)	1	With Indicator (Horizontal)
	2	With Indicator (Vertical)
	N	None
Option	/□	Optional code (See the Table of Optional Specifications)

T03.EPS

*1: 1 2 N



*2: For explosion proof types, specify type of explosion proof certification using the optional codes. In case of the TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.
*3: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.
*4: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

Signal Cable:

Model	Suffix Code	Description
AXFC		Magnetic Flowmeter Dedicated Signal cable for the ADMAG AXF series
Termination	-0	No Termination.
	-4	A set of termination parts for M4 screws is attached. Terminated for the AXFA11/14 Remote Converter.
Cable Length	-L□□□	Designate the cable length, unit: m Following "L", specify the cable in three digits as multiple of 1 meter (e.g., 001, 002, or 005) for a length up to 5 m, or as a multiple of 5 meters (i.e., 005, 010, 015, or the like). The maximum cable length: 200 m for combined use with AXFA11 100 m for combined use with AXFA14
Option	/C□	With termination parts sets. Following "C", specify the q'ty of sets of termination parts in one digits.

T04.EPS

Note:
- The cable is constructed with double shielding over the two conductors, and uses heat-resistant vinyl as the outer covering material.
  Finished diameture: 10.5 mm (0.41 in.)
  Maximum temperature: +80°C (+175°F)
- Unnecessary to order the above cable for submersible type flowtube or for the optional code DHC flowtube because the flowtube is wired with 30 m (98 ft) cable.
- For excitation cable, prepare a two-core cable at the customer side.

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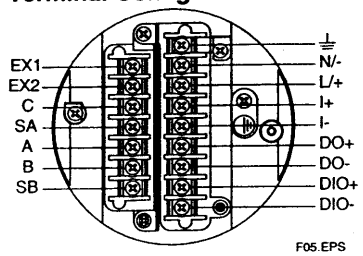
19.1.1

● Terminal Configuration



F05.EPS

● Terminal Wiring

Terminal Symbols	Description
EX1 EX2	Excitation current Output
C SA A B SB	Flow singal input

Terminal Symbols	Description
⏚	Functional grounding
N/– L/+	Power supply
I+ I–	Current output 4 to 20mA DC
DO+ DO–	Pulse output/ Alarm output/ Status output
DIO+ DIO–	Alarm output/ Status output/ Status input
⏚	Protective grounding (Outside of the terminal)

T06.EPS

■ OPTIONAL SPECIFICATIONS FOR AXFA14 REMOTE CONVERTER

O: Available –: Not available

Item	Specification		General-Purpose use	Explosion proof Type	Code
Lightning Protector	A lightning protector is built into the power terminals.		O	O	A
DC Noise Cut Circuit	The DC Noise Cut Circuit is built in. Available for 15 mm (0.5 in.) and larger sizes, and for fluids with the conductivity of 50 µS/cm or higher. Nullifies the empty check and electrode adhesion diagnostic function.		O	O	ELC
Burn Out Down	The output level is set to 0 mA during a CPU failure and is set 2.4 mA (-10%) or less during an alarm. Standard products are delivered with a setting 25 mA during a CPU failure and 21.6 mA (110%) or more during an alarm.		O	O	C1
NAMUR NE43 Compliance	Output signal limits: 3.8 to 20.5 mA	Failure alarm down-scale: The output level is set to 0 mA during a CPU failure and is set 2.4 mA (–10%) or less during an alarm.	O	O	C2
		Failure alarm up-scale. The output level is set to 25 mA during a CPU failure and is set 21.6 mA (110%) or more during an alarm.	O	O	C3
Active Pulse Output	Active pulses are output in order to drive an external electromagnetic or electronic counter directly using the converter's internal power supply. (Nullfies the standard transistor contact pulse output.) Output voltage: 24 V DC ±20% Pulse specifications: • The drive current of 30 to 150 mA • Pulse rate: 0.0001 to 2 pps (pulse/second); Pulse width: 20, 33, 50, or 100 ms		O	O	EM
Waterproof Glands	Waterproof glands are attached to the electrical connections. Available only for JIS G1/2 electric connections.		O	–	EG
Waterproof Glands with Union Joints	Waterproof glands with union joints are attached to the electrical connections. Available only for JIS G1/2 electric connections.		O	–	EU
Plastic Glands	Plastic glands are attached to the electrical connections. Available only for JIS G1/2 electric connections.		O	–	EP
Stainless Steel Mounting Bracket	Provided with a JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel mounting bracket in lieu of the standard carbon steel bracket.		O	O	SB
Stainless Steel Tag Plate	Screwed JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) stainless steel tag plate. Choose this option when an SS tag plate is required in addition to the standard nameplate with the tag number inscribed on it. Dimension (Height × Width): Appr. 12.5 (4.92) × 40 (15.7) mm (inch)		O	O	SCT
Painting Color Change	Coated in black (Munsell N1.5 or its equivalent.)		O	O	P1
	Coated in jade green (Munsell 7.5BG4/1.5 or its equivalent.)		O	O	P2
	Coated in metallic silver.		O	O	P7
Epoxy Resin Coating	Epoxy resin coating which has alkali-resistance instead of standard polyurethane resin coating. The color is same as standard type.		O	O	X1
High Anti-corrosion Coating	Three-layer coating (polyurethane coating on two-layer epoxy resin coating) in the same range as that for the standard coating. The color is same as standard type. Salt/alkali/acid/weather-resistance.		O	O	X2
Calibration Certificate	Level 2: The Declaration and the Calibration Equipment List are issued.		O	O	L2
	Level 3: The Declaration and the Primary Standard List are issued.		O	O	L3
	Level 4: The Declaration and the Yokogawa Measuring Instruments Control System are issued.		O	O	L4
FM Approval	FM Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	O	FF1
CENELEC ATEX Certification (KEMA Approval)	ATEX Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	O	KF2
CSA Certification	CSA Explosion proof See "HAZARDOUS AREA CLASSIFICATION"		–	O	CF1
TIIS Certification *1	TIIS Flame proof See "HAZARDOUS AREA CLASSIFICATION"		–	O	JF3
Flame proof packing adapter for TIIS Flame proof Type	Four flame proof packing adapters		–	O	G14
	Three flame proof packing adapters and one blind plug. Available only when a four-wires cable is used for power input and signal output with DC power supply.		–	O	G13

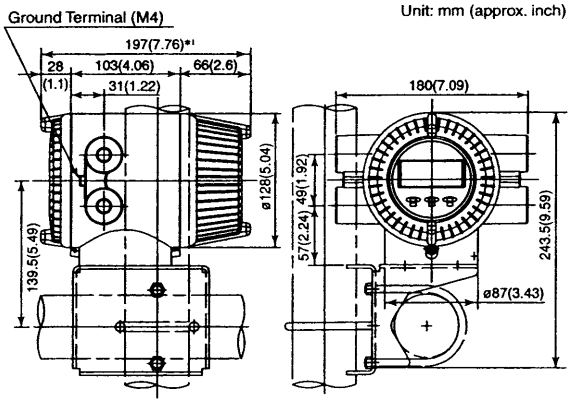
*1: Select optional code G14 or G13 when TIIS Flame proof type with wiring using a flame proof packing adapter. Available only for JIS G1/2 electric concections.

T05.EPS

■ EXTERNAL DIMENSIONS

● Remote Converter AXFA14G/C

Unit: mm (approx. inch)



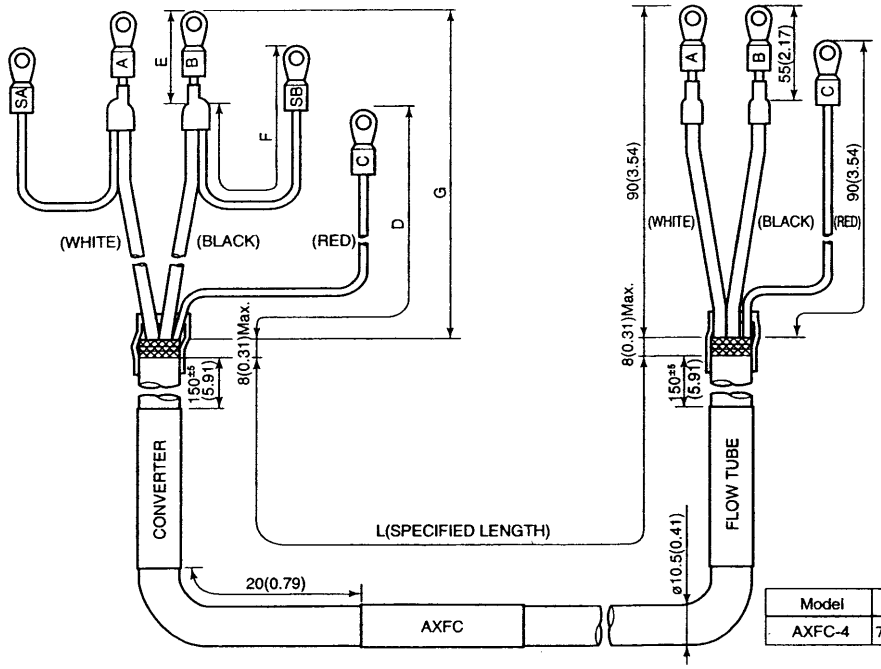
Weight: 2.8kg (6.2lb)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it. F06.EPS

● Dedicated Signal Cable

AXFC-4-L□□□

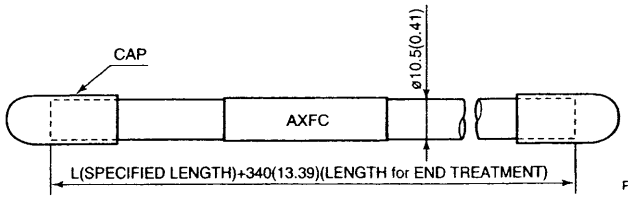
Unit: mm (approx. inch)



Model	D	E	F	G
AXFC-4	70(2.76)	25(0.98)	50(1.97)	60(1.36)

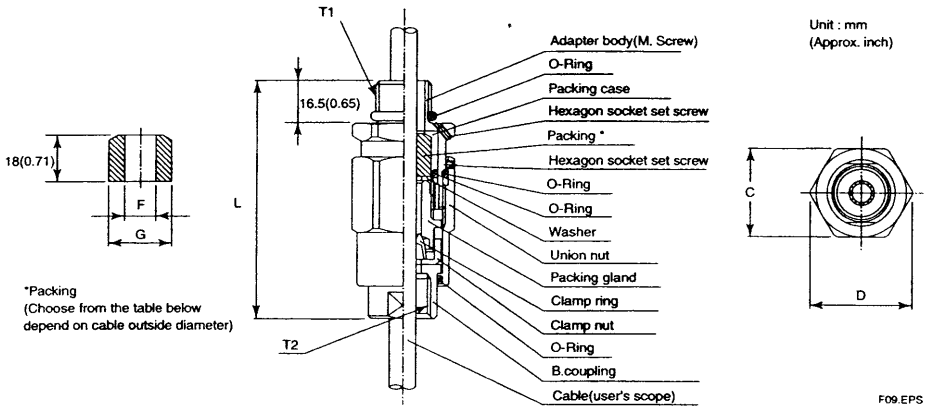
F07.EPS

AXFC-0-L□□□



F08.EPS

● Flame proof packing adapter for TIIS flame proof type (optional code G14 or G13)



Dimension					Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ϕ8.0 to ϕ10.0 (0.31 to 0.39)	ϕ10.0(0.39)	ϕ20.0 (0.79)	16 8-10	0.26 (0.57)
					ϕ10.0 to ϕ12.0 (0.39 to 0.47)	ϕ12.0(0.47)		16 10-12	

T013.EPS

● Unless otherwise specified, difference in the dimensions are refer to the following table.

General tolerance in the dimensional outline drawing.

Unit : mm (approx.inch)

Category of basic dimension		Tolerance	Category of basic dimension		Tolerance
Above	Equal or below		Above	Equal or below	
	3 (0.12)	±0.7 (±0.03)	500 (19.69)	630 (24.80)	±5.5 (±2.17)
3 (0.12)	6 (0.24)	±0.9 (±0.04)	630 (24.80)	800 (31.50)	±6.25 (±0.25)
6 (0.24)	10 (0.39)	±1.1 (±0.04)	800 (31.50)	1000 (39.37)	±7.0 (±0.28)
10 (0.39)	18 (0.71)	±1.35 (±0.05)	1000 (39.37)	1250 (49.21)	±8.25 (±0.32)
18 (0.71)	30 (1.18)	±1.65 (±0.06)	1250 (49.21)	1600 (62.99)	±9.75 (±0.38)
30 (1.18)	50 (1.97)	±1.95 (±0.08)	1600 (62.99)	2000 (78.74)	±11.5 (±0.45)
50 (1.97)	80 (3.15)	±2.3 (±0.09)	2000 (78.74)	2500 (98.43)	±14.0 (±0.55)
80 (3.15)	120 (4.72)	±2.7 (±0.11)	2500 (98.43)	3150 (124.02)	±16.5 (±0.65)
120 (4.72)	180 (7.09)	±3.15 (±0.12)			
180 (7.09)	250 (9.84)	±3.6 (±0.14)			
250 (9.84)	315 (12.40)	±4.05 (±0.16)			
315 (12.40)	400 (15.75)	±4.45 (±0.18)			
400 (15.75)	500 (19.69)	±4.85 (±0.19)			

Remarks: The numeric is based on criteria of tolerance class IT18 in JIS B 0401.

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19.1.1

12. EXPLOSION PROTECTED TYPE INSTRUMENT

In this section, further requirements and differences for explosion proof type instrument are described.

⚠ WARNING

- Magnetic flowmeters with the model name AXFA14C are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations.
  Be sure to read this chapter before handling the instruments.
  For explosion proof type instrument, the description in this chapter is prior to other description in this user's manual.
  For TIIS flame proof type instruments, be sure to read "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" at the end of this manual.

⚠ WARNING

The terminal box cover and display cover is locked by special screw. In case of opening the cover, please use the hexagonal wrench attached.
The covers of explosion proof type products are locked. Use the attached hexagonal wrench to open and close the cover. Before opening the cover, be sure to check that the power of flowmeter has been turned off. Once the cover is closed, be sure to re-lock the product.
Be sure to lock the cover with the special screw using the hexagonal wrench attached after tightening the cover.

12.1 CENELEC ATEX (KEMA)

⚠ WARNING

Only trained persons use this instrument in industrial locations.

(1) Technical Data

CENELEC ATEX (KEMA):

Applicable Standard:
EN 50014, EN 50018, EN 50281-1-1,
EN 60529, EN 61010-1
Certificate: KEMA 03ATEX2435

CENELEC ATEX (KEMA) Flame proof Type

Group: II
Category: 2G
EEx d IIC T6
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

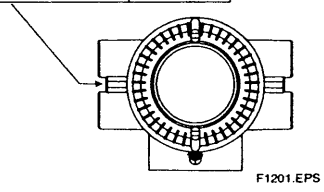
CENELEC ATEX (KEMA) Type of Protection "Dust"

Group: II
Category: 1D
Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: IP66, IP67
Maximum surface temperature: T75°C (+167°F)
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Electrical Connection

The type of electrical connection is stamped near the electrical connection port accordiing to the following codes.

Screw Size	Marking
ISO M20x1.5 female	⚠M
ANSI 1/2NPT female	⚠A



(3) Installation

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified ATEX flame proof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flame proof certified blanking elements. (The plug attached is flame proof certified.)

(4) Operation

WARNING

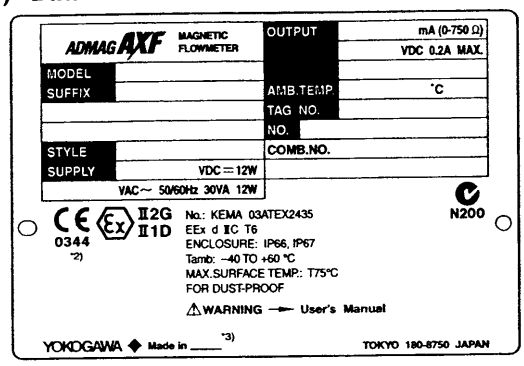
- After de-energizing, delay 20 minutes before opening.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(5) Maintenance and Repair

WARNING

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

(6) Data Plate



MODEL: Specified model code
SUFFIX: Suffix codes of the model code
STYLE: Specified style code
SUPPLY: Power supply voltage of apparatus
OUTPUT: Output signal of apparatus
AMB. TEMP., Tamb: Ambient temperature
No.: Manufacturing serial number *1)
CE: CE marking
II 2G: Group II Category 2 Gas atmosphere
II 1D: Group II Category 1 Dust atmosphere
No.: KEMA 03ATEX2435:
EC Type Examination certificate number
EEx d IIC T6: Protection type and temp. class
ENCLOSURE: Enclosure protection code

WARNING: Warning to apparatus
YOKOGAWA ◆ TOKYO 180-8750 JAPAN :
Name and address of manufacturer

*1) The third figure from the last shows the last one figure of the year of production. For example, the year of production of the product engraved as follows is year 2003.
No. F261GA091 3 13
↑
Produced in 2003

*2) The identification number of the notified body:
0344 KEMA Netherland

*3) The product-producing country

12.2 FM

(1) Technical Data

Applicable Standard:
FM3600, FM3615, FM3810, ANSI/NEMA 250
Explosion proof for Class I, Division 1, Groups A, B, C & D.
Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc
Excitation Circuit: 140V max
Enclosure: NEMA 4X
Temperature Code: T6
Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

WARNING

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and Local Electrical Code.
- In hazardous locations, wiring to be in conduit as shown in Figure 12.2.1.
- When installed in Division 2, "SEALS NOT REQUIRED"

(3) Operation

WARNING

- "OPEN CIRCUIT BEFORE REMOVING COVERS."
- "SEAL ALL CONDUITS WITHIN 18 INCHES" in hazardous locations.
- When installed in Division 2, "SEALS NOT REQUIRED"
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) 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 approval of Factory Mutual Research Corporation.

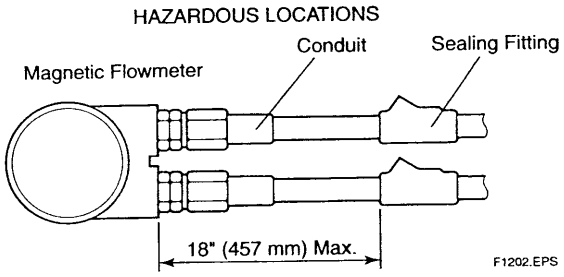


Figure 12.2.1 Conduit Wiring

12.3 CSA

(1) Technical Data

Applicable Standard:

For CSA C22.2 Series;

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 1010.1

For CSA E79 Series;

CAN/CSA-E79-0, CAN/CSA-E79-1,

Certificate: 1481213

For CSA C22.2 Series

Explosion proof for Class I, Division 1, Groups A, B, C & D.

Dust-ignition proof for Class II/III, Division 1, Groups E, F & G.

"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"

"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

Maximum power supply voltage: 250 Vac/130 Vdc

Excitation Circuit: 140V max

Enclosure: Type 4X

Temperature Code: T6

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

For CSA E79 Series

Flame proof for Zone 1, Ex d IIC T6

Maximum power supply voltage: 250 Vac/130 Vdc

Excitation Circuit: 140V max

Enclosure: IP66, IP67

Temperature Code: T6

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

For CSA C22.2 Series

WARNING

- 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 Figure 12.3.1.

WARNING : SEAL ALL CONDUITS WITHIN 50cm OF THE ENCLOSURE'.
UN SCELLEMENT DOIT ÉTRE INSTALLÉ À MOINS DE 50cm DU BOÎTIER.

- When installed in Division 2, "SEALS NOT REQUIRED"

For CSA E79 Series

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified flame proof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flame proof certified blanking elements. (The plug attached is flame proof certified.)

(3) Operation

For CSA C22.2 Series

⚠ WARNING

WARNING : 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.

For CSA E79 Series

⚠ WARNING

WARNING : AFTER DE-ENERGIZING, DELAY 20 MINUTES BEFORE OPENING.
APRÉS POWER-OFF, ATTENDRE 20 MINUTES AVANT D'OUVRIR.

- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) Maintenance and Repair

⚠ WARNING

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

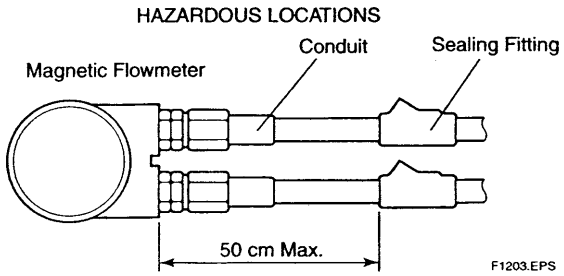


Figure 12.3.1 Conduit Wiring

12.4 TIIS

⚠ CAUTION

The model AXFA14C magnetic flowmeter remote converter with optional code JF3, which has obtained certification according to technical criteria for explosion-protected construction of electric machinery and equipment (Standards Notification No. 556 from the Japanese Ministry of Labor) conforming to IEC standards, is designed for hazardous areas where inflammable gases or vapors may be present. (This allows installation in Division 1 and 2 areas)
To preserve the safety of flameproof equipment requires great care during mounting, wiring, and piping. Safety requirements also place restrictions on maintenance and repair activities. Users absolutely must read "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" at the end of this manual.

(1) Technical Data

- Certificate: C16678
- Construction: Ex d IIC T6
  : Explosion proof
- Ignition and Explosion Class of gas or vapour: IIC T6
- Ambient Temperature: –20 to 60°C (power supply code 1)
  : –20 to 50°C (power supply code 2)
- Maximum power supply voltage: 250V AC/130V DC
- Grounding: JIS Class C(grouding resistance 10Ω or less) or JIS Class A(grounding resistance 10Ω or less)

⚠ WARNING

In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

⚠ WARNING

* In case of TIIS Flame proof type, a remote flowtube is available for combined use with the AXFA14 only.

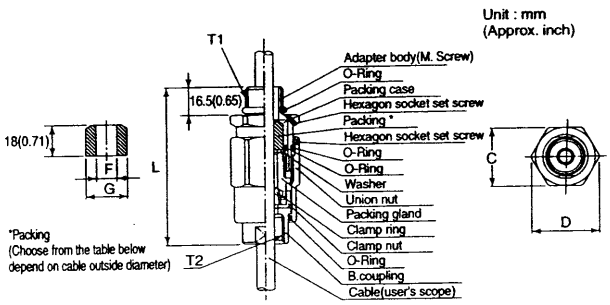
(2) Wiring Installation

For the external wiring of flame proof types, use a flame proof packing adapter approved by Yokogawa (refer to Figure 12.4.2) or cable wiring using a flame proof metal conduit (refer to Figure 12.4.4 and "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" at the end of this manual).

(2-1) Wiring Cable through Flame proof Packing Adapter

WARNING

For the TIIS flame proof type with wiring using a flame proof packing adapter, wire cables through the packing adapters approved by Yokogawa (optional code G14 or G13).

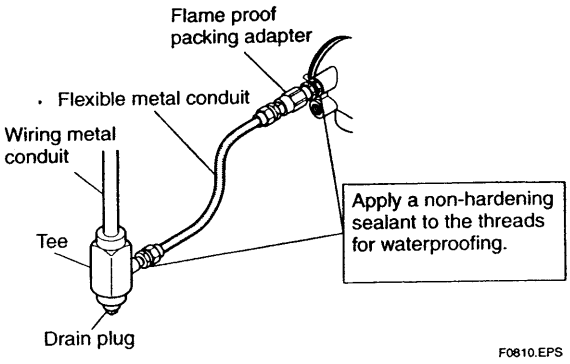


Dimension					Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ϕ8.0 to ϕ10.0 (0.31 to 0.39)	ϕ10.0(0.39)	ϕ20.0 (0.79)	16 8-10	0.26 (0.57)
					ϕ10.0 to ϕ12.0 (0.39 to 0.47)	ϕ12.0(0.47)		16 10-12	

F0809.EPS

Figure 12.4.1 Flame proof Packing Adapter

- Apply a nonhardening sealant to the terminal box connection port and to the threads on the flame proof packing adapter for waterproofing.
- The same wiring as described below is required for all of the terminal box connection ports except when a four-wire cable is used for power input and signal output with DC power supply.



F0810.EPS

Figure 12.4.2 Typical Wiring Using Flexible Metal Conduit

Follow the procedure for flame proof packing adapter setting. (refer to Figure 12.4.3)

CAUTION

Before fighting, confirm cable length from terminal to flame proof packing adapter when setting. Once it is tightened, loosening and re-tightening may damage its sealing performance.

(a) Loosen the locking screw and remove the terminal box cover.
(b) Measure the cable outer diameter in two directions to within 0.1 mm.
(c) Calculate the average of the two diameters, and use packing with an internal diameter nearest to this value (see Table 12.4.1).
(d) Screw the flame proof packing adapter into the terminal box until the O-ring touches the wiring port (at least 6 full turns), and firmly tighten the lock nut.
(e) Insert the cable through the union cover, the union coupling, the clamp nut, the clamp ring, the gland, the washer, the rubber packing, and the packing box, in that order.
(f) Insert the end of the cable into the terminal box.
(g) Tighten the union cover to grip the cable. When tightening the union cover, tighten approximately one turn past the point where the cable will no longer move up and down.
Proper tightening is important. If it is too tight, a circuit break in the cable may occur; if not tight enough, the flame proof effectiveness will be compromised.
(h) Fasten the cable by tightening the clamp nut.
(i) Tighten the lock nut on the union cover.
(j) Connect the cable wires to each terminal.

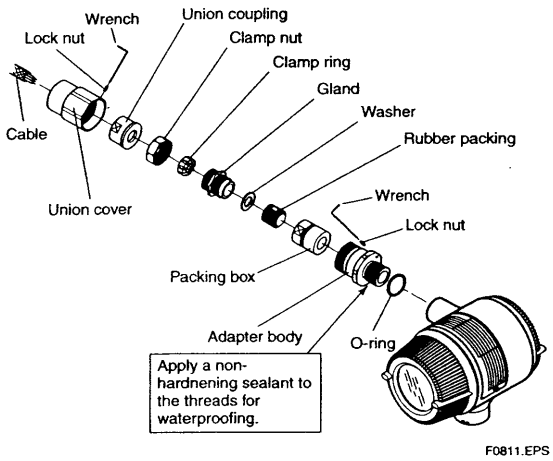


Figure 12.4.3 Installing Flame proof Packing Adapter

(2-2) Cable Wiring Using Flame proof Metal Conduit

- A seal fitting must be installed near the terminal box connection port for a sealed construction.
- Apply a non-hardening sealant to the threads of the terminal box connection port, flexible metal conduit and seal fitting for waterproofing.
- The same wiring as described below is required for all of the terminal box connection ports except when a four-wire cable is used for power input and signal output with DC power supply.

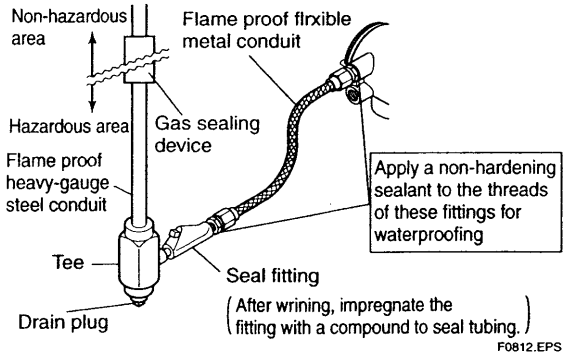


Figure 12.4.4 Typical Wiring Using Flame proof Metal Conduit

General Specifications

GS 01E20D01-01E

AXF
Magnetic Flowmeter
Integral Flowmeter
/Remote Flowtube

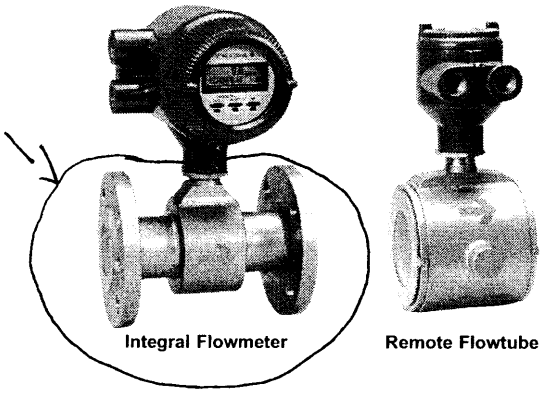
ADMAG AXF™

The AXF magnetic flowmeter series are sophisticated products with outstanding reliability and ease of operation, developed on the basis of decades of field-proven experience.

The combination of a replaceable electrode and the diagnostic to defect adhesion level on the electrodes dramatically improves maintainability.

The AXF employs the fluid noise free "Dual Frequency Excitation Method" (for sizes up to 400 mm (16 in.)) and the newly added "Enhanced Dual Frequency Excitation Method" as an option for more difficult applications to ensure greater stability and quicker response.

Note: The "Dual Frequency Excitation Method" is Yokogawa's unique technology.



■ FEATURES

● User-oriented Functionality

Fluid Adhesion Level Diagnosis

By constantly monitoring the level of insulating substance on the electrodes, it is possible to determine when maintenance is required.
With the utilization of an optional replaceable electrode, the electrodes can be easily removed from the flowmeter and cleaned.

Flexible Electrical Connection Direction

The converter or the terminal box can be rotated arbitrarily to change the directions of electrical connection on the site.

Clear and Versatile Indications

The LCD indicator employs a large, backlit full dot-matrix, that can facilitate various displays.

One to three lines are available. When there is an alarm condition, a full description of the countermeasure is indicated.

"Easy Setup" Parameters

The most frequently used parameters are arranged in a group at the top.
The infra-red switches enable the users to set parameters without opening the cover.

● Expansion of Product Lineup

Improved Accuracy Specification

The standard accuracy is 0.35% of reading. Also available is an optional high accuracy calibration rated at 0.2% of reading.

Extra Small Size Flange Type

The flange type is now available from a 2.5 mm size.

Various Sanitary Connections

A variety of sanitary connections are available, such as Tri-Clamp, ISO, DIN and SMS.

● Enhanced Performance and Specifications

Enhanced Dual Frequency Excitation Method

The "Enhanced Dual Frequency Excitation Method" can be optionally selected.
For difficult applications such as for high concentration slurries or low conductivity fluid, extremely stable measurements can be realized.

Improved Minimum Conductivity

The newly designed AXF converter permits the measurement of fluids with conductivity as low as 1μS/cm.

High-Speed Pulse Output

The pulse rate now goes up to 10,000 pps (pulse/second) for use with high speed applications such as in short time batch processes.

Versatile Input/ouput Function Now Available for Integral Flowmeter

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YOKOGAWA ◆

Yokogawa Electric Corporation
2-9-32, Nakacho, Musashino-shi, Tokyo, 180 Japan
Tel.: 81-422-52-4443 Fax.: 81-422-52-2018

GS 01E20D01-01E

6th Edition Sep. 2005

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4th Edition: Feb. 2005(KP)

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4. Installation of Flameproof Apparatus

(1) Installation Area

Flameproof apparatus may be installed, in accordance with applicable gases, in a hazardous area in Zone 1 or 2, where the specified gases are present. Those apparatus shall not be installed in a hazardous area in Zone 0.

Note: Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:
Zone 0: An area in which an explosive gas atmosphere is present continuously or is present for long periods.
Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation.
Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(2) Environmental Conditions

The standard environmental condition for the installation of flameproof apparatus is limited to an ambient temperature range from –20°C to +40°C (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to +60°C as indicated on the instrument nameplates. If the flameproof apparatus are exposed to direct sunshine or radiant heat from plant facilities, appropriate thermal protection measures shall be taken.

5. External Wiring for Flameproof Apparatus

Flameproof apparatus require cable wiring or flameproof metal conduits for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. For metal conduits, attach sealing fittings as close to wiring connections as possible and completely seal the apparatus. All non-live metal parts such as the enclosure shall be securely grounded. For details, see the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

(1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.
- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated form Zone 1 or 2 hazardous location to any different location or non-hazardous location through the protective pipe or duct, apply sealing of the protective pipes in the vicinity of individual boundaries, or fill the ducts with sand appropriately.
- When branch connections of cables, or cable connections with insulated cables inside the conduit pipes are made, a flameproof or increased-safety connection box shall be used. In this case, flameproof or increased-safety cable glands meeting the type of connection box must be used for cable connections to the box.

(2) Flameproof Metal Conduit Wiring

- For the flameproof metal conduit wiring or insulated wires shall be used as recommended by the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry, published in 1994.
- For conduit pipes, heavy-gauge steel conduits conforming to JIS C 8305 Standard shall be used.
- Flameproof sealing fittings shall be used in the vicinity of the wiring connections, and those fittings shall be filled with sealing compounds to complete sealing of the apparatus. In addition, to prevent explosive gases, moisture, or flame caused by explosion form being propagated through the conduit, always provide sealing fittings to complete sealing of the conduit in the following locations:
  (a) In the boundaries between the hazardous and non-hazardous locations.
  (b) In the boundaries where there is a different classification of hazardous location.
- For the connections of the apparatus with a conduit pipe or its associated accessories, G-type parallel pipe threads (JIS B 0202) shall be used to provide a minimum of five-thread engagement to complete tightness. In addition, since these parallel threads do not have sealing property, nonhardening sealant such as liquid gaskets shall thus be applied to those threads for ensuring waterproofness.
- If metal conduits need flexibility, use flameproof flexible fittings.

6. Maintenance of Flameproof Apparatus

To maintain the flameproof apparatus, do the following. (For details, see Chapter 10 "MAINTENANCE OF EXPLOSION-PROTECTED ELECTRICAL INSTALLATION" in the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry.)

(1) Maintenance servicing with the power on.

Flameproof apparatus shall not be maintenance-serviced with its power turned on. However, in cases where maintenance servicing is to be conducted with the power turned on, with the equipment cover removed, always use a gas detector to check that there is no explosive gas in that location. If it cannot be checked whether an explosive gas is present or not, maintenance servicing shall be limited to the following two items:

(a) Visual inspection
Visually inspect the flameproof apparatus, metal conduits, and cables for damage or corrosion, and other mechanical and structural defects.

(b) Zero and span adjustments
These adjustments should be made only to the extent that they can be conducted from the outside without opening the equipment cover. In doing this, great care must be taken not to cause mechanical sparks with tools.

(2) Repair

If the flameproof apparatus requires repair, turn off the power and transport it to a safety (non-hazardous) location. Observe the following points before attempting to repair the apparatus.

(a) Make only such electrical and mechanical repairs as will restore the apparatus to its original condition. For the flameproof apparatus, the gaps and path lengths of joints and mating surfaces, and mechanical strength of enclosures are critical factors in explosion protection. Exercise great care not to damage the joints or shock the enclosure.

(b) If any damage occurs in threads, joints or mating surfaces, inspection windows, connections between the transmitter and terminal box, shrouds or clamps, or external wiring connections which are essential in flameproofness, contact Yokogawa Electric Corporation.

⚠ CAUTION

Do not attempt to re-process threaded connections or refinish joints or mating surfaces.

(c) Unless otherwise specified, the electrical circuitry and internal mechanisms may be repaired by component replacement, as this will not directly affect the requirements for flameproof apparatus (however, bear in mind that the apparatus must always be restored to its original condition). If you attempt to repair the flameproof apparatus, company-specified components shall be used.

(d) Before starting to service the apparatus, be sure to check all parts necessary for retaining the requirements for flameproof apparatus. For this, check that all screws, bolts, nuts, and threaded connections have properly been tightened.

(3) Prohibition of specification changes and modifications

Do not attempt to change specifications or make modifications involving addition of or changes in external wiring connections.

7. Selection of Cable Entry Devices for Flameproof Type

⚠ CAUTION

The cable glands (cable entry devices for flameproof type) conforming to IEC Standards are certified in combination with the flameproof apparatus. So, Yokogawa-specified cable entry devices for flameproof type shall be used to meet this demand.

References:

(1) Type Certificate Guide for Explosion-Protected Construction Electrical Machinery and Equipment (relating to Technical Standards Conforming to International Standards), issued by the Technical Institution of Industrial Safety, Japan

(2) USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry (1994), issued by the Japanese Ministry of Labour, the Research Institute of Industrial Safet

1. INTRODUCTION

This instrument has been adjusted at the factory before shipment.

To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

NOTE

This manual describes the hardware configuration of integral flowmeter and remote flowtube of the AXF magnetic flowmeters.

For details of the "basic operating procedures", "parameter description", "operation via BRAIN terminal (BT200)", "operation via HART communicator", and "actual operation" for the AXF integral flowmeter, see the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

■ Regarding This User's Manual

- This manual should be provided to the end user.
- Before use, read this manual thoroughly to comprehend its contents.
- The contents of this manual may be changed without prior notice.
- All rights are 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 material, including, but not limited to, implied warranties of merchantability and suitability for a particular purpose.
- All reasonable effort has been made to ensure the accuracy of the contents of this manual. However, if any errors or omissions are found, please inform Yokogawa.
- Yokogawa assumes no responsibilities for this product except as stated in the warranty.
- Please note that this user's manual may not be revised for any specification changes, construction changes or operating part changes that are not considered to affect function or performance.
- If the customer or any third party is harmed by the use of this product, Yokogawa assumes no responsibility for any such harm owing to any defects in the product which were not predictable, or for any indirect damages.

NOTE

For details of the AXFA11G magnetic flowmeter converter, see the IM01E20C01-01E instruction manual. For details on the AXFA14G/C magnetic flowmeter converter, see the IM01E20C02-01E instruction manual.

■ Safety and Modification Precautions

- The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific WARNINGS given elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Yokogawa assumes no liability for the customer's failure to comply with these requirements. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- Yokogawa will not be liable for malfunctions or damage resulting from any modification made to this instrument by the customer.
- The following safety symbol marks are used in this user's manual and instrument.

WARNING

A WARNING sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in injury or death of personnel.

CAUTION

A CAUTION sign denotes a hazard. It calls attention to procedure, practice, condition or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the product.

9

1.4 ATEX Documentation

This procedure is only applicable to the countries in European Union.

GB

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

DK

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

I

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

E

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

NL

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

SF

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

P

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

F

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

D

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

S

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

GR

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

2. HANDLING PRECAUTIONS

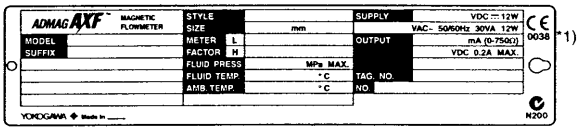
This instrument has been inspected carefully at the factory before shipment. When the instrument is delivered, visually check that no damage has occurred during transportation.

Read this section carefully as it contains important information on handling this instrument. Refer to the relevant sections for information not contained in this section. If you have any problems or questions, please contact Yokogawa sales office.

2.1 Checking Model and Specifications

The model code and specifications are found on the data plate located on the outside of the case. Check that the model code and specifications match what you have ordered.

Be sure you have your model number and serial number available when contacting Yokogawa.



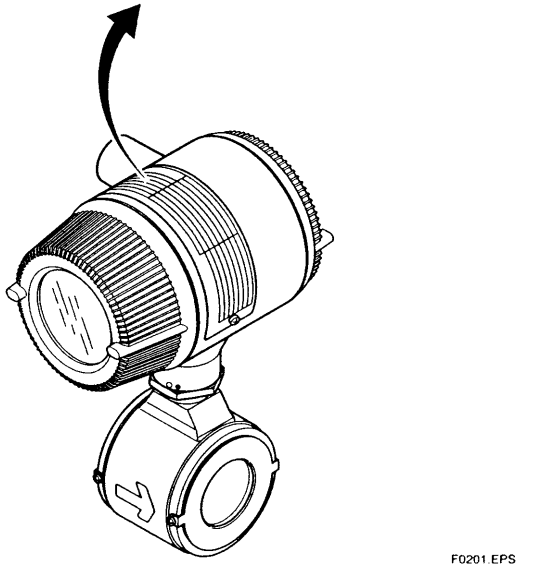
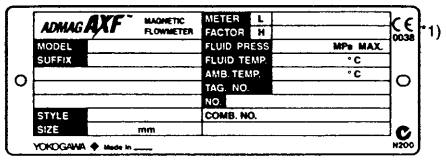


Figure 2.1.1 Data Plate (Integral Flowmeter Type)

*1) In case of the sizes of 2.5 to 25mm (0.1 to 1.0 in.) , "0038" is not described.



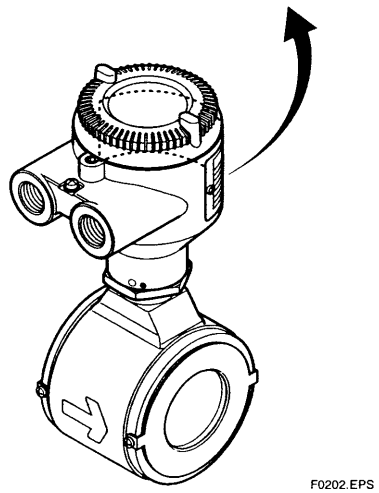


Figure 2.1.2 Data Plate (Remote Flowtube Type)

*1) In case of the sizes of 2.5 to 25mm (0.1 to 1.0 in.) , "0038" is not described.
In case of the sizes of 500 to 2600mm (20 to 104 in.), CE marking and "0038" are not described.

2.2 Accessories

Check that the parts shown below are included in the package:

- Remote Flowtube(size 2.5 to 1000 mm(0.1 to 40 in.)):
  Centering device (wafer type only): 1 pc.
  Hexagonal wrenche: 2 pcs. (one each of 1.5 mm and 3 mm nominal sizes)
- Integral Flowmeter:
  Centering device (wafer type only): 1 pc.
  Spare fuse (T2.0A, 250 V, T: Time lag fuse)
  : 1 pc. (Use this spare fuse for this product only)
  Hexagonal wrenche: 2 pcs. (one each of 1.5 mm and 3 mm nominal sizes)

2.3 Storage Precautions

If the instrument is to be stored for a long period of time after delivery, observe the following points.

- The instrument should be stored in its original packing condition in the storage location.
- Select a storage location that fulfils the following conditions:
  - A place where it will not be exposed to rain or water
  - A place subject to minimal vibrations or shocks
  - Temperature and humidity levels should be as follows:
    Temperature: -30 to 70°C
    Humidity: 5 to 80% RH (no condensation)
    The preferred ambient temperature and humidity levels are 25°C and approximately 65% RH.
- If the AXF magnetic flowmeter is transferred to the installation site and stored without being installed, its performance may be impaired due to the infiltration of rainwater and so forth. Be sure to install and wire the AXF magnetic flowmeter as soon as possible after transferring it to the installation location.

2.4 Installation Location Precautions

Select the installation location with consideration to the following items to ensure long-term stable operation of the instrument.

■ **Ambient Temperature:**
Avoid installing the instrument in locations with constantly fluctuating temperatures. If the location is subject to radiant heat from the plant, provide heat insulation or improve ventilation.

■ **Atmospheric Condition:**
Avoid installing the instrument in a corrosive atmosphere. In situations where this is unavoidable, consider ways to improve ventilation and to prevent rainwater from entering and being retained in the conduit pipes.

■ **Vibrations or Shocks:**
Avoid installing the instrument in a place subject to shocks or vibrations.

■ **Explosion protected type:**
Explosion protect types can be installed in hazardous areas according to the types of gases for which they are certified. See the description in Chapter 8 "EXPLOSION PROTECTED TYPE INSTRUMENT" and "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" in this user's manual.

3. INSTALLATION

3.1 Piping Design Precautions

WARNING

Installation of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to installation.

IMPORTANT

Design piping correctly, referring to the following to prevent damage to flowtubes and to assure accurate measuring.

NOTE

This chapter describes the remote flowtube as an example. The same attention must be paid to the integral flowmeter.

(1) Location

IMPORTANT

Install the flowmeter in a location where it is not exposed to direct sunlight. The minimum ambient temperature is limited by the minimum fluid temperature of the flowtube (the lining). For more information, refer to Chapter 6 "OUTLINE". The flowmeter may be used in an ambient humidity where the relative humidity ranges from 0 to 100%. However, avoid long-term continuous operation at relative humidity above 95%.

(2) Noise Avoidance

IMPORTANT

The flowmeter should be installed away from electrical motors, transformers, and other power sources in order to avoid interference with measurement.

(3) Required Lengths of Straight Runs

To maintain accurate measurement, see JIS B7554 "Electro Magnetic Flowmeters" which explains the requirements for upstream piping conditions of magnetic flowmeters.

The piping conditions we recommend to our customers as shown in Figure 3.1.1 are based on JIS B7554 and on our piping condition test data.

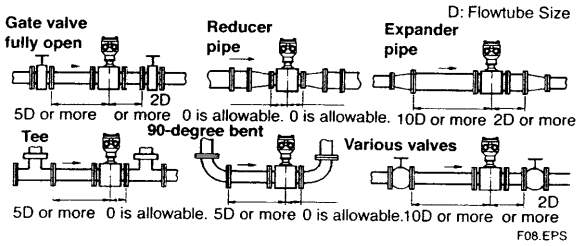


Figure 3.1.1 Required Lengths of Straight Runs

*1: Do not install anything in the vicinity that may interfere with the magnetic field, induced signal voltages, or flow velocity distributions of the flowmeter.

*2: A straight run may not be required on the downstream side of the flowmeter. However, if a downstream valve or other fitting causes irregularity or deviation in flows, provide a straight run of 2D to 3D on the downstream side.

*3: Highly recommend to mount valves on the downstream side so that deviated flows do not occur in the flowtube and to avoid startup from an empty condition.

(4) Maintaining Stable Fluid Conductivity

IMPORTANT

Do not install the flowmeter where fluid conductivity tends to become uneven. If chemicals are fed near the upstream side of a magnetic flowmeter, they may affect the flow rate's indications. To avoid this situation, it is recommended that the chemical feed ports be located on the downstream side of the flowmeter. If it is unavoidable that chemicals must be fed on the upstream side, provide a sufficient length of straight run (approximately 50D) to ensure the proper mixture of fluids.

15

19.1.2

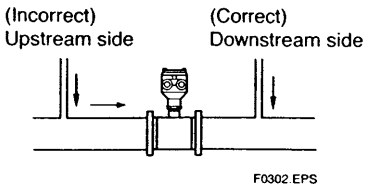


Figure 3.1.2 Chemical Injection

(5) Precautions for Use of Liquid Sealing Compounds

IMPORTANT

Care must be taken in using liquid sealing compounds on the piping, as it may have a negative influence on the flow indications by flowing out and covering the surfaces of an electrode or grounding ring. In particular, care must be taken if a liquid sealing compound is used in the case of vertical piping.

(6) Service Area

Select locations where there is adequate space to service installing, wiring, overhauling, etc.

(7) Bypass Line

It is recommended to install a bypass line to facilitate maintenance and zero adjustment.

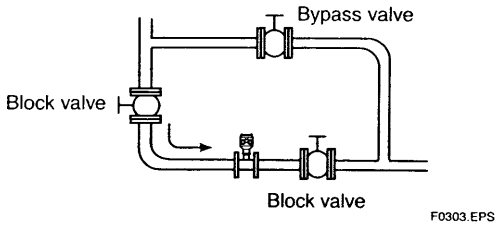


Figure 3.1.3 Bypass Line

(8) Supporting the Flowmeter

CAUTION

Do not secure the flowmeter separately to prevent the vibrations, shocks, and expansion and contraction forces of the piping from affecting it. Fix the pipes first, then support the flowmeter with the pipes. With extra small-sized flowmeters (2.5-10 mm), in particular, fix the flowmeter in parallel with the piping on a mounting base.

(9) Mounting Positions

• Pipes must be fully filled with liquids.

IMPORTANT

It is essential that pipes remain fully filled at all times, otherwise flow rate indications may be affected and measurement errors may be caused.

Piping shall be designed so as to maintain the interior of the flowtube filled with fluids.

Vertical mounting is effective in such cases as when fluids tend to separate or solid matter may be precipitated. When employing vertical mounting, direct the fluids from the bottom to the top to ensure that the pipes remain fully filled.

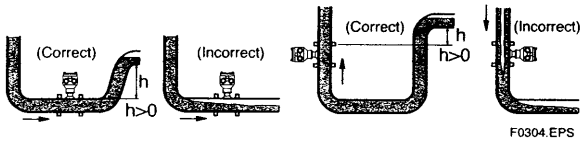


Figure 3.1.4 Mounting Positions

• Avoid air bubbles.

IMPORTANT

If air bubbles enter a measurement pipe, flow rate indications may be affected and measurement errors may be caused.

In cases where fluids contain air bubbles, piping must be designed to prevent them from accumulating in the measurement pipe of a flowtube.

If a valve exists near the flowmeter, try to mount the flowmeter on the valve's upstream side in order to prevent a possible reduction of pressure inside the pipe, thereby avoiding the possibility of air bubbles.

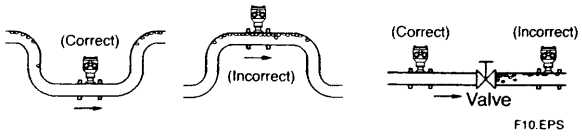


Figure 3.1.5 Avoiding Air Bubbles

· **Mounting orientation**

IMPORTANT

If electrodes are perpendicular to the ground, air bubbles near the top or precipitates at the bottom may cause measurement errors. Ensure that the terminal box of a remote flowtube and converter of an integral flowmeter are mounted above the piping to prevent water from entering them.

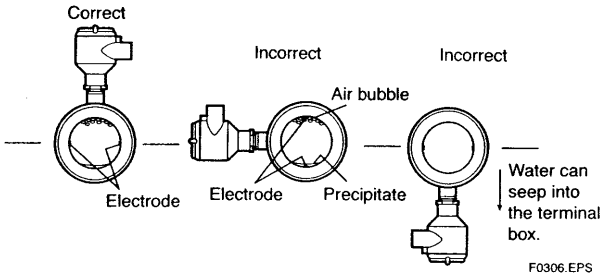


Figure 3.1.6 Mounting Orientation

3.2 Handling Precautions

WARNING

The magnetic flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the magnetic flowmeter. When moving the magnetic flowmeter, always use a trolley and have at least two people carry it.

NOTE

This chapter describes the remote flowtube as an example. The same attention must be paid to the integral flowmeter.

3.2.1 General Precautions

(1) Precaution during Transportation

The magnetic flowmeter is packed tightly. When it is unpacked, pay attention to prevent damaging the flowmeter. To prevent accidents while it is being transported to the installing location, transport it to the site in its original packing.

CAUTION

· In order to lift a magnetic flowmeter that is fitted with eyebolts, proceed as in Figure 3.2.1. Never lift it using a bar passed through the flowtube as this damages the liner severely.

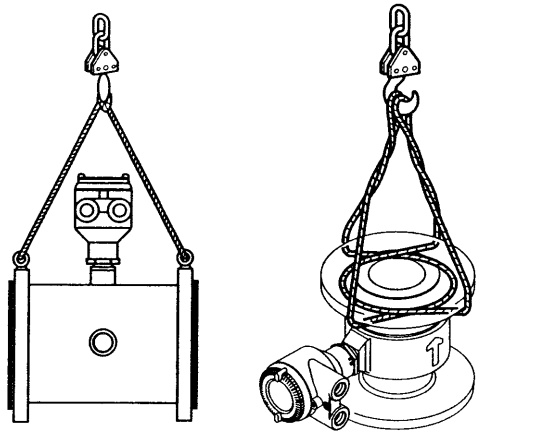


Figure 3.2.1 Lifting Flowmeter

(2) Avoiding Shocks from Impact

CAUTION

Care should be taken not to drop the flowmeter or expose it to excessive shock. In particular, be careful not to subject the flange surface to shock. This may lead to liner damage which will result in inaccurate readings.

(3) Flange Protection Covers

IMPORTANT

Keep the protective covering (i.e. the corrugated cardboard or other cushioning material) in place over the flange except when mounting the flowmeter to the pipe.

17

19.1.2

(4) Terminal Box Cover

IMPORTANT

As it is possible that the insulation will deteriorate, do not open the terminal box cover until it is time to wire it.

(5) Long-term Non-use

IMPORTANT

It is not desirable to leave the flowmeter unused for a long term after installation. If this situation is unavoidable, take care of the flowmeter by observing the following.

• Confirmation of sealing conditions for the flowmeter

Confirm that the terminal box screw and wiring ports are well sealed. Equip the conduit piping with drain plugs or waterproof glands to prevent moisture or water from penetrating into the flowmeter through the conduit.

• Regular inspections

Inspect the sealing conditions as mentioned above, and the inside of the terminal box at least once a year. Also, due to rain, etc. when it is suspected that water may have penetrated into the inside flowmeter perform supplementary inspections.

3.2.2 Flowmeter Piping

CAUTION

Misaligned or slanted piping can lead to leakage and damage to the flanges.

(1) Correct any misaligned or slanted piping, and any gaps that may exist between mounting flanges before installing the flowmeter (refer to Figure 3.2.2).

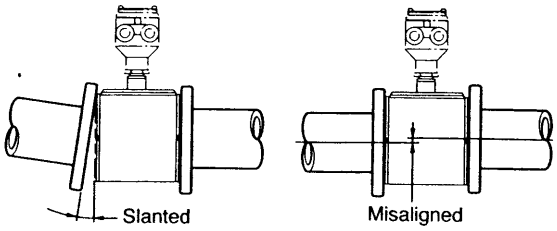


Figure 3.2.2 Slanted and Misaligned Flowmeter Piping

(2) Inside a newly installed pipeline, there may be some foreign substances such as residue from welding or wood chips. Remove them by flushing the piping before mounting the flowmeter. This prevents the lining from being damaged, as well as the occurrence of erroneous measured signals resulting from foreign substances passing through the flowtube during measurement.

3.3 Mounting Procedures

NOTE

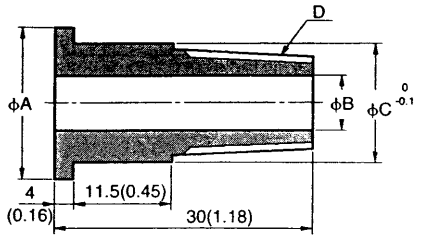
- The tightening torque value to which gaskets must be tightened varies depending on the type and external dimensions of the lining and the gasket. In this section, the tables indicating tightening torque values include the corresponding gasket types. The internal diameters of the gaskets are close to those of the grounding rings.
- For fluids capable of potentially permeating PFA linings (such as nitric acid, hydrofluoric acid, or sodium hydrate at high temperatures), different tightening torque values must be applied. The tables of these torque values is indicated in this section.
- For replacement models for the earlier ADMAG or ADMAG AE, the tightening torque values in the tables can be applied if their process connections, the lining types, and the nominal sizes are the same.

3.3.1 Nominal Diameter 2.5 mm (0.1 in.) to 10 mm (0.4 in.), Union Joint Type

Ceramics linings with diameters of 2.5 (0.1), 5 (0.2), or 10 mm (0.4 in.) are connected using union joints. Weld or screw the connecting fittings in Table 3.3.1 onto the piping. The external dimensions of the fittings are shown in the table.

Table 3.3.1 Fitting Dimensions

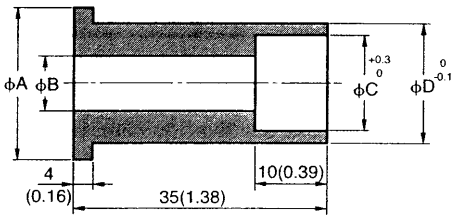
Union joint (process connection codes: GUR and GUN)



Size mm(inch)	Code	A	B	C	D
2.5 (0.1)	GUR	22 (0.87)	8 (0.31)	18.5 (0.73)	R1/4(PT1/4)
	GUN	22 (0.87)	8 (0.31)	18.5 (0.73)	NPT1/4
5 (0.2)	GUR	22 (0.87)	8 (0.31)	18.5 (0.73)	R1/4(PT1/4)
	GUN	22 (0.87)	8 (0.31)	18.5 (0.73)	NPT1/4
10 (0.4)	GUR	25 (0.98)	10 (0.39)	22.5 (0.89)	R3/8(PT3/8)
	GUN	25 (0.98)	10 (0.39)	22.5 (0.89)	NPT3/8

T0301.EPS

Welded joint (process connection code: GUW)



Size mm(inch)	Code	A	B	C	D
2.5 (0.1)	GUW	22(0.87)	8(0.31)	14.3(0.56)	18.5(0.73)
5 (0.2)	GUW	22(0.87)	8(0.31)	14.3(0.56)	18.5(0.73)
10 (0.4)	GUW	25(0.98)	10(0.39)	17.8(0.70)	22.5(0.89)

T0302.EPS

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter/AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(2) Connecting Process Piping

Weld or screw the connection fittings to the process piping.

IMPORTANT

- Be sure to pass the connection fittings through the union joint nuts in advance.
- When welding the fittings, pay attention to the edge preparation, level differences between the fittings and the piping, and the welding current to avoid deforming the piping or causing stagnation portion of the fluid.

(3) Positioning the Flowmeter

Install the flowmeter on a mounting base and position it so that the center axis of the flowtube is aligned with that of the process piping. Then screw the union joint nuts to the connecting ports of the flowmeter.

CAUTION

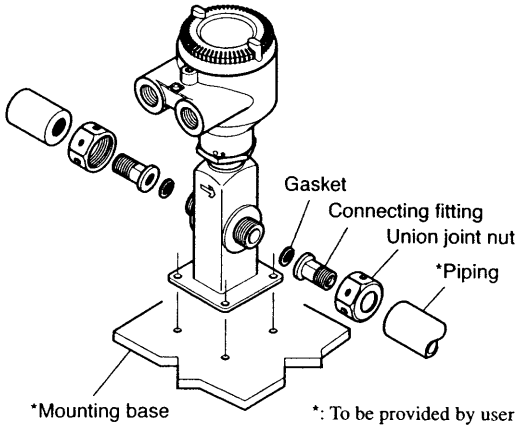
Ceramics pipes may be damaged if the nuts are tightened when the center axes are not properly aligned.

(4) Tightening Nuts

Use a torque wrench to tighten the union joint nuts.

CAUTION

Tighten the union joint nuts according to the tightening torque values in Table 3.3.2. For permeable fluid (such as nitric acid, hydrofluoric acid or sodium hydrate at high temperature), tighten the nuts according to the torque values in Table 3.3.3.
As the gasket material is fluorocarbon PTFE, it is possible that the nuts may loosen as time passes. Retighten the nuts if this is the case. Be sure to use the gasket (thickness is 1.5 mm) which comes with the flowmeter.



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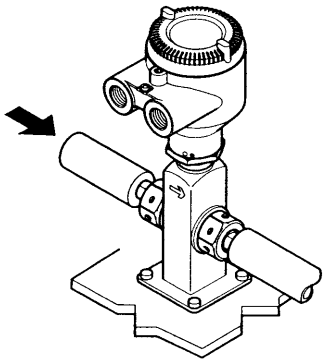
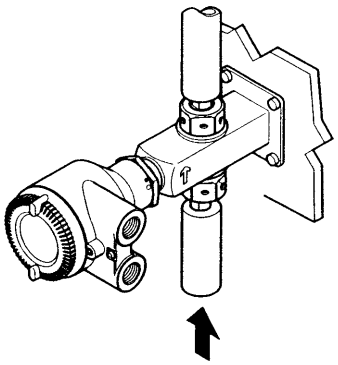


Horizontal mounting

F0309b.EPS



Vertical mounting

F0309c.EPS

Figure 3.3.1 Mounting Procedure for Union Joint Type

Table 3.3.2 Tightening torque values for Union Joint Type

Apply these tightening torque values when the gaskets are Valqua #7020 (standard) or alkali-resistant gaskets for the metal piping (optional code GF).

Size mm (inch)	Torque (N-m / {kgf-cm} / [in-lbf])
2.5 (0.1)	9 to 12 / {91.77 to 122.4} / [79.66 to 106.2]
5 (0.2)	9 to 12 / {91.77 to 122.4} / [79.66 to 106.2]
10 (0.4)	14 to 18 / {142.8 to 183.5} / [123.9 to 159.3]

T0303.EPS

Table 3.3.3 Tightening torque values for Union Joint Type and Permeable Fluids

Size mm (inch)	Torque (N-m / {kgf-cm} / [in-lbf])
2.5 (0.1)	11 to 15 / {112.2 to 153} / [97.36 to 132.8]
5 (0.2)	11 to 15 / {112.2 to 153} / [97.36 to 132.8]
10 (0.4)	17 to 23 / {173.4 to 234.5} / [150.5 to 203.6]

T0304.EPS

3.3.2 Nominal Diameter 2.5 mm (0.1 in.) to 40 mm (1.5 in.), Wafer Type

IMPORTANT

Use bolts and nuts in compliance with the flange ratings. When stud-type through-bolts are used, be sure the outside diameter of the shank is smaller than that of the thread ridge. Be sure to choose a gasket with an inner diameter that does not protrude inside the piping (refer to Table 3.3.13). If the inner diameter of the gasket is too large, however, fluid leakage may result.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter/AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(2) Mounting Centering Devices

To maintain concentricity of the flowmeter with the pipes, install centering devices on the Mini-flanges of the flowmeter. Use the appropriate centering devices according to the nominal diameter and the flange ratings.

(3) Positioning the Flowmeter

Pass two through-bolts through the adjacent holes of both flanges and position the flowmeter so that the Mini-flanges and the centering devices come in close contact with each other. Pass the other through-bolts through the other holes (refer to Figures 3.3.2 and 3.3.3). In case stud-type through-bolts are used, position them in such a way that the centering devices come in contact with the bolt threads.

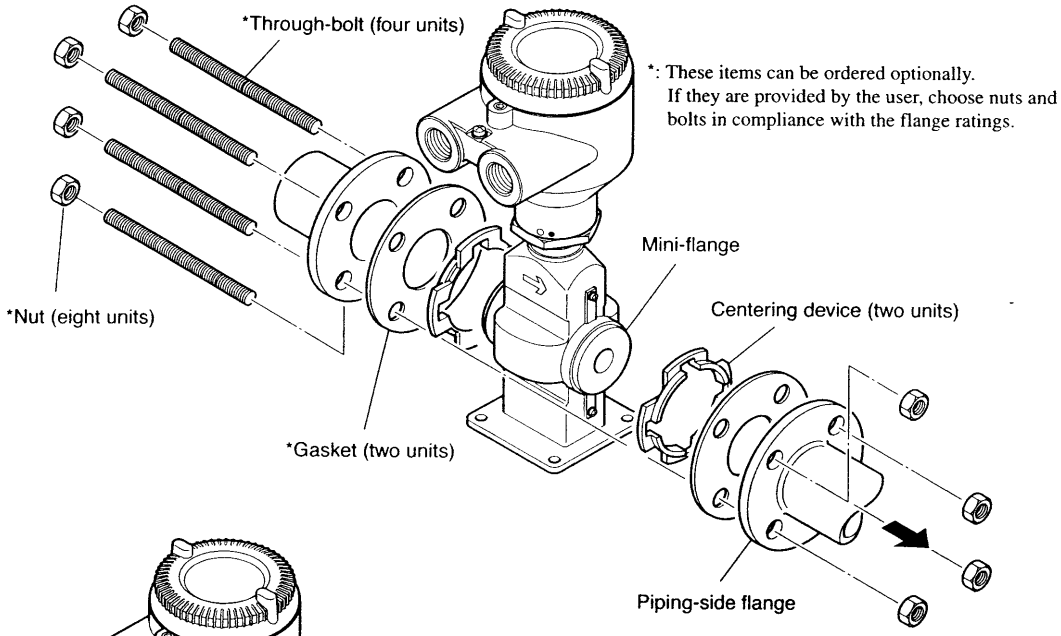
(4) Tightening Nuts

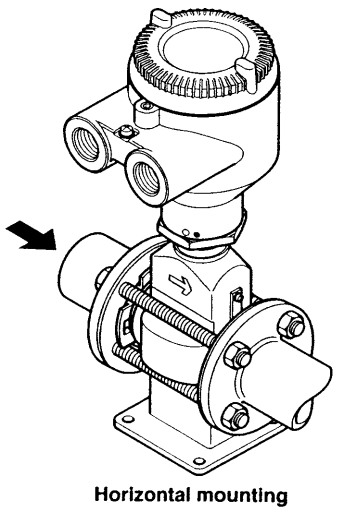
Tighten the nuts according to the torque values for metal piping in Table 3.3.4. For PVC piping, select an option code of /GA, /GC, or /GD, use rubber gaskets and tighten the nuts to the torque values for PVC piping in Table 3.3.5.

For permeable fluids (such as nitric acid, hydrofluoric acid, or sodium hydrate at high temperatures), tighten the nuts according to the torque values in Table 3.3.6.

⚠ CAUTION

For a flowmeter with fluorocarbon PFA lining, it is possible that the nuts may loosen as time passes, so tighten them regularly. Be sure to tighten the nuts according to the prescribed torque values. Tighten them diagonally with the same torque values, step by step up to the prescribed torque value.





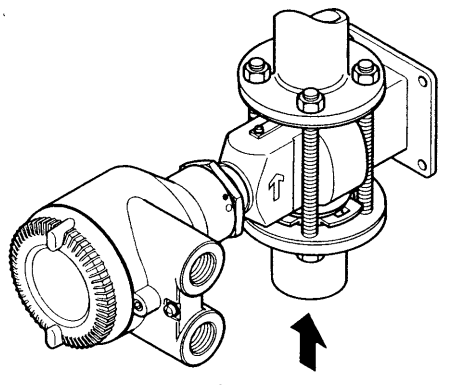


Figure 3.3.2 Mounting Procedure for Wafer Type (size: 2.5 (0.1) to 15 mm (0.5 in.))

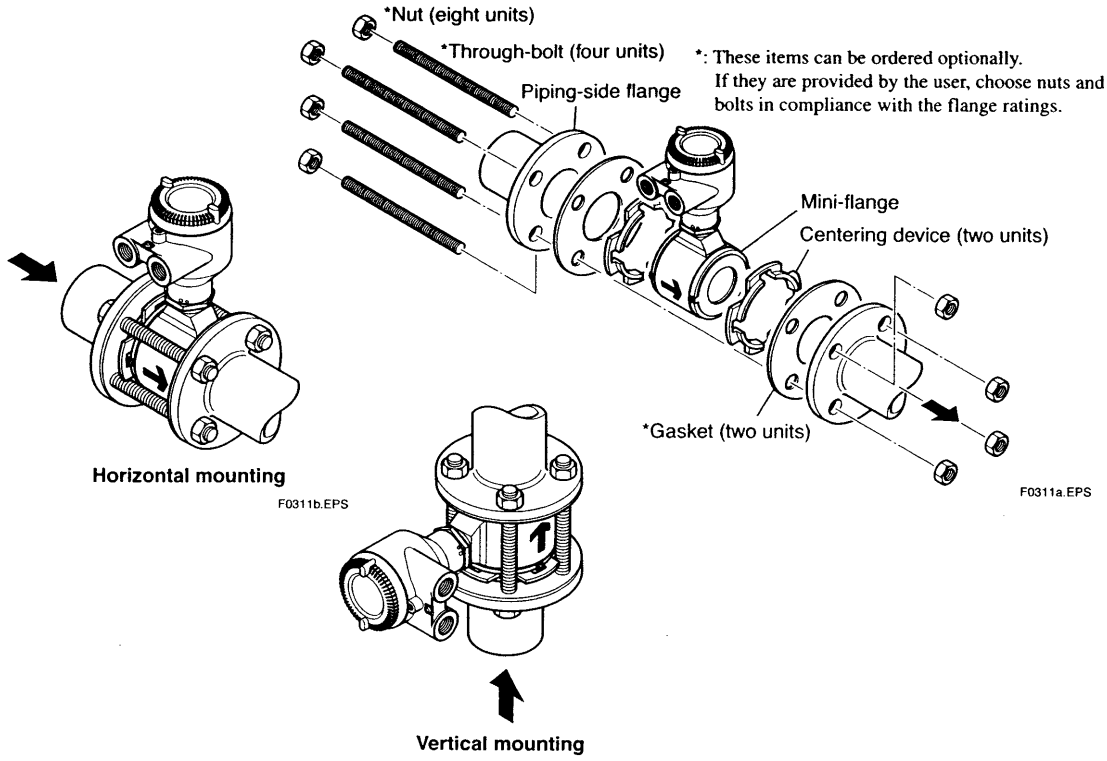


Figure 3.3.3 Mounting Procedure for Wafer Type (size: 25 (1.0), 32 (1.25), and 40 mm (1.5 in.))

Table 3.3.4 Wafer Type Tightening Torque Values for Metal Piping

	Tightening torque values for PFA/Polyurethane Rubber lining type (N-m / {kgf-cm} / [in-lbf])		
Gasket types within flowtube	No gasket (standard)		
Gasket types for user's flange	Non-asbestos fiber gasket, PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
2.5 (0.1)	7.2 to 8.4 / {73.42 to 85.66} / [63.72 to 74.35]	7.3 to 8.4 / {74.44 to 85.66} / [64.61 to 74.35]	7.6 to 8.4 / {77.5 to 85.66} / [67.26 to 74.35]
5 (0.2)	7.2 to 8.4 / {73.42 to 85.66} / [63.72 to 74.35]	7.3 to 8.4 / {74.44 to 85.66} / [64.61 to 74.35]	7.6 to 8.4 / {77.5 to 85.66} / [67.26 to 74.35]
10 (0.4)	7.2 to 8.4 / {73.42 to 85.66} / [63.72 to 74.35]	7.3 to 8.4 / {74.44 to 85.66} / [64.61 to 74.35]	7.6 to 8.4 / {77.5 to 85.66} / [67.26 to 74.35]
15 (0.5)	7.2 to 8.4 / {73.42 to 85.66} / [63.72 to 74.35]	7.3 to 8.4 / {74.44 to 85.66} / [64.61 to 74.35]	7.6 to 8.4 / {77.5 to 85.66} / [67.26 to 74.35]
25 (1.0)	23.5 to 27.3 / {239.6 to 278.4} / [208 to 241.6]	23.7 to 27.3 / {241.7 to 278.4} / [209.8 to 241.6]	22.3 to 27.3 / {227.4 to 278.4} / [197.4 to 241.6]
32 (1.25)	26.2 to 30.5 / {267.2 to 311} / [231.9 to 269.9]	26.6 to 30.5 / {271.2 to 311} / [235.4 to 269.9]	28.0 to 30.5 / {285.5 to 311} / [247.8 to 269.9]
40 (1.5)	36.2 to 42.4 / {369.1 to 432.4} / [320.4 to 375.3]	36.9 to 42.4 / {376.3 to 432.4} / [326.6 to 375.3]	39.1 to 42.4 / {398.7 to 432.4} / [346.1 to 375.3]

	Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])		
Gasket types within flowtube	Fluororesin with ceramic fillers (Valqua #7020) (standard) gasket, or fluororesin with carbon gasket (optional code GF)		
Gasket types for user's flange	Non-asbestos gasket, PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
15 (0.5)	2.9 to 4.8 / {29.57 to 48.95} / [25.67 to 42.48]	2.9 to 4.8 / {29.57 to 48.95} / [25.67 to 42.48]	3.0 to 5.0 / {30.59 to 50.99} / [26.55 to 44.25]
25 (1.0)	8.2 to 13.6 / {83.62 to 138.7} / [72.57 to 120.4]	8.2 to 13.7 / {83.62 to 139.7} / [72.57 to 121.3]	7.9 to 13.1 / {80.56 to 133.6} / [69.92 to 115.9]
40 (1.5)	14.1 to 23.6 / {143.8 to 240.7} / [124.8 to 208.9]	14.4 to 24.1 / {146.8 to 245.8} / [127.4 to 213.3]	15.5 to 25.8 / {158.1 to 263.1} / [137.2 to 228.3]

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Table 3.3.5 Wafer Type Tightening Torque Values for PVC Piping

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])			
Gasket types within flowtube	Fluororubber gasket (optional codes GA, GC, and GD)		
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket (optional codes BSC and BCC), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
2.5 (0.1)	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.4 / {15.3 to 24.47} / [13.28 to 21.24]
5 (0.2)	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.4 / {15.3 to 24.47} / [13.28 to 21.24]
10 (0.4)	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.4 / {15.3 to 24.47} / [13.28 to 21.24]
15 (0.5)	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]	1.5 to 2.4 / {15.3 to 24.47} / [13.28 to 21.24]
25 (1.0)	4.9 to 8.1 / {49.97 to 82.6} / [43.37 to 71.69]	5.0 to 8.3 / {50.99 to84.64 } / [44.25 to 73.46]	4.3 to 7.2 / {43.85 to 73.42} / [38.06 to 63.72]
32 (1.25)	5.5 to 9.2 / {56.08 to 93.81} / [48.68 to 81.43]	5.7 to 9.5 / {58.12 to 96.87} / [50.45 to 84.08]	5.4 to 8.9 / {55.06 to 90.75} / [47.79 to 78.77]
40 (1.5)	7.7 to 12.9 / {78.52 to 131.5} / [68.15 to 114.2]	8.1 to 13.4 / {82.6 to 136.6} / [71.69 to 118.6]	7.5 to 12.5 / {76.48 to 127.5} / [66.38 to 110.6]

Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])			
Gasket types within flowtube	Fluororubber gasket (optional codes GA, GC, and GD)		
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket (optional codes BSC and BCC), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
15 (0.5)	0.6 to 1.0 / {6.118 to 10.2} / [5.31 to 8.85]	0.6 to 1.0 / {6.118 to 10.2} / [5.31 to 8.85]	0.6 to 1.0 / {6.118 to 10.2} / [5.31 to 8.85]
25 (1.0)	1.7 to 2.8 / {17.34 to 28.55} / [15.05 to 24.78]	1.7 to 2.8 / {17.34 to 28.55} / [15.05 to 24.78]	1.5 to 2.5 / {15.3 to 25.49} / [13.28 to 22.13]
40 (1.5)	3.0 to 5.0 / {30.59 to 50.99} / [26.55 to 44.25]	3.1 to 5.2 / {31.61 to 53.03} / [27.44 to 46.02]	2.9 to 4.8 / {29.57 to 48.95} / [25.67 to 42.48]

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Table 3.3.6 Wafer Type Tightening Torque Values for Metal Piping and Permeable Fluids

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])			
Gasket types within flowtube	No gasket (standard)		
Gasket types for user's flange	PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
2.5 (0.1)	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	11.1 to 12.4 / {113.2 to 126.4} / [98.24 to 109.7]
5 (0.2)	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	11.1 to 12.4 / {113.2 to 126.4} / [98.24 to 109.7]
10 (0.4)	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	11.1 to 12.4 / {113.2 to 126.4} / [98.24 to 109.7]
15 (0.5)	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	10.8 to 12.4 / {110.1 to 126.4} / [95.59 to 109.7]	11.1 to 12.4 / {113.2 to 126.4} / [98.24 to 109.7]
25 (1.0)	34.9 to 40.1 / {355.9 to 408.9} / [308.9 to 354.9]	35.2 to 40.1 / {358.9 to 408.9} / [311.5 to 354.9]	32.3 to 37.1 / {329.4 to 378.3} / [285.9 to 328.4]
32 (1.25)	38.8 to 44.6 / {395.6 to 454.8} / [343.4 to 394.7]	39.2 to 44.6 / {399.7 to 454.8} / [346.9 to 394.7]	40.6 to 46.7 / {414.0 to 476.2} / [359.3 to 413.3]
40 (1.5)	53.5 to 61.5 / {545.5 to 627.1} / [473.5 to 544.3]	54.2 to 61.5 / {552.7 to 627.1} / [479.7 to 544.3]	56.4 to 61.5 / {575.1 to 627.1} / [499.2 to 544.3]

Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])			
Gasket types within flowtube	Fluororesin with ceramic fillers (Valqua #7020) gasket (standard), or fluororesin with carbon gasket (optional code GF)		
Gasket types for user's flange	PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness		
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40
15 (0.5)	4.2 to 7.1 / {42.83 to 72.4} / [37.17 to 62.84]	4.3 to 7.1 / {43.85 to 72.4} / [38.06 to 62.84]	4.4 to 7.3 / {44.87 to 74.44} / [38.94 to 64.61]
25 (1.0)	12.1 to 20.2 / {123.4 to 206.0} / [107.1 to 178.8]	12.2 to 20.3 / {124.4 to 207.0} / [108.0 to 179.7]	11.3 to 18.9 / {115.2 to 192.7} / [100.0 to 167.3]
40 (1.5)	20.8 to 34.7 / {212.1 to 353.8} / [184.1 to 307.1]	21.1 to 35.2 / {215.2 to 358.9} / [186.7 to 311.5]	22.2 to 37.0 / {226.4 to 377.3} / [196.5 to 327.5]

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3.3.3 Nominal Diameter 50 mm (2.0 in.) to 300 mm (12.0 in.), Wafer Type

IMPORTANT

Use bolts and nuts in compliance with the flange ratings. When stud-type through-bolts are used, be sure the outside diameter of the shank is smaller than that of the thread ridge. Be sure to choose a gasket with an inner diameter that does not protrude inside the piping (refer to Table 3.3.13). If the inner diameter of the gasket is too large, however, fluid leakage may result.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter/AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(2) Mounting Centering Devices

To maintain concentricity of the flowmeter with the pipes, install centering devices. From the process piping side, pass two through-bolts through the four centering devices (two for each bolt) and the adjacent two holes (the lower two holes for horizontal mounting) of both of the flanges (refer to Figure 3.3.4). Use the appropriate centering devices according to the nominal diameter and the flange ratings. The centering devices are engraved with an identifying character. Use the appropriate ones which meet the required specifications by referring to Tables 3.3.10 and 3.3.11 (AXF standard models) and Table 3.3.12 (replacement models for the earlier ADMAG or ADMAG AE).

(3) Positioning the Flowmeter

Position the flowmeter so that the Mini-flanges and the centering devices come in close contact with each other. Be careful to prevent the four centering devices from coming into contact with the housing. If stud-type through-bolts are used, position them in such a way that the four centering devices come in contact with the bolt threads (refer to Figure 3.3.4). Pass the other through-bolts through from the process piping side.

NOTE

Precautions for size 125 mm (5 in.), 150 mm (6 in.), replaceable electrode type
When installing this type of flowmeter with JIS F12 (JIS 75M) flanges, turn the flowmeter slightly because the cover of the electrode chambers will interfere with the bolts.

(4) Tightening Nuts

Tighten the nuts according to the torque values for metal piping in Table 3.3.7. For PVC piping, select an optional code of GA, GC, or GD, use rubber gaskets and tighten the nuts to the torque values for PVC piping in Table 3.3.8.
For permeable fluids (such as nitric acid, hydrofluoric acid, or sodium hydrate at high temperatures), tighten the nuts according to the torque values in Table 3.3.9.

CAUTION

For a flowmeter with fluorocarbon PFA lining, it is possible that the nuts may loosen as time passes, so tighten them regularly. Be sure to tighten the nuts according to the prescribed torque values. Tighten them diagonally with the same torque values, step by step up to the prescribed torque value.

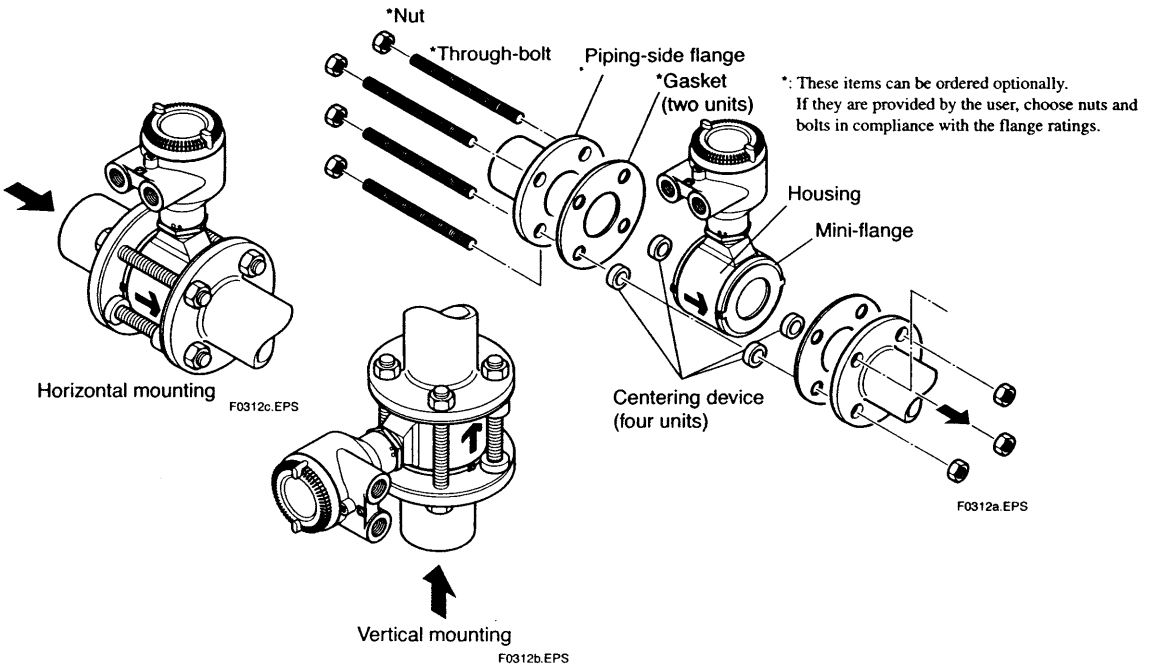

Figure 3.3.4 Mounting Procedure for Wafer Type (size: 50 mm (2 in.) to 300 mm (12 in.))

Table 3.3.7 Wafer Type Tightening Torque Values for Metal Piping

Tightening torque values for PFA/Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	No gasket (standard)			
Gasket types for user's flange	Non-asbestos fiber gasket, PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	45.0 to 56.8 / {458.9 to 579.2} / [398.3 to 502.7]	22.5 to 25.9 / {229.4 to 264.1} / [199.1 to 229.2]	50.0 to 57.5 / {509.9 to 586.3} / [442.5 to 508.9]	—
65 (2.5)	61.3 to 70.5 / {625.1 to 718.9} / [542.5 to 624.0]	30.8 to 35.4 / {3141.1 to 361.0} / [272.6 to 313.3]	—	—
80 (3.0)	35.0 to 40.3 / {356.9 to 410.9} / [309.8 to 356.7]	39.9 to 45.9 / {406.9 to 468.0} / [353.1 to 406.2]	—	68.4 to 78.7 / {697.5 to 802.5} / [605.4 to 696.5]
100 (4.0)	46.1 to 53.0 / {470.1 to 540.4} / [408.0 to 469.1]	52.9 to 60.8 / {539.4 to 620.0} / [468.2 to 538.1]	—	88.6 to 101.9 / {903.5 to 1039} / [784.2 to 901.9]
125 (5.0)	73.7 to 84.8 / {751.5 to 864.7} / [652.3 to 750.5]	80.5 to 92.6 / {820.9 to 944.3} / [712.5 to 819.6]	—	75.1 to 86.4 / {765.8 to 881.0} / [664.7 to 764.7]
150 (6.0)	85.4 to 98.2 / {870.8 to 1001.0} / [755.8 to 869.1]	61.0 to 70.2 / {622.0 to 715.8} / [539.9 to 621.3]	—	86.3 to 99.2 / {880.0 to 1012} / [763.8 to 878.0]
200 (8.0)	78.8 to 90.6 / {803.5 to 923.9} / [697.4 to 801.9]	87.5 to 100.6 / {892.3 to 1026} / [774.4 to 890.4]	—	88.6 to 101.9 / {903.5 to 1039} / [784.2 to 901.9]
250 (10)	119.4 to 137.3 / {1218 to 1400} / [1057 to 1215]	—	—	158.1 to 181.8 / {1612 to 1854} / [1399 to 1609]
300 (12)	105.2 to 121.0 / {1073 to 1234} / [931.1 to 1071]	—	—	146.6 to 168.6 / {1495 to 1719} / [1297 to 1492]

Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	Fluororesin with ceramic fillers (Valqua #7020) gasket (standard), or fluororesin with carbon gasket (optional code GF)			
Gasket types for user's flange	Non-asbestos gasket, PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	29.9 to 49.8 / {304.9 to 507.8} / [264.6 to 440.8]	30.5 to 50.9 / {311.0 to 519.0} / [269.9 to 450.5]	32.7 to 54.5 / {333.4 to 555.7} / [289.4 to 482.4]	—
80 (3.0)	37.1 to 61.8 / {378.3 to 630.2} / [328.4 to 547.0]	37.6 to 62.7 / {383.4 to 639.4} / [332.8 to 554.9]	—	56.3 to 93.8 / {574.1 to 956.5} / [498.3 to 830.2]
100 (4.0)	48.9 to 81.5 / {498.6 to 831.1} / [432.8 to 721.3]	49.9 to 83.1 / {508.8 to 847.4} / [441.6 to 735.5]	—	74.2 to 123.7 / {756.6 to 1261} / [656.7 to 1095]
150 (6.0)	101.4 to 169.0 / {1034 to 1723} / [897.5 to 1496]	104.4 to 174.0 / {1065 to 1774} / [924.0 to 1540]	—	82.2 to 137.0 / {838.2 to 1397} / [727.5 to 1213]
200 (8.0)	142.3 to 237.2 / {1451 to 2419} / [1259 to2099]	98.5 to 164.2 / {1004 to 1674} / [871.8 to 1453]	—	86.7 to 144.6 / {884.1 to 1475} / [767.3 to 1280]

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Table 3.3.8 Wafer Type Tightening Torque Values for PVC Piping

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	Fluororubber gasket (optional codes GA, GC, and GD)			
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket (optional codes BSC and BCC), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	9.9 to 16.5 / {101.0 to 168.3} / [87.62 to 146.0]	10.6 to 17.6 / {108.1 to 179.5} / [93.82 to 155.8]	9.5 to 15.9 / {96.87 to 162.1} / [84.08 to 140.7]	—
65 (2.5)	14.2 to 23.7 / {144.8 to 241.7} / [125.7 to 209.8]	15.5 to 25.9 / {158.1 to 264.1} / [137.2 to 229.2]	—	—
80 (3.0)	8.0 to 13.3 / {81.58 to 135.6} / [70.8 to 117.7]	9.7 to 16.1 / {98.91 to 164.2} / [85.85 to 142.5]	—	15.4 to 25.6 / {157.0 to 261.0} / [136.3 to 226.6]
100 (4.0)	11.3 to 18.8 / {115.2 to 191.7} / [100.0 to 166.4]	14.2 to 23.6 / {144.8 to 240.7} / [125.7 to 208.9]	—	21.1 to 35.1 / {215.2 to 357.9} / [186.7 to 310.7]
125 (5.0)	18.8 to 31.3 / {191.7 to 319.2} / [166.4 to 277.0]	22.3 to 37.2 / {227.4 to 379.3} / [197.4 to 329.2]	—	18.5 to 30.8 / {188.6 to 314.1} / [163.7 to 272.6]
150 (6.0)	22.5 to 37.6 / {229.4 to 383.4} / [199.1 to 332.8]	27.2 to 45.3 / {277.4 to 461.9} / [240.7 to 400.9]	—	21.8 to 36.3 / {222.3 to 370.2} / [192.9 to 321.3]
200 (8.0)	22.1 to 36.9 / {225.4 to 376.3} / [195.6 to 326.6]	27.3 to 45.3 / {278.4 to 461.9} / [241.6 to 400.9]	—	23.8 to 39.6 / {242.7 to 403.8} / [210.6 to 350.5]

Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	Fluororubber gasket (optional codes GA, GC, and GD)			
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket (optional codes BSC and BCC), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	4.5 to 7.4 / {45.89 to 75.46} / [39.83 to 65.49]	4.8 to 7.9 / {48.95 to 80.56} / [42.48 to 69.92]	4.3 to 7.1 / {43.85 to 72.4} / [38.06 to 62.84]	—
80 (3.0)	4.4 to 7.3 / {44.87 to 74.44} / [38.94 to 64.61]	4.8 to 7.9 / {48.95 to 80.56} / [42.48 to 69.92]	—	8.6 to 14.4 / {87.7 to 146.8} / [76.12 to 127.4]
100 (4.0)	6.4 to 10.7 / {65.26 to 109.1} / [56.64 to 94.7]	7.2 to 11.9 / {73.42 to 121.3} / [63.72 to 105.3]	—	12.2 to 20.3 / {124.4 to 207.0} / [108.0 to 179.7]
150 (6.0)	15.1 to 25.2 / {154.0 to 257.0} / [133.6 to 223.0]	17.6 to 29.3 / {179.5 to 298.8} / [155.8 to 259.3]	—	14.9 to 24.8 / {151.9 to 252.9} / [131.9 to 219.5]
200 (8.0)	23.4 to 39.0 / {238.6 to 397.7} / [207.1 to 345.2]	18.6 to 31.6 / {189.7 to 322.2} / [164.6 to 279.7]	—	17.1 to 28.6 / {174.4 to 291.6} / [151.3 to 253.1]

T0309.EPS

Table 3.3.9 Wafer Type Tightening Torque Values for Metal Piping and Permeable Fluids

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	No gasket (standard)			
Gasket types for user's flange	PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	66.2 to 76.1 / {675.0 to 776.0} / [585.9 to 673.5]	33.1 to 38.0 / {337.5 to 387.5} / [293.0 to 336.3]	71.2 to 118.6 / {726.0 to 1209} / [630.2 to 1050]	—
65 (2.5)	89.5 to 102.9 / {912.6 to 1049} / [792.1 to 910.7]	44.9 to 51.6 / {457.9 to 526.2} / [397.4 to 456.7]	—	—
80 (3.0)	51.3 to 59.0 / {523.1 to 601.6} / [454.0 to 522.2]	58.1 to 66.8 / {592.5 to 681.2} / [514.2 to 591.2]	—	100.8 to 115.9 / {1028 to 1182} / [892.1 to 1026]
100 (4.0)	66.7 to 76.7 / {680.2 to 782.1} / [590.3 to 678.8]	76.1 to 87.5 / {776.0 to 892.3} / [673.5 to 774.4]	—	129.8 to 149.3 / {1324 to 1522} / {1149 to 1321}
125 (5.0)	106.1 to 122.0 / {1082 to 1244} / [939.0 to 1080]	114.5 to 131.7 / {1168 to 1343} / [1013 to 1166]	—	109.6 to 126.0 / {1118 to 1285} / [970.0 to 1115]
150 (6.0)	122.2 to 140.5 / {1246 to 1433} / [1082 to 1244]	86.8 to 99.8 / {885.1 to 1018} / [768.2 to 883.3]	—	125.6 to 144.4 / {1281 to 1472} / [1112 to 1278]
200 (8.0)	111.6 to 128.3 / {1138 to 1308} / [987.7 to 1136]	122.0 to 140.3 / {1244 to 1431} / {1080 to 1242]	—	128.0 to 147.2 / {1305 to 1501} / [1133 to 1303]
250 (10)	167.7 to 192.9 / {1710 to 1967} / [1484 to 1707]	—	—	227.6 to 261.7 / {2321 to 2669} / [2014 to 2316]
300 (12)	146.0 to 167.9 / {1489 to 1712} / [1292 to 1486]	—	—	209.1 to 240.5 / {2132 to2452 } / [1851 to 2129]

Tightening torque values for Ceramics lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	Fluororesin with ceramic fillers (Valqua #7020) gasket (standard), or fluororesin with carbon gasket (optional code GF)			
Gasket types for user's flange	PTFE-sheathed non-asbestos gasket (optional codes BCF and BSF), or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
50 (2.0)	29.9 to 49.8 / {304.9 to 507.8} / [264.6 to 440.8]	30.5 to 50.9 / {311.0 to 519.0} / [269.9 to 450.5]	32.7 to 54.5 / {333.4 to 555.7} / [289.4 to 482.4]	—
80 (3.0)	48.5 to 80.8 / {494.6 to 823.9} / [429.3 to 715.1]	46.6 to 77.6 / {475.2 to 791.3} / [412.4 to 686.8]	—	56.3 to 93.8 / {574.1 to 956.5} / [498.3 to 830.2]
100 (4.0)	60.5 to 100.9 / {616.9 to 1029} / [535.5 to 893.0]	61.5 to 102.5 / {627.1 to 1045} / {544.3 to 907.2]	—	74.2 to 123.7 / {756.6 to 1261} / [656.7 to 1095]
150 (6.0)	125.0 to 208.3 / {1275 to 2124} / [1106 to 1844]	128.0 to 213.3 / {1305 to 2175} / {1133 to 1888]	—	82.2 to 137.0 / {838.2 to 1397} / [727.5 to 1213]
200 (8.0)	174.7 to 291.2 / {1781 to 2969} / [1546 to2577]	120.1 to 200.2 / {1225 to 2041} / [1063 to 1772]	—	86.7 to 144.6 / {884.1 to 1475} / [767.3 to 1280]

T0310.EPS

Table 3.3.10 Centering Device Identification (AXF Standard Models, PFA/Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber lining)

Flange ratings / Size mm (inch)	JIS			ANSI		DIN		
	10K	20K	F12 (75M)	150	300	PN10	PN16	PN40
50 (2.0)	B	B	—	B	F	—	—	F
65 (2.5)	B	B	—	B	G	—	F	—
80 (3.0)	B	F	H	F	C	—	G	—
100 (4.0)	B	F	H	C	H	—	F	—
125 (5.0)	B	C	C	G	D	—	F	—
150 (6.0)	C	D	D	C	E	—	C	—
200 (8.0)	C	D	D	D	E	C	C	—
250 (10)	C	—	D	N	—	C	C	—
300 (12)	C	—	D	P	—	C	C	—

*: Each centering device is engraved with a character as identification.

T0311.EPS

Table 3.3.11 Centering Device Identification (AXF Standard Models, Ceramics lining)

Flange ratings / Size mm (inch)	JIS			ANSI		DIN		
	10K	20K	F12(75M)	150	300	PN10	PN16	PN40
50 (2.0)	B	B	—	B	F	—	—	F
80 (3.0)	B	F	H	F	C	—	G	—
100 (4.0)	B	F	H	C	H	—	F	—
150 (6.0)	B	C	G	B	D	—	B	—
200 (8.0)	B	C	C	G	J	B	B	—

*: Each centering device is engraved with a character as identification.

T0312-1.EPS

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19.1.12

Table 3.3.12 Centering Device Identification (Replacement Models, PFA/Polyurethane Rubber lining)

Size mm (inch) \ Flange ratings	JIS			ANSI		DIN		
	10K	20K	F12(75M)	150	300	PN10	PN16	PN40
50 (2.0)	B	B	—	B	F	—	—	F
80 (3.0)	B	F	H	F	C	—	G	—
100 (4.0)	B	F	H	C	H	—	F	—
150 (6.0)	C	D	D	C	E	—	C	—
200 (8.0)	C	D	D	D	E	C	C	—

*: Each centering device is engraved with a character as identification.

T0312-2.EPS

Table 3.3.13 Inner Diameters of Grounding Ring

Unit: mm (inch)

Size mm (inch) \ Lining	AXF Standard Models			Replacement Models for earlier ADMAG or ADMAG AE
	PFA/Polyurethane Rubber/ Natural Soft Rubber/EPDM Rubber		Ceramics	PFA/Polyurethane Rubber
	Wafer	Flange		
2.5 (0.1)	15 (0.59) (*1)		—	15 (0.59)
5 (0.2)	15 (0.59) (*1)		—	15 (0.59)
10 (0.4)	15 (0.59) (*1)		—	15 (0.59)
15 (0.5)	15 (0.59) (*1)		15 (0.59)	15 (0.59)
25 (1.0)	28 (1.10)		27 (1.06)	27 (1.06)
32 (1.25)	34 (1.34)		—	—
40 (1.5)	41 (1.61)		40 (1.57)	40 (1.57)
50 (2.0)	53 (2.09)		52 (2.05)	52 (2.05)
65 (2.5)	66 (2.60)		—	—
80 (3.0)	77 (3.03)		81 (3.19)	81 (3.19)
100 (4.0)	102 (4.02)		98 (3.86)	98 (3.86)
125 (5.0)	128 (5.04)		—	—
150 (6.0)	146.1 (5.75)		144 (5.67)	140.7 (5.6)
200 (8.0)	193.6 (7.62)		192 (7.56)	188.9 (7.5)
250 (10)	243.7 (9.60)	243 (9.57)	—	239.1 (9.41)
300 (12)	294.7 (11.60)	291.3 (11.47)	—	—
350 (14)	—	323.4 (12.73)	—	—
400 (16)	—	373.5 (14.70)	—	—

*1: The inner diameter of the process connection code: DD4, DJ1, DJ2 is 12 mm (0.47 in.)

Note: Be sure that inner diameter of the piping-side gasket does not protrude into the inner diameter of the grounding ring. (This dimension is also applied when no grounding ring is used.) If the inner diameter of the gasket is too large, however, fluid leakage may result.

T0313.EPS

Unit : mm (in.)

Size mm (inch) \ Lining	AXF Standard Models
	Polyurethane Rubber
500 (20)	468 (18.42) [485 (19.09)]*1
600 (24)	563 (22.16) [589 (23.18)]*1
700 (28)	665 (26.18) [689 (27.12)]*1
800 (32)	765 (30.11) [788 (31.02)]*1
900 (36)	855 (33.66) [888 (34.96)]*1
1000 (40)	942 (37.08) [990 (38.97)]*1
1100 (44)	1085 (42.71)
1200 (48)	1185 (46.65)
1350 (54)	1335 (52.55)
1500 (60)	1485 (58.46)
1600 (64)	1585 (62.40)
1800 (72)	1785 (70.27)
2000 (80)	1985 (78.14)
2200 (88)	2185 (86.02)
2400 (96)	2385 (93.89)
2600 (104)	2585 (101.77)

*1: Values in brackets [ ] indicate a process connection code CG1.

T16-2.EPS

3.3.4 Nominal Diameter 2.5 mm (0.1 in.) to 400 mm (16 in.), Flange Type

IMPORTANT

Use bolts and nuts in compliance with the flange ratings. Be sure to choose a gasket with an inner diameter that does not protrude inside the piping (refer to Table 3.3.13). If the inner diameter of the gasket is too large, however, fluid leakage may result.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

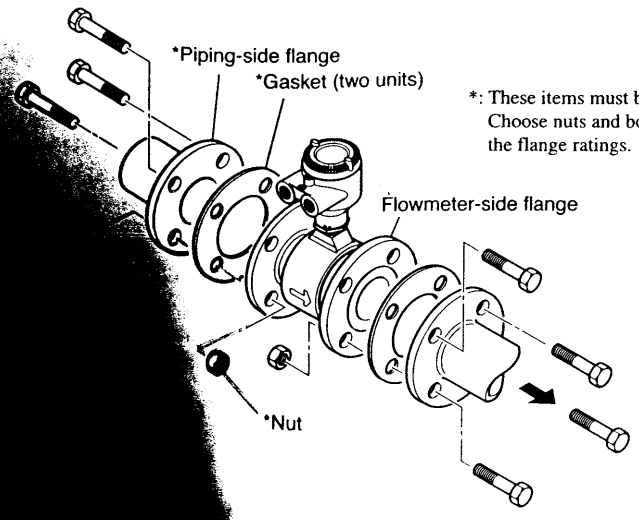
If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter/AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(2) Tightening Nuts

Tighten the bolts according to the torque values for the metal piping in Table 3.3.14. For PVC piping, select an optional code of GA, GC, or GD, use rubber gaskets and tighten the nuts to the torque values for the PVC piping in Table 3.3.15.
For permeable fluids (such as nitric acid, hydrofluoric acid, or sodium hydrate at high temperatures), tighten the nuts according to the torque values in Table 3.3.16.

CAUTION

For a flowmeter with fluorocarbon PFA lining, it is possible that the nuts may loosen as time passes, so tighten them regularly. Be sure to tighten the nuts according to the prescribed torque values. Tighten them diagonally with the same torque values, step by step up to the prescribed torque value.



...ure for Flange Type (size: 2.5 mm (0.1 in.) to 400 mm (16 in.))

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19.1.2

Table 3.3.14 Flange Type Tightening Torque Values for Metal Piping

Tightening torque values for PFA/Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	No gasket (standard)			
Gasket types for user's flange	Non-asbestos gasket, PTFE-sheathed non-asbestos gasket, or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
25 (0.1) (with 10-mm flanges)	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.4 / {38.75 to 65.26} / [33.63 to 56.64]	—
25 (0.1) (with 15-mm flanges)	4.6 to 7.7 / {46.91 to 78.52} / [40.71 to 68.15]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.7 to 7.9 / {47.93 to 80.56} / [41.6 to 69.92]	—
5 (0.2) (with 10-mm flanges)	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.4 / {38.75 to 65.26} / [33.63 to 56.64]	—
5 (0.2) (with 15-mm flanges)	4.6 to 7.7 / {46.91 to 78.52} / [40.71 to 68.15]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.7 to 7.9 / {47.93 to 80.56} / [41.6 to 69.92]	—
10 (0.4) (with 10-mm flanges)	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.3 / {38.75 to 64.24} / [33.63 to 55.76]	3.8 to 6.4 / {38.75 to 65.26} / [33.63 to 56.64]	—
10 (0.4) (with 15-mm flanges)	4.6 to 7.7 / {46.91 to 78.52} / [40.71 to 68.15]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.7 to 7.9 / {47.93 to 80.56} / [41.6 to 69.92]	—
15 (0.5)	4.6 to 7.7 / {46.91 to 78.52} / [40.71 to 68.15]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.7 to 7.9 / {47.93 to 80.56} / [41.6 to 69.92]	—
25 (1.0)	13.1 to 15.1 / {133.6 to 154.0} / [115.9 to 133.6]	13.2 to 15.2 / {134.6 to 155.0} / [116.8 to 134.5]	11.9 to 13.7 / {121.3 to 139.7} / [105.3 to 121.3]	—
32 (1.25)	14.4 to 15.6 / {146.8 to 159.1} / [127.4 to138.1]	14.6 to 16.8 / {148.9 to 171.3} / [129.2 to 148.7]	15.0 to 17.3 / {153.0 to 176.4} / [132.8 to 153.1]	—
40 (1.5)	21.9 to 25.2 / {223.3 to 257.0} / [193.8 to 223.0]	22.2 to 25.5 / {226.4 to 260.0} / [196.5 to 225.7]	23.2 to 26.7 / {236.6 to 272.3} / [205.3 to 236.3]	—
50 (2.0)	28.0 to 32.2 / {285.5 to 328.3} / [247.8 to 285.0]	27.8 to 32.0 / {283.5 to 326.3} / [246.0 to 283.2]	28.8 to 33.1 / {293.7 to 337.5} / [254.9 to 293.0]	—
65 (2.5)	41.6 to 47.8 / {424.2 to 487.4} / [368.2 to 423.1]	41.4 to 47.6 / {422.2 to 485.4} / [366.4 to 421.3]	—	—
80 (3.0)	23.2 to 26.7 / {236.6 to 272.3} / [205.3 to 236.3]	26.1 to 30.0 / {266.1 to 305.9} / [231.0 to265.5]	—	46.0 to 52.9 / {469.1 to 539.4} / [407.1 to 468.2]
100 (4.0)	30.9 to 35.5 / {315.1 to 362.0} / [273.5 to 314.2]	34.8 to 40.0 / {354.9 to 407.9} / [308.0 to 354.0]	—	60.9 to 70.0 / {621.0 to 713.8} / [539.0 to 619.5]
125 (5.0)	45.6 to 52.4 / {465.0 to 534.3} / [403.6 to 463.8]	48.6 to 55.9 / {495.6 to 570.0} / [430.1 to 494.7]	—	48.1 to 55.3 / {489.5 to 563.9} / [424.8 to 489.4]
150 (6.0)	64.5 to 74.2 / {657.7 to 756.6} / [570.9 to 656.7]	44.8 to 51.5 / {456.8 to 525.2} / [396.5 to 455.8]	—	67.5 to 77.6 / {688.3 to 791.3} / [597.4 to 686.8]
200 (8.0)	59.2 to 68.1 / {603.7 to 694.4} / [524.0 to 602.7]	63.6 to 73.1 / {648.5 to 745.4} / [562.9 to 647.0]	—	69.9 to 80.4 / {712.8 to 819.9} / [618.7 to 711.6]
250 (10)	144.0 to 165.6 / {1468 to 1689} / [1274 to 1466]	156.3 to 179.7 / {1594 to 1832} / [1383 to 1590]	—	190.5 to 219.1 / {1943 to 2234} / [1686 to 1939]
300 (12)	119.3 to 137.2 / {1217 to 1399} / [1056 to 1214]	173.3 to 199.3 / {1767 to 2032} / [1534 to 1764]	—	168.0 to 193.2 / {1713 to 1970} / [1487 to 1710]
350 (14)	164.7 to 189.4 / {1679 to 1931} / [1458 to 1676]	238.3 to 274.0 / {2430 to 2794} / [2109 to 2425]	—	238.6 to 274.4 / {2433 to 2798} / [2112 to 2429]
400 (16)	225.2 to 258.9 / {2296 to 2640} / [1993 to 2291]	315.1 to 362.4 / {3213 to 3695} / [2789 to 3207]	—	305.8 to 351.7 / {3118 to 3586} / [2707 to 3113]

T0314.EPS

Table 3.3.15 Flange Type Tightening Torque Values for PVC Piping

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	Fluororubber gasket (optional codes GA, GC, and GD)			
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket, or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
25 (0.1) (with 10-mm flanges)	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	—
25 (0.1) (with 15-mm flanges)	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	—
5 (0.2) (with 10-mm flanges)	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	—
5 (0.2) (with 15-mm flanges)	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	—
10 (0.4) (with 10-mm flanges)	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	0.8 to 1.3 / {8.158 to 13.26} / [7.08 to 11.51]	—
10 (0.4) (with 15-mm flanges)	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	—
15 (0.5)	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	—
25 (1.0)	2.7 to 4.5 / {27.53 to 45.89} / [23.9 to 39.83]	2.7 to 4.5 / {27.53 to 45.89} / [23.9 to 39.83]	2.3 to 3.9 / {23.45 to 39.77} / [20.36 to 34.52]	—
32 (1.25)	3.0 to 4.9 / {30.59 to 49.97} / [26.55 to 43.37]	3.0 to 5.0 / {30.59 to 50.99} / [26.55 to 44.25]	2.9 to 4.9 / {29.57 to 49.97} / [25.67 to 43.37]	—
40 (1.5)	4.5 to 7.6 / {45.89 to 77.5} / [39.83 to 67.26]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.4 to 7.4 / {44.87 to 75.46} / [38.94 to 65.49]	—
50 (2.0)	5.9 to 9.8 / {60.16 to 99.93} / [52.22 to 86.74]	2.9 to 4.8 / {29.57 to 48.95 } / [25.67 to 42.48]	5.5 to 9.2 / {56.08 to 93.81 } / [48.68 to 81.43]	—
65 (2.5)	9.0 to 15.0 / {91.77 to 153.0} / [79.66 to 132.8]	4.4 to 7.3 / {44.87 to 74.44} / [38.94 to 64.61]	—	—
80 (3.0)	4.9 to 8.1 / {49.97 to 82.6} / [43.37 to 71.69]	5.5 to 9.1 / {56.08 to 92.79} / [48.68 to 80.54]	—	9.7 to 12.2 / {98.91 to 124.4} / [85.85 to 108.0]
100 (4.0)	6.7 to 11.2 / {68.32 to 114.2} / [59.3 to 99.13]	7.5 to 12.6 / {76.48 to 128.5} / [66.38 to 111.5]	—	13.3 to 22.2 / {135.6 to 226.4} / [117.7 to 196.5]
125 (5.0)	9.9 to 16.5 / {101.0 to 168.3} / [87.62 to 146.0]	10.7 to 17.8 / {109.1 to 181.5} / [94.7 to 157.5]	—	10.5 to 17.6 / {107.1 to 179.5} / [92.93 to 155.8]
150 (6.0)	14.4 to 24.0 / {146.8 to 244.7} / [127.4 to 212.4]	9.8 to 16.3 / {99.93 to 166.2} / [86.74 to 144.3]	—	15.2 to 25.3 / {155.0 to 258.0} / [134.5 to 223.9]
200 (8.0)	13.4 to 22.3 / {136.6 to 227.4} / [118.6 to 197.4]	14.6 to 24.3 / {148.9 to 247.8} / [129.2 to 215.1]	—	16.1 to 26.9 / {164.2 to 274.3} / [142.5 to 238.1]

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Table 3.3.16 Flange Type Tightening Torque Values for Metal Piping and Permeable Fluids

Tightening torque values for PFA lining type (N-m / {kgf-cm} / [in-lbf])				
Gasket types within flowtube	No gasket (standard)			
Gasket types for user's flange	Non-asbestos gasket, PTFE-sheathed non-asbestos gasket, or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K, ANSI Class 150, and DIN PN10	JIS 20K, ANSI Class 300, and DIN PN16	DIN PN40	JIS F12 (JIS 75M)
25 (0.1) (with 10-mm flanges)	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	—
25 (0.1) (with 15-mm flanges)	6.9 to 7.9 / {70.36 to 80.56} / [61.07 to 69.92]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	—
5 (0.2) (with 10-mm flanges)	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	—
5 (0.2) (with 15-mm flanges)	6.9 to 7.9 / {70.36 to 80.56} / [61.07 to 69.92]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	—
10 (0.4) (with 10-mm flanges)	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	5.7 to 6.6 / {58.12 to 67.3} / [50.45 to 58.41]	—
10 (0.4) (with 15-mm flanges)	6.9 to 7.9 / {70.36 to 80.56} / [61.07 to 69.92]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	—
15 (0.5)	6.9 to 7.9 / {70.36 to 80.56} / [61.07 to 69.92]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	—
25 (1.0)	19.6 to 22.5 / {199.9 to 229.4} / [173.5 to 199.1]	19.7 to 22.7 / {200.9 to 231.5} / [174.4 to 200.9]	17.5 to 20.1 / {178.5 to 205.0} / [154.9 to 177.9]	—
32 (1.25)	21.5 to 24.7 / {219.2 to 251.9} / [190.3 to 218.6]	21.6 to 24.8 / {220.3 to 252.9} / [191.2 to 219.5]	22.1 to 25.4 / {225.4 to 259.0} / [195.6 to 224.8]	—
40 (1.5)	32.5 to 37.4 / {331.4 to 381.4} / [287.6 to 331.0]	32.8 to 37.7 / {334.5 to 384.4} / [290.3 to 333.7]	33.8 to 38.9 / {344.7 to 396.7} / [229.2 to 344.3]	—
50 (2.0)	41.3 to 47.5 / {421.1 to 484.4} / [365.5 to 420.4]	20.6 to 23.7 / {210.1 to 241.7} / [182.3 to 209.8]	42.2 to 48.5 / {430.3 to 494.6} / [373.5 to 429.3]	—
65 (2.5)	61.2 to 70.4 / {624.1 to 717.9} / [541.7 to 623.1]	30.5 to 35.1 / {311.0 to 357.9} / [269.9 to 310.7]	—	—
80 (3.0)	34.2 to 39.3 / {348.7 to 400.7} / [302.7 to 347.8]	38.5 to 44.3 / {392.6 to 451.7} / [340.7 to 392.1]	—	68.1 to 78.3 / {694.4 to 798.4} / [602.7 to 693.0]
100 (4.0)	45.2 to 52.0 / {460.9 to 530.3} / [400.0 to 460.2]	51.0 to 58.7 / {520.1 to 598.6} / [451.4 to 519.5]	—	89.6 to 103.0 / {913.7 to 1050} / [793.0 to 911.6]
125 (5.0)	66.8 to 76.8 / {681.2 to 783.1} / [591.2 to 679.7]	70.8 to 81.4 / {722.0 to 830.0} / [626.6 to 720.4]	—	70.7 to 81.3 / {720.9 to 829.0} / [625.7 to 719.6]
150 (6.0)	93.9 to 108.8 / {957.5 to 1109} / [831.1 to 962.9]	65.4 to 75.2 / {666.9 to 766.8} / [578.8 to 665.6]	—	98.8 to 113.6 / {1007 to 1158} / [874.4 to 1005]
200 (8.0)	85.8 to 98.7 / {874.9 to 1006} / [759.4 to 873.6]	91.5 to 105.2 / {933.0 to 1073} / [809.8 to 931.1]	—	101.8 to 117.1 / {1038 to 1194} / [901.0 to 1036]
250 (10)	207.8 to 239.0 / {2119 to 2437} / [1839 to 2115]	222.9 to 256.3 / {2273 to 2614} / [1973 to 2268]	—	277.9 to 319.6 / {2834 to 3259} / [2460 to 2829]
300 (12)	171.0 to 196.7 / {1744 to 2006} / [1513 to 1741]	184.1 to 211.7 / {1877 to 2159} / [1629 to 1874]	—	243.8 to 280.4 / {2486 to 2859} / [2158 to 2482]
350 (14)	234.7 to 269.9 / {2393 to 2752} / [2077 to 2389]	261.3 to 300.5 / {2665 to 3064} / [2313 to 2660]	—	350.6 to 403.2 / {3575 to 4111} / [3103 to 3569]
400 (16)	320.0 to 368.0 / {3263 to 3753} / [2832 to 3257]	343.2 to 394.7 / {3500 to 4025} / [3038 to 3493]	—	448.3 to 515.5 / {4571 to 5257} / [3968 to 4562]

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3.3.5 Nominal Diameter 500 mm (20 in.) to 2600 mm (104 in.), Flange Type

IMPORTANT

Use bolts and nuts in compliance with the flange ratings. Be sure to choose a gasket with an inner diameter that does not protrude inside the piping (refer to Table 3.3.13). If the inner diameter of the gasket is too large, however, fluid leakage may result.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter. It may be especially difficult to move large size flowtubes after bringing them into the pit. Check directions before bringing.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed (only for size 500 mm to 1000 mm). Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E).

(2) Carrying Flowtube

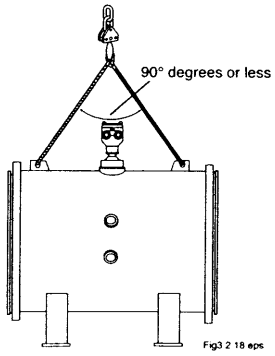


Figure 3.3.6 Lifting Flowtube

CAUTION

- When lifting the flowtube, use the lifting rings (eye bolts or shackle).
- To assure safety, keep lifting angle less than 90 degrees as shown in Figure 3.3.6
- If the size is 1600 mm (64 in.) or larger, use the eye bolts or eye nuts at all four of the locations simultaneously and lift the flowtube. Avoid lifting it from only one location or use only two locations and lift it at 45 degrees.
- Do not shock the installation foundation bracket when installing the flowmeter as the bracket may be damaged.

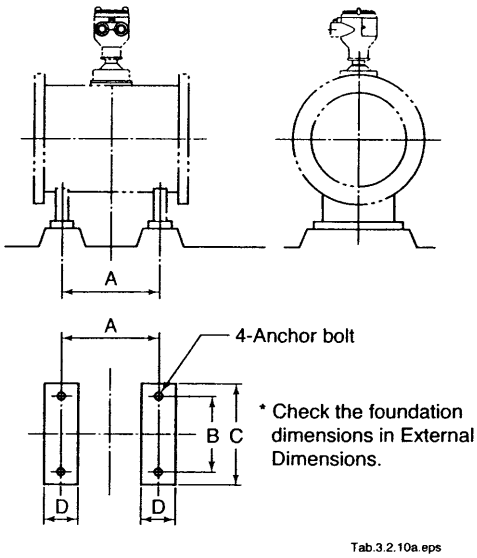
(3) Positioning Flowtube

Bring in the flowtube, place it in the bracket and use a jack to correct position it for height.

IMPORTANT

Apply the jack to near the flowtube support and insert a steel liner between the bracket and flowtube support. Never use wooden liner.
In addition, adjust any misalignment when the flowtube is brought in, as the jack can adjust vertical misalignments, but not horizontal ones.

(4) Installation Foundation Dimensions (Size 500 mm (20 in.) to 1000 mm (40 in.))



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19.1.2

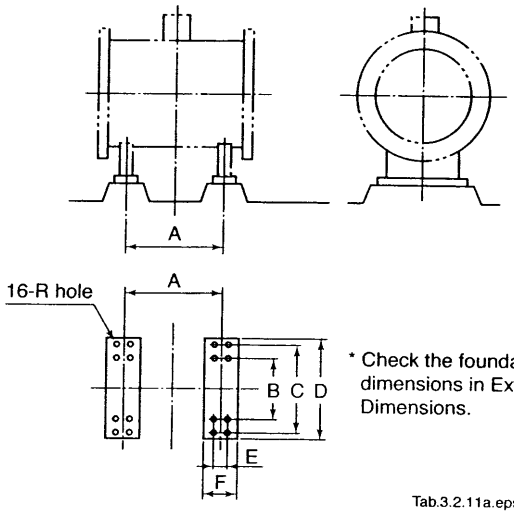
Table 3.3.17 Installation Foundation Dimensions (Size 500 mm (20 in.) to 1000 mm (40 in.)).

Unit: mm(approx. inch)

Location / Size mm(inch)	A	B	C	D
500 (20)	350(13.8)	350(13.8)	420(16.5)	125(4.9)
600 (24)	400(15.7)	400(15.7)	470(18.5)	125(4.9)
700 (28)	450(17.7)	500(19.7)	570(22.4)	125(4.9)
800 (32)	550(21.7)	550(21.7)	620(24.4)	125(4.9)
900 (36)	700(27.6)	650(25.6)	720(28.3)	125(4.9)
1000 (40)	800(31.5)	700(27.6)	770(30.3)	125(4.9)

Tab3.2.10b.eps

(5) Installation Foundation Dimensions(Size 1100 mm (44 in.) to 2600 mm (104 in.))



* Check the foundation dimensions in External Dimensions.

Tab.3.2.11a.eps

Table 3.3.18 Installation Foundation Dimensions (Size 1100 mm (44 in.) to 2600 mm (104 in.))

Unit: mm(approx. inch)

Location / Size mm (inch)	Dimensions						
	A	$B^{\pm 2}$	$C^{\pm 3}$	D	E	F	R
1100(44)	1,211(47.7)	720(28.3)	1,100(43.3)	1,280(50.4)	130 (5.12)	200 (7.87)	19 (0.75)
1200(48)	1,261(49.6)	780(30.7)	1,200(47.2)	1,380(54.3)			
1350(54)	1,366(53.8)	880(34.6)	1,350(53.1)	1,540(60.6)			
1500(60)	1,490(58.7)	980(38.6)	1,500(59.1)	1,700(66.9)			
1600(64)	1,698(66.9)	1,080(42.5)	1,650(65.0)	1,850(72.8)	170 (6.69)	250 (9.84)	22 (0.87)
1800(72)	1,864(73.4)	1,180(46.5)	1,800(70.9)	2,000(78.7)			
2000(80)	2,010(79.1)	1,300(51.2)	2,000(78.7)	2,220(87.4)			
2200(88)	2,172(85.5)	1,430(56.3)	2,200(86.6)	2,420(95.3)	200 (7.87)	300 (11.81)	
2400(96)	2,218(87.3)	1,560(61.4)	2,400(94.5)	2,620(103.1)			
2600(104)	2,300(90.6)	1,700(66.9)	2,600(102.4)	2,820(111.0)			

Tab3.2.11b.eps

(6) Tightening Nuts

Pass the bolts from pipe line side, not flowtube side, and tighten the bolts according to the torque values for the metal piping in Table 3.3.19

Finish a brackets part with mortar.

⚠ CAUTION

- Be sure to tighten the nuts according to the prescribed toeque values. Tighten them diagonally with the same torque values, step by up to the prescribed torque value.
- Completely cover the brackets and liners with mortar.

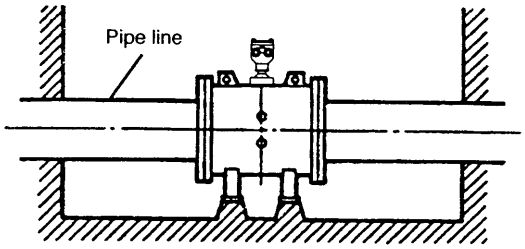


Figure 3.3.7 Mounting Flowtube

Figure 3.3.19 Flange Type Tightening Torque Values for Material Piping

	Tightening torque values for Polyurethane Rubber lining (N-m / {kgf-cm} / [in-lbf])			
Gasket types within	Size 500 to 1000 mm: No gasket Size 1100 to 2600 mm: Butadiene-styrene-rubber+Natural rubber			
Gasket types for user's	Rubber gasket, or the equivalent in hardness			
Flange ratings / Size mm (inch)	JIS 10K	ANSI Class150	DIN PIN10	JIS F12 (JIS 75M)
500 (20)	43 to 72 / {438.5 to 734.2}/[380.6 to 637.2]	51 to 85 / {520.1 to 866.8}/[451.4 to 752.3]	43 to 71 / {438.5 to 724.0}/[380.6 to 628.4]	61 to 102 / {622.0 to 1040}/[539.9 to 902.7]
600 (24)	52 to 87 / {530.3 to 887.2}/[460.2 to 770.0]	82 to 137 / {836.2 to 1397}/[725.7 to 1213]	64 to 107 / {652.6 to 1091}/[566.4 to 947.0]	65 to 108 / {662.8 to 1101}/[575.3 to 955.8]
700 (28)	69 to 116 / {703.6 to 1183}/[610.7 to 1027]	—	71 to 118 / {724.0 to 1203}/[628.4 to 1044]	84 to 141 / {856.6 to 1438}/[743.4 to 1248]
800 (32)	71 to 119 / {724.0 to 1213}/[628.4 to 1053]	—	94 to 157 / {958.5 to 1601}/[831.9 to 1390]	81 to 136 / {826.0 to 1387}/[716.9 to 1204]
900 (36)	93 to 155 / {948.3 to 1581}/[823.1 to 1372]	—	101 to 168 / {1030 to 1713}/[893.9 to 1487]	98 to 163 / {999.3 to 1662}/[867.3 to 1443]
1000 (40)	150 to 249 / {1530 to 2539}/[1328 to 2204]	—	147 to 245 / {1499 to 2498}/[1301 to 2168]	117 to 195 / {1193 to 1988}/[1035 to 1076]
1100 (44)	—	—	—	180 to 300 / {1835 to 3059}/[1593 to 2655]
1200 (48)	—	—	—	177 to 294 / {1805 to 2998}/[1567 to 2602]
1350 (54)	—	—	—	254 to 423 / {2590 to 4313}/[2248 to 3744]
1500 (60)	—	—	—	277 to 462 / {2825 to 4711}/[2542 to 4089]
1600 (64)	—	—	—	268 to 446 / {2733 to 4548}/[2372 to 3947]
1800 (72)	—	—	—	243 to 406 / {2478 to 4140}/[2151 to 3593]
2000 (80)	—	—	—	331 to 551 / {3375 to 5619}/[2929 to 4877]
2200 (88)	—	—	—	376 to 626 / {3834 to 6383}/[3328 to 5540]
2400 (96)	—	—	—	406 to 677 / {4140 to 6904}/[3593 to 5992]
2600 (104)	—	—	—	542 to 903 / {5527 to 9208}/[4797 to 7992]

Tab.3.3.19.EPS

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19.1.12

3.3.6 Sanitary Type

The sanitary type can be mounted to the piping using a clamp, a union, or a welded joint.

NOTE

This section describes the remote flowtube as an example. The same procedure also applies to the integral flowmeter.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter/AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(2) Mounting Procedure

(a). Clamp type

(process connection codes: HAB, HDB, and HKB)

1) Welding ferrule

Weld a ferrule to the piping.

IMPORTANT

When welding the ferrule, pay attention to the edge preparation, level differences between the ferrule and the piping, and the welding current to avoid deforming the piping or causing stagnation portion of the fluid.

2) Installing gasket

Install a gasket for clamp to fit in the groove on the ferrule.

3) Positioning flowmeter

Position the flowmeter between the two ferrules.

4) Tightening clamp

Install a clamp to cover the tapered parts of the flowmeter-side adapter and the ferrule, and tighten the clamp screw.

NOTE

The ferrule, clamp, and gasket are not provided with the flowmeter, and must be provided by the user.

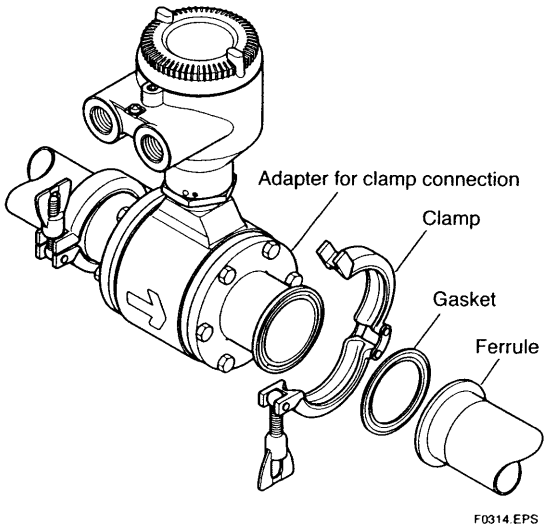

Figure 3.3.8 Mounting Procedure for Clamp Connection Type

(b) Union type

(process connection codes: JDB, JKB, and JSB)

1) Welding sleeve

Pass the piping through a nut and then weld a sleeve to the piping.

IMPORTANT

- Be sure to weld the sleeve after passing the piping through the nut.
- When welding the sleeve, pay attention to the edge preparation, level differences between the sleeve and the piping, and the welding current to avoid deforming the piping or causing stagnation of some of the fluid.

2) Installing gasket

Install a gasket for union to fit in the groove on the sleeve.

3) Positioning flowmeter

Move the nut closer to the piping temporarily and position the flowmeter between the two sleeves.

4) Tightening nut

Install the nut to cover the tapered parts of the flowmeter-side adapter and the sleeve, and tighten it using a wrench.

NOTE

The sleeve, nut, and gasket are not provided with the flowmeter, and must be provided by the user.

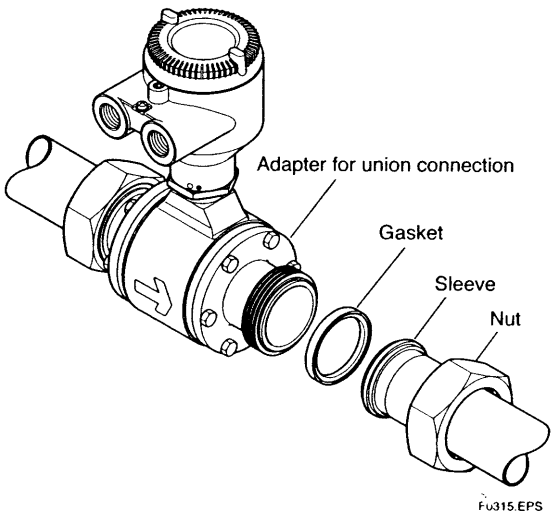

Figure 3.3.9 Mounting Procedure for Union Connection Type

(c) Butt weld adapter type

(process connection codes: KDB and KKB)

1) Removing adapter

Remove the butt weld adapter by loosening the mounting screws.

2) Welding ferrule or sleeve

Weld a ferrule, a sleeve, or an alternative (provided by the user) to the butt weld adapter.

IMPORTANT

- Be sure to weld the ferrule, the sleeve, or the alternative after removing the butt weld adapter from the flowmeter itself.
- When welding the ferrule, the sleeve, or the alternative, pay attention to the edge preparation, level differences between them and the piping, and the welding current to avoid deforming the piping or causing stagnation portion of the fluid.

3) Installing butt weld adapter

Install a gasket to fit in the groove of the butt weld adapter, and tighten the mounting screws.

CAUTION

- In case of standard gasket (EPDM rubber), tighten the adapter mounting screw according to the torque values in Table 3.3.20.
- In case that optional code GH (Silicon rubber) is selected, tighten the adapter mounting screw according to the torque values in Table 3.3.21.
- Tighten the adapter mounting screw in diagonal order step by step.
- After tightening of screw, confirm that gaskets protrude inside adapter. Protruding of gasket is necessary to keep the sanitary requirements.

Table 3.3.20 Tightening Torque Values of adapter for EPDM rubber gasket

Tightening torque values (N-m / {kgf-cm} / [in-lbf])	
Size mm (inch) \ Gasket type	EPDM rubber (standard)
15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5)	3.0 to 3.5 / {30.59 to 35.69} / [26.55 to 30.98]
50 (2.0), 65 (2.5)	4.5 to 5.0 / {45.89 to 50.99} / [39.83 to 44.25]
80 (3.0)	8.0 to 9.0 / {81.58 to 91.78} / [70.81 to 79.65]
100 (4.0), 125 (5.0)	10 to 11 / {102.0 to 112.2} / [88.50 to 97.35]

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19.1.12

Table 3.3.21 Tightening Torque Values of adapter for silicon rubber gasket

Tightening torque values (N-m / {kgf-cm} / [in-lbf])	
Size mm (inch) \ Gasket type	Silicon rubber (optional code GH)
15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5)	2.0 to 2.5 / {20.39 to 25.49} / [17.70 to 22.13]
50 (2.0), 65 (2.5), 80 (3.0)	4.0 to 4.5 / {40.79 to 45.89} / [35.40 to 39.83]
100 (4.0), 125 (5.0)	6.0 to 6.5 / {61.18 to 66.28} / [53.10 to 57.53]

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4) Mounting flowmeter to piping

Connect the flowmeter to the piping in a manner appropriate to the ferrule, the sleeve, or the alternative that has been welded to the adapter.

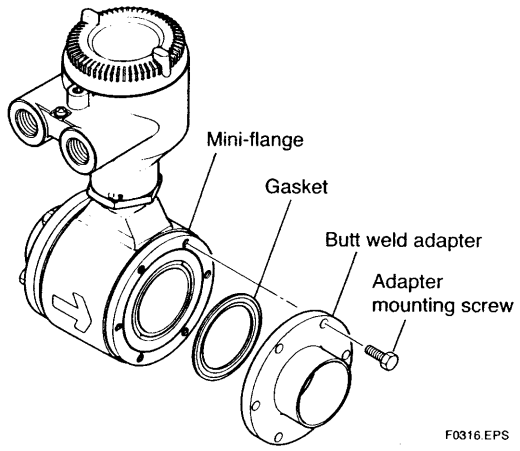


Figure 3.3.10 Mounting Procedure for Weld Joint Adapter Type

(3) Maintenance of Sanitary Type

Refer to Section 5.3

4. WIRING

4.1 Wiring the Integral Flowmeter

This section describes the wiring of the integral flowmeter.

⚠ WARNING

The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.

⚠ CAUTION

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

4.1.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

⚠ CAUTION

- In cases where the ambient temperature exceeds 50°C (122°F), use external heat-resistant wiring with a maximum allowable temperature of 70°C (158°F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation, e.g. inside the terminal box of the flowmeter.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables must be routed in separate steel conduit tubes 16 (JIS C 8305) or flexible conduit tubes 15 (JIS C 8309).
- Always route the power and output signal cables in separate steel conduit tubes, except when the power supply voltage is 24 V and four-core cables are used for wiring. Keep conduits or flexible tubes watertight using sealing tape.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- In case of 24 V power supply version, it comes with a plug. Use this plug to cover the unused wiring port when wiring the instrument with only one, four-core cable.
- Be sure to turn the power off before opening the terminal box cover.
- Before turning the power on, tighten the terminal box cover securely.
- The terminal box cover is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw, refer to Figure 4.1.5.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw, refer to Figure 4.1.15.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.

4.1.2 Power Cable/Output Cable

Use polyvinyl chloride insulated and sheathed control cables (JIS C 3401) or polyvinyl chloride insulated and sheathed portable power cables (JIS C 3312) or the equivalent.

Outer Diameter: 6.5 to 12 mm (0.26 to 0.47 in.)
10.5 or 11.5 mm (0.41 to 0.45 in.) for optional code EG, EU and EW.
6 to 12 mm (0.24 to 0.47 in.) for optional code EP.
Nominal Cross Section (Single wire): 0.5 to 2.5 mm^2
Nominal Cross Section (Stranded wire): 0.5 to 1.5 mm^2

In case of power cable, Green/Yellow covered conductor shall be used only for connection to PROTECTIVE CONDUCTOR TERMINALS. Conform to IEC227, IEC245 or equivalent national authorization.

NOTE

- For power cables, always use a crimp terminal with an insulation cover.
- Use crimp tools from the manufacturer of the crimp terminal you want to use to connect the crimp terminal and cable.
- Use crimp tools that are appropriate for the diameter of the cable to be connected.

4.1.3 Wiring Ports

This instrument is of watertight construction as stipulated in JIS C0920-1982. (Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment.) It is shipped with a wiring bracket (waterproof gland or waterproof gland with union) or a plastic gland attached, only in cases where an optional specification is selected for the wiring port.
In case of the explosion proof type, refer to Chapter 8.

(1) When there are no particular optional specifications

The wiring port is sealed with a cap (not water-proof) that must be removed before wiring. At this time, handle the wiring port in accordance with the JIS C0920-1982 mentioned above.

(2) Wiring using waterproof glands

IMPORTANT

To prevent water or condensation from entering the converter housing, waterproof glands are recommended. Do not over-tighten the glands or damage to the cables may result. Tightness of the gland can be checked by confirming that the cable is held firmly in place.

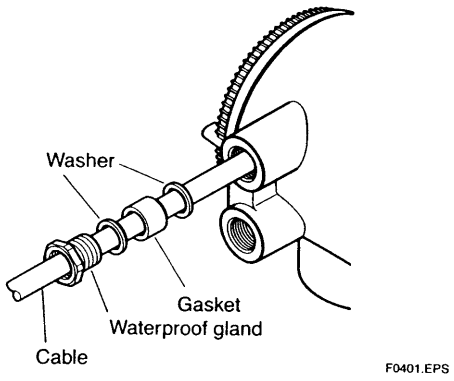


Figure 4.1.1 Waterproof Gland (Optional code EG)

For working on the electric wire tubes or the flexible tubes (PF1/2), remove the waterproof gland and attach them directly to the wiring port.

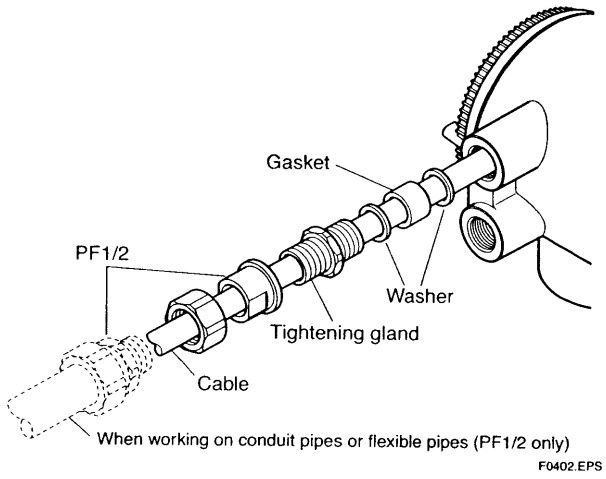


Figure 4.1.2 Waterproof Gland with Union Joint (Optional code EU)

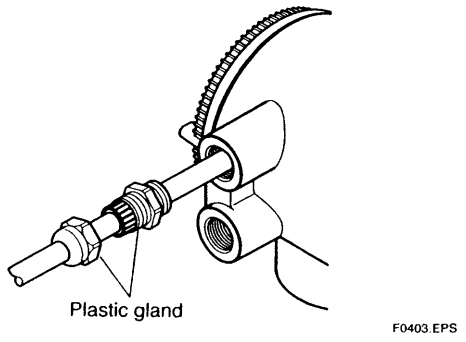


Figure 4.1.3 Plastic Gland (Optional code EP)

(3) Conduit Wiring

When wiring the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.1.4. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

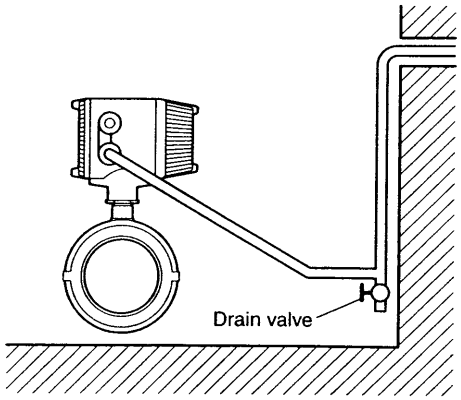


Figure 4.1.4 Conduit Wiring

4.1.4 Wiring Connections

(1) Removing Cover

Loosen cover locking screw 2 clockwise using a hexagonal wrench (nominal size 3 mm) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is unlocked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

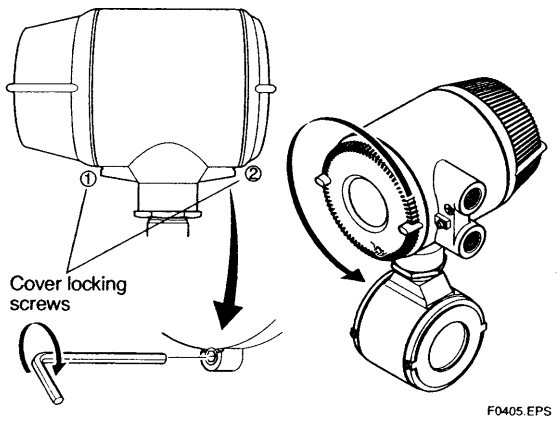


Figure 4.1.5 Removing the Terminal Box Cover

(2) Terminal Configuration

When the cover is removed, the connection terminals will be visible.

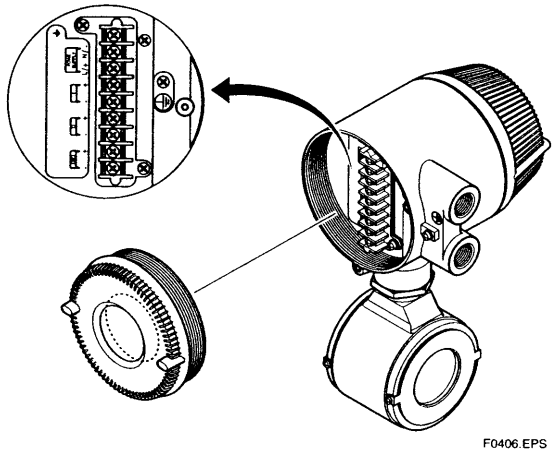


Figure 4.1.6 Terminal Configuration

The description of the terminal symbols is shown in Table 4.1.1.

Table 4.1.1 Terminal Symbols

Terminal Symbols	Description
⏚	Functional grounding
N/- L/+	Power supply
I+ I-	Current output 4 to 20mA DC
DO+ DO-	Pulse output/Alarm output/ Status output
DIO+ DIO-	Alarm output/Status output Status input
⊕	Protective grounding (Outside of the terminal)

T0401.EPS

(3) Precautions for Wiring of Power Supply Cables

When connecting to the power supply, observe the points below. Failure to comply with these warnings may result in an electric shock or damage to the instrument.

⚠ WARNING

- Ensure that the power supply is OFF in order to prevent electric shocks.
- Ensure the protective grounding terminal is grounded before turning the power on.
- Use insulating sleeve crimp terminals (for 4-mm screws) for the power supply wiring and protective grounding wiring.
- Install an external switch or circuit breaker as a means to turn the power off (capacitance; 15A, conforming to IEC947-1 and IEC947-3). Locate this switch either near the instrument or in other

places facilitating easy operation. Affix a "Power Off Equipment" label to this external switch or circuit breaker.

Wiring Procedure

1. Turn the instrument's power off.
2. Wire the power supply cable and the functional grounding cable to the power supply terminals.

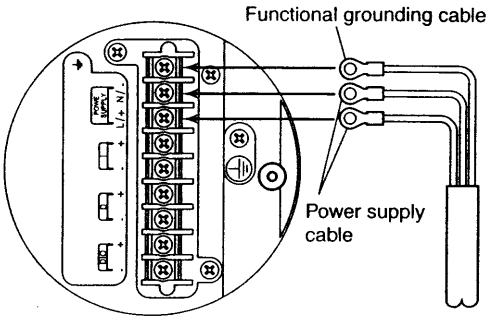


Figure 4.1.7 Electric Cable Wiring

(4) DC Power Connection

When using DC power as the power supply for the converter, give attention to the following points.

1) Connecting Power Supply

IMPORTANT

Do not connect power supply with reversed polarities.

L/+ terminal: connect +

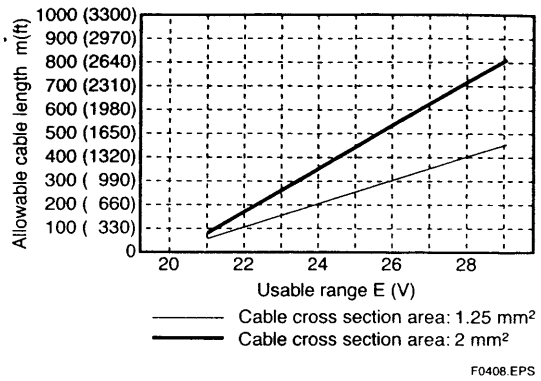
N/– terminal: connect –

2) Required Power Supply Voltages

IMPORTANT

When using a 24 V power supply, the specification for the supply voltage is 24 V (–15% to +20%), but the input voltage of the converter drops due to cable resistance therefore it must be used within the following ranges.

Supply Voltage and Cable Length



3) Setting Power Supply Frequency

IMPORTANT

Set the local commercial power frequency in order to eliminate the effect of induction noise from the power supply.
Refer to "Chapter 6: Parameter Description" in the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).
Parameter No.: **J30** and **J31**

(5) Grounding

CAUTION

Be sure to connect the protective grounding of the AXF integral flowmeter with a cable of 2mm² or larger cross section in order to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.
Connect the grounding wire to the ⏚ mark.
The grounding should satisfy Class D requirements (ground resistance, 100 Ω or less).
In case of TIIS Flame proof type, the grounding should satisfy Class C requirements (ground resistance, 10 Ω or less) or class A requirements (ground resistance, 10 Ω or less).
For explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.

IMPORTANT

When optional code A (lighting protector) is selected, the ground should satisfy Class C requirements (grounding resistance, 10 Ω or less).

- The protective grounding terminals ⏚ are located on the inside and outside of the terminal area. Either terminal may be used.
- Use 600 V vinyl insulation wires as the grounding wires.

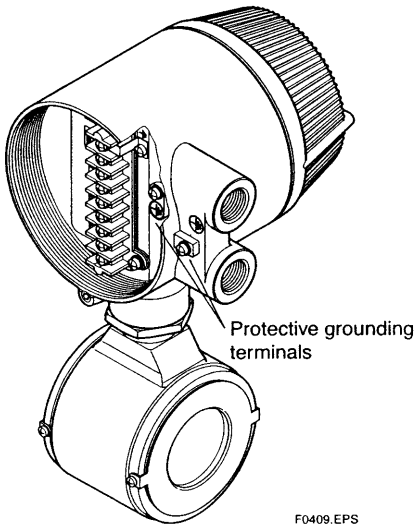


Figure 4.1.8 Protective Grounding Terminal Location

IMPORTANT

Improper grounding can have an adverse effect on the flow measurement. Ensure that the instrument is properly grounded.

The electromotive force of the magnetic flowmeter is minute and it is easily affected by noise, and the reference electric potential is the same as that of the measuring fluid. Therefore, the reference electric potential (terminal potential) of the flowtube and converter also need to be the same as that of the measuring fluid. Moreover, the potential must be the same as the ground. The magnetic flowmeter is equipped with an grounding ring that makes a connection with the charge of the measured fluid for grounding and protects the lining. Be sure to ground the flowmeter according to Figure 4.1.9.

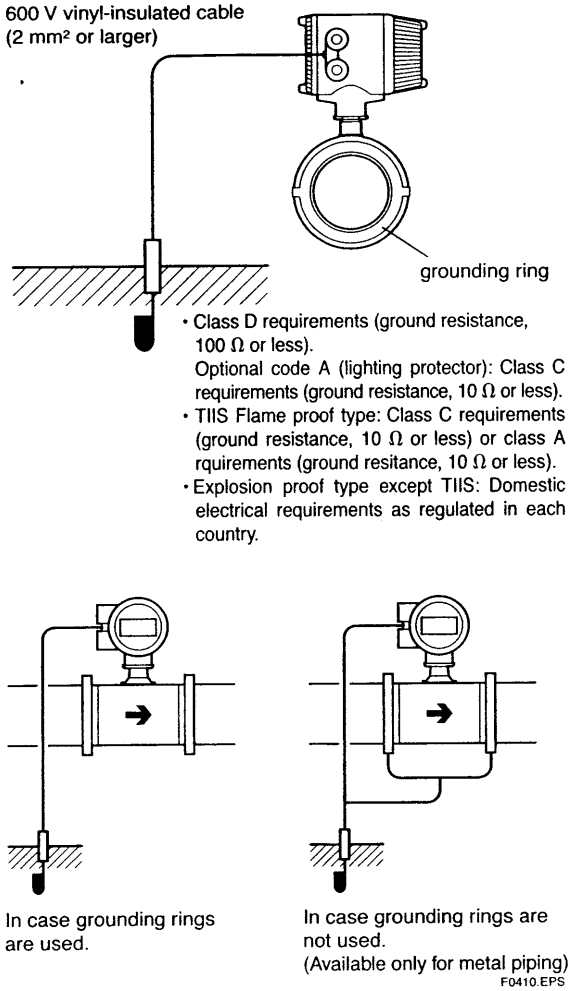


Figure 4.1.9 Grounding

(6) Connecting to External Instruments

WARNING

Before wiring with external instruments, be sure to turn off the magnetic flowmeter and any external instruments.

Connect the AXF integral flowmeter terminal to external instruments, giving attention to the following points.

● 4 to 20 mA DC Current Output

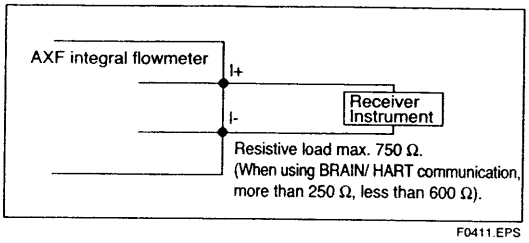


Figure 4.1.10 4 to 20 mA DC Output Connection

● Pulse Output

IMPORTANT

- As this is a transistor contact (insulated type), give attention to proper voltage and polarity when wiring.
- Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.
- When input filter constant of the electronic counter is large in relation to the pulse width, the signal will decrease and the count will not be accurate.
- If the input impedance of the electronic counter is large, an induction noise from the power supply may result in inaccurate counts. Use a shield cable or sufficiently reduce the input impedance of the electronic counter within the electromagnetic flowmeter pulse output specification range.
- The active pulse output (Optional code EM) cannot be used in conjunction with the standard pulse output.
- When the active pulse output (Optional code EM) is selected, do not be short-circuit between the DO+ and DO– terminals to avoid damaging the instrument.
- To avoid communication (BRAIN/ HART) failure, it is recommended to use the shield cable.

NOTE

For pulse output from the DO terminals, parameters must be set. Refer to "Parameter Description" in the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

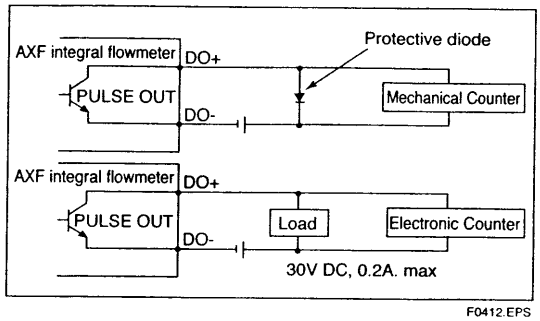


Figure 4.1.11 Pulse Output Connection

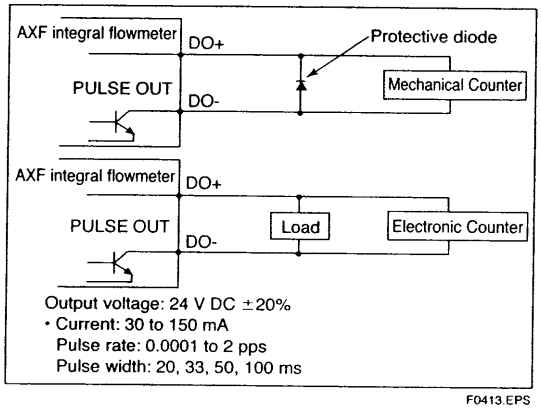


Figure 4.1.12 Active Pulse Output (Optional code EM)

● Status Input

IMPORTANT

Status inputs are designed for use with no-voltage (dry) contacts. Be careful not to connect the status to any signal source carrying voltage. Applying voltage may damage the input circuit.

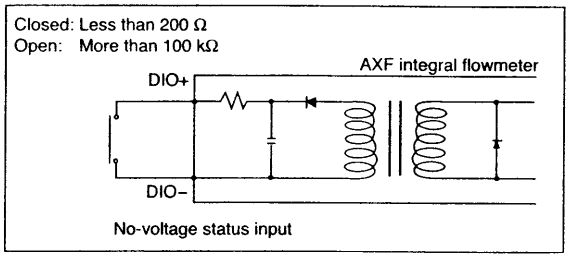


Figure 4.1.13 Status Input Connection

NOTE

For status input to the DIO terminals, parameters must be set. Refer to "Parameter Description" in the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

● Status Output/ Alarm Output

IMPORTANT

Since this is an isolated transistor output, be careful of voltage and polarity when wiring. Do not apply a voltage larger than 30V DC or a current larger than 0.2A in order to prevent damage to the instrument.
This output cannot switch an AC load. To switch an AC load, an intermediate relay must be inserted as shown in Figure 4.1.14.
*The alarm output operates from open (normal) to closed (alarm occurrence) in the default value (as setup upon plant shipment). Changes can be made via the parameter settings.

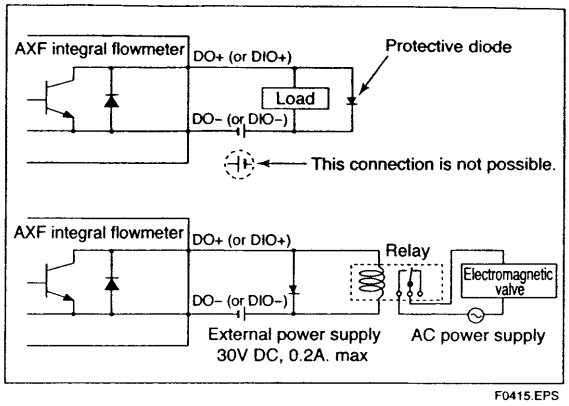


Figure 4.1.14 Status Output/Alarm Output Connection

NOTE

For status and alarm outputs from the DO or DIO terminals, parameters must be set. Refer to "Parameter Description" in the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

(7) Installing the Cover

Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 2 counterclockwise using a hexagonal wrench (nominal size 3 mm) to lock the cover.

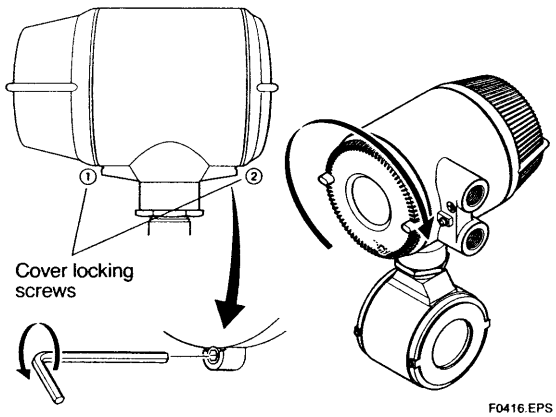


Figure 4.1.15 Installing the Terminal Box Cover

4.2 Wiring the Remote Flowtube

This section describes the wiring of the remote flowtube only. For information relating to the wiring of the converter, refer to the user's manual of the AXFA11 Magnetic Flowmeter Remote Converter (IM 01E20C01-01E) or the AXFA14 Magnetic Flowmeter Remote Converter (IM 01E20C02-01E).

⚠ WARNING

The wiring of the magnetic flowmeter must be performed by expert engineer or skilled personnel. No operator shall be permitted to perform procedures relating to wiring.

⚠ CAUTION

Once all wiring is complete, check the connections before applying power to the instrument. Improper arrangements or wiring may cause a unit malfunction or damage.

4.2.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

⚠ CAUTION

- In cases where the ambient temperature exceeds 50°C (122°F), use external heat-resistant wiring with a maximum allowable temperature of 70°C (158°F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation, e.g. inside the terminal box of the flowtube.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables must be routed in separate steel conduit tubes 16 (JIS C 8305) or flexible conduit tubes 15 (JIS C 8309).
- Keep conduits or flexible tubes watertight using sealing tape.
- Ground the remote flowtube and the converter separately.
- Cover each shield of the signal cable with vinyl tube or vinyl tape to avoid contact between two shields or between a shield and a case.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- Be sure to turn the power off before opening the terminal box cover.
- Before turning the power on, tighten the terminal box cover securely.
- The terminal box cover of size 2.5 mm to 1000 mm is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw, refer to Figure 4.2.8.
- Be sure to lock the cover of size 2.5 mm to 1000 mm by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw, refer to Figure 4.2.20.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.
- When submersible type or optional code DHC is selected, waterproof glands, signal and excitation cables are attached.
  In order to preserve the effectiveness of waterproof features, the terminal box cover and waterproof grounds must not be detached from flowmeter.

4.2.2 Cables

(1) Dedicated Signal Cable (AXFC)

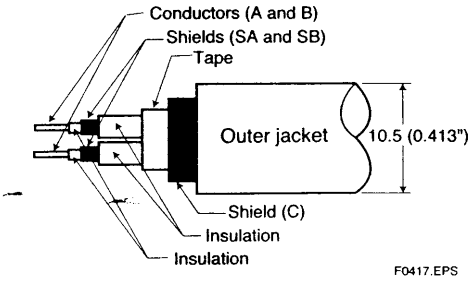


Figure 4.2.1 Dedicated Signal Cable AXFC

The flow signal is transmitted via this dedicated cable. The cable is constructed with double shielding over the two conductors, and heat-resistant vinyl is used for the outer jacket material.

Finished diameter: 10.5 mm (0.413")
Maximum length:
Combination with the AXFA11 converter:
200 m (660 ft)
Combination with the AXFA14 converter:
100 m (330 ft)
Maximum temperature: 80°C (176°F)

IMPORTANT

If the cable is longer than required, cut off any extra length rather than coiling it up, and terminate the conductors as shown in Figure 4.2.2. Avoid using junction terminal boards to extend the cable length, as this will interrupt the shielding.

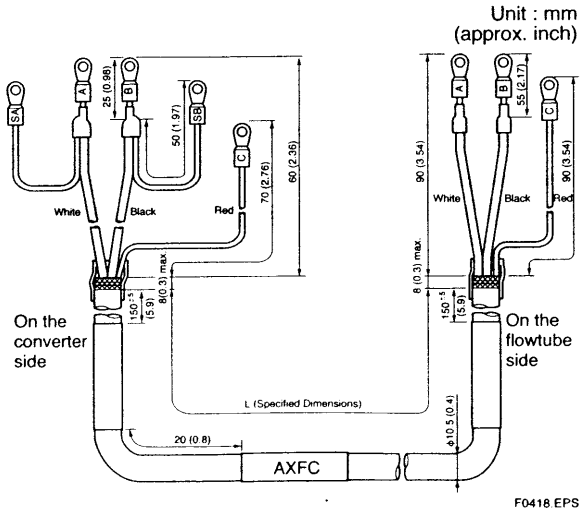


Figure 4.2.2 Treatment of Dedicated Signal Cables

CAUTION

- As crimp terminals A, B, SA, SB and C have their own electrical potentials, securely insulate them so as not to come in contact with one another.
- To prevent a shield from coming in contact with another shield or the case, cover each shield with a vinyl tube or wrap it in vinyl tape.

NOTE

Conductors A and B carry the signal from the electrodes, and C is at the potential of the liquid (signal common). Shields SA and SB are kept at the same potentials as the individual electrodes (these are actively driven shields.) This is done to reduce the effect of the distributed capacitance of the cable at long cable length. Note that, since the signals from the individual electrodes are impedance converted inside the converter, errors will result if they come in contact with any other component. Great care must be taken in the cable end treatment.

(2) Excitation Cable

Use polyvinyl chloride insulated and sheathed control cables (JIS C 3401) or polyvinyl chloride insulated and sheathed portable power cables (JIS C 3312) or the equivalent.

Outer Diameter: 6.5 to 12 mm (0.26 to 0.47 in.)
10.5 or 11.5 mm (0.41 to 0.45 in.) for optional code EG, EU and EW.
6 to 12 mm (0.24 to 0.47 in.) for optional code EP.
Nominal Cross Section (Single wire): 0.5 to 2.5 mm²
Nominal Cross Section (Stranded wire): 0.5 to 1.5 mm²

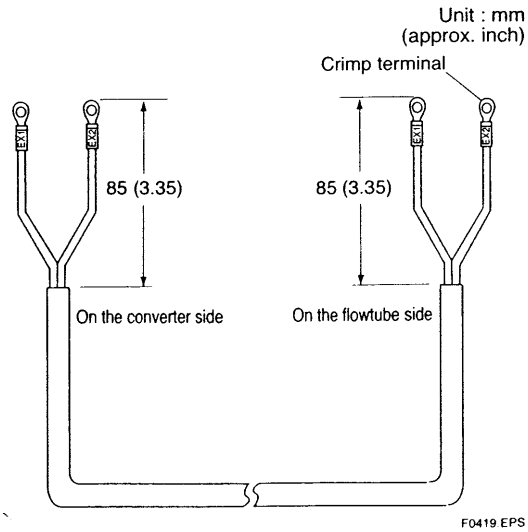


Figure 4.2.3 End Treatment of Excitation Cable

NOTE

- For excitation cables, always use a crimp terminal with an insulation cover.
- Use crimp tools from the manufacturer of the crimp terminal you want to use to connect the crimp terminal and cable.
- Use crimp tools that are appropriate for the diameter of the cable to be connected.

4.2.3 Wiring Ports

This instrument is of watertight construction as stipulated in JIS C0920-1982. (Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment.) It is shipped with a wiring bracket (waterproof gland or waterproof gland with union) or a plastic gland attached, only in cases where an optional specification is selected for the wiring port.
In case of the explosion proof type, refer to chapter 8.

(1) When there are no particular optional specifications

The wiring port is sealed with a cap (not water-proof) that must be removed before wiring. At this time, handle the wiring port in accordance with the JIS C0920-1982 mentioned above.

(2) Wiring using waterproof glands

IMPORTANT

To prevent water or condensation from entering the converter housing, waterproof glands are recommended. Do not over-tighten the glands or damage to the cables may result. Tightness of the gland can be checked by confirming that the cable is held firmly in place.

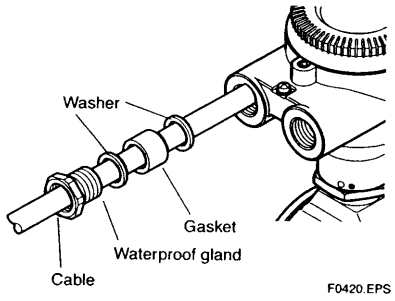


Figure 4.2.4 Waterproof Gland (Optional code EG)

For working on the electric wire tubes or the flexible tubes (PF1/2), remove the waterproof gland and attach them directly to the wiring port.

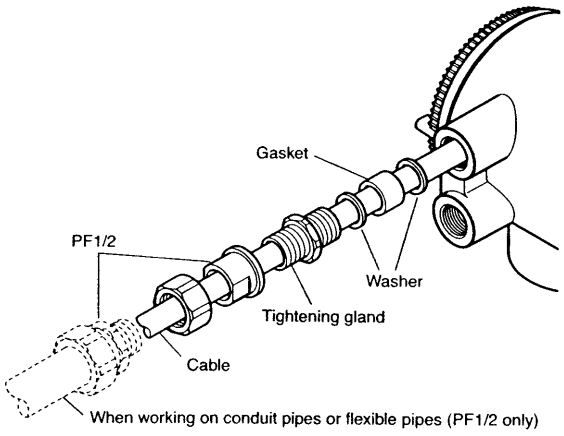


Figure 4.2.5 Waterproof Gland with Union Joint (Optional code EU)

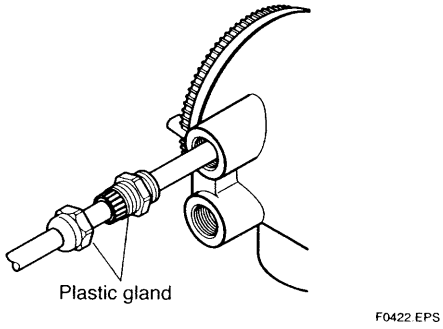


Figure 4.2.6 Plastic Gland (Optional code EP)

(3) Conduit Wiring

When wiring the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.2.7. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

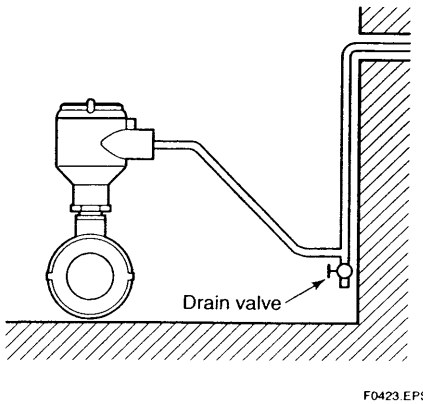


Figure 4.2.7 Conduit Wiring

4.2.4 Wiring Connections

WARNING

Before wiring, be sure that the power supply for AXFA11 or AXFA14 converter has been turned off to prevent an electrical shock.

(1) Removing Cover (Size 2.5 to 1000 mm (0.1 to 40 in.))

Loosen the cover locking screw clockwise using a hexagonal wrench (nominal size 3 mm) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is unlocked.) Hold the flowtube with your hand and remove the cover by turning it in the direction of the arrow as shown below.

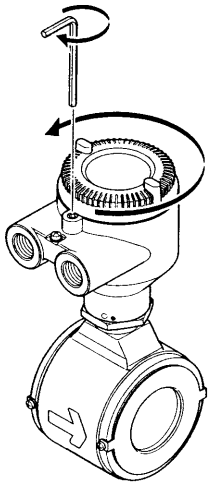
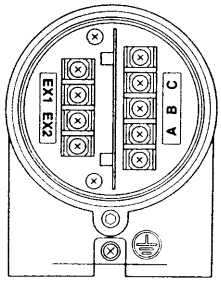


Figure 4.2.8 Removing the Terminal Box Cover (Remote Flowtube)

(2) Terminal Configuration

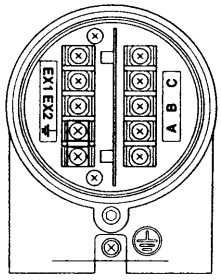
When the cover is removed, the connection terminals will be visible.



Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Protective grounding (Outside of the terminal)

F0425.EPS

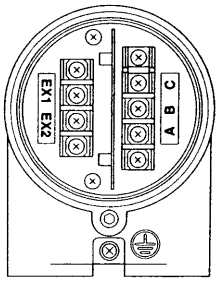
Figure 4.2.9 Terminal Configuration (General-Purpose Use, Submersible Type, Sanitary Type, Size 2.5 to 400 mm (0.1 to 16 in.))



Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Functional grounding (Only for explosion proof type)
⏚	Protective grounding (Oitside of the terminal)

F042401.EPS

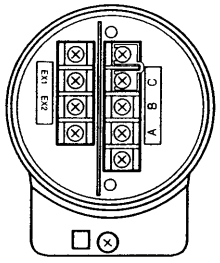
Figure 4.2.10 Terminal Configuration (Explosion proof Type, Size 2.5 to 400 mm (0.1 to 16 in.))



Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Protective grounding (Outside of the terminal)

F040211.EPS

Figure 4.2.11 Terminal Configuration (General-purpose Use, Submersible Type, Size 500 to 1000 mm (20 to 40 in.))



Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Protective grounding (Outside of the terminal)

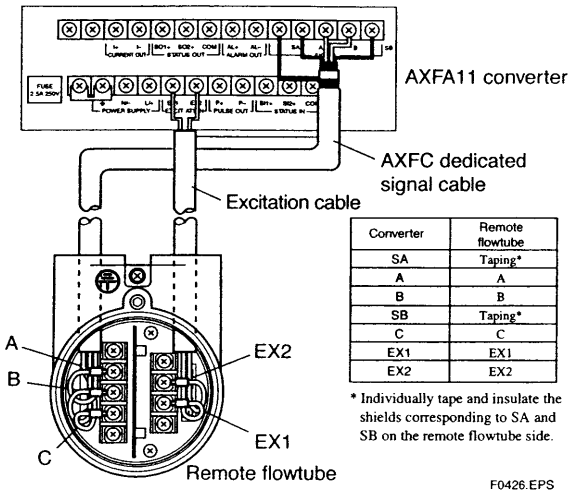
F040212.EPS

Figure 4.2.12 Terminal Configuration (General-purpose Use, submersible Type, Size 1100 to 2600 mm (44 to 104 in.))

(3) Wiring the Remote Flowtube (General-Purpose Use, Submersible Type, Sanitary Type, Size 2.5 to 400 mm (0.1 to 16 in.)) with Converters

1) Connection with the AXFA11 converter

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

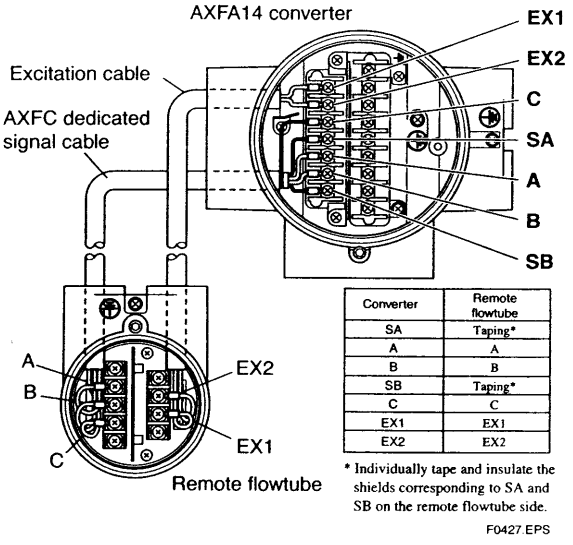
* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

F0426.EPS

Figure 4.2.13 Wiring Diagram

2) Connection with the AXFA14 converter

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

F0427.EPS

Figure 4.2.14 Wiring Diagram

(4) Wiring the Remote Flowtube (Explosion Proof Type) with Converters

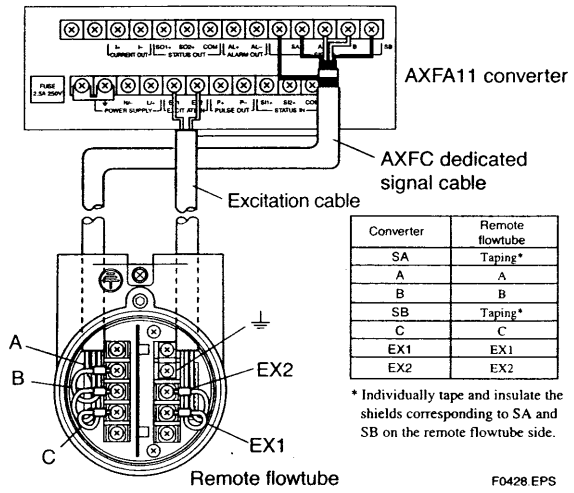
IMPORTANT

In case of TIIS Flame proof type, a remote flowtube is available for combined use with AXFA14 converter only.

1) Connection with the AXFA11 converter

In case of explosion proof type for CENELEC ATEX, FM, and CSA certification, connect wiring as shown in the figure below.

In case of the explosion proof type, the protective grounding ⏚ of remote flowtube must be connected to a suitable IS grounding system. In that case, ⏚ (functional grounding terminal) need not be connected.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

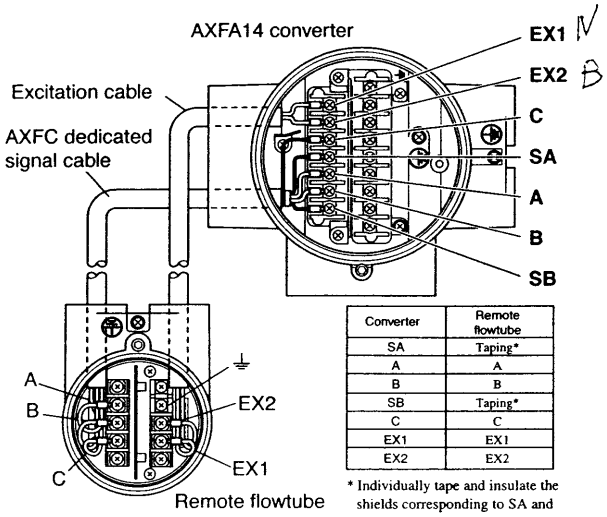
* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.2.15 Wiring Diagram

2) Connection with the AXFA14 converter

In case of explosion proof type for CENELEC ATEX, FM, CSA, and TIIS certification, connect wiring as shown in the figure below.

In case of the explosion proof type, the protective grounding ⏚ of remote flowtube must be connected to a suitable IS grounding system. In that case, ⏚ (functional grounding terminal) need not be connected.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

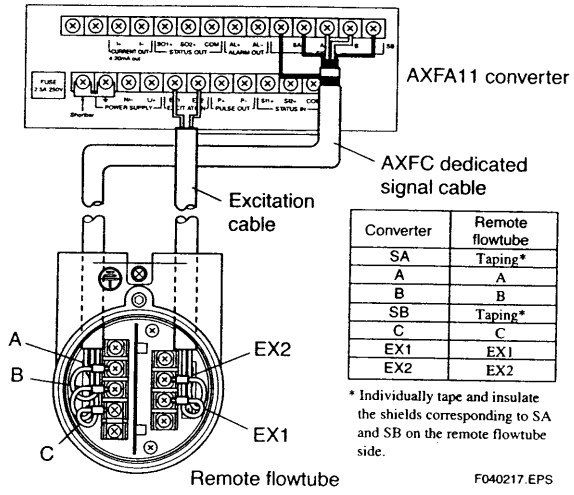
* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.2.16 Wiring Diagram

(5) Wiring the Remote Flowtube (General-Purpose Use, Submersible Type, Size 500 to 1000 mm (20 to 40 in.)) with Converters

1) Connection with the AXFA11 converter

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.2.17 Wiring Diagram

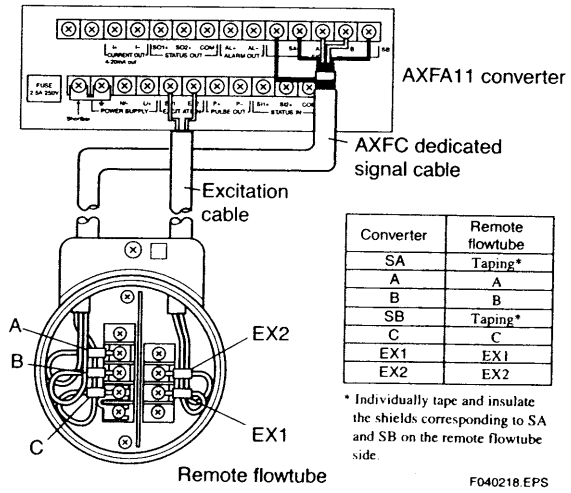
IMPORTANT

A remote flowtube (size 500 to 1000 mm) cannot be combined with AXFA14 converter.

(6) Wiring the Remote Flowtube (General-Purpose Use, Submersible Type, Size 1100 to 2600 mm (44 to 104 in.)) with Converters

1) Connection with the AXFA11 converter

Connect wiring as shown in the figure below.



Converter	Remote flowtube
SA	Taping*
A	A
B	B
SB	Taping*
C	C
EX1	EX1
EX2	EX2

* Individually tape and insulate the shields corresponding to SA and SB on the remote flowtube side.

Figure 4.2.18 Wiring Diagram

IMPORTANT

A remote flowtube (size 1100 to 2600 mm) cannot be combined with AXFA14 converter.

(7) Grounding

CAUTION

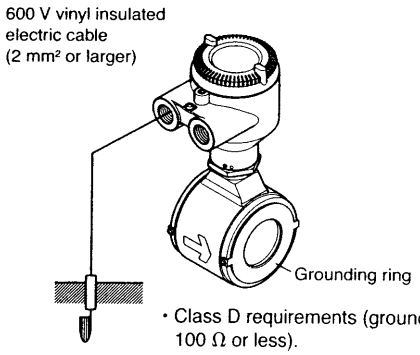
Be sure to connect the protective grounding of the AXF remote flowtube with a cable of 2mm² or larger cross section in order to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.
Connect the grounding wire to the ⏚ mark.
The grounding should satisfy Class D requirements (ground resistance, 100 Ω or less).
In case of TIIS Flame proof type, the grounding should satisfy Class C requirements (ground resistance, 10 Ω or less) or class A requirements (ground resistance, 10 Ω or less).
For explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.

IMPORTANT

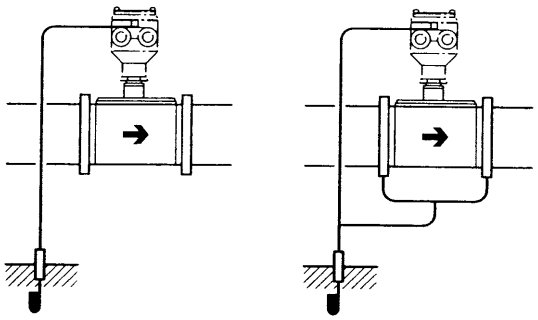
Improper grounding can have an adverse affect on the flow measurement. Ensure that the instrument is properly grounded.

The electromotive force of the magnetic flowmeter is minute and it is easy to be affected by noise. And also that reference electric potential is the same as the measuring fluid potential. Therefore, the reference electric potential (terminal potential) of the flowtube and the converter also need to be the same as the measuring fluid. Moreover, that the potential must be the same with ground. The magnetic flowmeter is equipped with an grounding ring that makes a connection with the charge of the measured fluid for grounding and protects the lining.

Be sure to ground according to Figure 4.2.19.



- Class D requirements (ground resistance. 100 Ω or less).
- TIIS Flame proof type: Class C requirements (ground resistance, 10 Ω or less) or Class A requirements (ground resistance, 10 Ω or less)
- Explosion proof type except TIIS: Domestic electrical requirements as regulated in each country.



In case grounding rings are used.

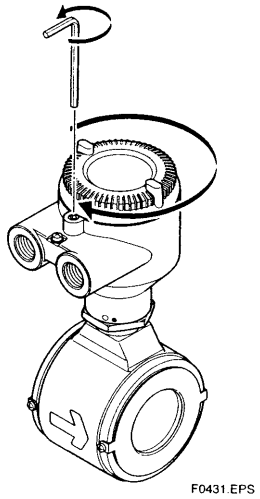
In case grounding rings are not used.
(Available only for metal piping)

F0430.EPS

Figure 4.2.19 Protective Grounding Terminal Location

(8) Installing the Cover (Size 2.5 to 1000 mm (0.1 to 40 in.))

Install the cover to the flowtube by turning it in the direction of the arrow as shown below. Tighten the cover locking screw counterclockwise using a hexagonal wrench (nominal size 3 mm) to lock the cover.



F0431.EPS

Figure 4.2.20 Installing the Terminal Box Cover (Remote Flowtube)

53

19.1.2

5. MAINTENANCE

WARNING

- Maintenance work must be carried out by expert engineer or skilled personnel and not by operators.
- Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.

CAUTION

- Explosion protected type must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
- The cover is locked by the special screw. In case of opening the cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover.

5.1 Changing Direction of Electrical Connection

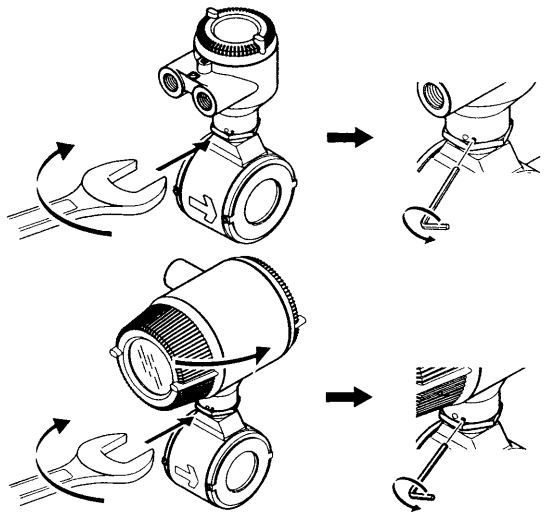
IMPORTANT

The following types can not be changed direction of electrical connection after delivery.
- Submersible Type.
- Optional code DHC (for district heating and cooling or condensation-proof).
- Size of 1100 mm (44 in.) or larger.

(1) The following tools are required to change the direction of the electrical connection:
- Hexagonal wrench (nominal size 1.5): Comes with the instrument.
- Wrench

(2) Turn off the power to the flowmeter.

(3) Using the wrench, loosen the hexagonal nut at the neck of the instrument.



F0501.EPS

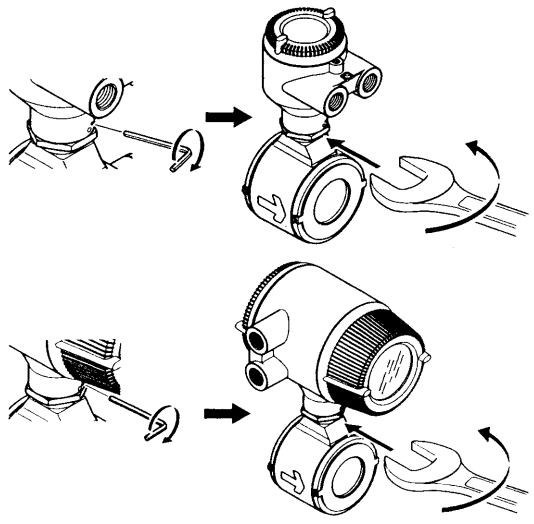
(4) Using the hexagonal wrench, loosen the screw in the neck.

(5) Turn the converter or the terminal box in the desired direction.

NOTE

The converter and the terminal box can be turned –140 degree to +180 degree from the arrow mark indicating the flow direction. Do not exceed these angle.

(6) Using the hexagonal wrench, retighten the neck screw.



F0502.EPS

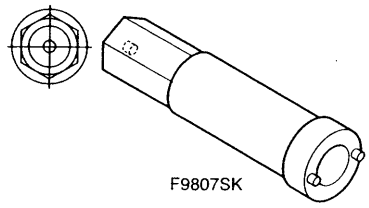
(7) Using the wrench, retighten the hexagonal nut at the neck.

5.2 Removing, Cleaning, and Installing Replaceable Electrodes (General-Purpose Use Type Only)

5.2.1 Removing Replaceable Electrodes

(1) The following tools are required to replace the electrodes:

- Special tool for removing and installing electrodes (F9807SK): Optional
- Torque wrench or torque driver (nominal size 12)
- Phillips screwdriver



F0503.EPS

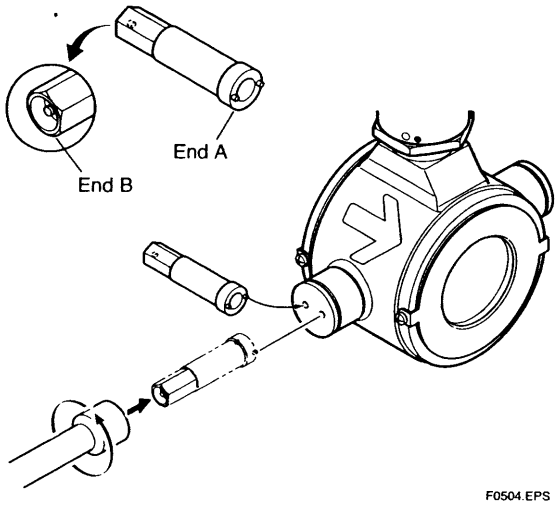
(2) Turn off the power to the flowmeter.

(3) Drain the fluid from the interior of the flowtube.

WARNING

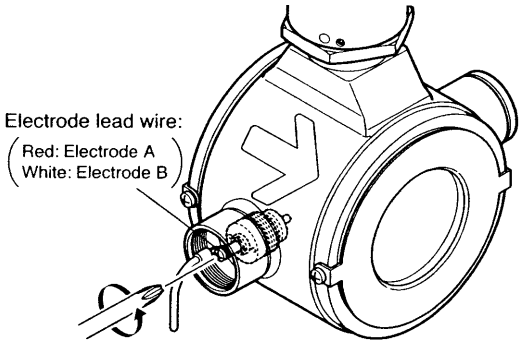
- Never fail to drain the fluid from the interior of the flowtube.
- If the fluid is at a high temperature, the instrument itself may also be hot. Be careful not to get burned when removing the electrodes.
- When the process fluid is hazardous to humans, exercise caution to avoid coming into contact with it, and avoid inhaling any residual gas.

(4) Using end A of the tool, open the electrode cover.



F0504.EPS

(5) Hold down the electrode lead wire and terminal lug and remove the mounting screw using the Phillips screwdriver.

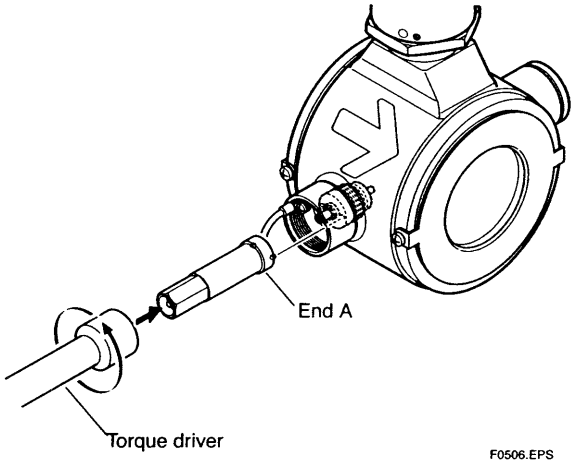


F0505.EPS

NOTE

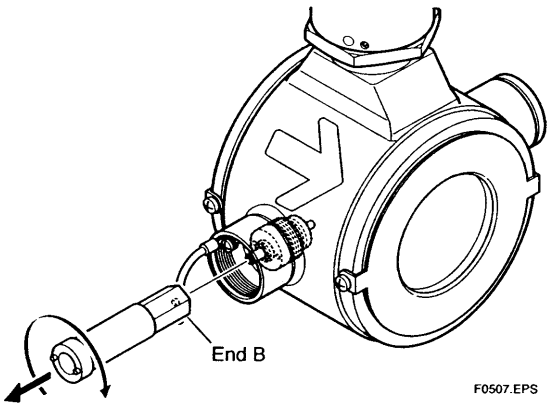
Always hold down the lead wire and terminal lug when removing the mounting screw.

(6) Move aside the electrode lead wire and avoiding the screw, insert end A of the tool to the electrode and loosen the electrode holder using the torque driver.



F0506.EPS

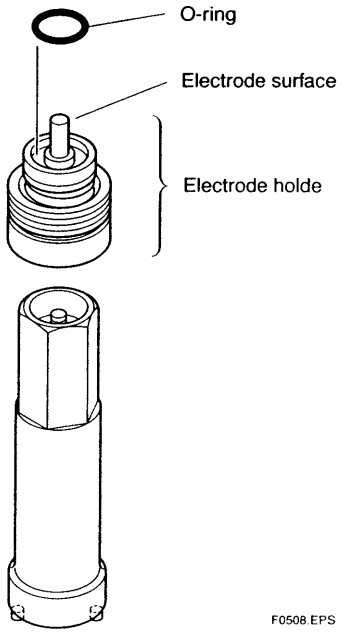
(7) Screw end B of the tool into the screw block of the electrode, and pull the tool straight out to remove the electrode holder.



F0507.EPS

5.2.2 Cleaning Replaceable Electrodes

(1) Clean the electrode surface (wetted part) with alcohol or other cleaning agents.

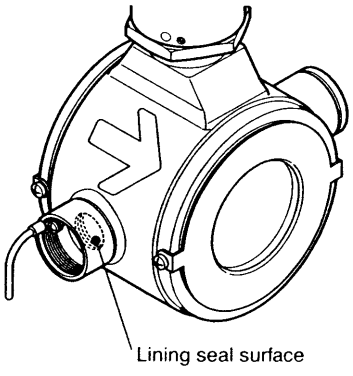


F0508.EPS

NOTE

The screw threads are coated with an anti-seizing compound. Do not let the compound come in contact with the electrode.

(2) Clean the surface of the lining seal with an alcohol moistened swab.



F0509.EPS

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19.1.2

5.2.3 Installing Replaceable Electrodes

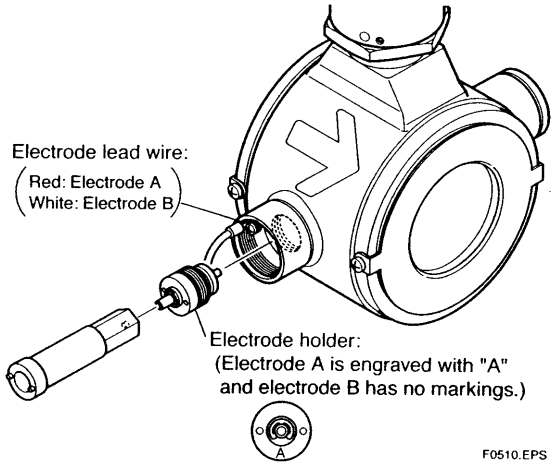
NOTE

It is recommended to replace the O-ring when reinstalling the replaceable electrode. Use the O-ring specified by Yokogawa (G9303SE: material is fluororubber).

NOTE

Precautions for storage of O-rings:
- Keep them in a cool, dark place.
- Wrap them well.
- Do not use O-rings after one year since their purchase.

(1) Push the electrode holder with end B of the tool screwed into it, straight into the flowtube.

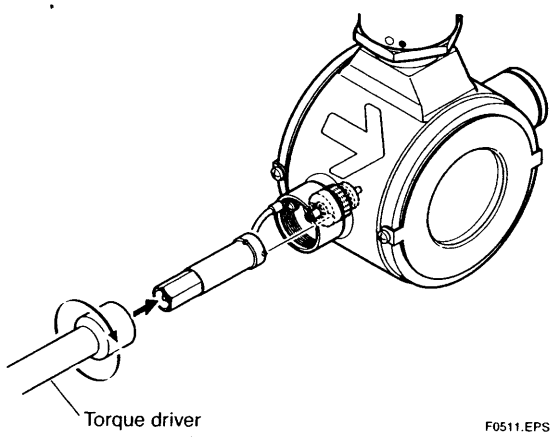


F0510.EPS

NOTE

- Check that the O-ring has not come off.
- Do not interchange electrodes A and B when installing them. Install electrode A to the electrode boss with the red lead wire and electrode B to the one with the white lead wire.

(2) Using end A of the tool, tighten the electrode holder.



F0511.EPS

NOTE

Using the torque wrench or torque driver, tighten the electrode holder to the following torque values:

PFA lining:
8.0 N·m ±1 N·m (80 kgf·cm ±10 kgf·cm)

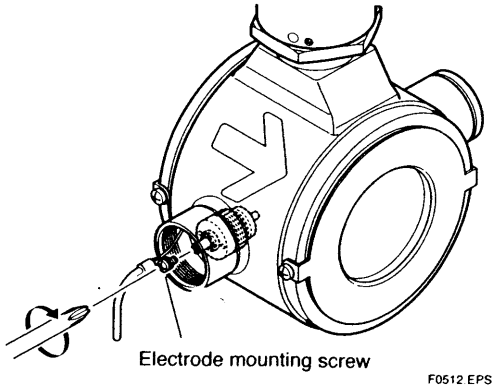
Polyurethane rubber lining:
3.0 N·m ±0.5 N·m (30 kgf·cm ±5 kgf·cm)

WARNING

If the electrode holder was not tightened to its specified torque value, fluid leakage from the electrode may result. Should fluid spill over the electrode block, wipe it dry and check that the O-ring has not come off.

(3) Fill the interior of the flowtube with the fluid and check that there is no leakage from the electrode.

(4) Hold down the lead wire and terminal lug and screw the mounting screw into the electrode using the Phillips screwdriver.

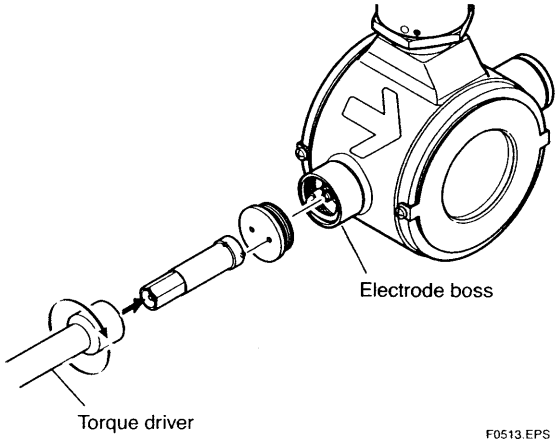


F0512.EPS

NOTE

Always hold down the lead wire and terminal lug when adjusting the mounting screw.

(5) Put the lead wire in the electrode boss, and install the electrode cover to the boss and tighten it using end A of the tool.



(6) Turn on the power to the flowmeter and start normal operation.

5.3 Removing and Installing Adapters for Sanitary Types

CAUTION

This section describes how to remove and install a butt weld adapter as an example. Apply the same procedure to clamp and union adapters.

1) Removing the butt weld adapter

Remove the butt weld adapter by loosening the mounting screws.

2) Installing the butt weld adapter

Install a gasket to fit in the groove of the butt weld adapter, and tighten in the adapter with the mounting screws.

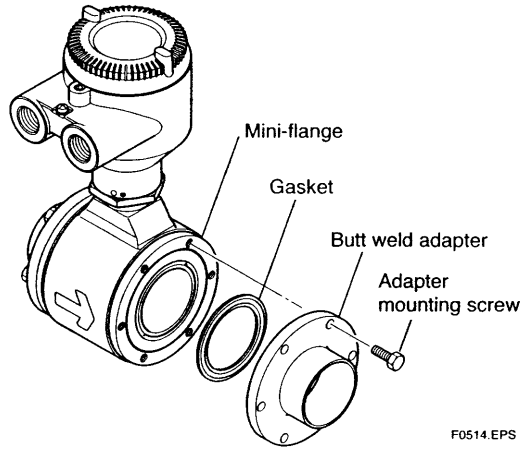


Figure 5.3.1 Removing and Installing a Butt Weld Adapter

CAUTION

- In case of standard gasket (EPDM rubber), tighten the adapter mounting screw according to the torque values in Table 5.3.1.
- In case that optional code GH (Silicon rubber) is selected, tighten the adapter mounting screw according to the torque values in Table 5.3.2.
- Tighten the adapter mounting screw in diagonal order step by step.
- After tightening of screw, confirm that gaskets protrude inside adapter. Protruding of gasket is necessary to keep the sanitary requirements.

Table 5.3.1 Tightening Torque Values of adapter for EPDM rubber gasket

Tightening torque values (N-m / {kgf-cm} / [in-lbf])	
Gasket type / Size mm (inch)	EPDM rubber (standard)
15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5)	3.0 to 3.5 / {30.59 to 35.69} / [26.55 to 30.98]
50 (2.0), 65 (2.5)	4.5 to 5.0 / {45.89 to 50.99} / [39.83 to 44.25]
80 (3.0)	8.0 to 9.0 / {81.58 to 91.78} / [70.81 to 79.65]
100 (4.0), 125 (5.0)	10 to 11 / {102.0 to 112.2} / [88.50 to 97.35]

T0502.EPS

Table 5.3.2 Tightening Torque Values of adapter for silicon rubber gasket

Tightening torque values (N-m / {kgf-cm} / [in-lbf])	
Gasket type / Size mm (inch)	Silicon rubber (optional code GH)
15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5)	2.0 to 2.5 / {20.39 to 25.49} / [17.70 to 22.13]
50 (2.0), 65 (2.5), 80 (3.0)	4.0 to 4.5 / {40.79 to 45.89} / [35.40 to 39.83]
100 (4.0), 125 (5.0)	6.0 to 6.5 / {61.18 to 66.28} / [53.10 to 57.53]

T0503.EPS

⚠ CAUTION

- The lining of sanitary type uses fluorocarbon PFA. For the property of fluorocarbon PFA, it is possible that the adapter mounting screws may loosen as time passes, so retighten them regularly.
- Be sure to retighten the adapter mounting screws according to the prescribed torque values in Table 5.3.1 or Table 5.3.2. Retighten them diagonally with the same torque values, step by step up to the prescribed torque value.
- In case of leakage from adapter connection point, retighten the adapter mounting screws. If leakage doesn't stop even if they are retightened, replace the gasket between mini-flange of flowmeter and adapter.
- It is recommended to replace the gasket periodically,
- It is necessary to decide the period between changes with consideration for the frequency of cleaning cycles, the cleaning temperature and the fluid temperature.
- Use the gasket specified by Yokogawa in Table 5.3.3

Table 5.3.3 Parts number of gasket

Gasket type / Size mm (inch)	EPDM rubber (standard)	Silicon rubber (optional code GH)
15 (0.5)	F9811QA	F9811QB
25 (1.0)	B1002EG	B1010EG
32 (1.25)	B1003EG	B1011EG
40 (1.5)	B1004EG	B1012EG
50 (2.0)	B1005EG	B1013EG
65 (2.5)	B1006EG	B1014EG
80 (3.0)	B1007EG	B1015EG
100 (4.0)	B1008EG	B1016EG
125 (5.0)	F9811QC	F9811QD

T0504.EPS

5.4 Components Replacement (Integral Flowmeter Only)

WARNING

- Component replacement and the associated operations must be carried out by expert engineer or skilled personnel and not by operators.
- Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.

IMPORTANT

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

5.4.1 Fuse Replacement

CAUTION

Be sure to turn off the power before performing fuse replacement. Also be sure to use the spare fuse that was supplied with the product, or ones supplied by Yokogawa's sales or service offices.

The fuse holder is located on the farthest circuit board from the front.

(1) Remove the amplifier assembly by following the procedures shown in Section 5.4.3 "Amplifier Replacement."

(2) The fuse can be seen after step (1). Remove the fuse from the fuse holder.

(3) Push a new fuse into the holder until it clicks.

(4) Reinstall the amplifier assembly by following the procedures shown in Section 5.4.3.

Spare fuses are shipped with the instrument.

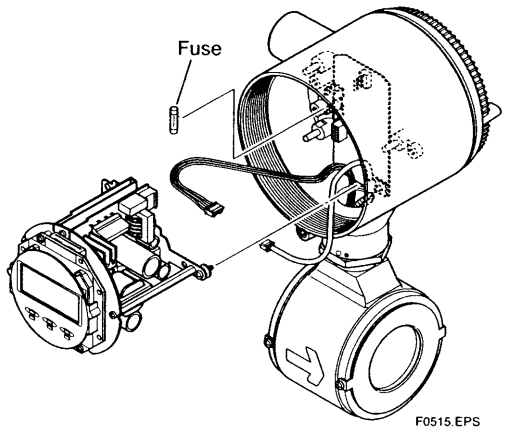


Figure 5.4.1 Fuse Replacement

5.4.2 Display Unit Replacement

5.4.2.1 Removing the Display Unit

(1) Turn off the power.

(2) Loosen cover locking screw 1 clockwise using a hexagonal wrench (nominal size 3) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is locked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

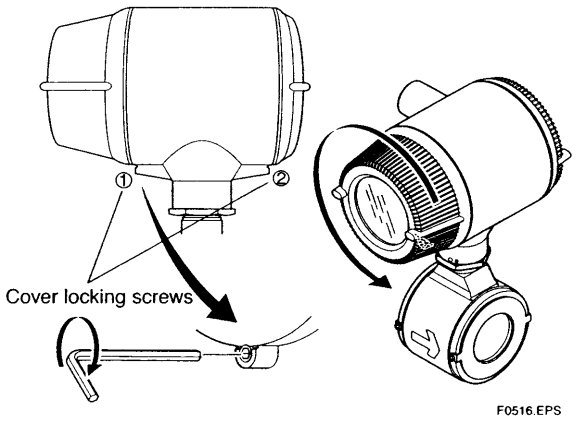


Figure 5.4.2 Removing the Display Cover

(3) Hold the display unit with your hand and remove the two mounting screws. Remove the connector of the display unit by pulling it to the left, taking care not to damage it (refer to Figure 5.4.3).

5.4.2.2 Assembling the Display Unit

(1) Align the display unit with the protrusion of the connector facing the amplifier assembly and then make the required connection.

(2) Secure the display unit using its two mounting screws.

(3) Replace the cover by following the procedures used to remove it in the reverse order.

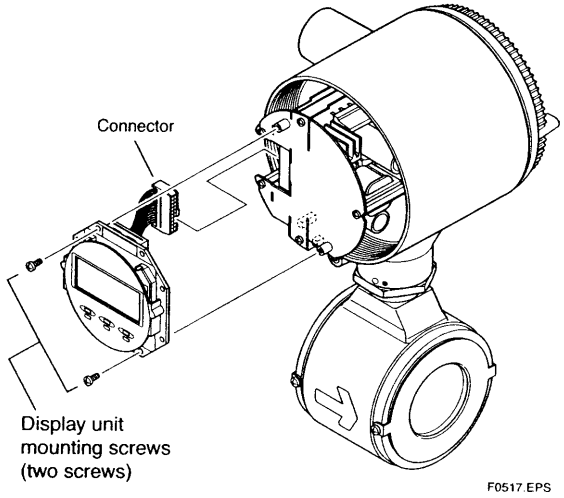


Figure 5.4.3 Removing and Assembling the Display Unit

5.4.2.3 Changing the Display Unit Orientation 90 Degrees

(1) Hold the display unit with your hand and remove the two mounting screws.

(2) Turn the display unit 90 degrees clockwise and confirm the assembling position, taking care of the connector and wire of the display unit.

(3) Secure the display unit using its two mounting screws.

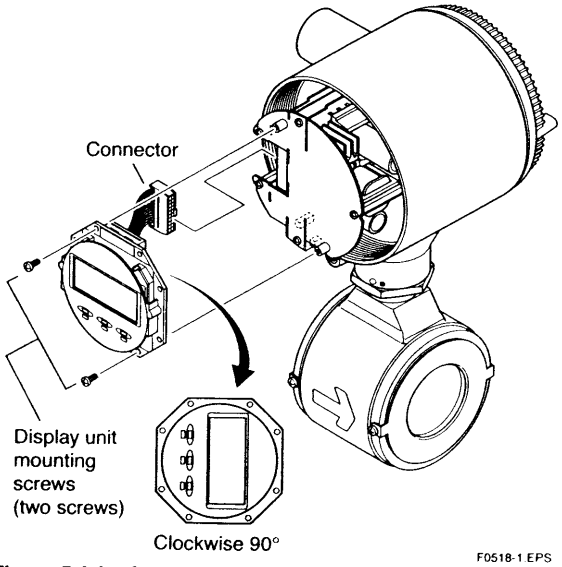


Figure 5.4.4 Assembling the Display Unit

5.4.2.4 Installing the Cover

(1) Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 1 counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

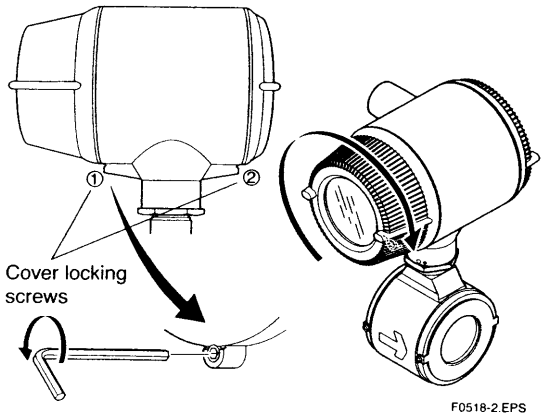


Figure 5.4.5 Installing the Display Cover

5.4.3 Amplifier Replacement

IMPORTANT

In case of amplifier replacement, it is necessary to perform the parameter resetting.
For parameters, refer to Chapter 6: Parameter Description.

5.4.3.1 Removing the Amplifier Assembly

(1) Turn off the power.

(2) Remove the cover.

(3) Remove wiring connectors 1 and 2 (refer to Figure 5.4.6) from the amplifier assembly. Remove them carefully, without applying excessive force.

(4) Loosen the three mounting screws while holding the assembly with your hand.

(5) Pull the assembly straight out.

5.4.3.2 Assembling the Amplifier Assembly

(1) To replace the amplifier assembly, follow the procedures used to remove it in the reverse order.

(2) Replace the assembly by pushing it in, taking care not to damage the amplifier mounting connectors on the circuit board.

(3) Carefully connect wiring connectors 1 and 2 to the amplifier assembly, making sure that the connectors' directions are correct. Let wiring connector 2 pass along the amplifier side of the rod.

(4) Tighten the three mounting screws while holding the assembly with your hand.

(5) Replace the cover, taking care not to entangle the cables of the wiring connectors.

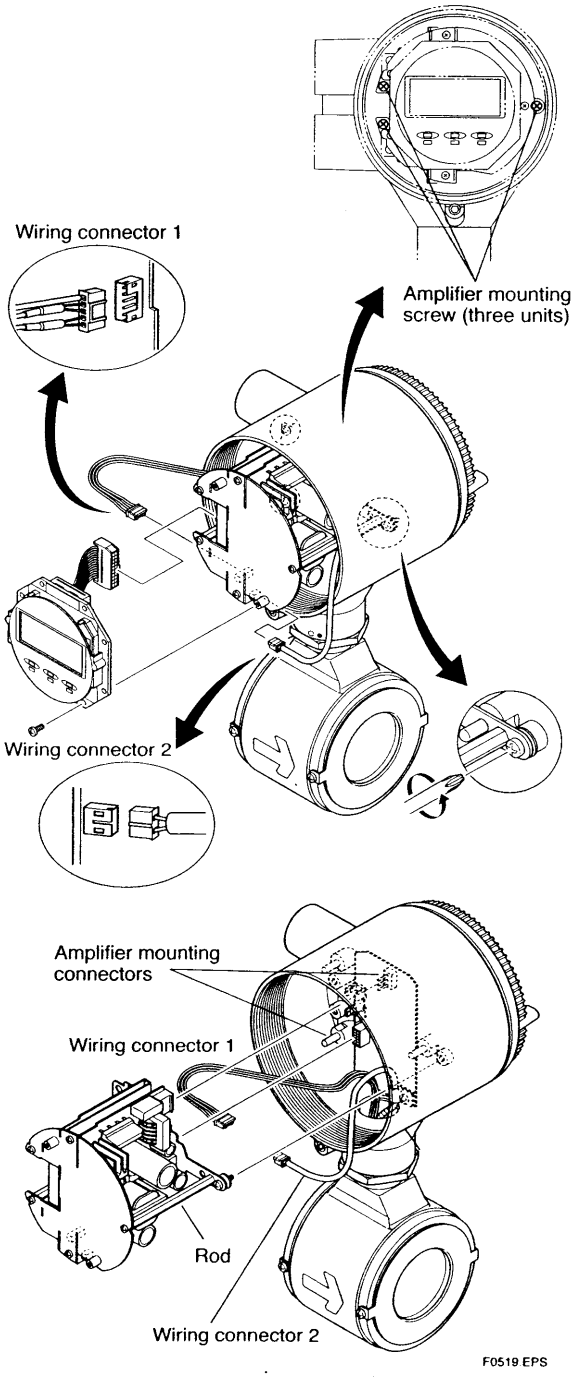


Figure 5.4.6 Assembling the Amplifier

5.5 Setting of Switches (Integral Flowmeter Only)

5.5.1 Setting of Burnout Switch

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing plant, the burnout direction is set to High (i.e., 25 mA); however, in cases where the optional code C1 has been specified, the output direction will be set to Low (i.e., 0 mA).

Modification of the burnout direction must be carried out using the setting switch from the amplifier's CPU board (i.e., Switch 1) (See Figure 5.5.1).

Table 5.5.1 Output Setting Pins for Burnout

Position of Pin	Burnout Direction	Burnout Output	Remarks
Low High	High	25 mA	Set to High before shipment
Low High	Low	0 mA	Set to Low for optional code C1

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NOTE

On the amplifier's CPU board, the burnout setting switch (i.e., Switch 1) and the write protect switch (i.e., Switch 2) are located adjacent to each other. Accordingly, special care should be taken when making switch settings.

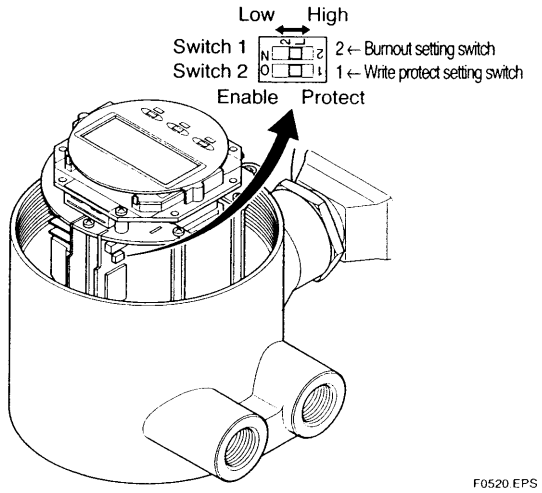

Figure 5.5.1 Switch Configuration

5.5.2 Setting of Write Protect Switch

By setting the write protect function to "Protect" it is possible to prevent the overwriting of parameters. Write protection can be carried out using either the hardware switch on the CPU board (i.e., Switch 2) or software parameter settings. If either of these items is set to "Protect," the overwriting of parameters will be prohibited.

NOTE

If the hardware switch is set to "Protect," it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to "Enable."

For more details regarding usage of the write protect function and the software's parameter switches, refer to "Chapter 6: Parameter Description" in the user's manual of the AXF Integral Flowmeter [Software Edition] (IM 01E20C02-01E).

5.6 Regular Inspection Items

(1) Inspection of moisture-proofing inside the terminal box: Once/year

(2) Retightening of piping joint screws: About twice/year

(3) Inspection of electrodes and lining (in case of adhesive and/or abrasive fluids, etc.)

Determine the period of regular inspection as necessary.

5.7 Excitation Coil and Insulation Resistance Check (Remote Flowtube Only)

WARNING

- Before checking of the excitation coil and the insulation resistance, be sure that the power supply for AXFA11 or the AXFA14 converter has been turned off.
- Before checking, be sure to disconnect the cables from the terminals of the remote flowtube.

(1) Excitation Coil Check (Remote Flowtube Only)

Check that there is continuity between terminals EX1 and EX2 in the terminal box. If there is no continuity, the coils may be broken and replacement or repair of the flowtube is necessary. The coil resistance is designed to be 150 Ω or less. If it is not, this may be an abnormal condition. Consult Yokogawa's sales or service offices.

(2) Insulation Resistance Check (Remote Flowtube Only)

Check the insulation resistances in the terminal box in accordance with the tables below. If any of them falls below the values listed in the tables, consult Yokogawa's sales or service offices for investigation. If the insulation resistance cannot be restored, replacement or repair of the flowtube is needed. In case of submersible type flowmeters, undo the wiring connection on the converter side and measure resistance at the cable terminals.

Coil Circuit

Checking is possible even if the pipe is filled with fluid.

Test Terminals	Test Voltage	Specification
Between terminals EX1 and C	500 V DC (Use an insulation tester or the equivalent.)	1 MΩ or more

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Signal Circuit

Before testing, be sure to empty and dry the interior of the pipe, checking that there is no adhesive material. Also undo the wiring connection on the converter side before testing.

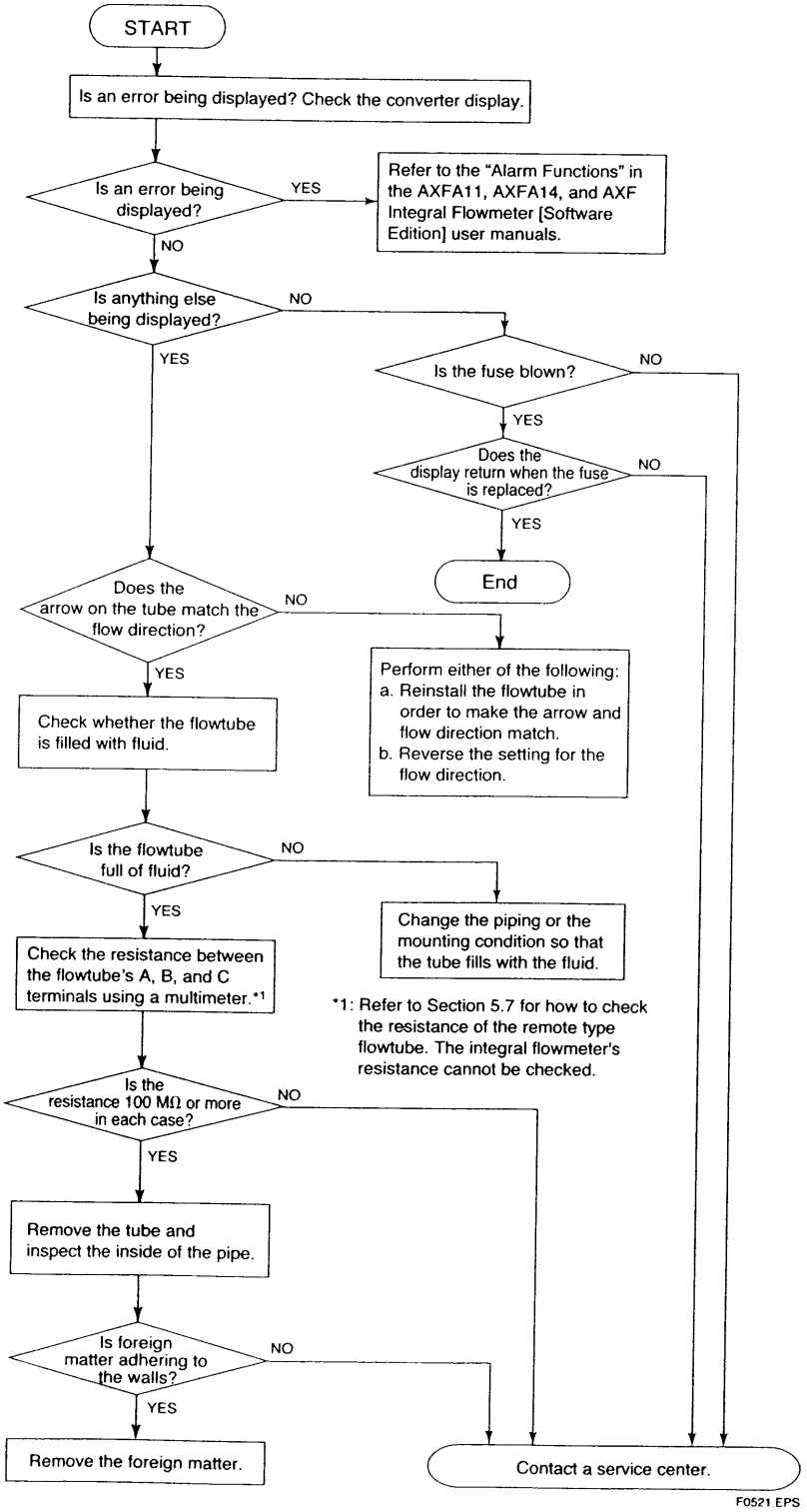
Test Terminals	Test Voltage	Specification
Between terminals A and C Between terminals B and C	500 V DC (Use an insulation tester or the equivalent.)	100 MΩ or more for each

T050602.EPS

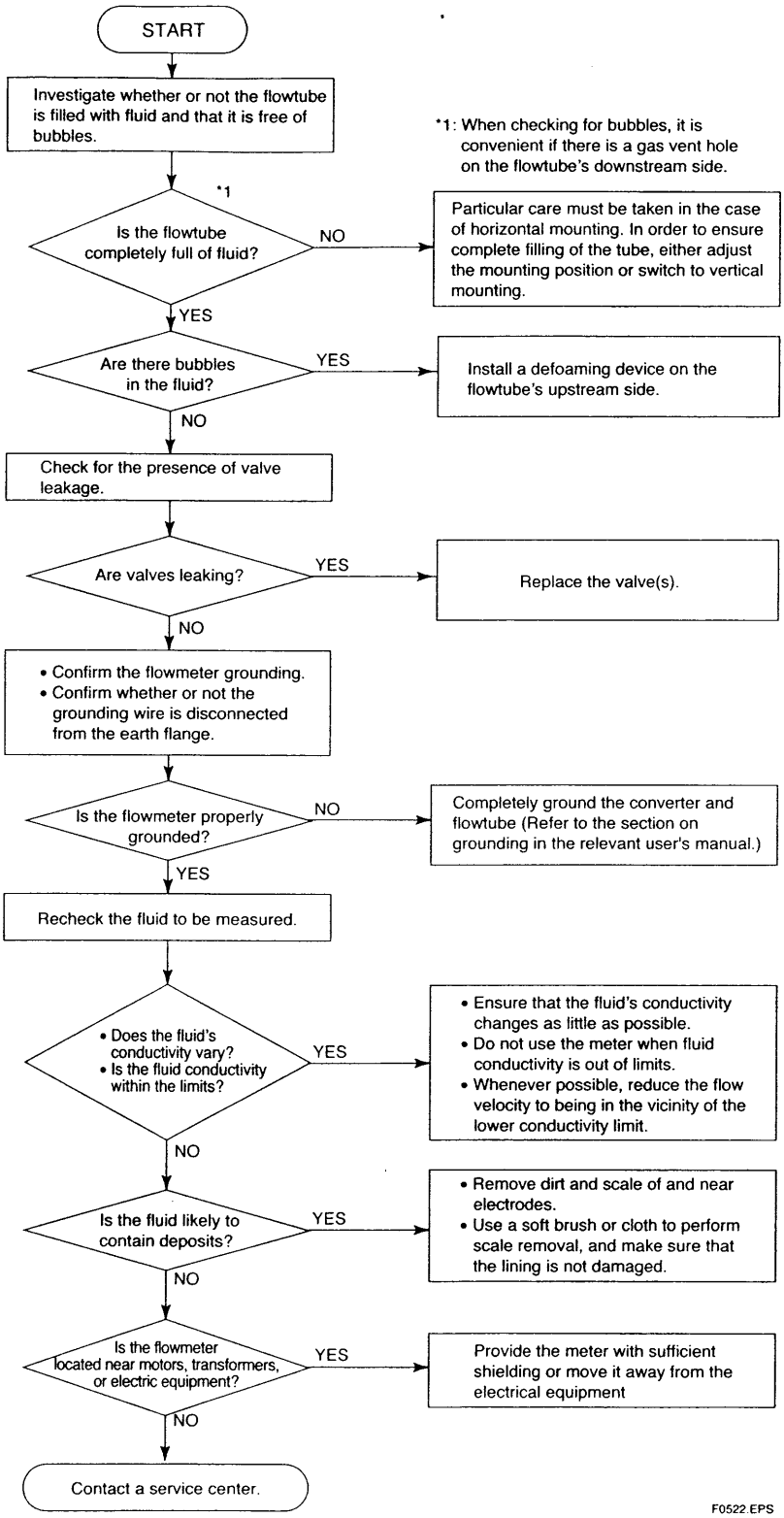
5.8 Troubleshooting

Although magnetic flowmeters rarely require maintenance, failures may occur when the instrument is not operated correctly. This section describes troubleshooting procedures where the cause of the breakdown is identified through receiver indication.

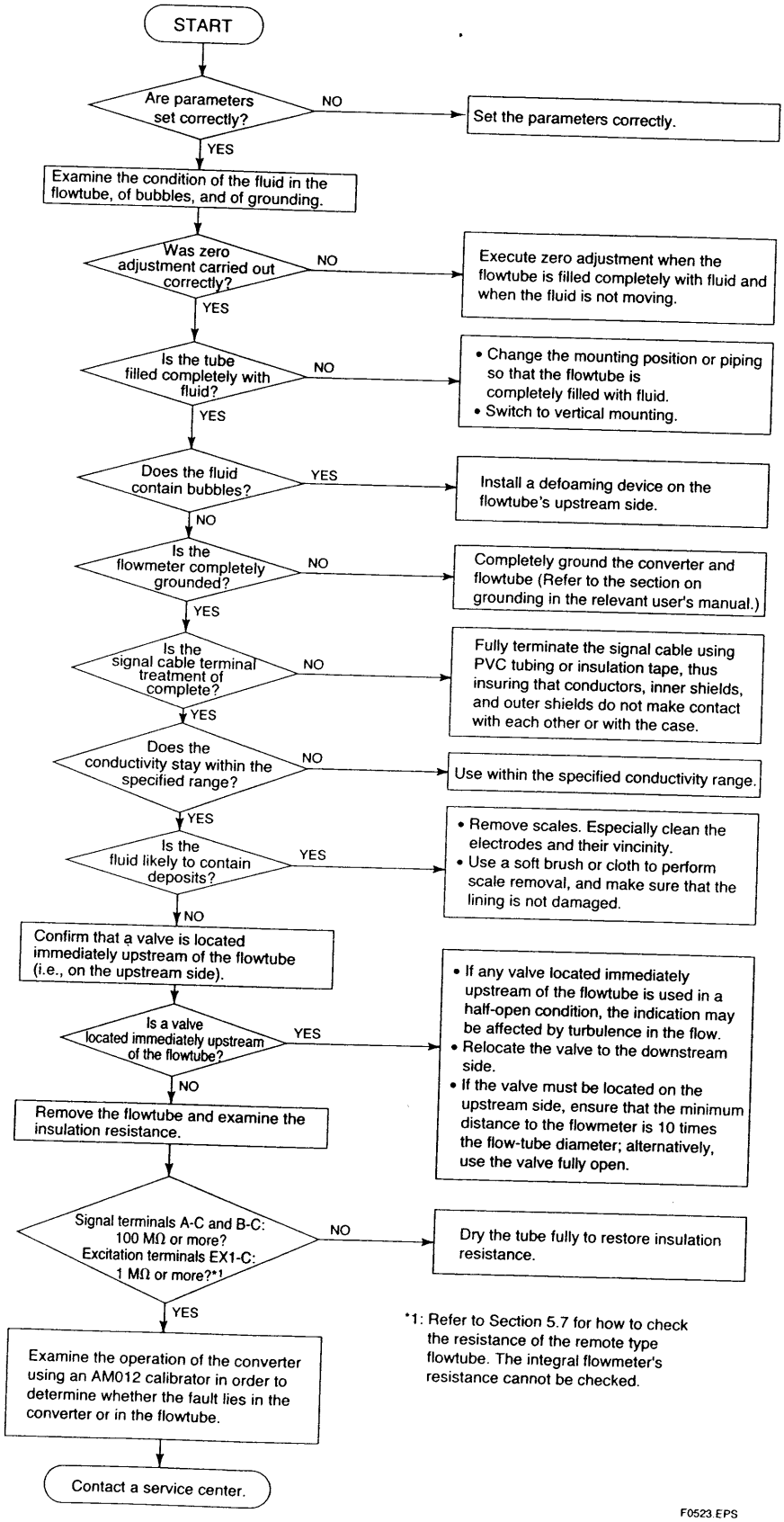
5.8.1 No Indication



5.8.2 Unstable Zero



5.8.3 Disagreement Between Indication and Actual Flow



*1: Refer to Section 5.7 for how to check the resistance of the remote type flowtube. The integral flowmeter's resistance cannot be checked.

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6. OUTLINE

■ STANDARD SPECIFICATIONS

● Converter (Integral flowmeter)

*1: Select two points from: one pulse output, one alarm output, one status input, or two status outputs.
*2: For models without an indicator, the hand-held terminal is necessary to set parameters.

Excitation Method:
- Standard dual frequency excitation:
  Size 2.5 to 400 mm (0.1 to 16 in.)
- Enhanced dual frequency excitation:
  Size 25 to 200 mm (1.0 to 8.0 in.)
  (Optional code HF1 or HF2)

Input Signal (*1):
One Status Input: Dry contact
Load Resistance: 200 Ω or less (ON), 100 kΩ or more (OFF)

Output Signals:
- One Current Output: 4 to 20 mA DC (load resistance: 750Ω maximum, including cable resistance)
- One Pulse Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
  Output rate: 0.0001 to 10,000 pps (pulse/second)
- One Alarm Output (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)
- Two Status Outputs (*1):
  Transistor contact output (open collector)
  Contact capacity: 30 V DC (OFF), 200 mA (ON)

Communication Signals:
BRAIN or HART communication signal
(Superimposed on the 4 to 20 mA DC signal)
Distance from Power Line: 15 cm (6 in.) or more (Parallel wiring should be avoided.)

BRAIN:

Communication Distance:
Up to 2 km (1.25 miles), when polyethylene insulated PVC-sheathed cables (CEV cables) are used. Communication distance varies depending on the type of cable and wiring used.

Load Resistance:
250 to 600Ω (including cable resistance)

Load Capacitance: 0.22 μF or less

Load Inductance: 3.3 mH or less

Input Impedance of Communicating Device:
10 kΩ or more (at 24 kHz)

HART:

Communication Distance:
Up to 1.5 km (0.9 mile), when using multiple twisted pair cables. Communication distance varies depending on the type of cable used.

Load Resistance:
230 to 600Ω (including cable resistance)

Cable Length for Specific Applications:
Use the following formula to determine the cable length for specific applications.

$$L = \frac{65\times10^6}{(R\times C)} - \frac{(Cf+10{,}000)}{C}$$

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

Note: HART is a registered trademark of the HART Communication Foundation.

Data Security During Power Failure:
Data (parameters, totalizer value, etc.) storage by EEPROM. No back-up battery required.

Indicator (*2):
Full dot-matrix LCD (32×132 pixels)

Lightning Protector:
The lightning protector is built into the current output and pulse/alarm/status input and output terminals. When optional code A is selected, the lightning protector is built into the power terminals.

Protection:
IP67, NEMA4X, JIS C0920 immersion-proof type

Coating:
Case and Cover: Polyurethane corrosion-resistant
Coating Color: Mint green coating (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Converter Material:
Case and Cover : Aluminum alloy

Mounting/Shapes (Integral Flowmeter):
- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 ×1.5 female
  JIS G1/2 (PF1/2) female
- Direction of Electrical Connection: The direction can be changed even after delivery.
- Terminal Connection: M4 size screw terminal

Grounding:
Grounding resistance 100 Ω or less
When optional code A is selected, grounding resistance 10 Ω or less shall be applied.
* In case of explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.
* In case of TIIS Flame proof type, refer to description of "HAZARDOUS AREA CLASSIFICATION".

Functions

How to Set Parameters (*2):
The indicator's LCD and three infra-red switches enable users to set parameters without opening the case cover. Parameters can also be set by means of the HHT (Handheld terminal).

Displayed Languages (*2):
Users can choose a language from among English, Japanese, German, French, Italian, and Spanish.

Instantaneous Flow Rate/Totalized Value Display Functions (for models with an indicator) (*2):
The full dot-matrix LCD enables user selections of displays from one line to three lines for:
- Instantaneous flow rate
- Instantaneous flow rate (%)
- Instantaneous flow rate (bar graph)
- Current output value (mA)
- Totalized value
- Tag No.
- Results of electrode adhesion diagnostics

Totalizer Display Function (*2):
The flow rate is counted one pulse at a time according to the setting of totalization pulse weights. For forward and reverse flow measurement functions, the totalized values of the flow direction (forward or reverse) and the flow direction are displayed on the indicator together with the units. The difference of totalized values between the forward and reverse flow rate can be displayed. Totalization for the reverse flow rate is carried out only when "Forward and reverse flow measurement functions" is selected.

Damping Time Constant (*2):
Time constant can be set from 0.1 second to 200.0 seconds (63% response).

Span Setting Function (*2):
Span flows can be set in units such as volume flow rate, mass flow rate, time, or flow rate value. The velocity unit can also be set.
Volume Flow Rate Unit: kcf, cf, mcf, Mgal (US), kgal (US), gal (US), mgal (US), kbbl (US)*, bbl (US)*, mbbl (US)*, µbbl (US)*, Ml (megaliter), m^3, kl (kiloliter), l (liter), cm^3
Mass Flow Rate Unit (Density must be set.): klb (US), lb (US), t (ton), kg, g
Velocity Unit: ft, m (meter)
Time Unit: s (sec), min, h (hour), d (day)
* "US oil" or "US Beer" can be selected.

Pulse Output (*1)(*2):
Scaled pulse can be output by setting a pulse weight.
Pulse Width: Duty 50% or fixed pulse width (0.05, 0.1, 0.5, 1, 20, 33, 50, 100 ms) can be selected.
Output Rate: 0.0001 to 10,000 pps (pulse/second)

Multi-range Function (*1)(*2):
- Range switching via status input
  Status input enables the switching of up to two ranges.
- Automatic range switching
  When the flow rate exceeds 100 % of the range, transition to the next range (up to four ranges) is carried out automatically. Range swiching can be confirmed by status outputs and indicator.

Forward and Reverse Flow Measurement Functions (*1)(*2):
Flows in both forward and reverse directions can be measured. The reverse flow measurement can be confirmed by status output and indicator.

Totalization Switch (*1)(*2):
The status output is carried out when a totalized value becomes equal to or greater than the set value.

Preset Totalization (*1)(*2):
The parameter setting or status input enables a totalized value to be preset to a setting value or zero.

0% Signal Lock (*1)(*2):
Status input forcibly fixes the instantaneous flow rate display, current output, pulse output, and flow rate totalization to 0%.

Alarm Selection Function (*2):
Alarms are classified into the System Alarms (hard failures), Process Alarms (such as 'Empty Pipe', 'Signal Overflow' and 'Adhesion Alarm'), Setting Alarms, and Warnings.
Whether alarms should be generated or not can be selected for each item.
The current output generated for an alarm can be selected from among 2.4 mA or less, fixed to 4 mA, 21.6 mA or more, or HOLD.

Alarm Output (*1)(*2):
Alarms are generated only for the items selected via the 'Alarm Selection Function' if relevant failures occur.

Self Diagnostics Functions (*2):
If alarms are generated, details of the System Alarms, Process Alarms, Setting Alarms and Warnings are displayed together with concrete descriptions of countermeasures.

Flow Upper/Lower Limit Alarms (*1)(*2):
If a flow rate becomes greater or smaller than the set value, this alarm is generated. In addition, two upper limits (H, HH) and two lower limits (L, LL) can be set.
If a flow rate becomes greater or smaller than any of the set values, the status is output.

Electrode Adhesion Diagnostics Function (*1) (*2):
This function enables monitoring of the adhesion level of insulating substances to the electrodes. Depending on the status of adhesion, users are notified by a warning or an alarm via status outputs. If replaceable electrodes are used, they can be removed and cleaned when adhesion occurs.

● Flowtubes (Remote Flowtube/Integral Flowmeter)

Size of AXF Flowtubes: AXF Standard (Lay length code 1)

Unit: mm (in.)

Use	Process Connection	Lining	Remote Flowtube	Integral Flowmeter	High Grade Accuracy 0.2% of Rate (*3)	Enhanced Dual Frequency Excitation (Optional code HF1,HF2) (*3)	Replaceable Electrode (Electrode structure code 2)
General-purpose Use	Wafer	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)		25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)
		Polyurethane Rubber	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)		–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)
		Natural Soft Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)		–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		EPDM Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)		–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Ceramics (*1)	15 (0.5), 25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)		25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
	Flange	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)		25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)
		Polyurethane Rubber	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16), 500(20), 600 (24), 700 (28), 800 (32), 900(36), 1000(40), 1100(44), 1200(48), 1350(54), 1500(60), 1600(64), 1800(72), 2000(80), 2200(88), 2400(96), 2600(104)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16),	–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)
		Natural Soft Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350(14), 400(16)		–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		EPDM Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350(14), 400(16)		–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
	Union Joint	Ceramics (*2)	2.5 (0.1), 5 (0.2), 10 (0.4)		–	–	–

Size of AXF Flowtubes: AXF Standard (Lay length code 1) (continued)

Unit: mm (in.)

Use	Process Connection	Lining	Remote Flowtube	Integral Flowmeter	*High Grade Accuracy 0.2% of Rate (*3)	Enhanced Dual Frequency Excitation (Optional code HF1,HF2) (*3)	Replaceable Electrode (Electrode structure code 2)
Submersible Type	Wafer	PFA	15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5) 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)	–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Polyurethane Rubber	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)	–	–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Natural Soft Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)	–	–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		EPDM Rubber	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)	–	–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
	Flange	PFA	15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)	–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Polyurethane Rubber	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16), 500(20), 600 (24), 700 (28), 800 (32), 900(36), 1000(40), 1100(44), 1200(48), 1350(54), 1500(60), 1600(64), 1800(72), 2000(80), 2200(88), 2400(96), 2600(104)	–	–	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Natural Soft Rubber	50 (2.0), 65 (2.5), 80(3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)	–	–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		EPDM Rubber	50 (2.0), 65 (2.5), 80(3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10) 300 (12), 350 (14), 400 (16)	–	–	50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
Explosion proof Type	Wafer	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12)		25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
		Ceramics (*1)	15 (0.5), 25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)		25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	25(1.0),40(1.5),50(2.0), 80(3.0),100(4.0), 150(6.0),200(8.0)	–
	Flange	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)		25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0)	–
	Union Joint	Ceramics (*2)	2.5 (0.1), 5 (0.2), 10 (0.4)		–	–	–
Sanitary Type	Clamp: Tri-Clamp (*4), DIN32676 ISO2852/SMS3016 Union: DIN11851 ISO2853 (*5) SMS1145 (*6) Butt Weld: DIN11850, ISO203	PFA	15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0)		25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0)	25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0)	–

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*1: AXF standard lay length dimensions for wafer type ceramics linings are the same as those for ADMAG ceramics linings.
*2: AXF standard lay length dimensions for union joint type ceramics linings are the same as those for ADMAG ceramics linings.
*3: Enhanced dual frequency excitation is not available for models with High grade accuracy.
*4: Not available with 32 mm (1.25 in.), 125 mm (5.0 in.)
*5: Not available with 125 mm (5.0 in.)
*6: Not available with 15 mm (0.5 in.), 125 mm (5.0 in.)

Size of AXF Flowtubes: Replacement model for earlier ADMAG or ADMAG AE (Lay length code 2)

Unit: mm (in.)

Use	Process Connection	Lining	Remote Flowtube	Integral Flowmeter	High Grade Accuracy 0.2% of Rate	Enhanced Dual Frequency Excitation (Optional code HF1,HF2)	Replaceable Electrode (Electrode structure code 2)
General-purpose use	Wafer (*6)	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)		–	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
		Polyurethane rubber	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100(4.0), 150 (6.0), 200(8.0)		–	25 (1.0), 40(1.5), 50 (2.0), 80(3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
	Flange (*7)	PFA	150 (6.0), 200 (8.0), 250 (10)		–	150 (6.0), 200 (8.0)	150 (6.0), 200 (8.0), 250 (10)
		Polyurethane rubber	150 (6.0), 200 (8.0), 250 (10)		–	150 (6.0), 200 (8.0)	150 (6.0), 200 (8.0), 250 (10)
Submersible Type	Wafer (*6)	PFA	15 (0.5), 25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–	–	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
		Polyurethane rubber	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–	–	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
	Flange (*7)	PFA	150 (6.0), 200 (8.0), 250(10)	–	–	150 (6.0), 200 (8.0)	–
		Polyurethane rubber	150 (6.0), 200 (8.0), 250 (10)	–	–	150 (6.0), 200 (8.0)	–
Explosion proof Type	Wafer (*6)	PFA	2.5 (0.1), 5 (0.2), 10 (0.4), 15 (0.5), 25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)		–	25 (1.0), 40 (1.5), 50 (2.0), 80 (3.0), 100 (4.0), 150 (6.0), 200 (8.0)	–
	Flange (*7)	PFA	150 (6.0), 200 (8.0), 250 (10)		–	150 (6.0), 200 (8.0)	–

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*6: ADMAG lay length dimensions for wafer type of 250 mm (10 in.), and 300 mm (12 in.) are the same as those for AXF Standard.
*7: ADMAG lay length dimensions for flange type of 15 mm (0.5 in.) to 100 mm (4.0 in.), or 300 mm (12 in.) to 2600 mm (104 in.) are the same as those for AXF Standard. However, in case of platinum-iridium (grounding ring code P) or tantalum (grounding ring code T) or None (grounding ring code N) in flange type of 15 mm (0.5 in.) to 100 mm (4.0 in.), the lay length of AXF Standard are longer by approx. 4mm (0.16 in) than those of earlier ADMAG or ADMAG AE.

Protection:

General-Purpose Use/Sanitary Type/Explosion proof Type:

IP67, NEMA4X , JIS C0920 immersion-proof type

Submersible Type (only for Remote Flowtube):

IP68 (can be used for temporary submergence)
JIS C0920 Submersible Type

Note: Test Condition: 50 m below the surface of the water, equivalent to 0.5 MPa hydraulic pressure, for one month.
Cable should be protected at customer site. In the case of installation always under water or corrosion fluid, contact Yokogawa office.

Carting:

General-Purpose Use/Explosion proof Type:

Size 2.5 to 125 mm (0.1 to 5.0 in.) (Wafer type),
Size 2.5 to 100 mm (0.1 to 4.0 in.) (Process connection code B or D of flange type):

- Housing: No coating (Stainless steel surface)
- Flange (Flange type only) : No coating (Stainless steel surface)
- Terminal Box and Cover (Remote Flowtube):
  Polyurethane corrosion-resistant coating
  Coating color: Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Size 150 to 300 mm (6.0 to 12 in.) (Wafer type),
Size 125 to 400 mm (5.0 to 16 in.) (Process connection code B of flange type),
Size 50 to 2600 mm (2.0 to 104 in.) (Process connection code C of flange type):

- Housing, Flange (Flange type only), Terminal Box and Cover (Remote Flowtube):
  Polyurethane corrosion-resistant coating
  Coating color: Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Sanitary Type:

Size 15 to 125 mm (0.5 to 5.0 in.):

- Housing: No coating (Stainless steel surface)
- Adapter : No coating (Stainless steel surface)
- Terminal Box and Cover (Remote Flowtube):
  Polyurethane corrosion-resistant coating
  Coating color: Mint green (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Submersible Type: Non-tar epoxy coating (black)

Flowtube Material:

Size 2.5 mm (0.1 in.) to 15 mm (0.5 in.)

Part Name		Material
Housing		Stainless steel-JIS SCS11
Flange		Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
Mini-Flange	Wafer Type PFA/Polyurethane Rubber lining	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
	Wafer Type Ceramics lining [only for 15 mm (0.5 in.)]	Stainless steel-JIS SUS316L (AISI 316 SS/EN 1.4404 equivalent)
	Sanitary Type [only for 15 mm (0.5 in.)]	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
Pipe	Flange/Wafer Type PFA/Polyurethane Rubber lining	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
	Wafer Type/Union Joint Ceramics lining	Alumina ceramics (99.9%)
	Sanitary Type [only for 15 mm (0.5 in.)]	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
Terminal Box (Remote Flowtube)		Aluminum alloy

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Size 25 mm (1.0 in.) to 125 mm (5.0 in.)

Part Name			Material
Housing			Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
Flange	Process Connection code: B**		Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
	Process Connection code: C** [(Size 50 mm (2.0 in.) to 125 mm (5.0 in.)]		Carbon steel-JIS SS400
Mini-Flange	Wafer Type PFA/Polyurethane Rubber/ Natural Soft Rubber/ EPDM Rubber lining	Size 25 mm (1.0 in.)	Stainless steel- EN 1.4308 SCS 13 equivalent
		Size 32 mm (1.25 in.) to 125 mm (5.0 in.)	Stainless steel-JIS SUS430 (ASTM 43000/DIN X6Cr17/EN 1.4016 equivalent)
	Wafer Type Ceramics lining	Size 25 mm (1.0 in.) to 50 mm (2.0 in.)	Stainless steel-JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)
		Size 80 mm (3.0 in.), 100 mm (4.0 in.)	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
	Sanitary Type	Size 25 mm (1.0 in.)	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
		Size 32 mm (1.25 in.) to 125 mm (5.0 in.)	Stainless steel-JIS SUS430 (ASTM 43000/DIN X6Cr17/EN 1.4016 equivalent)
Pipe	Flange/Wafer Type PFA/Polyurethane Rubber/ Natural Soft Rubber/ EPDM Rubber lining	Size 25 mm (1.0 in.)	Stainless steel- EN 1.4308 SCS 13 equivalent
		Size 32 mm (1.25 in.) to 125 mm (5.0 in.)	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
	Wafer Type Ceramics lining	Size 25 mm (1.0 in.) to 100 mm (4.0 in.)	Alumina ceramics (99.9%)
	Sanitary Type	Size 25 mm (1.0 in.)	Stainless steel-JIS SCS13 /EN 1.4308 equivalent
		Size 32 mm (1.25 in.) to 125 mm (5.0 in.)	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
Terminal Box (Remote Flowtube)			Aluminum alloy

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Size 150 mm (6.0 in.) to 400 mm (16 in.)

Part Name		Material
Housing		Carbon steel-JIS SPCC
Flange	Process Connection code: B**	Stainless steel-JIS SUS304 or SUS304F (AISI 304 SS/EN 1.4301 equivalent)
	Process Connection code: C**	Carbon steel-JIS SS400
Mini-Flange	Wafer Type PFA/Polyurethane Rubber/Natural Soft Rubber/ EPDM Rubber lining	Carbon steel-JIS SS400
	Wafer Type Ceramics lining [available with 150 mm (6.0 in.), 200 mm (8.0 in.)]	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
Pipe	Flange Type/Wafer Type PFA/Polyurethane Rubber/Natural Soft Rubber/ EPDM Rubber lining	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
	Wafer Type Ceramics lining [available with 150 mm (6.0 in.), 200 mm (8.0 in.)]	Alumina ceramics (99.9%)
Terminal Box (Remote Flowtube)		Aluminum alloy

T05.EPS

Size 500 mm (20 in.) to 2600 mm (104 in.)

Part Name		Material
Housing		Carbon steel-JIS SPCC
Flange		Carbon steel-JIS SS400
Pipe		Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent)
Terminal Box (Remote Flowtube)	Case, Cover (500 to 1000 mm) (20 to 40 in.)	Aluminum alloy
	Case (1100 to 2600 mm) (44 to 104 in.)	Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) Electrical connection: Carbon steel
	Cover (1100 to 2600 mm) (44 to 104 in.)	Aluminum alloy

T05-1.EPS

Wetted Part Material:

Lining:

Fluorocarbon PFA*1 lining
Polyurethane Rubber lining
Natural Soft Rubber lining*2
EPDM Rubber lining*3
Alumina ceramics lining

*1: PFA is FDA (U.S. Food and Drug Administration) approval material.
*2: Natural soft rubber is a material which can reduce wear of the lining due to fluids mixed with slurries. If the concentration of mixed slurries is high, contact Yokogawa as necessary measures need to be taken separately for the electrodes.
*3: EPDM rubber lining is superior in the ozone proof.

Electrode:

Stainless steel-JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent), Hastelloy*1 C276 equivalent, Titanium, Tantalum, Platinum-Iridium, Tungsten Carbide, Platinum-Alumina cermet(only for ceramics lining)

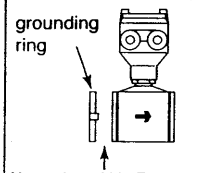
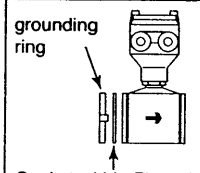
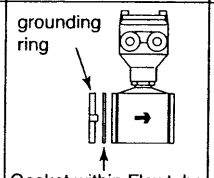
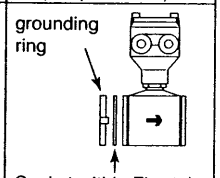
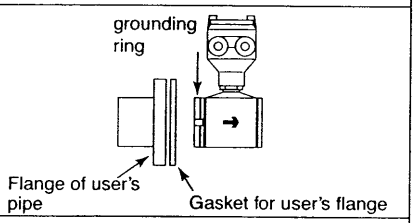
Note : For size over 500 mm and sanitary type, SUS316L only.

Grounding Ring/Grounding Electrode:

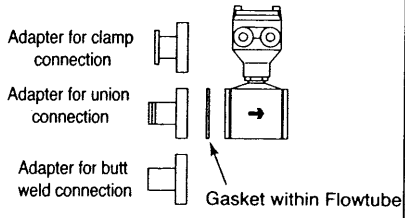
- Grounding Ring(plate type)
  Stainless steel-JIS SUS316 (AISI 316 SS/EN 1.4401 equivalent),
  Stainless steel-JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent),
  Hastelloy*1 C276 equivalent, Titanium,
  Stainless steel-JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) for size 500 to 1000mm (20 to 40 in.) only,
  SS400 carbon steel lined with stainless steel-JIS SUS316 (AISI 316 SS/EN 1.4404 equivalent) for size 1100 to 2600mm (44 to 104 in.) only.
- Grounding Electrode(electrode type)
  Fluorocarbon PFA lining + grounding electrode (Tantalum, Platinum-Iridium)

*1: Hastelloy is a registered trademark of Haynes International Inc.
*2: Available with sizes 2.5 to 200mm (0.1 to 8.0 in.), PFA and ceramics linings only.

Gasket:

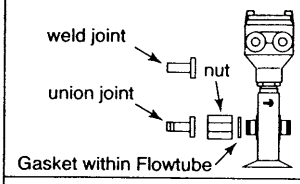
Use	General-Purpose Use / Submersible Type / Explosion proof Type	
Lining	PFA/Polyurethane Rubber/ Natural Soft Rubber/ EPDM Rubber	Ceramics
Standard		
	Gasket Material (within Flowtube)	
	–	Fluororesin with ceramic fillers (Valqua #7020)
Optional code (GA, GC, GD, or GF) (Only when selecting the PFA lining/ ceramics lining)		
	Gasket Material (within Flowtube)	
	GA: Fluororubber for PVC pipes (Viton®) GC: Acid-resistant fluororubber for PVC pipes (Viton®) GD: Alkali-resistant fluororubber for PVC pipes (Viton®) GF*1: Fluororesin with alkali-resistant carbons for metal pipes *1: GF is applicable only for ceramics lining.	
Optional code (BCF, BSF, BCC, or BSC)		
	Gasket Material (for user's flange)	
	BCF, BSF: PTFE-sheathed non-asbestos BCC, BSC: Chloroprene rubber	

T23-1.EPS

Use	Sanitary Type
Lining	PFA
Standard	
	Gasket Material (within Flowtube)
	EPDM (ethylene propylene) rubber
Optional code (GH)	GH: Silicone rubber

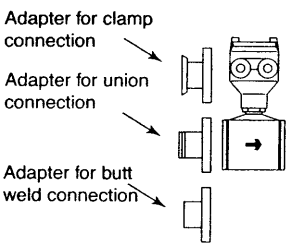
T23-2.EPS

Joints:

Lining	Ceramics Weld / Union Joints (size 10 mm or less)	
Standard		
	Materials for Weld / Union Joint	
	Process Connection Code GUW: weld joint	Stainless steel (JIS SUS316L (ANSI 316L SS/EN 1.4404 equivalent))
	Process Connection Code GUN, GUR: union joint	

Note: Contact Yokogawa office if PVC union joint is required.

T23-3.EPS

Use	Sanitary Type
Standard	
	Materials for Adapters (clamp, union, butt weld)
	Stainless steel-JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)

T23-4.EPS

O-Ring (Replaceable electrode type only):
Fluororubber (Part number : G9303SE)

Electrode Construction:

Non-replaceable Electrode Type

General-Purpose Use/Submersible Type/Explosion proof Type:

PFA, Polyurethane Rubber lining:
External insertion type

Natural Soft Rubber, EPDM Rubber lining:
Internal insertion type

Ceramics lining: Integral type

Sanitary Type: Internal insertion type

Replaceable Electrode Type

Electrode parts can be put into unit to facilitate replacement or mounting at customer site.
The optional dedicated tool (F9807SK) is required.

Replaceable electrodes are available for the following:

AXF standard:

Use	Process Connection	Available Size	Lining	Electrode Material
General-Purpose Use	Wafer	25 to 300 mm (1.0 to 12 in.)	PFA/ Polyurethane Rubber	JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)(*1)
	Flange	25 to 400 mm (1.0 to 16 in.)		

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Replacement model for earlier ADMAG or ADMAG AE:

Use	Process Connection	Available Size	Lining	Electrode Material
General-Purpose Use	Flange	150 to 250 mm (6.0 to 10 in.)	PFA/ Polyurethane Rubber	JIS SUS316L (AISI 316L SS/EN 1.4404 equivalent)(*1)

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*1: If any other electrode materials are required, please contact Yokogawa office.

Mounting/Shapes (Remote Flowtube):

- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 × 1.5 female
  JIS G1/2 (PF1/2) female
- Direction of Electrical Connection: The direction can be changed even after delivery.
  Note: In case of submersible types, an optional code DHC, and sizes of 1100 mm or larger, the direction can not be changed after delivery.
- Terminal Connection at Terminal Box: M4 size screw

Grounding:

Grounding resistance 100 Ω or less

* In case of explosion proof type except TIIS, follow the domestic electrical requirements as regulated in each country.

* In case of TIIS Flame proof type, refer to description of "HAZARDOUS AREA CLASSIFCATION".

Combined Converter:

- A remote flowtube for sizes of up to 400 mm can be combined with the AXFA11 Converter or the AXFA14 Converter. If a combined converter is changed from AXFA11 to AXFA14 or vice versa, a new meter factor must be adjusted by flow calibrations.
- In case that size 250 mm (10 in.) or larger is used in low conductivity or high concentration slurries, please use the AXFA11 Converter.
- A remote flowtube for sizes of 500 mm or larger can be combined with the AXFA11 Converter only.
- Maximum Cable Length:
  Combination of AXF remote Flowtube and AXFA11: up to 200 m (660 ft)
  Combination of AXF remote Flowtube and AXFA14: up to 100 m (330 ft)

■ HAZARDOUS AREA CLASSIFICATION

FM:

*AXF002C – AXF400C

(Integral Flowmeter)

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: NEMA 4X

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T27-1.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(Remote Flowtube)

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: NEMA 4X

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T28-1.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

Note: Installation shall be in accordance with the manufacturer's instructions and National Electric code, ANSI/NFPA-70.

CENELEC ATEX (KEMA):
No. KEMA 03ATEX2435
*AXF002C – AXF400C

(Integral Flowmeter)
CENELEC ATEX (KEMA) Flame proof Type
Group category: II 2G
EEx dme [ia] IIC T6...T3
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: IP66, IP67

Temperature Class	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T27-2.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)
CENELEC ATEX (KEMA) Type of Protection "Dust"
Group category: II 1D
Maximum surface temperature:

Maximum Surface Temperature	Maximum Process Temperature
T75°C (+167°F)	+70°C (+158°F)
T85°C (+185°F)	+85°C (+185°F)
T100°C (+212°F)	+120°C (+248°F)
T110°C (+230°F)	+130°C (+266°F)

T29.EPS

(Remote Flowtube)
CENELEC ATEX (KEMA) Flame proof Type
Group category: II 2G
EEx dme [ia] IIC T6...T3
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: IP66, IP67

Temperature Class	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T28-2.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)
CENELEC ATEX (KEMA) Type of Protection "Dust"
Group category: II 1D
Maximum surface temperature:

Maximum Surface Temperature	Maximum Process Temperature
T75°C (+167°F)	+70°C (+158°F)
T85°C (+185°F)	+85°C (+185°F)
T100°C (+212°F)	+120°C (+248°F)
T115°C (+239°F)	+150°C (+302°F)

T30.EPS

CSA:
*AXF002C – AXF400C
(Integral Flowmeter)
For CSA C22. 2 Series
Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division 1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
For CSA E79 Series
Flame proof for Zone 1, Ex dme [ia] IIC T6...T3
Intrinsically safe (electrodes) for Zone 0, Ex ia IIC T6...T3

Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: Type 4X, IP66, IP67

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T27-1.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(Remote Flowtube)
For CSA C22.2 Series
Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division 1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
For CSA E79 Series
Flame proof for Zone 1, Ex dme [ia] IIC T6...T3
Intrinsically safe (electrodes) for Zone 0,Ex ia IIC T6...T3

Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: Type 4X, IP66, IP67

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T28-1.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

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19.1.2

TIIS:

(Integlal Flowmeter)

- Construction: Exde[ia] II CT4
  : Converter, Terminal box ; Explosion proof
  Flowtube ; Increased Safety
  Signal Ciruit ; Intrinsically Safety(ia)
- Ambient Temperature: –40 to 60°C (power supply code 1)
  : –40 to 50°C (power supply code 2)
- Fluid Temperature: 120°C max
- Electrode Circuit: 250 V AC/DC
- Grounding: JIS Class C(grouding resister 10Ω or less) or JIS Class A(grounding resister 10Ω or less)

*In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

(Remote Flowtube)

- Construction: Exde[ia] II CT4
  : Terminal box ; Explosion proof
  Flowtube; Increased Safety
  Electrode; Intrinsically Safety(ia)
- Ambient Temperature: –40 to 60°C
- Fluid Temperature: 120°C max
- Electrode Circuit: 250 V AC/DC
- Grounding: JIS Class C(grouding resistance 10Ω or less) or JIS Class A(grounding resistance 10Ω or less)

Note : In case of TIIS Flame proof type, a remote flowtube is available for combined use with the AXFA14 converter only.

*In case that ambient temperature exceeds 50°C, use heat-resistant cables with maximum allowable temperature of 70°C or above.

■ STANDARD PERFORMANCE

Reference Conditions:

Similar to BS EN 29104 (1993); ISO9104 (1991)

- Fluid temperature: 20°C ± 10°C (+68°F ± 18°F)
- Ambient temperature: 25°C ± 5°C (+77°F ± 9°F)
- Warm-up time: 30 min
- Straight runs:
  Upstream > 10 × DN
  Downstream > 5 × DN
- Properly grounded
- Properly centered

Accuracy (at reference conditions)

Pulse Output:

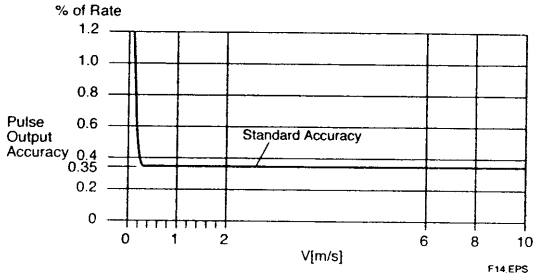
·PFA/Ceramics Lining:

Size mm (In.)	Flow Velocity V m/s (ft/s)	Standard Accuracy (Calibration code B)	Flow Velocity V m/s (ft/s)	High Grade Accuracy (Calibration code C)
2.5 (0.1) to 15 (0.5)	$V < 0.3$ (1)	±1.0 mm/s	–	
	$0.3 \leqq V \leqq 10$ (1) (33)	±0.35% of Rate		
25 (1.0) to 200 (8.0)	$V < 0.15$ (0.5)	±0.5 mm/s	$V < 0.15$ (0.5)	±0.5 mm/s
	$0.15 \leqq V \leqq 10$ (0.5) (33)	±0.35% of Rate	$0.15 \leqq V < 1$ (0.5) (3.3)	±0.18% of Rate ± 0.2mm/s
			$1 \leqq V \leqq 10$ (3.3) (33)	±0.2% of Rate
250 (10) to 400 (16)	$V < 0.15$ (0.5)	±0.5 mm/s	–	
	$0.15 \leqq V \leqq 10$ (0.5) (33)	±0.35% of Rate		

T08.EPS

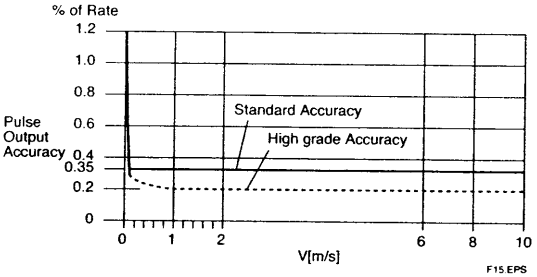
Enhanced dual frequency excitation(Option code HF2):
Standard accuracy ±1 mm/ s

Size 2.5 mm (0.1 in.) to 15 mm (0.5 in.)



F14.EPS

Size 25 mm (1.0 in.) to 400 mm (16 in.)



F15.EPS

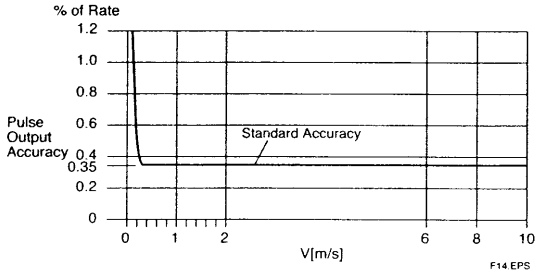
Polyurethane Rubber /Natural Soft Rubber / EPDM Rubber Lining:

Size mm (in.)	Flow Velocity *V* m/s (ft/s)	Standard Accuracy (Calibration code B)
25 (1.0) to 400 (16)	$V < 0.3$ (1.0)	±1.0 mm/s
	$0.3 \leqq V \leqq 10$ (1.0) (33)	±0.35% of Rate
500 (20) to 1000 (40)	$V < 0.3$ (1.0)	±1.75 mm/s
	$0.3 \leqq V < 1$ (1.0) (3.3)	±0.25% of Rate ±1 mm/s
	$1 \leqq V \leqq 10$ (3.3) (33)	±0.35% of Rate
1100 (44) to 2000 (80)	$V < 0.3$ (1.0)	±2.2 mm/s
	$0.3 \leqq V < 1$ (1.0) (3.3)	±0.4% of Rate ±1 mm/s
	$1 \leqq V \leqq 10$ (3.3) (33)	±0.5% of Rate
2200 (88) to 2600 (104)	$V < 1$ (3.3)	±8.5 mm/s
	$1 \leqq V \leqq 10$ (3.3) (33)	±0.85% of Rate

T09.EPS

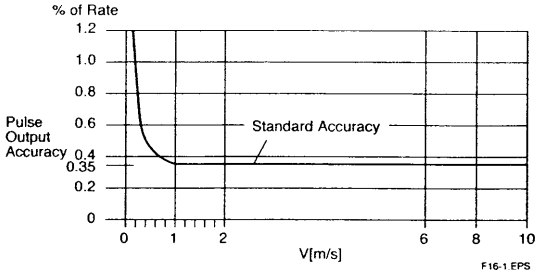
Enhanced dual frequency excitation(Option code HF2) : Standard accuracy ±1 mm/ s

Size 25 mm (1.0 in.) to 400 mm (16 in.)



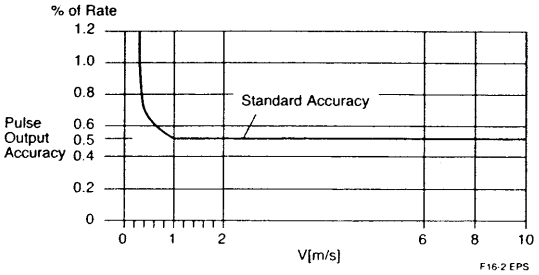
F14.EPS

Size 500 mm (20 in.) to 1000 mm (40 in.)



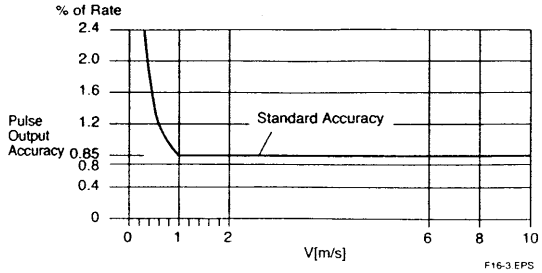
F16-1.EPS

Size 1100 mm (44 in.) to 2000 mm (80 in.)



F16-2.EPS

Size 2200 mm (88 in.) to 2600 mm (104 in.)



F16-3.EPS

Current Output: Pulse output accuracy plus ±0.05% of Span

Repeatability:
±0.1% of Rate ($V \geqq 1$ m/s (3.3 ft/s))
±0.05% of Rate ±0.5 mm/s ($V < 1$ m/s (3.3 ft/s))

Maximum Power Consumption:
Integral Flowmeter: 12W
Remote Flowtube: Combined with AXFA11: 20W
Combined with AXFA14: 12W

Insulation Resistance (*1):
Integral Flowmeter:
Between power supply terminals and ground terminalm : 100MΩ at 500V DC
Between power supply terminals and input /output terminals : 100MΩ at 500V DC
Between ground terminal and input/output terminals : 20MΩ at 100V DC
Between input/output terminals : 20MΩ at 100V DC
Remote Flowtube:
Between excitation current terminal and signal /common terminals : 100MΩ at 500V DC
Between signal terminals : 100MΩ at 500V DC
Between signal terminals and common terminal (C) : 100MΩ at 500V DC

Withstand Voltage (*1):
Integral Flowmeter:
Between power supply terminals and ground terminal : 1390V AC for 2 seconds
Between power supply terminals and input/output terminals : 1390V AC for 2 seconds
Remote Flowtube (option code JF3, KF2, and CF1)
Between excitation current terminal and ground terminal : 1500V AC for 1 minute
Between signal terminals and ground terminal : 1500V AC for 1 minute
Between signal terminals and excitation current terminal : 2000V AC for 1 minute
Remote Flowtube (option code FF1)
Between signal terminals and ground terminal : 500V AC for 1 minute or 600V AC for 1 second
Between signal terminals and excitation current terminal : 2000V AC for 1 minute or 2400V AC for 1 second.

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⚠ CAUTION

*1: When performing the Insulation Resistance Test or the Withstand Voltage Test, please obey the following caution.
- Following the relevant test, wait for more than 10 seconds after the power supply has been turned off before removing the cover.
- Remove all wires from terminals before testing.
- When the power terminal has a lighting protector (optional code A), remove the short bar at the ground terminal.
- After testing, be sure to discharge by using a resistance and return all wires and the short bar to its correct position.
- Screws must be tightened to a torque of 1.18 N-m or more.
- After closing the cover, the power supply can be restored.

Safety Requirement Standards:

EN61010
- Altitude at installation site: Max. 2000 m above sea level
- Installation category based on IEC1010:
  Overvoltage category II ("II" applies to electrical equipment which is supplied from the fixed installation like distribution board.)
- Pollution degree based on IEC1010
  Pollution degree 2 ("Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to a normal indoor atmosphere.)

EMC Conformity Standards:

EN61326
EN61000-3-2, EN61000-3-3
AS/NZS 2064

■ NORMAL OPERATING CONDITIONS

Ambient Temperature: –40° to +60°C (–40° to +140°F)

*1: Minimum temperature should also be limited according to minimum fluid temperature of linings.

*2: Indicator's operating range (integral flowmeter): –20° to +60°C (–4° to +140°F)

*3: Maximum temperature should be +50°C (+122°F) in the case of power supply code 2 (integral flowmeter).

Ambient Humidity: 0 to 100%

Lengthy continuous operation at 95% or more is not recommended.

Power Supply (integral flowmeter):

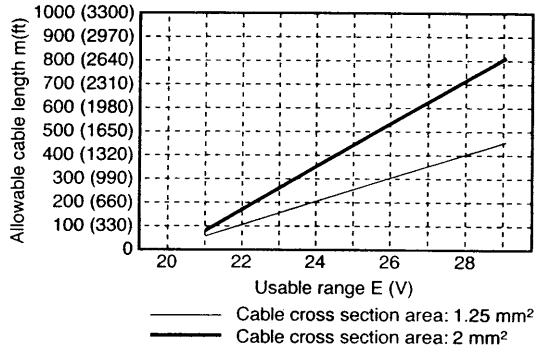
Power supply code 1:

- AC specifications
  Rated power supply: 100 to 240 V AC, 50/60 Hz
  (Operating voltage range: 80 to 264 V AC)
- DC specifications
  Rated power supply: 100 to 120 V DC
  (Operating voltage range: 90 to 130 V DC)

Power supply code 2:

- AC specifications
  Rated power supply: 24 V AC, 50/60 Hz
  (Operating voltage range: 20.4 to 28.8 V AC)
- DC specifications
  Rated power supply: 24 V DC
  (Operating voltage range: 20.4 to 28.8 V DC)

Supplied Voltage and Cable Length for Power Supply Code 2



F01.EPS

Fluid Conductivity:

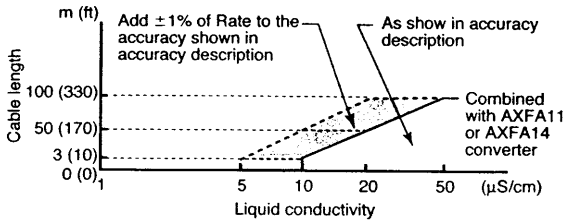
Size 2.5 to 10 mm (0.1 to 0.4 in.): 5 µS/cm or larger
Size 15 to 125 mm (0.5 to 5 in.): 1 µS/cm or larger
Size 150 to 400 mm (6 to 16 in.): 3 µS/cm or larger

Note: In the case of fluids which have large flow noise (pure water, pure alcohol or others), low conductivity and low viscosity, please contact Yokogawa office.

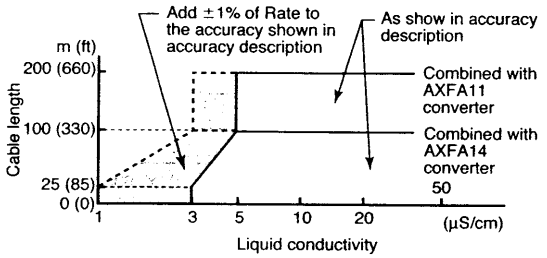
Size 500 to 2600 mm (20 to 104 in.) : 50 µS/cm or large.

Cable Length and Liquid Conductivity (Remote Flowtube):

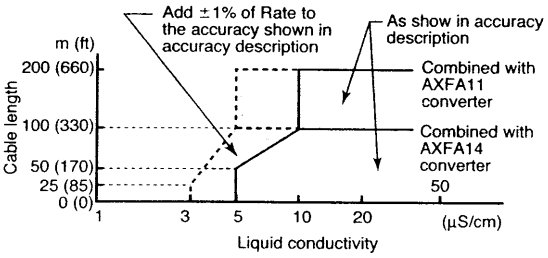
Size 2.5 to 10 mm (0.1 to 0.4 in.)



Size 15 to 125 mm (0.5 to 5.0 in.)



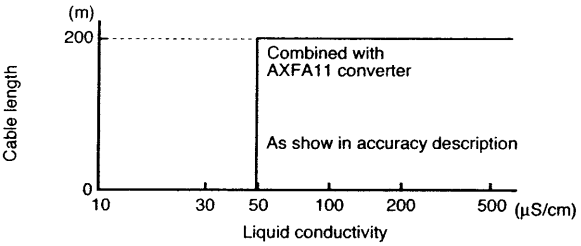
Size 150 to 400 mm (6.0 to 16 in.)



F03.EPS

Note: In case that size 250 or 300 mm (10 or 12 in.) is used for high conductivity fluid (ex. caustic soda, seawater), please use the flange type.

Size 500 to 2600 mm (20 to 104 in.)



F02.EPS

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19.1.2

Measurable Flow Rate Range:

SI Units (Size: mm, Flow rate: m^3/h)

Size (mm)	0 to Min. Span Flow Rate (0.1 m/s)	0 to Max. Span Flow Rate (10 m/s)
2.5	0 to 0.0018 m^3/h	0 to 0.1767 m^3/h
5	0 to 0.0071	0 to 0.7068
10	0 to 0.0283	0 to 2.8274
15	0 to 0.0637	0 to 6.361
25	0 to 0.1768	0 to 17.671
32	0 to 0.2897	0 to 28.967
40	0 to 0.4524	0 to 45.23
50	0 to 0.7069	0 to 70.68
65	0 to 1.1946	0 to 119.45
80	0 to 1.8096	0 to 180.95
100	0 to 2.8275	0 to 282.74
125	0 to 4.418	0 to 441.7
150	0 to 6.362	0 to 636.1
200	0 to 11.310	0 to 1,130.9
250	0 to 17.672	0 to 1,767.1
300	0 to 25.447	0 to 2,544.6
350	0 to 34.64	0 to 3,463
400	0 to 45.24	0 to 4,523
500	0 to 70.69	0 to 7,068
600	0 to 101.79	0 to 10,178
700	0 to 138.55	0 to 13,854
800	0 to 180.96	0 to 18,095
900	0 to 229.03	0 to 22,902
1000	0 to 282.75	0 to 28,274

T11.EPS

English Units (Size: in., Flow rate: GPM)

Size (in.)	0 to Min. Span Flow Rate (0.33ft/s)	0 to Max. Span Flow Rate (33ft/s)
0.1	0 to 0.0081 GPM	0 to 0.8031 GPM
0.2	0 to 0.0322	0 to 3.212
0.4	0 to 0.1286	0 to 12.850
0.5	0 to 0.2008	0 to 20.078
1.0	0 to 0.8032	0 to 80.31
1.25	0 to 1.004	0 to 100.39
1.5	0 to 1.8071	0 to 180.70
2.0	0 to 3.213	0 to 321.2
2.5	0 to 5.020	0 to 501.9
3.0	0 to 7.229	0 to 722.8
4.0	0 to 12.851	0 to 1,285.0
5.0	0 to 20.079	0 to 2,007.8
6.0	0 to 28.914	0 to 2,891.3
8.0	0 to 51.41	0 to 5,140
10	0 to 80.32	0 to 8,031
12	0 to 115.66	0 to 11,565
14	0 to 157.42	0 to 15,741
16	0 to 205.61	0 to 20,560
20	0 to 321.3	0 to 32,125
24	0 to 462.7	0 to 46,261
28	0 to 629.7	0 to 62,966
32	0 to 822.5	0 to 82,242
36	0 to 1040.9	0 to 104,082
40	0 to 1285.1	0 to 128,503

T24.EPS

Size (mm)	0 to Min. Span Flow Rate (0.3 m/s)	0 to Max. Span Flow Rate (10 m/s)
1100	0 to 1,026.4 m^3/h	0 to 34,211 m^3/h
1200	0 to 1,221.5	0 to 40,715
1350	0 to 1,545.9	0 to 51,529
1500	0 to 1,908.6	0 to 63,617
1600	0 to 2,171.5	0 to 72,382
1800	0 to 2,748.3	0 to 91,608
2000	0 to 3,393	0 to 113,097
2200	0 to 4,106	0 to 136,847
2400	0 to 4,886	0 to 162,860
2600	0 to 5,735	0 to 191,134

T11-1.EPS

Size (in.)	0 to Min. Span Flow Rate (1.0ft/s)	0 to Max. Span Flow Rate (33ft/s)
44	0 to 4,665 GPM	0 to 155,489 GPM
48	0 to 5,552	0 to 185,045
54	0 to 7,026	0 to 234,197
60	0 to 8,674	0 to 289,133
64	0 to 9,870	0 to 328,969
72	0 to 12,491	0 to 416,351
80	0 to 15,421	0 to 514,014
88	0 to 18,659	0 to 621,957
96	0 to 22,206	0 to 740,181
104	0 to 26,061	0 to 868,684

T24-1.EPS

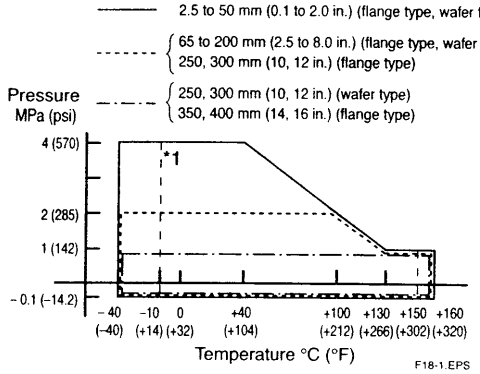
Fluid Temperature and Pressure:

Note *1 The following figures show maximum allowable fluid pressure for the flowtube itself. Further fluid pressure should also be limitted according to flange rating.

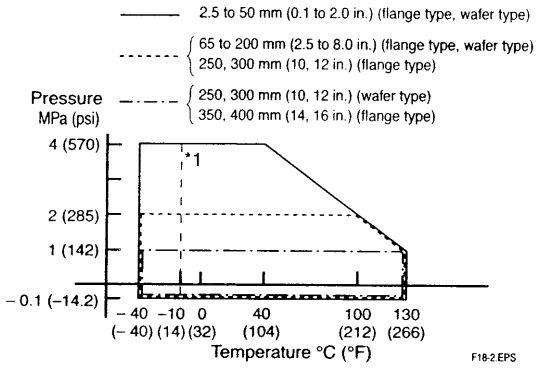
*2 For fluid temperature of the explosion proof type, refer to descriptions of "HAZARDOUS AREA CLASSIFICATION".

PFA Lining (*1)

General-Purpose Use, Submersible Type, Explosion proof Type, Remote Flowtube (electrode structure code 1: Non-replaceable electrode)



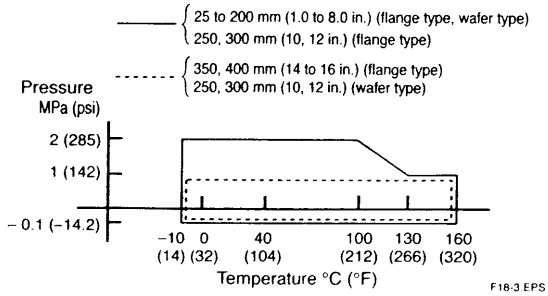
General-Purpose Use and Explosion proof Type, Integral Flowmeter (electrode structure code 1: Non-replaceable electrode)



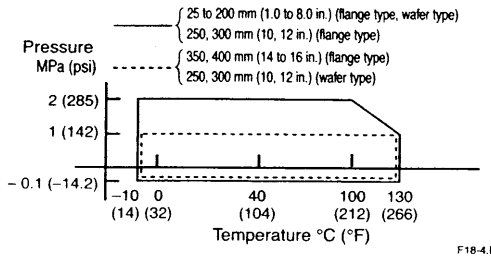
*1: For wafer types of 32 mm to 300 mm(1.25 to 12 in.), and for carbon steel flange types (process connection code: C**) of 50 to 400 mm (2.0 to 16 in.) the minimum temperature is -10°C (+14°F).

*2: For fluid temperature of the explosion proof type, refer to descriptions of "HAZARDOUS AREA CLASSIFICATION".

General-Purpose Use, Remote Flowtube (electrode structure code 2: replaceable electrode)

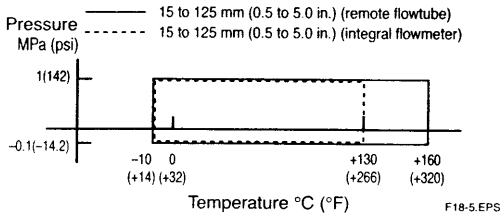


General-Purpose Use, Integral Flowmeter (electrode structure code 2: replaceable electrode)



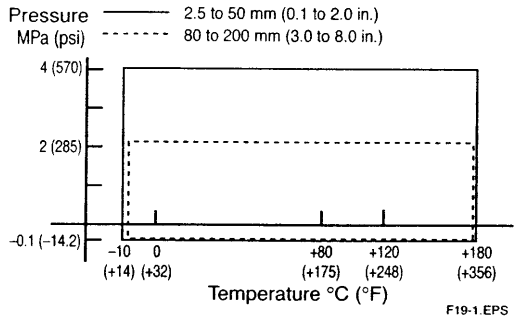
Note: For replaceable electrodes for fluid temperatures of 10°C (50°F)or less, please contact Yokogawa office.

Sanitary Type (electrode structure code 1: Non-replaceable electrode)

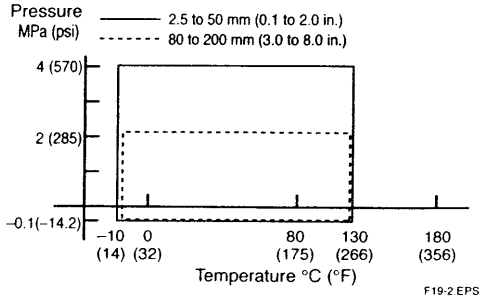


Ceramics Lining

General-Purpose Use and Explosion proof Type, Remote Flowtube (electrode structure code 1: Non-replaceable electrode)



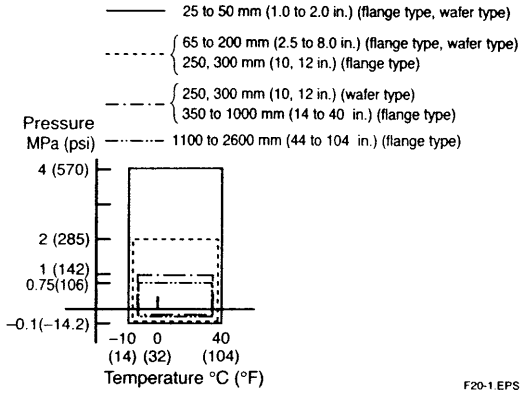
General-Purpose Use and Explosion proof Type, Integral flowmeter (electrode structure code 1: Non-replaceable electrode)



*1: For fluid temperature of the explosion proof type, refer to descriptions of "HAZARDOUS AREA CLASSIFICATION".

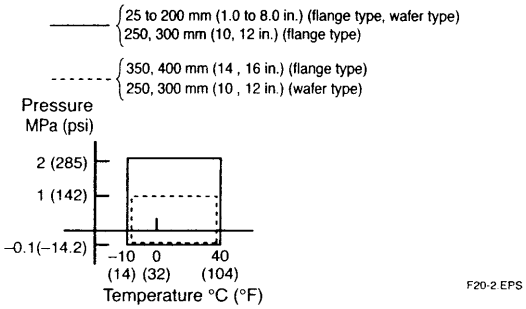
Polyurethane Rubber Lining

General-Purpose Use and Submersible Type, Remote Flowtube (electrode structure code 1: Non-replaceable electrode)



F20-1.EPS

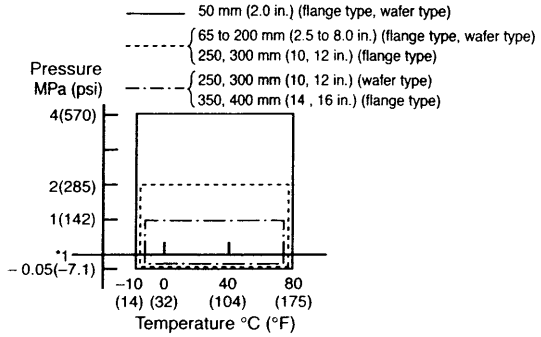
General-Purpose Use, Integral Flowmeter (electrode structure code 2: replaceable electrode)



F20-2.EPS

Natural Soft Rubber Lining

General-Purpose Use and Submersible Type, Remote Flowtube (electrode structure code 1: Non-replaceable electrode)

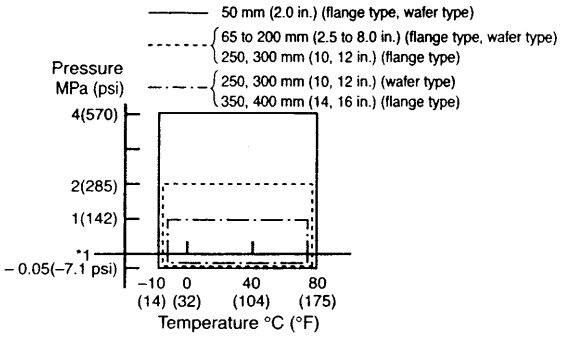


*1 : –0.04 MPa (–5.7 psi) for sizes of 350 mm (14 in.) and 400 mm (16 in.)

F05-2.EPS

EPDM Rubber Lining

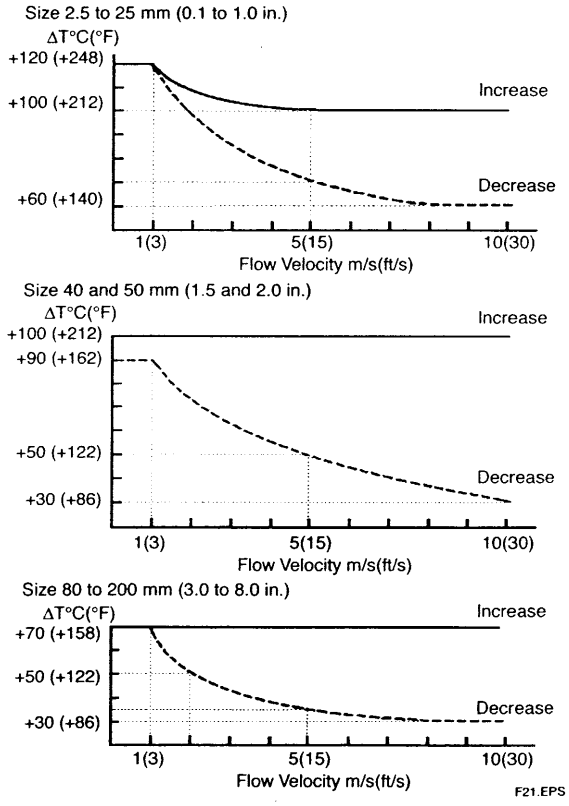
General-Purpose Use and Submersible Type, Remote Flowtube (electrode structure code 1: Non-replaceable electrode)



*1 : –0.04 MPa (–5.7 psi) for sizes of 350 mm (14 in.) and 400 mm (16 in.)

F05-3.EPS

Reasonable Figure for Thermal Shock of Creamics Lining:



F21.EPS

"Decrease" means that the temperature of a measured fluid drops rapidly, while "increase" means that the temperature rises rapidly. The maximum allowable ranges in both cases are indicated by the curves shown in the diagrams, with the solid line indicating the maximum increase, and the broken line the maximum decrease.

ΔT: Change in temperature of measured fluid in one second

Flow velocity: flow velocity of the measured fluid

Allowable Conditions for Cleaning Sanitary Type Linings

Steam or hot water cleaning: Max.temp.= +150 °C (+302°F), time= 60 minutes or less

Vibration Conditions:

Level of vibration in conformity with IEC 60068-2-6 (SAMA 31.1-1980)

- Integral Flowmeter: 1 G or less (frequency 500 Hz or less)
- Remote Flowtube (size 2.5 to 400 mm (0.1 to 16 in.)): 2 G or less (frequency 500 Hz or less)

Note: Avoid locations with much vibration (where the pipe vibration frequency is 500 Hz or more), which may cause damage to the equipment.
(This dimension is also applied to when no grounding ring is used).
If the I.D of the gasket is too large, however, fluid leakage may result.

■ ACCESSORIES

Remote Flowtube (size 2.5 to 1000 mm(0.1 to 40 in.)):

Centering device (wafer type only): 1 pc.
Hexagonal wrench: 2 pcs.

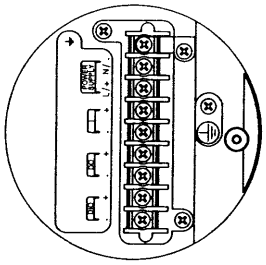
Integral Flowmeter:

Centering device (wafer type only): 1 pc.
Fuse (T2.0A, 250 V): 1 pc.
*Time lag fuse
Hexagonal wrench: 2 pcs.

■ TERMINAL CONFIGURATION AND TERMINAL WIRING

● Integral Flowmeter

Terminal configuration



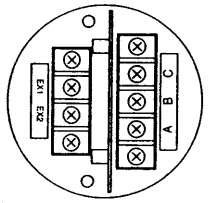
Terminal wiring

Terminal Symbols	Description
⏚	Functional grounding
N/-	Power supply
L/+	
I+	Current output 4 to 20mA DC
I-	
DO+	Pulse output/Alarm output/ Status output
DO-	
DIO+	Alarm output/Status output Status input
DIO-	
⏚	Protective grounding (Outside of the terminal)

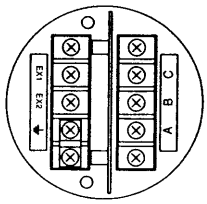
F41.EPS

● Remote Flowtube

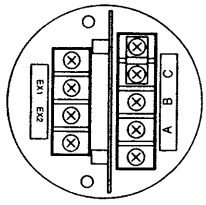
Terminal configuration



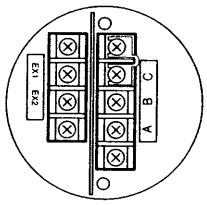
size 2.5 to 400 mm (0.1 to 16 in.)



(Only for Explosion proof type)



size 500 to 1000 mm (20 to 40 in.)



size 1100 to 2600 mm (44 to 104 in.)

Terminal wiring

Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Functional grounding (Only for explosion proof type)
⏚	Protective grounding (Outside of the terminal)

F42.EPS

Note: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.

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19.1.2

■ MODEL AND SUFFIX CODE

AXF STANDARD (Wafer Type)

General-purpose Use/Submersible Type/Explosion proof Type, PFA/Polyurethane Rubber/Natural Soft Rubber/EPDM Rubber Lining

Model	Suffix Code	Description	Applicable Model
AXF002		Size 2.5 mm (0.1 in.) Integral Flowmeter/Remote Flowtube	
AXF005		Size 5 mm (0.2 in.) Integral Flowmeter/Remote Flowtube	
AXF010		Size 10 mm (0.4 in.) Integral Flowmeter/Remote Flowtube	
AXF015		Size 15 mm (0.5 in.) Integral Flowmeter/Remote Flowtube	
AXF025		Size 25 mm (1.0 in.) Integral Flowmeter/Remote Flowtube	
AXF032		Size 32 mm (1.25 in.) Integral Flowmeter/Remote Flowtube	
AXF040		Size 40 mm (1.5 in.) Integral Flowmeter/Remote Flowtube	
AXF050		Size 50 mm (2.0 in.) Integral Flowmeter/Remote Flowtube	
AXF065		Size 65 mm (2.5 in.) Integral Flowmeter/Remote Flowtube	
AXF080		Size 80 mm (3.0 in.) Integral Flowmeter/Remote Flowtube	
AXF100		Size 100 mm (4.0 in.) Integral Flowmeter/Remote Flowtube	
AXF125		Size 125 mm (5.0 in.) Integral Flowmeter/Remote Flowtube	
AXF150		Size 150 mm (6.0 in.) Integral Flowmeter/Remote Flowtube	
AXF200		Size 200 mm (8.0 in.) Integral Flowmeter/Remote Flowtube	
AXF250		Size 250 mm (10 in.) Integral Flowmeter/Remote Flowtube	
AXF300		Size 300 mm (12 in.) Integral Flowmeter/Remote Flowtube	
Use	G	General-Purpose Use	
	W	Submersible Type	Size 15 mm (0.5 in.) to 300 mm (12 in.) Remote Flowtube only
	C	Explosion proof Type (*5)	PFA lining only
Converter Output Signal and Communication	-D	Integral Flowmeter with 4 to 20mA DC Output and BRAIN Communication	
	-E	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N	Remote Flowtube for Combined Use with AXFA11	
	-P	Remote Flowtube for Combined Use with AXFA14	
Power Supply	1	Integral Flowmeter, 100 V to 240 V AC or 100 to 120 V DC	
	2	Integral Flowmeter, 24V AC/DC	
	N	Remote Flowtube	
Lining	A	Fluorocarbon PFA	
	U	Polyurethane Rubber	Size 25 mm (1.0 in.) to 300 mm (12 in.)
	D	Natural Soft Rubber	Size 50 mm (2.0 in.) to 300 mm (12 in.)
	G	EPDM Rubber	Size 50 mm (2.0 in.) to 300 mm (12 in.)
Elecrode Material	L	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P	Platinum-iridium	PFA lining only
	H	Hastelloy C276 Equivalent	
	T	Tantalum	PFA lining only
	V	Titanium	
	W	Tungsten Carbide	PFA/Polyurethane Rubber lining only
Electrode Structure	1	Non-replaceable	
	2	Replaceable	General-Purpose use, Size 25 mm (1.0 in.) to 300 mm (12 in.), PFA/Polyurethane Rubber lining only Electrode Material: JIS SUS316L only
Grounding Ring and Grounding Electrode Material	N	None	
	S	JIS SUS316 (AISI 316 SS/EN 1.4401 Equivalent)	
	L	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P	Platinum-iridium	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.), PFA lining only
	H	Hastelloy C276 Equivalent	
	T	Tantalum	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.), PFA lining only
	V	Titanium	
Process Connection (*3)	-AA1	ANSI Class 150 Wafer (*1)	Size 2.5 mm (0.1 in.) to 300 mm (12 in.)
	-AA2	ANSI Class 300 Wafer (*1)	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	-AD1	DIN PN 10 Wafer (*2)	Size 200 mm (8.0 in.) to 300 mm (12 in.)
	-AD2	DIN PN 16 Wafer (*2)	Size 65 mm (2.5 in.) to 300 mm (12 in.)
	-AD4	DIN PN 40 Wafer (*1)(*2)	Size 2.5 mm (0.1in.) to 50 mm (2.0 in.)
	-AJ1	JIS 10K Wafer (*1)	Size 2.5 mm (0.1in.) to 300 mm (12 in.)
	-AJ2	JIS 20K Wafer (*1)	Size 2.5 mm (0.1in.) to 200 mm (8.0 in.)
	-AG1	JIS F12 (JIS75M) Wafer	Size 80 mm (3.0 in.) to 300 mm (12 in.)
Lay Length	1	Standard	
Electrical Connection (*6)	-0	JIS G1/2 female	
	-2	ANSI 1/2 NPT female	Not available for Submersible Type
	-4	ISO M20×1.5 female	Not available for Submersible Type
Indicator (*4)(*7)	1	Integral Flowmeter with indicator (Horizontal)	
	2	Integral Flowmeter with indicator (Vertical)	
	N	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B	Standard	
	C	High Grade	Size 25 mm (1.0 in.) to 200 mm (8.0 in.), PFA lining only
	/□	Optional code (See the Table of Optional Specifications)	

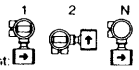
T15.EPS

*1: For a wafer type of 2.5 to 10 mm (0.1 to 0.4 in.), prepare 15 mm (0.5 in.) diameter nominal flanges on the process pipe side. (Process connection codes: AA1, AA2, AD4, AJ1, and AJ2)

*2: Even when DIN PN10 or 16 is required for a model of size 2.5 to 50 mm (0.1 to 2.0 in.), select PN40 (Process connection code: AD4) because there is no difference in the dimensions of the mating faces.
Even when DIN PN10 is required for a model of size 65 to 150 mm (2.5 to 6.0 in.), select PN16 (Process connection code: AD2) because there is no difference in the dimensions of the mating faces.

*3: Mating dimensions are based on standards as follow:
ANSI:ASME B 16.5, DIN: DIN 2501, JIS:JIS B 2220 and JIS G 3451

*4: N shall be always selected for remote flowtubes
In the case of an integral flowmeter, select from among the figures at the right:



*5: For explosion proof types, specify types of explosion proof certification using the optional codes. In case of TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.

*6: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.

*7: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

AXF STANDARD (Wafer /Union Joint Type)

General-purpose Use/Explosion proof Type, Ceramics Lining

Model	Suffix Code	Description	Applicable Model
AXF002		Size 2.5 mm (0.1 in.) Integral Flowmeter/Remote Flowtube	
AXF005		Size 5 mm (0.2 in.) Integral Flowmeter/Remote Flowtube	
AXF010		Size 10 mm (0.4 in.) Integral Flowmeter/Remote Flowtube	
AXF015		Size 15 mm (0.5 in.) Integral Flowmeter/Remote Flowtube	
AXF025		Size 25 mm (1.0 in.) Integral Flowmeter/Remote Flowtube	
AXF040		Size 40 mm (1.5 in.) Integral Flowmeter/Remote Flowtube	
AXF050		Size 50 mm (2.0 in.) Integral Flowmeter/Remote Flowtube	
AXF080		Size 80 mm (3.0 in.) Integral Flowmeter/Remote Flowtube	
AXF100		Size 100 mm (4.0 in.) Integral Flowmeter/Remote Flowtube	
AXF150		Size 150 mm (6.0 in.) Integral Flowmeter/Remote Flowtube	
AXF200		Size 200 mm (8.0 in.) Integral Flowmeter/Remote Flowtube	
Use	G	General-Purpose Use	
	C	Explosion proof Type(*5)	
Converter Output Signal and Communication	-D	Integral Flowmeter with 4 to 20 mA DC Output and BRAIN Communication	
	-E	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N	Remote Flowtube for Combined use with AXFA11	
	-P	Remote Flowtube for Combined use with AXFA14	
Power Supply	1	Integral Flowmeter, 100 V to 240 V AC or100 to 120 V DC	
	2	Integral Flowmeter, 24 V AC/DC	
	N	Remote Flowtube	
Lining	C	Ceramics	
Elecrode Material	E	Platinum-alumina Cermet	
Electrode Structure	1	Non-replaceable	
Grounding Ring and Grounding Electrode Material	N	None	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	S	JIS SUS316 (AISI 316 SS/EN 1.4401 Equivalent)	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	L	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	P	Platinum-iridium	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	H	Hastelloy C276 Equivalent	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	T	Tantalum	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	V	Titanium	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
Process Connection (*2)	-AA1	ANSI Class 150 Wafer	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	-AA2	ANSI Class 300 Wafer	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	-AD1	DIN PN 10 Wafer (*1)	Size 200 mm (8.0 in.) only
	-AD2	DIN PN 16 Wafer (*1)	Size 80 mm (3.0 in.) to 200 mm (8.0 in.)
	-AD4	DIN PN 40 Wafer (*1)	Size 15 mm (0.5 in.) to 50 mm (2.0 in.)
	-AJ1	JIS 10K Wafer	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	-AJ2	JIS 20K Wafer	Size 15 mm (0.5 in.) to 200 mm (8.0 in.)
	-AG1	JIS F12 (JIS75M) Wafer	Size 80 mm (3.0 in.) to 200 mm (8.0 in.)
	-GUW	Union Joint (Weld Joint)	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
	-GUN	Union Joint (1/4NPT Male for 2.5 or 5 mm dia.: 3/8NPT Male for 10 mm dia.)	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
	-GUR	Union Joint (R1/4 Male for 2.5 or 5 mm dia.: R3/8 Male for 10mm dia.)	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
Lay Length (*3)	1	Standard	
Electrical Connection (*6)	-0	JIS G1/2 female	
	-2	ANSI 1/2 NPT female	
	-4	ISO M20×1.5 female	
Indicator (*4)(*7)	1	Integral Flowmeter with indicator (Horizontal)	
	2	Integral Flowmeter with indicator (Vertical)	
	N	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B	Standard	
	C	High Grade	Size 25 mm (1.0 in.) to 200mm (8.0 in.)
	/□	Optional code (See the Table of Optional Specifications)	

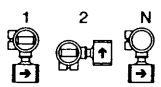
T16.EPS

*1: Even when DIN PN10 or 16 is required for a model of size 2.5 to 50 mm (0.1 to 2.0 in.), select PN40 (Process connection code : AD4) because there is no difference in the dimensions of the mating faces.
Even when DIN PN10 is required for a model of size 65 to 150 mm (2.5 to 6.0 in.), select PN16 (Process connection code : AD2) because there is no difference in the dimensions of the mating faces.

*2: Mating dimensions are based on standards as follow:
ANSI:ASME B 16.5, DIN: DIN 2501, JIS:JIS B 2220 and JIS G 3451

*3: AXF standard lay length dimension for ceramics linings are the same as those for ADMAG ceramics linings.

*4: N shall be always selected for remote flowtubes
In the case of an integral flowmeter, select from among the figures at the right:



*5: For explosion proof types, specify types of explosion proof certification using the optional codes. In case of TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.

*6: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.

*7: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

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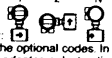
19.1.2

AXF STANDARD (Flange Type) Size 2.5 mm (0.1 in.) to 400 mm (16 in.)

General-purpose Use/Submersible Type/Explosion proof Type, PFA/Polyurethane Rubber /Natural Soft Rubber/ EPDM Rubber Lining

Model	Suffix Code	Description	Applicable Model
AXF002		Size 2.5 mm (0.1 in.) Integral Flowmeter/Remote Flowtube	
AXF005		Size 5 mm (0.2 in.) Integral Flowmeter/Remote Flowtube	
AXF010		Size 10 mm (0.4 in.) Integral Flowmeter/Remote Flowtube	
AXF015		Size 15 mm (0.5 in.) Integral Flowmeter/Remote Flowtube	
AXF025		Size 25 mm (1.0 in.) Integral Flowmeter/Remote Flowtube	
AXF032		Size 32 mm (1.25 in.) Integral Flowmeter/Remote Flowtube	
AXF040		Size 40 mm (1.5 in.) Integral Flowmeter/Remote Flowtube	
AXF050		Size 50 mm (2.0 in.) Integral Flowmeter/Remote Flowtube	
AXF065		Size 65 mm (2.5 in.) Integral Flowmeter/Remote Flowtube	
AXF080		Size 80 mm (3.0 in.) Integral Flowmeter/Remote Flowtube	
AXF100		Size 100 mm (4.0 in.) Integral Flowmeter/Remote Flowtube	
AXF125		Size 125 mm (5.0 in.) Integral Flowmeter/Remote Flowtube	
AXF150		Size 150 mm (6.0 in.) Integral Flowmeter/Remote Flowtube	
AXF200		Size 200 mm (8.0 in.) Integral Flowmeter/Remote Flowtube	
AXF250		Size 250 mm (10 in.) Integral Flowmeter/Remote Flowtube	
AXF300		Size 300 mm (12 in.) Integral Flowmeter/Remote Flowtube	
AXF350		Size 350 mm (14 in.) Integral Flowmeter/Remote Flowtube	
AXF400		Size 400 mm (16 in.) Integral Flowmeter/Remote Flowtube	
Use	G	General-Purpose Use	
	W	Submersible Type	Size 15 mm (0.5 in.) to 400 mm (16 in.), Remote Flowtube only
	C	Explosion proof Type (*6)	PFA lining only
Converter Output Signal and Communication	-D	Integral Flowmeter with 4 to 20 mA DC Output and BRAIN Communication	
	-E	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N	Remote Flowtube for Combined Use with AXFA11	
	-P	Remote Flowtube for Combined Use with AXFA14	
Power Supply	1	Integral Flowmeter, 100 V to 240 V AC or 100 to 120 V DC	
	2	Integral Flowmeter, 24 V AC/DC	
	N	Remote Flowtube	
Lining	A	Fluorocarbon PFA	
	U	Polyurethane Rubber	Size 25 mm (1.0 in.) to 400 mm (16 in.)
	D	Natural Soft Rubber	Size 50 mm (2.0 in.) to 400 mm (16 in.)
	G	EPDM Rubber	Size 50 mm (2.0 in.) to 400 mm (16 in.)
Elecrode Material	L	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P	Platinum-iridium	PFA lining only
	H	Hastelloy C276 Equivalent	
	T	Tantalum	PFA lining only
	V	Titanium	
	W	Tungsten Carbide	PFA/Polyurethane Rubber lining only
Electrode Structure	1	Non-replaceable	
	2	Replaceable	General-Purpose use, Size 25 mm (1.0 in.) to 400 mm (16 in.) PFA/Polyurethane Rubber lining only Electrode Material: JIS SUS316L only
Grounding Ring and Grounding Electrode Material	N	None	
	S	JIS SUS316 (AISI 316 SS/EN 1.4401 Equivalent)	
	L	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P	Platinum-iridium	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.), PFA lining only
	H	Hastelloy C276 Equivalent	
	T	Tantalum	Size 2.5mm (0.1 in.) to 200 mm (8.0 in.), PFA lining only
	V	Titanium	
Process Connection (*4)	-BA1	ANSI Class 150 Flange (Stainless Steel)(*1)	Size 2.5 mm (0.1 in.) to 400 mm (16 in.)
	-BA2	ANSI Class 300 Flange (Stainless Steel)(*1)	Size 2.5 mm (0.1 in.) to 300 mm (12 in.)
	-BD1	DIN PN 10 Flange (Stainless Steel)(*2)	Size 200 mm (8.0 in.) to 400 mm (16 in.)
	-BD2	DIN PN 16 Flange (Stainless Steel)(*2)	Size 65 mm (2.5 in.) to 300 mm (12 in.)
	-BD4	DIN PN 40 Flange (Stainless Steel)(*1)(*2)	Size 2.5 mm (0.1 in.) to 50 mm (2.0 in.)
	-BJ1	JIS 10K Flange (Stainless Steel)(*1)	Size 2.5 mm (0.1 in.) to 400 mm (16 in.)
	-BJ2	JIS 20K Flange (Stainless Steel)(*1)	Size 2.5 mm (0.1 in.) to 300 mm (12 in.)
	-BG1	JIS F12 (JIS75M) Flange (Stainless Steel)	Size 80 mm (3.0 in.) to 400 mm (16 in.)
	-CA1	ANSI Class 150 Flange (Carbon Steel)	Size 50 mm (2 in.) to 400 mm (16 in.)
	-CA2	ANSI Class 300 Flange (Carbon Steel)	Size 50 mm (2 in.) to 300 mm (12 in.)
	-CD1	DIN PN 10 Flange (Carbon Steel)(*2)	Size 200 mm (8.0 in.) to 400 mm (16 in.)
	-CD2	DIN PN 16 Flange (Carbon Steel)(*2)	Size 65 mm (2.5 in.) to 300 mm (12 in.)
	-CD4	DIN PN 40 Flange (Carbon Steel)(*2)	Size 50 mm (2.0 in.) only
	-CJ1	JIS 10K Flange (Carbon Steel)	Size 50 mm (2.0 in.) to 400 mm (16 in.)
	-CJ2	JIS 20K Flange (Carbon Steel)	Size 50 mm (2.0 in.) to 300 mm (12 in.)
	-CG1	JIS F12 (JIS75M) Flange (Carbon Steel)	Size 80 mm (3.0 in.) to 400 mm (16 in.)
	-DD4	DIN PN 40 Flange (Stainless Steel), DN10(*2)(*3)"	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
	-DJ1	JIS 10K Flange (Stainless Steel), 10 mm Diameter Nominal (*3)	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
	-DJ2	JIS 20K Flange (Stainless Steel), 10 mm Diameter Nominal (*3)	Size 2.5 mm (0.1 in.) to 10 mm (0.4 in.)
Lay Length	1	Standard	
Electrical Connection (*7)	-0	JIS G1/2 female	
	-2	ANSI 1/2 NPT female	Not available for Submersible Type
	-4	ISO M20×1.5 female	Not available for Submersible Type
Indicator (*5)(*8)	1	Integral Flowmeter with indicator (Horizontal)	
	2	Integral Flowmeter with indicator (Vertical)	
	N	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B	Standard	
	C	High Grade	Size 25 mm (1.0 in.) to 200 mm (8.0 in.), PFA lining only
	/□	Optional code (See the Table of Optional Specifications)	

*1: For a wafer type of 2.5 to 10 mm (0.1 to 0.4 in.), prepare 15 mm (0.5 in.) diameter nominal flanges on the process pipe side.
(Process connection codes: BA1, BA2, BD4, BJ1, and BJ2)
*2: Even when DIN PN10 or 16 is required for a model of size 2.5 to 50 mm (0.1 to 2.0 in.), select PN40 (Process connection codes: BD4,CD4 and DD4) because there is no difference in the dimensions of the mating faces.
Even when DIN PN10 is required for a model of size 65 to 150 mm (2.5 to 6.0 in.), select PN16 (Process connection codes: BD2 , CD2) because there is no difference in the dimensions of the mating faces.
*3: For a flange type of 2.5 to 10 mm (0.1 to 0.4 in)(Process connection codes: DJ1, DJ2, and DD4), prepare 10 mm (0.4 in.) diameter nominal flanges on the process pipe side.
*4: Mating dimensions are based on standards as follow:
ANSI:ASME B 16.5, DIN: DIN 2501, JIS:JIS B 2220 and JIS G 3451
*5: N shall be always selected for remote flowtubes
In the case of an integral flowmeter, select from among the figures at the right:



*6: For explosion proof types, specify types of explosion proof certification using the optional codes. In case of TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.
*7: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.
*8: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

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AXF STANDARD (Flange Type) Size 500 mm (20 in.) to 2600 mm (104 in.)

General-purpose Use/Submersible Type, Polyurethane Rubber Lining

Model	Suffix Code	Description	Applicable Model
AXF500	·····	Size 500 mm (20 in.) Remote Flowtube	
AXF600	·····	Size 600 mm (24 in.) Remote Flowtube	
AXF700	·····	Size 700 mm (28 in.) Remote Flowtube	
AXF800	·····	Size 800 mm (32 in.) Remote Flowtube	
AXF900	·····	Size 900 mm (36 in.) Remote Flowtube	
AXF10L	·····	Size 1000 mm (40 in.) Remote Flowtube	
AXF11L	·····	Size 1100 mm (44 in.) Remote Flowtube	
AXF12L	·····	Size 1200 mm (48 in.) Remote Flowtube	
AXF13L	·····	Size 1350 mm (54 in.) Remote Flowtube	
AXF15L	·····	Size 1500 mm (60 in.) Remote Flowtube	
AXF16L	·····	Size 1600 mm (64 in.) Remote Flowtube	
AXF18L	·····	Size 1800 mm (72 in.) Remote Flowtube	
AXF20L	·····	Size 2000 mm (80 in.) Remote Flowtube	
AXF22L	·····	Size 2200 mm (88 in.) Remote Flowtube	
AXF24L	·····	Size 2400 mm (96 in.) Remote Flowtube	
AXF26L	·····	Size 2600 mm (104 in.) Remote Flowtube	
Use	G ·····	General-Purpose Use	
	W ·····	Submersible Type	
Converter	-N ·····	Remote Flowtube for Combined Use with AXFA11	
Power Supply	N ·····	Remote Flowtube	
Lining	U ·····	Polyurethane Rubber	
Elecrode Material	L ·····	JIS SUS316L(AISI 316L SS/EN 1.4404 Equivalent)	
Electrode Structure	1 ·····	Non-replaceable	
Grounding Ring material	S ·····	JIS SUS304 (AISI 304 SS/EN 1.4301 Equivalrnt)	Size 500 mm (20 in.) to 1000 mm (40 in.)
		SS400 Carbon Steel lined with Stainless Steal SUS316	Size 1100 mm (44 in.) to 2600 mm (104 in.)
Process Connection (*1)	-CA1 ·····	ANSI Class 150 Flange (Carbon Steel) (*2)	Size 500 mm (20 in.), 600 mm (24 in.)
	-CD1 ·····	DIN PN10 Flange (Carbon Steel) (*2)	Size 500 mm (20 in.) to 1000 mm (40 in.)
	-CJ1 ·····	JIS 10K Flange (Carbon Steel) (*2)	Size 500 mm (20 in.) to 1000 mm (40 in.)
	-CG1 ·····	JIS F12 (JIS 75M) Flange (Carbon Steel) (*2)(*3)	Size 500 mm (20 in.) to 2600 mm (104 in.)
Lay Length	1 ·····	AXF Standard	
Electrical Connection	-0 ····	JIS G1/2 female	
	-2 ····	ANSI 1/2 NPT female	Size 500 mm (20 in.) to 1000 mm (40 in.), Not available for Submersible Type
	-4 ····	ISO M20×1.5 female	Size 500 mm (20 in.) to 1000 mm (40 in.), Not available for Submersible Type
Indicator	N ···	None	
Calibration	B ···	Standard	
Options	/□	Optional code (See the Table of Optional Specifications)	

*1: Mating dimensions are based on standards as follows:
ANSI:ASME B 16.5, DIN: DIN 2501, JIS:JIS B 2220 and JIS G 3451

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*2: Carbon steel Flange Material: JIS SS400(EN S275 Equivalent)

*3: There are no differences in dimensions of mating faces between JIS F12(JIS 75M) and JIS 7.5K.

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AXF STANDARD (Clamp/Union/Butt Weld Connection)

Sanitary Type , PFA Lining

Model	Suffix Code	Description	Applicable Model
AXF015	·····	Size 15 mm (0.5 in.), Integral Flowmeter/Remote Flowtube	
AXF025	·····	Size 25 mm (1.0 in.), Integral Flowmeter/Remote Flowtube	
AXF032	·····	Size 32 mm (1.25 in.), Integral Flowmeter/Remote Flowtube	
AXF040	·····	Size 40 mm (1.5 in.), Integral Flowmeter/Remote Flowtube	
AXF050	·····	Size 50 mm (2.0 in.), Integral Flowmeter/Remote Flowtube	
AXF065	·····	Size 65 mm (2.5 in.), Integral Flowmeter/Remote Flowtube	
AXF080	·····	Size 80 mm (3.0 in.), Integral Flowmeter/Remote Flowtube	
AXF100	·····	Size 100 mm (4.0 in.), Integral Flowmeter/Remote Flowtube	
AXF125	·····	Size 125 mm (5.0 in.), Integral Flowmeter/Remote Flowtube	
Use	H ·····	Sanitary Type	
Converter Output Signal and Communication	-D ·····	Integral Flowmeter with 4 to 20 mA DC Output and BRAIN Communication	
	-E ·····	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N ·····	Remote Flowtube for Combined use with AXFA11	
	-P ·····	Remote Flowtube for Combined use with AXFA14	
Power Supply	1 ·····	Integral Flowmeter, 100 V to 240 V AC or 100 to 120 V DC	
	2 ·····	Integral Flowmeter, 24 V AC/DC	
	N ·····	Remote Flowtube	
Lining	A ·····	Fluorocarbon PFA	
Elecrode Material	L ·····	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
Electrode Structure	1 ·····	Non-replaceable	
Grounding Ring	N ·····	None	
Process Connection (*2)	-HAB ·····	Tri-Clamp (3A), JIS SUS316L (AISI 316L SS/EN1.4404 Equivalent)(*1)	Size 15 mm (0.5 in.) to 100 mm (4.0in.), except 32 mm (1.25 in.)
	-HDB ·····	DIN32676 Clamp, JIS SUS316L (AISI 316L SS/EN1.4404 Equivalent)	Size 15 mm (0.5 in.) to 125 mm (5.0 in.)
	-HKB ·····	ISO2852/SMS3016 Clamp, JIS SUS316L (AISI 316L SS/ EN1.4404 Equivalent)	Size 15 mm (0.5 in.) to 125 mm (5.0 in.)
	-JDB ·····	DIN11851 Union, SUS316L (AISI 316L SS/EN1.4404 Equivalent)	Size 15 mm (0.5 in.) to 125 mm (5.0 in.)
	-JKB ·····	ISO2853 Union, SUS316L (AISI 316L SS/EN1.4404 Equivalent)	Size 15 mm (0.5 in.) to 100 mm (4.0 in.)
	-JSB ·····	SMS1145 Union, SUS316L (AISI 316L SS/EN1.4404 Equivalent)	Size 25 mm (1.0 in.) to 100 mm (4.0 in.)
	-KDB ·····	Butt Weld for DIN 11850 Pipe Connection (SUS316L [AISI 316L SS/EN1.4404 Equivalent])	Size 15 mm (0.5 in.) to 125 mm (5.0 in.)
	-KKB ·····	Butt Weld for ISO 2037 Pipe Connection (SUS316L [AISI 316L SS/EN1.4404 Equivalent])	Size 15 mm (0.5 in.) to 125 mm (5.0 in.)
Lay Length	1 ·····	Standard	
Electrical Connection	-0 ····	JIS G1/2 female	
	-2 ····	ANSI 1/2 NPT female	
	-4 ····	ISO M20×1.5 female	
Indicator (*3)	1 ···	Integral Flowmeter with indicator (Horizontal)	
	2 ···	Integral Flowmeter with indicator (Vertical)	
	N ···	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B ···	Standard	
	C ···	High Grade	Size 25 mm (1.0 in.) to 125 mm (5.0 in.)
	/□	Optional code (See the Table of Optional Specifications)	

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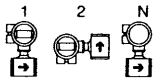
*1: For a tri-clamp type of size15 mm (0.5 in.)(Process connection code: HAB), prepare a 3/4 in. tri-clamp on the process pipe side.

*2: The detail dimensions of process connections (clamp/union/butt weld) are shown in the 'EXTERNAL DIMENSIONS' section of the sanitary type.
In case of Butt Weld type, ferrules, sleeves, or alternative must be provided by the user. User need to weld these parts to the butt weld adapter.

*3: N shall be always selected for remote flowtubes.
In the case of an integral flowmeter, select from among the following figures.



REPLACEMENT MODEL FOR EARLIER ADMAG OR ADMAG AE (Wafer Type)

General-purpose Use/Submersible Type/Explosion proof Type, PFA/Polyurethane Rubber Lining

For the Wafer Types of size 250 mm (10 in.), 300 mm (12 in.), **AXF Standard** shall be selected.

Model	Suffix Code	Description	Applicable Model
AXF002	·····	Size 2.5 mm (0.1 in.) Integral Flowmeter/Remote Flowtube	
AXF005	·····	Size 5 mm (0.2 in.) Integral Flowmeter/Remote Flowtube	
AXF010	·····	Size 10 mm (0.4 in.) Integral Flowmeter/Remote Flowtube	
AXF015	·····	Size 15 mm (0.5 in.) Integral Flowmeter/Remote Flowtube	
AXF025	·····	Size 25 mm (1.0 in.) Integral Flowmeter/Remote Flowtube	
AXF040	·····	Size 40 mm (1.5 in.) Integral Flowmeter/Remote Flowtube	
AXF050	·····	Size 50 mm (2.0 in.) Integral Flowmeter/Remote Flowtube	
AXF080	·····	Size 80 mm (3.0 in.) Integral Flowmeter/Remote Flowtube	
AXF100	·····	Size 100 mm (4.0 in.) Integral Flowmeter/Remote Flowtube	
AXF150	·····	Size 150 mm (6.0 in.) Integral Flowmeter/Remote Flowtube	
AXF200	·····	Size 200 mm (8.0 in.) Integral Flowmeter/Remote Flowtube	
Use	G ·····	General-Purpose Use	
	W ·····	Submersible Type	Size 15 mm (0.5 in.) to 200 mm (8.0 in.), Remote Flowtube only
	C ·····	Explosion proof Type (*5)	PFA lining only
Converter Output Signal and Communication	-D ·····	Integral Flowmeter with 4 to 20 mA DC Output and BRAIN Communication	
	-E ·····	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N ·····	Remote Flowtube for Combined Use with AXFA11	
	-P ·····	Remote Flowtube for Combined Use with AXFA14	
Power Supply	1 ·····	Integral Flowmeter, 100 V to 240 V AC or 100 to 120 V DC	
	2 ·····	Integral Flowmeter, 24 V AC/DC	
	N ·····	Remote Flowtube	
Lining	A ·····	Fluorocarbon PFA	
	U ·····	Polyurethane Rubber	Size 25 mm (1.0 in.) to 200 mm (8.0 in.)
Elecrode Material	L ·····	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P ·····	Platinum-iridium	PFA lining only
	H ·····	Hastelloy C276 Equivalent	
	T ·····	Tantalum	PFA lining only
	V ·····	Titanium	
	W ·····	Tungsten Carbide	
Electrode Structure	1 ·····	Non-replaceable	
Grounding Ring and Grounding Electrode Material	N ·····	None	Size 25 mm (1.0 in.) to 200 mm (8.0 in.)(*5)
	S ·····	JIS SUS316 (AISI 316 SS/EN 1.4401 Equivalent)	
	L ·····	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P ·····	Platinum-iridium	PFA lining only
	H ·····	Hastelloy C276 Equivalent	
	T ·····	Tantalum	PFA lining only
	V ·····	Titanium	
Process Connection (*3)	-AA1 ·····	ANSI Class 150 Wafer(*1)	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	-AA2 ·····	ANSI Class 300 Wafer(*1)	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	-AD1 ·····	DIN PN 10 Wafer(*2)	Size 200 mm(8.0 in.) only
	-AD2 ·····	DIN PN 16 Wafer(*2)	Size 80 mm (3.0 in.) to 200 mm (8.0 in.)
	-AD4 ·····	DIN PN 40 Wafer(*1)(*2)	Size 2.5 mm (0.1 in.) to 50 mm (2.0 in.)
	-AJ1 ·····	JIS 10K Wafer(*1)	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	-AJ2 ·····	JIS 20K Wafer(*1)	Size 2.5 mm (0.1 in.) to 200 mm (8.0 in.)
	-AG1 ·····	JIS F12 (JIS75M) Wafer	Size 80 mm (3.0 in.) to 200 mm (8.0 in.)
Lay Length	2 ·····	Matches an Earlier ADMAG Flowmeter (ADMAG or ADMAG AE) for Replacement	
Electrical Connection (*6)	-0 ····	JIS G1/2 female	
	-2 ····	ANSI 1/2 NPT female	Not available for Submersible Type
	-4 ····	ISO M20×1.5 female	Not available for Submersible Type
Indicator (*4)(*7)	1 ···	Integral Flowmeter with indicator(Horizontal)	
	2 ···	Integral Flowmeter with indicator(Vertical)	
	N ···	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B ···	Standard	
	/□	Optional code (See the Table of Optional Specifications)	

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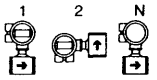
*1: For a wafer type of 2.5 to 10 mm (0.1 to 0.4 in.), prepare 15 mm (0.5 in.) diameter nominal flanges on the process pipe side.
(Process connection codes: AA1, AA2, AD4, AJ1, and AJ2)

*2: Even when DIN PN10 or 16 is required for a model of size 2.5 to 50 mm (0.1 to 2.0 in.), select PN40 (Process connection code: AD4) because there is no difference in the dimensions of the mating faces.
Even when DIN PN10 is required for a model of size 65 to 150 mm (2.5 to 6.0 in.), select PN16 (Process connection code: AD2) because there is no difference in the dimensions of the mating faces.

*3: Mating dimensions are based on standards as follow:
ANSI:ASME B 16.5, DIN: DIN 2501, JIS:JIS B 2220 and JIS G 3451

*4: N shall be always selected for remote flowtubes
In the case of an integral flowmeter, select from among the figures at the right:



*5: For explosion proof types, specify types of explosion proof certification using the optional codes. In case of TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.

*6: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.

*7: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

REPLACEMENT MODEL FOR EARLIER ADMAG OR ADMAG AE (Flange Type)

General-purpose Use/Submersible Type/Explosion proof Type, PFA/Polyurethane Rubber Lining

For Flange Types of size 15 mm (0.5 in.) to 100 mm (4.0 in.), 300 mm (12 in.) to 2600 mm (104 in.), **AXF Standard** shall be selected.

Model	Suffix Code	Description	Applicable Model
AXF150	·····	Size 150 mm (6.0 in.) Integral Flowmeter/Remote Flowtube	
AXF200	·····	Size 200 mm (8.0 in.) Integral Flowmeter/Remote Flowtube	
AXF250	·····	Size 250 mm (10 in.) Integral Flowmeter/Remote Flowtube	
Use	G ·····	General-Purpose Use	
	W ·····	Submersible Type	Remote Flowtube only
	C ·····	Explosion proof Type (*4)	PFA lining only
Converter Output Signal and Communication	-D ·····	Integral Flowmeter with 4 to 20 mA DC Output and BRAIN Communication	
	-E ·····	Integral Flowmeter with 4 to 20 mA DC Output and HART Communication	
	-N ·····	Remote Flowtube for Combined Use with AXFA11	
	-P ·····	Remote Flowtube for Combined Use with AXFA14	
Power Supply	1 ·····	Integral Flowmeter, 100 V to 240 V AC or 100 to 120 V DC	
	2 ·····	Integral Flowmeter, 24 V AC/DC	
	N ·····	Remote Flowtube	
Lining	A ·····	Fluorocarbon PFA	
	U ·····	Polyurethane Rubber	
Elecrode Material	L ·····	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P ·····	Platinum-iridium	PFA lining only
	H ·····	Hastelloy C276 Equivalent	
	T ·····	Tantalum	PFA lining only
	V ·····	Titanium	
	W ·····	Tungsten Carbide	
Electrode Structure	1 ·····	Non-replaceable	
	2 ·····	Replaceable	General-Purpose use,Electrode Material : JIS SUS316L only
Grounding Ring and Grounding Electrode Material	N ·····	None	
	S ·····	JIS SUS316 (AISI 316 SS/EN 1.4401 Equivalent)	
	L ·····	JIS SUS316L (AISI 316L SS/EN 1.4404 Equivalent)	
	P ·····	Platinum-iridium	Size150 mm (6.0 in.), 200 mm (8.0 in.), PFA lining only
	H ·····	Hastelloy C276 Equivalent	
	T ·····	Tantalum	Size150 mm (6.0 in.), 200 mm (8.0 in.), PFA lining only
	V ·····	Titanium	
Process Connection (*2)	-CA1 ·····	ANSI Class 150 Flange (Carbon Steel)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
	-CA2 ·····	ANSI Class 300 Flange (Carbon Steel)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
	-CD1 ·····	DIN PN 10 Flange (Carbon Steel)(*1)	Size 200 mm (8.0 in.) to 250 mm (10 in.)
	-CD2 ·····	DIN PN 16 Flange (Carbon Steel)(*1)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
	-CJ1 ·····	JIS 10K Flange (Carbon Steel)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
	-CJ2 ·····	JIS 20K Flange (Carbon Steel)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
	-CG1 ·····	JIS F12 (JIS75M) Flange (Carbon Steel)	Size 150 mm (6.0 in.) to 250 mm (10 in.)
Lay Length	2 ·····	Matches an Earlier ADMAG Flowmeter (ADMAG or ADMAG AE) for Replacement	
Electrical Connection (*5)	-0 ····	JIS G1/2 female	
	-2 ····	ANSI 1/2 NPT female	Not available for Submersible Type
	-4 ····	ISO M20×1.5 female	Not available for Submersible Type
Indicator (*3)(*6)	1 ···	Integral Flowmeter with indicator (Horizontal)	
	2 ···	Integral Flowmeter with indicator(Vertical)	
	N ···	Integral Flowmeter without indicator /Remote Flowtube	
Calibration	B ···	Standard	
	/□	Optional code (See the Table of Optional Specifications)	

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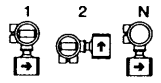
*1: Even when DIN PN10 is required for a 150 (6.0 in.)-mm model, select PN16 (Process connection code: CD2) because there is no difference in the dimensions of the mating faces.

*2: Mating dimensions are based on standards as follow:
ANSI: ASME B 16.5, DIN:DIN 2501, JIS:JIS B 2220 and JIS G 3451

*3: N shall be always selected for remote flowtubes.
In the case of an integral, select from among the following figures:



*4: For explosion proof types, specify types of explosion proof certification using the optional codes. In case of TIIS flame proof type, the remote flowtube is available only for combined use with the AXFA14. For the TIIS flame proof type with wiring using a flame proof packing adapter, select optional code G12 or G11. Available only for JIS G1/2 electrical connections.

*5: JIS G1/2 Female electrical connection is available only for TIIS flame proof type.

*6: In case of integral flowmeters of the TIIS flame proof type, select "with indicator"(code 1 or 2).

■ OPTIONAL SPECIFICATIONS FOR FLOWTUBES

● Table of Optional Specifications (Size 2.5 mm (0.1 in.) to 400 mm (16 in.))

○: Available –: Not available

Item	Specifications	Applicable Model							Code
		General		Explosion proof		Submersible	Sanitary		
		Integral Flowmeter	Remote Flowtube	Integral Flowmeter	Remote Flowtube	Remote Flowtube	Integral Flowmeter	Remote Flowtube	
		AXF***G-D AXF***G-E	AXF***G-N AXF***G-P	AXF***C-D AXF***C-E	AXF***C-N AXF***C-P	AXF***W-N AXF***W-P	AXF***H-D AXF***H-E	AXF***H-N AXF***H-P	
For District Heating and Cooling or Condensation-proof	Urethane resin potting is applied in the terminal box of a remote flowtube. Select JIS G1/2 for the electrical connections. 30-m signal and excitation cables are pre-wired and waterproof grands with union joints are attached at factory.	–	○	–	–	–	–	○	DHC
User-specified Signal and Excitation Cable Length	Available for the submersible type and a model with optional code DHC. The cable length is limited up to 200 meters when combined with an AXFA11 converter, or 100 meters when combined with an AXFA14 converter. Following "L," specify the cable length in three digits as a multiple of 1 meter (e.g., 001, 002, or 005) for a length up to 5 m, or as a multiple of 5 meters (i.e., 005, 010, 015, or the like) for a length of 5 meters or more. If this optional code is not sellected, a 30m long cable is attached.	–	○	–	–	○	–	○	L***
Lightning Protector	A lightning protector is built into the power terminals.	○	–	○	–	–	○	–	A
DC Noise Cut Circuit	The DC Noise Cut Circuit is built in. Available for 15 mm (0.5 in.) and larger sizes, and for fluids with the conductivity of 50 µS/cm or higher. Nullifies the empty check and electrode adhesion diagnostic function	○	–	○	–	–	○	–	ELC
Burn Out Down	The output level is set to 0 mA during a CPU failure and is set 2.4 mA (-10 %) or less during an alarm. Standard products are delivered with a setting 25 mA during a CPU failure and 21.6 mA (110%) or more during an alarm.	○	–	○	–	–	○	–	C1
NAMUR NE43 Compliance	Output signal limits: 3.8 to 20.5 mA — Failure alarm down-scale: The output level is set to 0 mA during a CPU failure and is set 2.4 mA (–10%) or less during an alarm.	○	–	○	–	–	○	–	C2
	Output signal limits: 3.8 to 20.5 mA — Failure alarm up-scale: The output level is set to 25 mA during a CPU failure and is set 21.6 mA (110%) or more during an alarm.	○	–	○	–	–	○	–	C3
Active Pulse Output	Active pulses are output in order to drive an external electromagnetic or electronic counter directly using the converter's internal power supply. (Nullifies the standard transistor contact pulse output.) Output voltage: 24 V DC ±20% Pulse specifications: • The drive current of 30 to 150 mA • Pulse rate: 0.0001 to 2 pps (pulse/second); Pulse width: 20, 33, 50, or 100 ms	○	–	○	–	–	○	–	EM
Mass Unit Setting	The flow rate span, output pulse weight, and totalizer display pulse weight can be set in terms of mass. Specify the density of the process fluid when ordering in addition to the flow rate span, output pulse weight, and totalizer display pulse weight. The mass flow rate span must not exceed 32000 when ignoring the decimal point. When ordering a remote flowtube, parameters for 'Mass Unit Setting' will be set in the corresponding converter before shipment. Available mass units: t, kg, g, klb, lb Available time units: /d, /h, /min, /s Available density units: kg/m³ , lb/gal, lb/cf	○	○	○	○	○	○	○	MU
G3/4 Female Waterproof Glands	Waterproof glands for G3/4 conduits or flexible tubes are attached to the electrical connections. Available only for JIS G1/2 electric connections.	–	○	–	–	–	–	○	EW
Waterproof Glands	Waterproof glands are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	○	–	–	–	○	○	EG
Waterproof Glands with Union Joints	Waterproof glands with union joints are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	○	–	–	–	○	○	EU
Plastic Glands	Plastic glands are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	○	–	–	–	○	○	EP

T26-1.EPS

● Table of Optional Specifications (Size 2.5 mm (0.1 in.) to 400 mm (16 in.)) (continued)

○: Available –: Not available

Item	Specifications		Applicable Model							Code
			General		Explosion proof		Submersible	Sanitary		
			Integral Flowmeter	Remote Flowtube	Integral Flowmeter	Remote Flowtube	Remote Flowtube	Integral Flowmeter	Remote Flowtube	
			AXF***G-D AXF***G-E	AXF***G-N AXF***G-P	AXF***C-D AXF***C-E	AXF***C-N AXF***C-P	AXF***W-N AXF***W-P	AXF***H-D AXF***H-E	AXF***H-N AXF***H-P	
Mirror Finished PFA Lining	Mirror finishing on the PFA lining inside of the tube to the smoothness lying between 0.05 and 0.15 μm of Ra. Available for 15 mm (0.5 in.) and larger sizes.		○	○	○	○	○	○	○	PM
Mirror Finished Ceramics	Mirror finishing on the inside of the ceramics tube to Rmax ≤ 1 μm. Available for 5 mm (0.2 in.) and larger sizes.		○	○	○	○	–	–	–	CM
Stainless Steel Tag Plate	A pendant tag plate of JIS SUS304 (AISI 304 SS/EN 1.4301 equivalent) is provided. Choose this option when a pendant tag plate is required in addition to the standard nameplate with the tag number inscribed on it. Dimension (Height × Width): Appr. 12.5 (4.92) × 40 (15.7) mm (inch)		○	○	○	○	○	○	○	SCT
Direction change of the electrical connection (*1)	+90 degrees rotated converter (or terminal box) to change the direction of the electrical connection.		○	○	○	○	○	○	○	RA
	+180 degrees rotated converter (or terminal box) to change the direction of the electrical connection.		○	○	○	○	○	○	○	RB
	−90 degrees rotated converter (or terminal box) to change the direction of the electrical connection.		○	○	○	○	○	○	○	RC
Bolts, Nuts, and Gaskets (*2)	Bolts, nuts, and gaskets are provided for wafer connections.	Bolts and nuts: Carbon steel; Gaskets: Chloroprene rubber	○	○	○	○	○	–	–	BCC
		Bolts and nuts: Carbon steel; Gaskets: PTFE-sheathed non-asbestos	○	○	○	○	○	–	–	BCF
	Available only for ANSI 150, JIS10K, or, JIS20K wafer connections.	Bolts: JIS SUS304 (AISI 304 SS stainless steel equivalent); Nuts: JIS SUS403 (AISI 403SS stainless steel equivalent) ; Gaskets: Chloroprene rubber	○	○	○	○	○	–	–	BSC
		Bolts: JIS SUS304 (AISI 304 SS stainless steel equivalent); Nuts: JIS SUS403 (AISI 403SS stainless steel equivalent) ; Gaskets: PTFE-sheathed non-asbestos	○	○	○	○	○	–	–	BSF
Special Gaskets (*3)	Viton® gaskets for use with a PFA or ceramics lining with PVC piping. Valqua #4010, special fluororubber not mixed. Available for 2.5 mm (0.1 in.) to 200 mm (8.0 in.) of PFA lining or 15 to 200 mm (0.5 to 8 in.) sizes of ceramics lining.		○	○	○	○	○	–	–	GA
	Acid-resistant Viton® gaskets for use with a PFA or ceramics lining with PVC piping. Valqua #4010, special fluororubber mixed (mixing #RCD470). Available for 2.5 mm (0.1 in.) to 200 mm (8.0 in.) of PFA lining or 15 to 200 mm (0.5 to 8 in.) sizes of ceramics lining.		○	○	○	○	○	–	–	GC
	Alkali-resistant Viton® gaskets for use with a PFA or ceramics lining with PVC piping. Valqua #4010, special fluororubber mixed (mixing #RCD970). Available for 2.5 mm (0.1 in.) to 200 mm (8.0 in.) of PFA lining or 15 to 200 mm (0.5 to 8 in.) sizes of ceramics lining.		○	○	○	○	○	–	–	GD
	Alkali-resistant carbonized fluororesin gaskets for use with a ceramics lining with metal piping. Valqua #7026.		○	○	○	○	–	–	–	GF
	Silicon rubber gaskets for Sanitary Type, provided between the lining and the adapter. For the condition of fluid temp. 120 to 160°C (248 to 320°F).		–	–	–	–	–	○	○	GH
Oil-prohibited Use	Electrodes, linings, and grounding rings are assembled and packed with polyethylene after being cleaned with water and acetone and dried with air. The label 'OIL FREE' is affixed.		○	○	○	○	–	–	–	K1
Oil-prohibited Use with Dehydrating Treatment	Electrodes, linings, and grounding rings are assembled and packed with polyethylene including desiccants after being cleaned with water and acetone and dried with air. The label 'OIL & WATER FREE' is affixed.		○	○	○	○	–	–	–	K5
Painting Color Change	Coated in black (Munsell N1.5 or its equivalent.)		○	○	○	○	–	○	○	P1
	Coated in jade green (Munsell 7.5 BG 4/1.5 or its equivalent.)		○	○	○	○	–	○	○	P2
	Coated in metallic silver.		○	○	○	○	–	○	○	P7

T26-2 EPS

● Table of Optional Specifications (Size 2.5 mm (0.1 in.) to 400 mm (16 in.)) (continued)

○: Available –: Not available

Item	Specifications	Applicable Model							Code
		General		Explosion proof		Submersible	Sanitary		
		Integral Flowmeter	Remote Flowtube	Integral Flowmeter	Remote Flowtube	Remote Flowtube	Integral Flowmeter	Remote Flowtube	
		AXF···G-D AXF···G-E	AXF···G-N AXF···G-P	AXF···C-D AXF···C-E	AXF···C-N AXF···C-P	AXF···W-N AXF···W-P	AXF···H-D AXF···H-E	AXF···H-N AXF···H-P	
Epoxy Resin Coating	Epoxy resin coating which has alkali-resistance instead of standard polyurethane resin coating. The color is same as standard type.	○	○	○	○	–	–	–	X1
High Anti-corrosion Coating	Three-layer coating (polyurethane coating on two-layer epoxy resin coating) in the same range as that for the standard coating. The color is same as standard type. Salt/alkali/acid/weather-resistance.	○	○	○	○	–	–	–	X2
Material Certificate	Reproduced material certificates for : PFA/polyurethane: Pipe, electrodes, grounding rings/grounding electrodes, flanges or mini flanges, adapters (for sanitary type) Ceramics: only grounding rings or grounding electrodes	○	○	○	○	○	○	○	M01
Hydrostatic Test	The test verifies the absence of leaks by applying the following water pressures (which are determined under process connection conditions) to linings for ten minutes. Test results are described in the Note column of a test certificate (QIC). **Process Connection:** / **Water Pressure:** ANSI Class 150, DIN PN10, JIS 10K / 1.5 MPa ANSI Class 300, DIN PN16, JIS 20K / 3.0 MPa DIN PN40, Union joint (Ceramics lining) / 6.0 MPa JIS F12 / 1.25 MPa	○	○	○	○	○	–	–	T01
Calibration Certificate	Level 2: The Declaration and the Calibration Equipment List are issued.	○	○	○	○	○	○	○	L2
	Level 3: The Declaration and the Primary Standard List are issued.	○	○	○	○	○	○	○	L3
	Level 4: The Declaration and the Yokogawa Measuring Instruments Control System are issued.	○	○	○	○	○	○	○	L4
Vent Hole	With a vent hole provided for permeable fluids (such as nitric acid, hydrofluoric acid, or sodium hydroxide at high temperature). Available only for a PFA lining flange type tube.	○	○	○	○	–	–	–	H
Enhanced Dual Frequency Excitation (*4)	Available for 25 to 200 mm (1.0 to 8.0 in.) sizes. Products are delivered with the Standard dual frequency excitation mode and the Enhanced dual frequency excitation mode enabled. As flow calibration is not performed for optional code HF1 while in Enhanced dual frequency excitation. Excitation mode select optional code HF2 when an accurate flow measurement is required.	○	○	○	○	○	○	○	HF1
	Available for 25 to 200 mm (1.0 to 8.0 in.) sizes. Products are delivered with the Standard dual frequency excitation mode and the Enhanced dual frequency excitation mode enabled. The meter factor for the Enhanced dual frequency excitation obtained by flow calibration is inscribed on the nameplate and set into the combined converter in addition to the meter factor for the Standard dual frequency excitation.	○	○	○	○	○	○	○	HF2

T26-3.EPS

● Table of Optional Specifications (Size 2.5 mm (0.1 in.) to 400 mm (16 in.)) (continued)

○: Available –: Not available

Item	Specifications	Applicable Model: General – Integral Flowmeter AXF***G-D AXF***G-E	General – Remote Flowtube AXF***G-N AXF***G-P	Explosion proof – Integral Flowmeter AXF***C-D AXF***C-E	Explosion proof – Remote Flowtube AXF***C-N AXF***C-P	Submersible – Remote Flowtube AXF***W-N AXF***W-P	Sanitary – Integral Flowmeter AXF***H-D AXF***H-E	Sanitary – Remote Flowtube AXF***H-N AXF***H-P	Code
Five-point Calibration in User-specified Span	A flow test at 0, 25, 50, 75, and 100% of the user-specified span is performed instead of the flow test of the standard 2m/s span and a test certificate (QIC) is submitted. Specify the span (100% flow rate) whose corresponding flow velocity lies between 0.5 to 10 m/s (limits imposed by the flowtube performance) and that is less than the maximum line capacity shown below. **Size** / **Max. line capacity (m^3/h)** 2.5 mm (0.1 in.) 0.05 5 mm (0.2 in.) 0.2 10 mm (0.4 in.) 0.96 15 mm (0.5 in.) 2.8 25 mm (1 in.) 11 32 mm (1.25 in.) 30 40 mm (1.5 in.) 32 50 mm (2 in.) 56 65 mm (2.5 in.) 80 80 mm (3 in.) 126 100 mm (4 in.) 220 125 mm (5 in.) 300 150 mm (6 in.) 380 200 mm (8 in.) 670 250 mm (10 in.) 1000 300,350 mm (12, 14 in.) 1200 400 mm (16 in.) 1350	○	○	○	○	○	○	○	SC
FM Approval	FM Explosion proof See "HAZARDOUS AREA CLASSIFICATION"	–	–	○	○	–	–	–	FF1
CENELEC ATEX Certification (KEMA Approval)	ATEX Explosion proof See "HAZARDOUS AREA CLASSIFICATION"	–	–	○	○	–	–	–	KF2
CSA Certification	CSA Explosion proof See "HAZARDOUS AREA CLASSIFICATION"	–	–	○	○	–	–	–	CF1
TIIS Certification	TIIS Flame proof See "HAZARDOUS AREA CLASSIFICATION"	–	–	○	△ (*6)	–	–	–	JF3
Flame proof packing adapter for TIIS Flame proof Type (*5)	Two flame proof packing adapters	–	–	○	○	–	–	–	G12
	One flame proof packing adapter and one blind plug. Available for integral flowmeter and only when a four-wire cable is used for power input and signal output with a DC power supply.	–	–	○	–	–	–	–	G11

*1:

	Standard	+90-degree rotation Optional Code RA	+180-degree rotation Optional Code RB	-90-degree rotation Optional Code RC
Integral Flowmeter	Electrical Connection 	Indicator 	 Electrical Connection	 Indicator
Remote Flowtube		Electrical Connection 		 Electrical Connection

*2: When specifying the optional code BCC or BSC for a PFA or ceramics lining, it is advisable to specify the optional code GA, GC, or GD at the same time to prevent potential leakage caused by the difference in elasticity between the flowtube and chloroprene gaskets. Refer to description of "Gasket" in the "Wetted Part Material".

*3: Special gaskets are inserted between the flowtube and the grounding ring or grounding electrode.

*4: Enhanced dual frequency excitation is not available for models with calibration code C (High Grade Accuracy).

*5: Select optional code G12 or G11 when TIIS Flame proof type with wiring using a flame proof packing adapter. Available only for JIS G1/2 electric connection.

*6: The TIIS flame proof type is only available for AXF***C-P (remote flowtube for combined use with AXFA14).

T26-4.EPS

● Table of Optional Specifications (Size 500 mm (20 in.) to 2600 mm (104 in.)) (continued)

○: Available –: Not available

Item	Specifications	Applicable Model: General, Remote Flowtube, AXF***G-N	Applicable Model: Submersible, Remote Flowtube, AXF***W-N	Code
For District Heating and Cooling or Condensation-proof	Urethane resin potting is applied in the terminal box of a remote flowtube. Select JIS G1/2 for the electrical connections. 30-m dedicated and excitation cables are pre-wired and waterproof glands with union joints are attached at factory.	○	–	DHC
User-specified Signal and Excitation Cable Length	Available for the submersible type and a model with optional code DHC. The cable length is limited up to 200 meters when combined with an AXFA11 converter. Following "L," specify the cable length in three digits as a multiple of 1 meter (e. g., 001, 002, or 005) for a length up to 5 meters, or as a multiple of 5 meters (i.e., 005, 010, 015, or the like) for a length of 5 meters or more. If this optional code is not sellected, a 30m long cable is attached.	○	○	L***
Mass Unit Setting	The flow rate span, output pulse weight, and totalizer display pulse weight can be set in terms of mass. Specify the density of the process fluid when ordering in addition to the flow rate span, output pulse weight, and totalizer display pulse weight. The mass flow rate span must not exceed 32000 when ignoring the decimal point. When ordering a remote flowtube, parameters for 'Mass Unit Setting' will be set in the corresponding converter before shipment. Available mass units: t, kg, g, klb, lb Available time units: /d, /h, /min, /s Available density units: kg/m^3 , lb/gal, lb/cf	○	○	MU
G3/4 Female Waterproof Glands	Waterproof glands for G3/4 conduits or flexible tubes are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	–	EW
Waterproof Glands	Waterproof glands are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	–	EG
Waterproof Glands with Union Joints	Waterproof glands with union joints are attached to the electrical connections. Available only for JIS G1/2 electric connections.	○	–	EU
Stainless Steel Tag Plate	Screwd JIS SUS304 (AISI 304 SS/EN 1.4301 stainless steel equivalent) stainless steel tag plate for size 1100 to 2600 mm, or a pendant tag plate of JIS SUS304 is provided for size 500 to 1000 mm. Choose this option when a SS tag plate is required in addition to the standard nameplate with the tag number inscribed on it. Dimension (Height × Width): Appr. 12.5 (4.92) × 40 (15.7) mm (inch)	○	○	SCT
Direction Change of Electrical Connection (*1)	+90 degrees rotated terminal box to change the direction of the electrical connection. Available for 1000 mm (40 in.) and smaller sizes.	○	○	RA
	+180 degrees rotated terminal box to change the direction of the electrical connection. Available for 1000 mm (40 in.) and smaller sizes.	○	○	RB
	–90 degrees rotated terminal box to change the direction of the electrical connection. Available for 1000 mm (40 in.) and smaller sizes.	○	○	RC
Material Certificate	Material certificates are provided for linings, electrodes, grounding rings, and flanges.	○	○	M01
Hydrostatic Test	The test verifies the absence of leaks by applying the following water pressures (which are determined under process connection conditions) to lining for ten minutes. Test results are described in the Note column of a test certificate(QIC). **Process Connection:** / **Water Pressure:** JIS 10K, ANSI Class 150, DIN PN10 / 1.5 MPa JIS F12 / 1.25 MPa	○	○	T01
Calibration Certificate	Level 2: The Declaration and the Calibration Equipment List are issued.	○	○	L2
	Level 3: The Declaration and the Primary Standard List are issued.	○	○	L3
	Level 4: The Declaration and the Yokogawa Measuring Instruments Control System are issued.	○	○	L4
Five-point Calibration in User-specified Span	A flow test at 0, 25, 50, 75, and 100% of the user-specified span is performed instead of the flow test of the standard 2m/s span and a test certificate (QIC) is submitted. Specify the span (100% flow rate) whose corresponding flow velocity lies between 0.5 to 10m/s (limits imposed by the flowtube performance) and that is less than the maximum line capacity shown below. **Size** / **Max. line capacity (m^3/h)** 500 to 1200 mm(20 to 48 in.) / 8200 1350 to 2600 mm(54 to 104 in.) / 41300	○	○	SC

*1:

	Standard	+90-degree rotation Optional Code RA	+180-degree rotation Optional Code RB	–90-degree rotation Optional Code RC
Remote Flowtube		Electrical Connection 		 Electrical Connection

T26-5.EPS

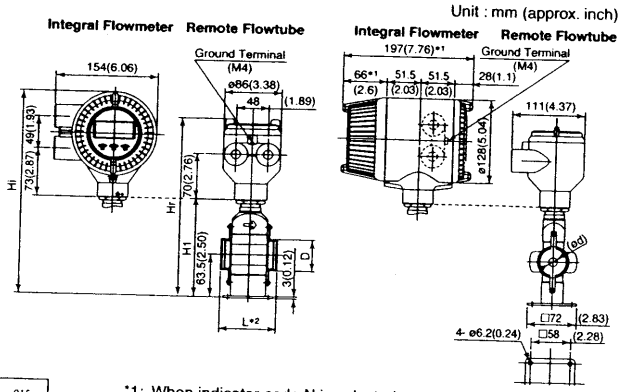
■ EXTERNAL DIMENSIONS

● AXF Standard, AXF002-AXF015, Wafer Type, PFA Lining

Unit : mm (approx. inch)

AXF002 / AXF005 / AXF010 / AXF015 — G / W / C — *4: D E N P — 1 2 N — A □ 1 □ − A □ □ 1

*4: D, E; Integral Flowmeter, N, P; Remote Flowtube



Model	Size code		002	005	010	015
	Size		2.5(0.1)	5(0.2)	10(0.4)	15(0.5)
	Lining code		A	A	A	A
Remote flowtube / Integral flowmeter	Face-to-face length	L*2	81(3.19)			
Remote flowtube	Outside dia.	D	44(1.73)			
Integral flowmeter	Inner diameter of Grounding ring	ød	15(0.59)			
Integral flowmeter	Height	H1	144(5.67)			
Remote flowtube	Max. Height	Hr	268(10.55)			
	Weight kg (lb) *3		2.4(5.3)			
Integral flowmeter	Max. Height	Hi	306(12.03)			
	Weight kg (lb)		4.1(9.0)			

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+26(1.02)	-2(0.08)
	GA, GC, GD (Special Gaskets)	+6(0.24)	+28(1.10)	–

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

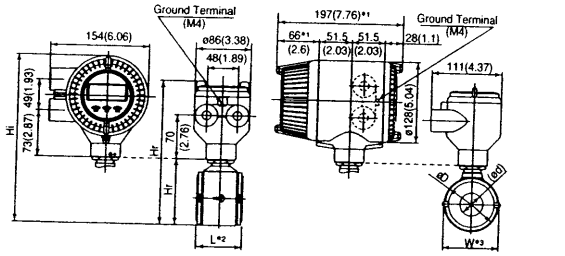
F22 EPS

● AXF Standard, AXF025-AXF125, Wafer Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

AXF025 / AXF032 / AXF040 / AXF050 / AXF065 / AXF080 / AXF100 / AXF125 — G / W / C — *5: D E N P — 1 2 N — A U D G — □ 1/2 □ − A □ □ 1

*5: D, E; Integral Flowmeter, N, P; Remote Flowtube



Model	Size code		025	032	040	050	065	080	100	125
	Size		25(1)	32(1.25)	40(1.5)	50(2)	65(2.5)	80(3)	100(4)	125(5)
	Lining code		A,U	A,U	A,U	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G
Remote Flowtube / Integral Flowmeter	Face-to-face length	L*2	60(2.36)	70(2.76)	70(2.76)	80(3.15)	100(3.94)	120(4.72)	150(5.91)	200(7.87)
Remote Flowtube	Outside dia.	ØD	67.5(2.66)	73(2.87)	86(3.39)	99(3.90)	117(4.61)	129(5.08)	155(6.10)	183(7.20)
Integral Flowmeter	Inner diameter of Grounding ring	Ød	28(1.10)	34(1.34)	41(1.61)	53(2.09)	66(2.60)	77(3.03)	102(4.02)	128(5.04)
Integral Flowmeter	Width	W*3	67.5(2.66)	73(2.87)	86(3.39)	99(3.90)	117(4.61)	129(5.08)	155(6.10)	183(7.20)
	Height	H1	92(3.62)	98(3.86)	111(4.37)	129(5.08)	147(5.79)	157(6.18)	183(7.20)	212(8.35)
Remote Flowtube	Max. Height	Hr	216(8.50)	222(8.74)	235(9.25)	253(9.96)	271(10.67)	281(11.06)	307(12.09)	336(13.23)
	Weight kg (lb)*4		1.9(4.1)	2.0(4.5)	2.2(4.9)	2.7(5.8)	3.4(7.6)	4.1(9.1)	5.6(12.3)	9.3(20.4)
Integral Flowmeter	Max. Height	Hi	254(9.98)	260(10.24)	273(10.73)	291(11.44)	309(12.17)	319(12.54)	345(13.56)	374(14.70)
	Weight kg (lb)		3.6(7.8)	3.7(8.2)	3.9(8.7)	4.4(9.6)	5.1(11.3)	5.8(12.9)	7.3(16.0)	11.0(24.2)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+26(1.02)	-2(0.08)
	GA, GC, GD (Special Gaskets)	+8(0.31)	+30(1.18)	–

*3: When electrode structure 2 is selected, add the following value to W (width).

Nominal Size	25	32, 40, 50	65, 80	100	125
W	+52.5(2.07)	+52(2.05)	+49(1.93)	+48(1.89)	+47(1.85)

*4: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

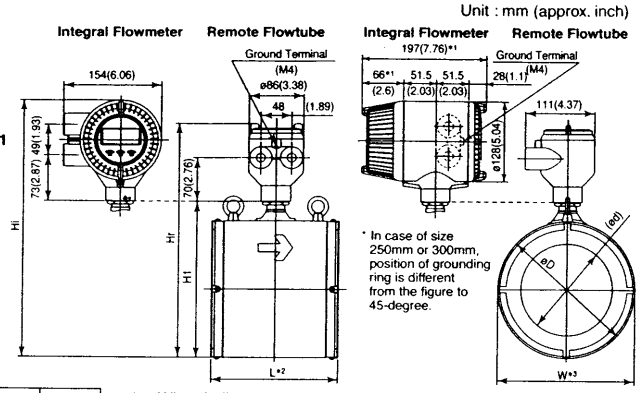
F23 EPS

● AXF Standard, AXF150-AXF300, Wafer Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

AXF150 / AXF200 / AXF250 / AXF300 — G / W / C — *5 — D / E / N / P — 1 / 2 / N — A / U / D / G — □ — 1 / 2 — □ — A □ □ 1

*5: D, E; Integral Flowmeter, N, P; Remote Flowtube



Model	Size code		150	200	250	300
	Size		150(6)	200(8)	250(10)	300(12)
	Lining code		A,U D,G	A,U D,G	A,U D,G	A,U D,G
Remote Flowtube / Integral Flowmeter	Face-to-face length	L*2	200(7.87)	250(9.84)	300(11.81)	350(13.78)
Remote Flowtube	Outside dia.	ØD	202(7.95)	252(9.92)	310(12.20)	358(14.09)
Remote Flowtube / Integral Flowmeter	Inner diameter of Grounding ring	Ød	146.1(5.75)	193.6(7.62)	243.7(9.59)	294.7(11.60)
Integral Flowmeter	Width	W*3	202(7.95)	252(9.92)	310(12.20)	358(14.09)
	Height	H1	243(9.57)	293(11.54)	354(13.94)	402(15.83)
Remote Flowtube	Max. Height	Hr	367(14.45)	417(16.42)	478(18.82)	526(20.71)
	Weight kg (lb)*4		14.5(32.0)	22.1(48.7)	39.0(86.0)	48.3(106.5)
Integral Flowmeter	Max. Height	Hi	405(15.93)	455(17.89)	516(20.31)	564(22.20)
	Weight kg (lb)		16.2(35.7)	23.8(52.4)	40.7(89.7)	50.0(110.2)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Nominal Size: 150 to 200mm				
Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+32(1.26)	-2(0.08)
	GA, GC, GD (Special Gaskets)	+10(0.39)	+38(1.5)	–

Nominal Size: 250 to 300mm			
Grounding Ring Code	S, L, H, V	P, T	N
Option Code is "None"	+0	–	-2(0.08)

*3: When electrode structure 2 is selected, add the following value to W(width).

Nominal size	150	200	250	300
W	+49(1.93)	+50(1.97)	+49(1.93)	+53(2.09)

*4: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached. Add 9.5kg(20.9lb) to the weight in the table.

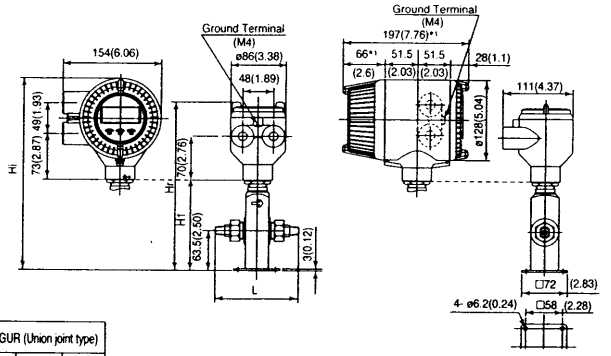
F24 EPS

● AXF Standard, AXF002-AXF010, Weld · Union Joint, Ceramics Lining

Unit : mm (approx. inch)

AXF002 / AXF005 / AXF010 — G / C — *2 — D / E / N / P — 1 / 2 / N — C E 1 N — G U N — W / 1 / R

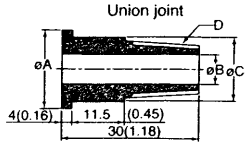
*2: D, E; Integral Flowmeter, N, P; Remote Flowtube



Model	Process connection		GUW (Welding type)			GUN/GUR (Union joint type)		
	Size code		002	005	010	002	005	010
	Size		2.5 (0.1)	5 (0.2)	10 (0.4)	2.5 (0.1)	5 (0.2)	10 (0.4)
	Lining code		C	C	C	C	C	C
Remote flowtube / Integral flowmeter	Face-to-face length	L	140(5.51)			130(5.12)		
Integral flowmeter	Height	H1	144(5.67)			144(5.67)		
Remote flowtube	Max. Height	Hr	268(10.55)			268(10.55)		
	Weight kg (lb)		2.3(5.1)			2.3(5.1)		
Integral flowmeter	Max. Height	Hi	306(12.03)			306(12.03)		
	Weight kg (lb)		4(8.8)			4(8.8)		

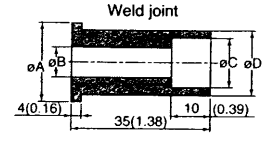
*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

Union joint



Size	A	B	C	D
2.5 (0.1)	22(0.87)	8(0.31)	18.5(0.73)	R1/4
	22(0.87)	8(0.31)	18.5(0.73)	NPT1/4
5 (0.2)	22(0.87)	8(0.31)	18.5(0.73)	R1/4
	22(0.87)	8(0.31)	18.5(0.73)	NPT1/4
10 (0.4)	25(0.98)	10(0.39)	22.5(0.89)	R3/8
	25(0.98)	10(0.39)	22.5(0.89)	NPT3/8

Weld joint



Size	A	B	C	D
2.5(0.1)	22(0.87)	8(0.31)	14.3(0.56)	18.5(0.73)
5(0.2)	22(0.87)	8(0.31)	14.3(0.56)	18.5(0.73)
10(0.4)	25(0.98)	10(0.39)	17.8(0.70)	22.5(0.89)

F25 EPS

99

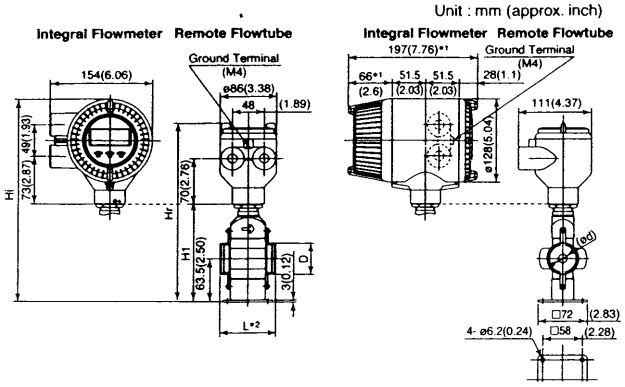
19.1.2

● AXF Standard, AXF015, Wafer Type, Ceramics Lining

Unit : mm (approx. inch)

AXF015 $\frac{G}{C}$ – *3 (D, E, N, P) 1 2 C E 1 □ – A □ □ 1

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube



Model	Size code		015
	Size		15(0.5)
	Lining code		C
Remote flowtube	Face-to-face length	L*2	85(3.35)
	Outside dia.	D	44(1.73)
Integral flowmeter	Inner diameter of Grounding ring	ød	15(0.59)
	Height	H1	144(5.67)
Remote flowtube	Max. Height	Hr	268(10.55)
	Weight kg (lb)		2.3(5.1)
Integral flowmeter	Max. Height	Hi	306(12.03)
	Weight kg (lb)		4(8.8)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code	S, L, H, V	P, T	N
L(Face-to-face length)	+0	+22(087)	-6(0.24)

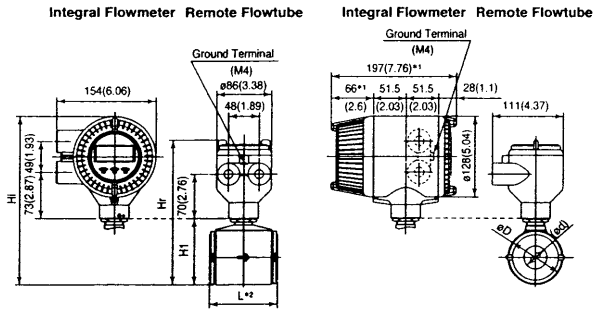
F26.EPS

● AXF Standard, AXF025-AXF100, Wafer Type, Ceramics Lining

Unit : mm (approx. inch)

AXF025
AXF040
AXF050 $\frac{G}{C}$ – *3 (D, E, N, P) 1 2 C E 1 □ – A □ □ 1
AXF080
AXF100

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube



Model	Size code		025	040	050	080	100
	Size		25(1)	40(1.5)	50(2)	80(3)	100(4)
	Lining code		C	C	C	C	C
Remote Flowtube	Face-to-face length	L*2	93(3.66)	106(4.17)	120(4.72)	160(6.30)	180(7.09)
	Outside dia.	øD	67.5(2.66)	86(3.39)	99(3.90)	129(5.08)	155(6.10)
Integral Flowmeter	Inner diameter of Grounding ring	ød	27(1.06)	40(1.57)	52(2.05)	81(3.19)	98(3.86)
	Height	H1	92(3.62)	111(4.37)	129(5.08)	159(6.26)	184(7.24)
Remote Flowtube	Max. Height	Hr	216(8.50)	235(9.25)	253(9.96)	283(11.14)	308(12.13)
	Weight kg (lb)		2.3(5.1)	3.2(7.0)	4.1(9.0)	6.8(15.0)	9.6(21.1)
Integral Flowmeter	Max. Height	Hi	254(9.98)	273(10.73)	291(11.44)	321(12.64)	346(13.62)
	Weight kg (lb)		4.0(8.8)	4.9(10.8)	5.8(12.7)	8.5(18.8)	11.3(24.9)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code	S, L, H, V	P, T	N
L(Face-to-face length)	+0	+22(0.87)	-6(0.24)

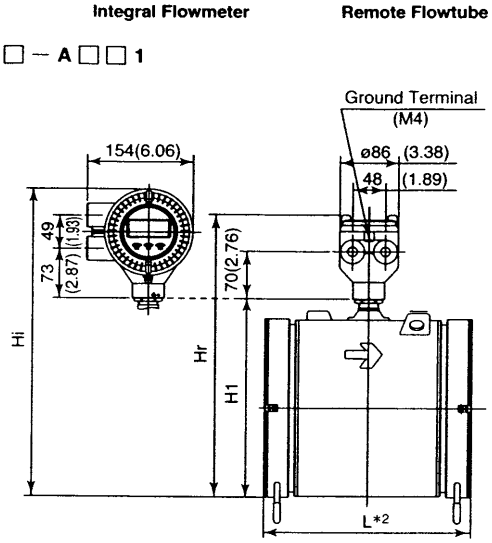
F27.EPS

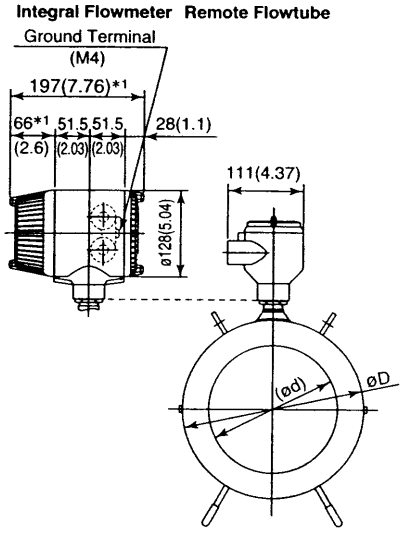
● AXF Standard, AXF150, AXF200, Wafer Type, Ceramics Lining

Unit : mm (approx. inch)

AXF150G — *3 D E N P 1 2 N C E 1 □ — A □ □ 1
AXF200C

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube





Model	Size code		150	200
	Size		150(6)	200(8)
	Lining code		C	C
Remote Flowtube / Integral Flowmeter	Face-to-face length	L*2	232(9.13)	302(11.89)
	Outside dia.	D	214(8.43)	264(10.39)
	Inner diameter of Grounding ring	ød	144(5.67)	192(7.56)
	Height	H1	254(10.00)	304(11.97)
Remote Flowtube	Max. Height	Hr	378(14.88)	428(16.85)
	Weight kg (lb)		20.2(44.5)	33.5(73.9)
Integral Flowmeter	Max. Height	Hi	416(16.36)	466(18.33)
	Weight kg (lb)		21.9(48.3)	35.2(77.6)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code	S, L, H, V	P, T	N
L(Face-to-face length)	+0	+30(1.18)	-6(0.24)

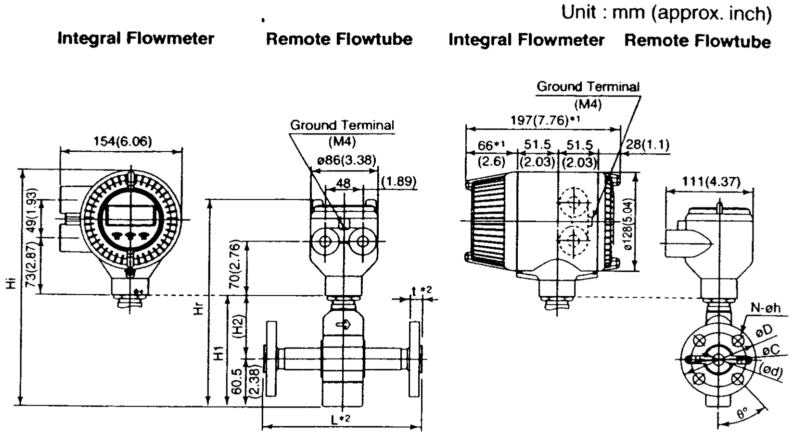
F28.EPS

● AXF Standard, AXF002-AXF015, JIS/ANSI/DIN Flange Type, PFA Lininig

Unit : mm (approx. inch)

AXF002 G — *4 D 1 — 2 A □ 1 □ — B J 1 — 1
AXF005 W — E 2 — B J 2
AXF010 C — N N — B A 1
AXF015 — P — B A 2 — B D 4 — D J 1 — D J 2 — D D 4

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube



	Process Connection		BJ1(JIS10K)				BJ2(JIS20K)			
Model	Size code		002	005	010	015	002	005	010	015
	Size		2.5 (0.1)	5 (0.2)	10 (0.4)	15 (0.5)	2.5 (0.1)	5 (0.2)	10 (0.4)	15 (0.5)
	Lining code		A	A	A	A	A	A	A	A
Remote Flowtube / Integral Flowmeter	Face-to-face length	L $^{0}_{-3}$ *2	150(5.91)			200 (7.87)	150(5.91)			200 (7.87)
	Outside dia.	øD	95(3.74)				95(3.74)			
	Thickness	t *2	18 to 22 (0.71 to 0.87)			16 (0.63)	20 to 24 (0.79 to 0.94)			18 (0.71)
	Inner diameter of Grounding ring	ød	15(0.59)				15(0.59)			
	Pitch circle dia.	øC	70(2.76)				70(2.76)			
	Bolt hole interval	θ°	45				45			
	Hole dia.	øh	15(0.59)				15(0.59)			
	Number of holes	N	4				4			
	Height	H1	141(5.54)				141(5.54)			
	Height	H2	80(3.15)				80(3.15)			
Remote Flowtube	Max. Height	Hr	265(10.43)				265(10.43)			
	Weight kg (lb)*3		3.4(7.5)			3.5 (7.7)	3.6(7.9)			3.7 (8.2)
Integral Flowmeter	Max. Height	Hi	303(11.91)				303(11.91)			
	Weight kg (lb)		5.1(11.2)			5.2 (11.5)	5.3(11.7)			5.4 (11.9)

	Process Connection		BA1(ANSI Class 150)				BA2(ANSI Class 300)				BD4(DIN PN40)			
Model	Size code		002	005	010	015	002	005	010	015	002	005	010	015
	Size		2.5 (0.1)	5 (0.2)	10 (0.4)	15 (0.5)	2.5 (0.1)	5 (0.2)	10 (0.4)	15 (0.5)	2.5 (0.1)	5 (0.2)	10 (0.4)	15 (0.5)
	Lining code		A	A	A	A	A	A	A	A	A	A	A	A
Remote Flowtube / Integral Flowmeter	Face-to-face length	L $^{0}_{-3}$ *2	150(5.91)			200 (7.87)	150(5.91)			200 (7.87)	150(5.91)			200 (7.87)
	Outside dia.	øD	88.9(3.50)				95.3(3.75)				95(3.74)			
	Thickness	t *2	17 to 22 (0.67 to 0.87)			15.2 (0.60)	20 to 25 (0.79 to 0.98)			18.2 (0.72)	21 to 25 (0.83 to 0.98)			20 (0.79)
	Inner diameter of Grounding ring	ød	15(0.59)				15(0.59)				15(0.59)			
	Pitch circle dia.	øC	60.5(2.38)				66.5(2.62)				65(2.56)			
	Bolt hole interval	θ°	45				45				45			
	Hole dia.	øh	15.7(0.62)				15.7(0.62)				14(0.55)			
	Number of holes	N	4				4				4			
	Height	H1	141(5.54)				141(5.54)				141(5.54)			
	Height	H2	80(3.15)				80(3.15)				80(3.15)			
Remote Flowtube	Max. Height	Hr	265(10.43)				265(10.43)				265(10.43)			
	Weight kg (lb)*3		3.2(7.1)			3.3 (7.3)	3.6(7.9)			3.7 (8.2)	3.8(8.4)			3.9 (8.6)
Integral Flowmeter	Max. Height	Hi	303(11.91)				303(11.91)				303(11.91)			
	Weight kg (lb)		4.9(10.8)			5.0 (11.0)	5.3(11.7)			5.4 (11.9)	5.5(12.1)			5.6 (12.4)

	Process Connection		DJ1(JIS10K)			DJ2(JIS20K)			DD4(DIN PN40)		
Model	Size code		002	005	010	002	005	010	002	005	010
	Size		2.5 (0.1)	5 (0.2)	10 (0.4)	2.5 (0.1)	5 (0.2)	10 (0.4)	2.5 (0.1)	5 (0.2)	10 (0.4)
	Lining code		A	A	A	A	A	A	A	A	A
Remote Flowtube / Integral Flowmeter	Face-to-face length	L $^{0}_{-3}$ *2	150(5.91)			150(5.91)			150(5.91)		
	Outside dia.	øD	90(3.54)			90(3.54)			90(3.54)		
	Thickness	t *2	18 to 22 (0.71 to 0.87)			20 to 24 (0.79 to 0.94)			21 to 25 (0.83 to 0.98)		
	Inner diameter of Grounding ring	ød	12(0.47)			12(0.47)			12(0.47)		
	Pitch circle dia.	øC	65(2.56)			65(2.56)			60(2.36)		
	Bolt hole interval	θ°	45			45			45		
	Hole dia.	øh	15(0.59)			15(0.59)			14(0.55)		
	Number of holes	N	4			4			4		
	Height	H1	141(5.54)			141(5.54)			141(5.54)		
	Height	H2	80(3.15)			80(3.15)			80(3.15)		
Remote Flowtube	Max. Height	Hr	265(10.43)			265(10.43)			265(10.43)		
	Weight kg (lb)*3		3.3(7.3)			3.4(7.5)			3.6(7.9)		
Integral Flowmeter	Max. Height	Hi	303(11.91)			303(11.91)			303(11.91)		
	Weight kg (lb)		5.0(11.0)			5.1(11.2)			5.3(11.7)		

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to "L" (face-to-face length) and "t" (thickness of flange).

		L	t	L	t	L	t
Grounding Ring Code		S, L, H, V		P, T		N	
Option Code	None	+0	+0	+26(1.02)	+13(0.51)	-2(0.08)	-1(0.04)
	GA, GC, GD (Special Gaskets)	+8(0.31)	+4(0.16)	+30(1.18)	+15(0.59)	-	-

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F29.EPS

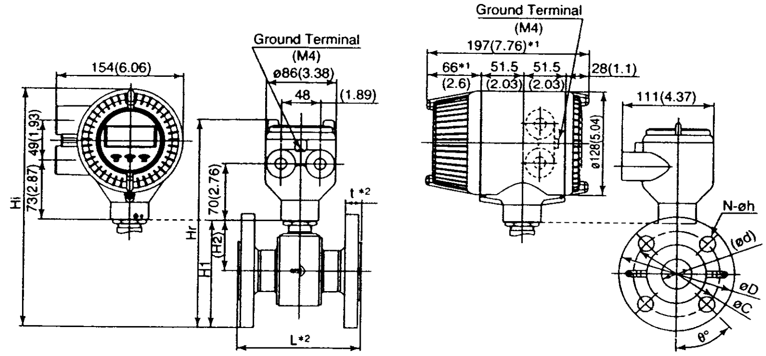
● AXF Standard, AXF025-AXF050, JIS/ANSI/DIN Flange Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**

AXF025 G – D 1 A □ 1 □ – B A □
AXF032 W – E 2 U □ 2 □ – B J □
AXF040 C – N N D – B D 4
AXF050 – P G – C A □
C J □
C D 4

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube



Model	Process Connection		BJ1(JIS10K)			BJ1/CJ1 (JIS10K)	BJ2(JIS20K)			BJ2/CJ2 (JIS20K)
Model	Size code		025	032	040	050	025	032	040	050
Model	Size		25 (1)	32 (1.25)	40 (1.5)	50 (2)	25 (1)	32 (1.25)	40 (1.5)	50 (2)
Model	Lining code		A,U	A,U	A,U	A,U D,G	A,U	A,U	A,U	A,U D,G
Remote Flowtube / Integral Flowmeter	Face-to-face length	L $^{0}_{-3}$ *2	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
	Outside dia.	øD	125 (4.92)	135 (5.31)	140 (5.51)	155 (6.10)	125 (4.92)	135 (5.31)	140 (5.51)	155 (6.10)
	Thickness	t*2	18 (0.71)	20 (0.79)	20 (0.79)	20 (0.79)	20 (0.79)	22 (0.87)	22 (0.87)	22 (0.87)
	Inner diameter of Grounding ring	ød	28 (1.10)	34 (1.34)	41 (1.61)	53 (2.09)	28 (1.10)	34 (1.34)	41 (1.61)	53 (2.09)
	Pitch circle dia.	øC	90 (3.54)	100 (3.94)	105 (4.13)	120 (4.72)	90 (3.54)	100 (3.94)	105 (4.13)	120 (4.72)
	Bolt hole interval	θ°	45	45	45	45	45	45	45	22.5
	Hole dia.	øh	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)
	Number of holes	N	4	4	4	4	4	4	4	8
	Height	H1	120 (4.74)	129 (5.08)	138 (5.43)	157 (6.16)	120 (4.74)	129 (5.08)	138 (5.43)	157 (6.16)
	Height	H2	58 (2.28)	61 (2.40)	68 (2.67)	79 (3.11)	58 (2.28)	61 (2.40)	68 (2.67)	79 (3.11)
Remote Flowtube	Max. Height	Hr	244 (9.62)	253 (9.96)	262 (10.31)	281 (11.04)	244 (9.62)	253 (9.96)	262 (10.31)	281 (11.04)
	Weight kg (lb)*3		4.4 (9.8)	5.3 (11.7)	5.7 (12.6)	6.8 (14.9)	4.8 (10.5)	5.7 (12.6)	6.2 (13.6)	7.0 (15.4)
Integral Flowmeter	Max. Height	Hi	282 (11.09)	291 (11.46)	299 (11.79)	318 (12.52)	282 (11.09)	291 (11.46)	299 (11.79)	318 (12.52)
	Weight kg (lb)		6.1 (13.5)	7.0 (15.5)	7.4 (16.4)	8.5 (18.6)	6.5 (14.3)	7.4 (16.4)	7.9 (17.4)	8.7 (19.1)

Model	Process Connection		BA1(ANSI Class 150)			BA1/CA1 (ANSI Class 150)	BA2(ANSI Class 300)			BA2/CA2 (ANSI Class 300)	BD4(DIN PN40)			BD4/CD4 (DIN PN40)
Model	Size code		025	032	040	050	025	032	040	050	025	032	040	050
Model	Size		25 (1)	32 (1.25)	40 (1.5)	50 (2)	25 (1)	32 (1.25)	40 (1.5)	50 (2)	25 (1)	32 (1.25)	40 (1.5)	50 (2)
Model	Lining code		A,U	A,U	A,U	A,U D,G	A,U	A,U	A,U	A,U D,G	A,U	A,U	A,U	A,U D,G
Remote Flowtube / Integral Flowmeter	Face-to-face length	L $^{0}_{-3}$ *2	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
	Outside dia.	øD	108.0 (4.25)	117.3 (4.62)	127.0 (5.00)	152.4 (6.00)	124.0 (4.88)	133.4 (5.25)	155.4 (6.12)	165.1 (6.50)	115 (4.53)	140 (5.51)	150 (5.91)	165 (6.50)
	Thickness	t*2	18.2 (0.72)	19.7 (0.78)	21.5 (0.85)	23.1 (0.91)	21.5 (0.85)	23.1 (0.91)	24.6 (0.97)	26.4 (1.04)	22 (0.87)	22 (0.87)	22 (0.87)	24 (0.94)
	Inner diameter of Grounding ring	ød	28 (1.10)	34 (1.34)	41 (1.61)	53 (2.09)	28 (1.10)	34 (1.34)	41 (1.61)	53 (2.09)	28 (1.10)	34 (1.34)	41 (1.61)	53 (2.09)
	Pitch circle dia.	øC	79.2 (3.12)	88.9 (3.50)	98.6 (3.88)	120.7 (4.75)	88.9 (3.50)	98.6 (3.88)	114.3 (4.50)	127.0 (5.00)	85 (3.35)	100 (3.94)	110 (4.33)	125 (4.92)
	Bolt hole interval	θ°	45	45	45	45	45	45	45	22.5	45	45	45	45
	Hole dia.	øh	15.7 (0.62)	15.7 (0.62)	15.7 (0.62)	19.1 (0.75)	19.1 (0.75)	19.1 (0.75)	22.4 (0.88)	19.1 (0.75)	14 (0.55)	18 (0.71)	18 (0.71)	18 (0.71)
	Number of holes	N	4	4	4	4	4	4	4	8	4	4	4	4
	Height	H1	112 (4.40)	120 (4.72)	131 (5.17)	155 (6.11)	120 (4.72)	128 (5.04)	146 (5.73)	162 (6.36)	115 (4.54)	131 (5.16)	143 (5.63)	162 (6.36)
	Height	H2	58 (2.28)	61 (2.40)	68 (2.67)	79 (3.11)	58 (2.28)	61 (2.40)	68 (2.67)	79 (3.11)	58 (2.28)	61 (2.40)	68 (2.67)	79 (3.11)
Remote Flowtube	Max. Height	Hr	236 (9.28)	244 (9.61)	255 (10.05)	279 (10.99)	244 (9.60)	252 (9.92)	270 (10.61)	286 (11.24)	239 (9.42)	255 (10.04)	267 (10.51)	286 (11.24)
	Weight kg (lb)*3		3.9 (8.5)	4.5 (9.9)	5.4 (11.9)	7.4 (16.4)	5.0 (11.0)	5.8 (12.9)	7.8 (17.1)	9.0 (19.8)	4.7 (6.4)	6.1 (7.8)	6.9 (8.6)	8.7 (10.4)
Integral Flowmeter	Max. Height	Hi	273 (10.76)	282 (11.10)	293 (11.53)	317 (12.47)	281 (11.07)	290 (11.42)	307 (12.09)	323 (12.72)	277 (10.90)	293 (11.54)	304 (11.98)	323 (12.72)
	Weight kg (lb)		5.6 (12.2)	6.2 (13.6)	7.1 (15.7)	9.1 (20.1)	6.7 (14.7)	7.5 (16.6)	9.5 (20.8)	10.7 (23.6)	6.4 (8.1)	7.8 (9.5)	8.6 (10.3)	10.4 (12.1)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to "L" (face-to-face length) and "t" (thickness of flange).

		L	t	L	t	L	t
Grounding Ring Code		S, L, H, V		P, T		N	
Option Code	None	+0	+0	+26(1.02)	+13(0.51)	-2(0.08)	-1(0.04)
	GA, GC, GD (Special Gaskets)	+8(0.31)	+4(0.16)	+30(1.18)	+15(0.59)	-	-

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F30.EPS

103

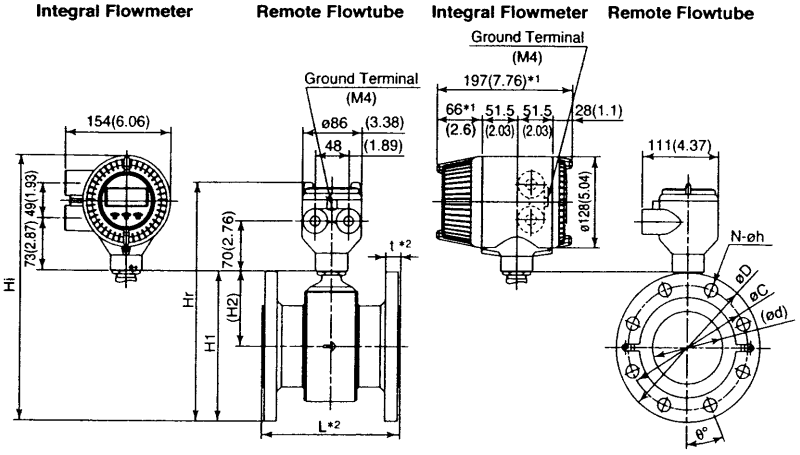
19.1.2

● AXF Standard, AXF065-AXF125, JIS/ANSI/DIN Flange Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

AXF065 AXF080 AXF100 AXF125 — G W C — *4 D E N P — 1 2 N — A U D G — □ 1 □ 2 □ — B A □ / B D 2 / B J □ / B G 1 / C A □ / C D 2 / C J □ / C G 1 — 1

*4: D, E; Integral Flowmeter, N, P; Remote Flowtube



Model	Process Connection		BJ1/CJ1(JIS10K)				BJ2/CJ2(JIS20K)				BG1/CG1(JIS F12)			BA1/CA1(ANSI Class 150)				BA2/CA2(ANSI Class 300)				BD2/CD2(DIN PN16)			
	Size code		065	080	100	125	065	080	100	125	080	100	125	065	080	100	125	065	080	100	125	065	080	100	125
	Size		65 (2.5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)
	Lining code		A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G
Remote flowtube	Face-to-face length	L *1 *2	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)
	Outside dia.	øD	175 (6.89)	185 (7.28)	210 (8.27)	250 (9.84)	175 (6.89)	200 (7.87)	225 (8.86)	270 (10.63)	211 (8.31)	238 (9.37)	263 (10.35)	177.8 (7.00)	190.5 (7.50)	228.6 (9.00)	254.0 (10.00)	190.5 (7.50)	209.6 (8.25)	254.0 (10.00)	279.4 (11.00)	185 (7.28)	200 (7.87)	220 (8.66)	250 (9.84)
	Thickness	t *2	22 (0.87)	22 (0.87)	22 (0.87)	24 (0.94)	24 (0.94)	26 (1.02)	28 (1.10)	30 (1.18)	22 (0.87)	22 (0.87)	24 (0.94)	26.4 (1.04)	27.9 (1.10)	27.9 (1.10)	27.9 (1.10)	29.4 (1.16)	32.4 (1.28)	35.8 (1.41)	39.1 (1.54)	22 (0.87)	24 (0.94)	24 (0.94)	26 (1.02)
	Inner diameter of Grounding ring	ød	66 (2.60)	77 (3.03)	102 (4.02)	128 (5.04)	66 (2.60)	77 (3.03)	102 (4.02)	128 (5.04)	77 (3.03)	102 (4.02)	128 (5.04)	66 (2.60)	77 (3.03)	102 (4.02)	128 (5.04)	66 (2.60)	77 (3.03)	102 (4.02)	128 (5.04)	66 (2.60)	77 (3.03)	102 (4.02)	128 (5.04)
	Pitch circle dia.	øC	140 (5.51)	150 (5.91)	175 (6.89)	210 (8.27)	140 (5.51)	160 (6.30)	185 (7.28)	225 (8.86)	168 (6.61)	195 (7.68)	220 (8.66)	139.7 (5.50)	152.4 (6.00)	190.5 (7.50)	215.9 (8.50)	149.4 (5.88)	168.1 (6.62)	200.2 (7.88)	235.0 (9.25)	145 (5.71)	160 (6.30)	180 (7.09)	210 (8.27)
Integral flowmeter	Bolt hole interval	θ°	45	22.5	22.5	22.5	22.5	22.5	22.5	22.5	45	45	30	45	45	22.5	22.5	22.5	22.5	22.5	22.5	45	22.5	22.5	22.5
	Hole dia.	øh	19 (0.75)	19 (0.75)	19 (0.75)	23 (0.91)	19 (0.75)	23 (0.91)	23 (0.91)	25 (0.98)	19 (0.75)	19 (0.75)	19 (0.75)	19.1 (0.75)	19.1 (0.75)	19.1 (0.75)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	18 (0.71)	18 (0.71)	18 (0.71)	18 (0.71)
	Number of holes	N	4	8	8	8	8	8	8	8	4	4	6	4	4	8	8	8	8	8	8	4	8	8	8
	Height	H1	176 (6.93)	187 (7.36)	211 (8.30)	245 (9.65)	176 (6.93)	195 (7.68)	218 (8.59)	255 (10.04)	200 (7.87)	225 (8.85)	252 (9.90)	177 (6.97)	190 (7.48)	220 (8.66)	247 (9.72)	184 (7.24)	200 (7.87)	233 (9.16)	260 (10.22)	181 (7.13)	195 (7.68)	216 (8.49)	245 (9.65)
	Height	H2	89 (3.50)	95 (3.74)	106 (4.16)	120 (4.73)	89 (3.50)	95 (3.74)	106 (4.16)	120 (4.73)	95 (3.74)	106 (4.16)	120 (4.73)	89 (3.50)	95 (3.74)	106 (4.16)	120 (4.72)	89 (3.50)	95 (3.74)	106 (4.16)	120 (4.72)	89 (3.50)	95 (3.74)	106 (4.16)	120 (4.72)
Remote flowtube	Max. Height	Hr	300 (11.81)	311 (12.24)	335 (13.18)	369 (14.53)	300 (11.81)	319 (12.56)	342 (13.47)	379 (14.92)	324 (12.76)	349 (13.73)	376 (14.79)	301 (11.85)	314 (12.36)	344 (13.54)	371 (14.61)	308 (12.13)	324 (12.76)	357 (14.04)	384 (15.11)	305 (12.01)	319 (12.56)	340 (13.37)	369 (14.53)
	Weight kg (lb) *3		9.0 (11.2)	9.6 (11.8)	12.4 (14.6)	17.4 (38.3)	9.3 (11.5)	12.4 (14.6)	16.9 (19.1)	24.7 (54.5)	12.2 (14.4)	15.5 (17.7)	19.5 (43.1)	10.8 (23.7)	12.9 (28.5)	17.7 (39.1)	20.8 (45.9)	12.6 (27.7)	16.6 (36.6)	26.8 (59.1)	34.9 (76.9)	9.8 (21.6)	11.9 (26.2)	14.5 (32.0)	19.3 (42.5)
Integral flowmeter	Max. Height	Hi	338 (13.31)	349 (13.74)	372 (14.65)	407 (16.01)	338 (13.31)	357 (14.06)	380 (14.95)	417 (16.40)	362 (14.25)	386 (15.21)	413 (16.26)	339 (13.35)	352 (13.86)	382 (15.02)	409 (16.08)	346 (13.62)	362 (14.25)	394 (13.52)	421 (16.58)	343 (13.50)	357 (14.06)	377 (14.85)	407 (16.00)
	Weight kg (lb)		10.7 (23.5)	11.3 (25.0)	14.1 (31.0)	19.1 (42.1)	11.0 (24.3)	14.1 (31.0)	18.6 (41.0)	26.4 (58.3)	13.9 (30.7)	17.2 (37.8)	21.2 (46.8)	12.5 (27.5)	14.6 (32.2)	19.4 (42.8)	22.5 (49.6)	14.3 (31.4)	18.3 (40.4)	28.5 (62.8)	36.6 (80.7)	11.5 (25.4)	13.6 (29.9)	16.2 (35.7)	21.0 (46.2)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to "L" (face-to-face length) and "t" (thickness of flange).

		L	t	L	t	L	t
Grounding Ring Code		S, L, H, V		P, T		N	
Option Code	None	+0	+0	+26(1.02)	+13(0.51)	-2(0.08)	-1(0.04)
	GA, GC, GD (Special Gaskets)	+8(0.31)	+4(0.16)	+30(1.18)	+15(0.59)	-	-

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F31.EPS

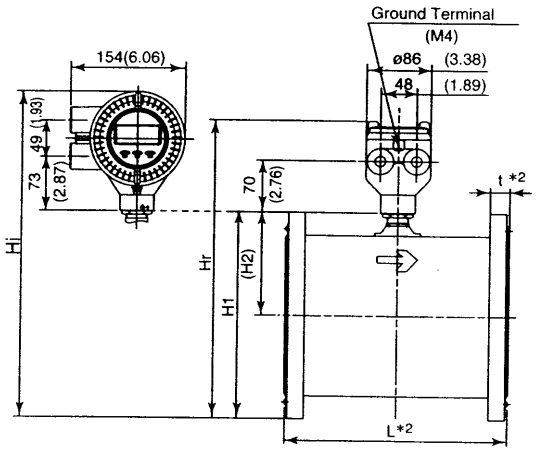
● AXF Standard, AXF150, AXF200, JIS/ANSI/DIN Flange Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

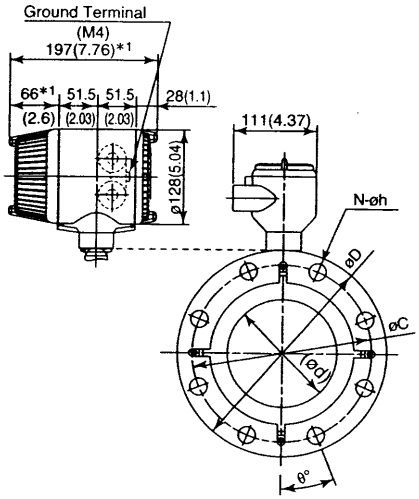
AXF150 G W C — *4 D E N P 1 2 N A U D G □ 1 2 □ — B A □ B D □ B J □ B G 1 C A □ C D □ C J □ C G 1 1

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Integral Flowmeter **Remote Flowtube**



Integral Flowmeter **Remote Flowtube**



Model	Process Connection		BJ1/CJ1(JIS10K)		BJ2/CJ2(JIS20K)		BG1/CG1(JIS F12)		BA1/CA1(ANSI Class 150)		BA2/CA2(ANSI Class 300)		BD1/CD1(DIN PN10)	BD2/CD2(DIN PN16)	
	Size code		150	200	150	200	150	200	150	200	150	200	200	150	200
	Size		150 (6)	200 (8)	150 (6)	200 (8)	150 (6)	200 (8)	150 (6)	200 (8)	150 (6)	200 (8)	200 (8)	150 (6)	200 (8)
	Lining code		A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G
Remote flowtube / Integral flowmeter	Face-to-face length	L *2 *3	300 (11.81)	350 (13.78)	300 (11.81)	350 (13.78)	300 (11.81)	350 (13.78)	300 (11.81)	350 (13.78)	300 (11.81)	350 (13.78)	350 (13.78)	300 (11.81)	350 (13.78)
	Outside dia.	øD	280 (11.02)	330 (12.99)	305 (12.01)	350 (13.78)	290 (11.42)	342 (13.46)	279.4 (11.00)	342.9 (13.50)	317.5 (12.50)	381.0 (15.00)	340 (13.39)	285 (11.22)	340 (13.39)
	Thickness	t *2	27 (1.06)	27 (1.06)	33 (1.30)	35 (1.38)	27 (1.06)	29 (1.14)	30.4 (1.20)	33.4 (1.31)	43.5 (1.71)	46.1 (1.81)	29 (1.14)	27 (1.06)	29 (1.14)
	Inner diameter of Grounding ring	ød	146.1 (5.75)	193.6 (7.62)	146.1 (5.75)	193.6 (7.62)	146.1 (5.75)	193.6 (7.62)	146.1 (5.75)	193.6 (7.62)	146.1 (5.75)	193.6 (7.62)	193.6 (7.62)	146.1 (5.75)	193.6 (7.62)
	Pitch circle dia.	øC	240 (9.45)	290 (11.42)	260 (10.24)	305 (12.01)	247 (9.72)	299 (11.77)	241.3 (9.50)	298.5 (11.75)	269.7 (10.62)	330.2 (13.00)	295 (11.61)	240 (9.45)	295 (11.61)
	Bolt hole interval	θ°	22.5	15	15	15	30	22.5	22.5	22.5	15	15	22.5	22.5	15
	Hole dia.	øh	23 (0.91)	23 (0.91)	25 (0.98)	25 (0.98)	19 (0.75)	19 (0.75)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	22 (0.87)	22 (0.87)	22 (0.87)
	Number of holes	N	8	12	12	12	6	8	8	8	12	12	8	8	12
	Height	H1	281 (11.06)	331 (13.03)	294 (11.56)	341 (13.43)	286 (11.26)	337 (13.27)	281 (11.05)	337 (13.29)	300 (11.80)	357 (14.04)	336 (13.23)	284 (11.16)	336 (13.23)
	Height	H2	141 (5.55)	166 (6.54)	141 (5.55)	166 (6.54)	141 (5.55)	166 (6.54)	141 (5.55)	166 (6.54)	141 (5.55)	166 (6.54)	166 (6.54)	141 (5.55)	166 (6.54)
Remote flowtube	Max. Height	Hr	405 (15.94)	455 (17.91)	418 (16.44)	465 (18.31)	410 (16.14)	461 (18.15)	405 (15.93)	461 (18.17)	424 (16.68)	481 (18.92)	460 (18.11)	408 (16.04)	460 (18.11)
	Weight kg (lb) *3		27.8 (61.3)	37.3 (82.2)	37.1 (81.8)	51.9 (114.4)	29.9 (65.9)	43.2 (95.3)	30.9 (68.0)	49.2 (108.4)	52.5 (115.7)	78.8 (173.7)	42.5 (93.7)	28.7 (63.2)	41.9 (92.5)
Integral flowmeter	Max. Height	Hi	443 (17.42)	493 (19.39)	456 (17.95)	503 (19.80)	448 (17.64)	499 (19.65)	443 (17.43)	499 (19.66)	462 (18.18)	519 (20.41)	498 (19.61)	446 (17.54)	498 (19.61)
	Weight kg (lb)		29.5 (65.0)	39.0 (86.0)	38.8 (85.5)	53.6 (118.2)	31.6 (69.7)	44.9 (99.0)	32.6 (71.8)	50.9 (112.2)	54.2 (119.5)	80.5 (177.5)	44.2 (97.5)	30.4 (66.9)	43.6 (96.2)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to "L" (face-to-face length) and "t" (thickness of flange).

		L	t	L	t	L	t
Grounding Ring Code		S, L, H, V		P, T		N	
Option Code	None	+0	+0	+32(1.26)	+16(0.63)	-2(0.08)	-1(0.04)
	GA, GC, GD (Special Gaskets)	+10(0.39)	+5(0.20)	+38(1.5)	+19(0.75)	-	-

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F32.EPS

105

19.1.2

● AXF Standard, AXF250-AXF400, JIS/ANSI/DIN Flange Type, PFA /Polyurethane Rubber /Natural Soft Rubber /EPDM Rubber Lining

Unit : mm (approx. inch)

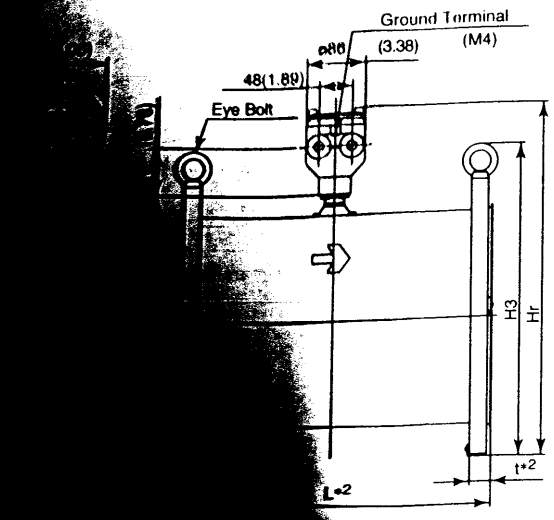
	*4									
AXF250	G	D	1	A				B	A	□
AXF300	W	E	2	U	□	1	□	B	D	□
AXF350	N	N		D		2		B	J	□
AXF400	C	P		G			–	B	G	1
								C	A	□
								C	D	□
								C	J	□
								C	G	1

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

1

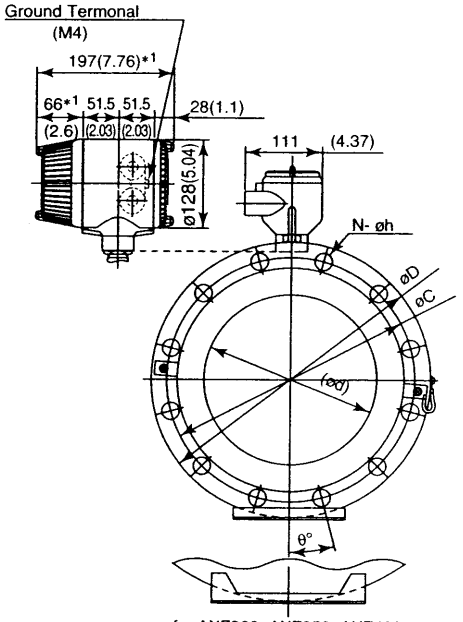
Integral Flowmeter

Remote Flowtube



Integral Flowmeter

Remote Flowtube



for AXF300, AXF350, AXF400

	BG1/CG1(JIS F12)				BA1/CA1(ANSI Class 150)				BA2/CA2 (ANSI Class 300)		BD1/CD1(DIN PN10)				BD2/CD2 (DIN PN16)	
250	300	350	400	250	300	350	400	250	300	250	300	350	400	250	300	
250	300 (12)	350 (14)	400 (16)	250 (10)	300 (12)	350 (14)	400 (16)	250 (10)	300 (12)	250 (10)	300 (12)	350 (14)	400 (16)	250 (10)	300 (12)	
A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	A,U D,G	
450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)	450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)	450 (17.72)	500 (19.69)	450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)	450 (17.72)	500 (19.69)	
410 (16.14)	464 (18.27)	530 (20.87)	582 (22.91)	406.4 (16.00)	482.6 (19.00)	533.4 (21.00)	596.9 (23.50)	444.5 (17.50)	520.7 (20.50)	395 (15.55)	445 (17.52)	505 (19.88)	565 (22.24)	405 (15.94)	460 (18.11)	
32 (1.26)	34 (1.34)	36 (1.42)	36 (1.42)	38.2 (1.50)	39.8 (1.57)	45.1 (1.78)	46.6 (1.83)	55.7 (2.19)	58.8 (2.31)	34 (1.34)	34 (1.34)	36 (1.42)	36 (1.42)	34 (1.34)	36 (1.42)	
345 (13.57)	291.3 (11.47)	323.4 (12.73)	373.5 (14.70)	243 (9.57)	291.3 (11.47)	323.4 (12.73)	373.5 (14.70)	243 (9.56)	291.3 (11.47)	243 (9.57)	291.3 (11.47)	323.4 (12.73)	373.5 (14.70)	243 (9.57)	291.3 (11.47)	
460 (18.11)	414 (16.30)	472 (18.58)	524 (20.63)	362.0 (14.25)	431.8 (17.00)	476.3 (18.75)	539.8 (21.25)	387.4 (15.25)	450.9 (17.75)	350 (13.78)	400 (15.75)	460 (18.11)	515 (20.28)	355 (13.98)	410 (16.14)	
22.5	18	18	15	15	15	15	11.25	11.25	11.25	15	15	11.25	11.25	15	15	
23 (0.91)	25 (0.98)	25 (0.98)	25 (0.98)	25.4 (1.00)	25.4 (1.00)	28.4 (1.12)	28.4 (1.12)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	22 (0.87)	22 (0.87)	26 (1.02)	26 (1.02)	26 (1.02)	
8	10	10	12	12	12	12	16	16	16	12	12	16	16	12	12	
456 (17.95)	511 (20.12)	564 (22.20)	403 (15.87)	466 (18.35)	512 (20.16)	572 (22.52)	422 (16.61)	485 (19.09)	397 (15.63)	447 (17.60)	498 (19.61)	556 (21.89)	402 (15.83)	454 (17.87)		
221 (8.70)	243 (9.57)	270 (10.63)	197 (7.76)	221 (8.70)	243 (9.57)	270 (10.63)	197 (7.76)	221 (8.70)	197 (7.76)	221 (8.70)	243 (9.57)	270 (10.63)	197 (7.76)	221 (8.70)		
518 (20.39)	593 (23.35)	645 (25.39)	460 (18.11)	537 (21.14)	596 (23.46)	660 (25.98)	499 (19.65)	575 (22.64)	449 (17.68)	499 (19.65)	568 (22.36)	628 (24.72)	459 (18.07)	514 (20.24)		
580 (22.83)	635 (25.00)	688 (27.09)	527 (20.75)	590 (23.23)	636 (25.04)	696 (27.40)	546 (21.50)	609 (23.98)	521 (20.51)	571 (22.48)	622 (24.49)	680 (26.77)	526 (20.71)	578 (22.76)		
85.0 (187.4)	121.2 (267.2)	137.0 (301.9)	83.4 (183.8)	104.8 (231.0)	151.8 (334.7)	185.3 (408.5)	133.0 (293.1)	176.7 (389.5)	73.0 (161.0)	79.4 (174.9)	112.5 (248.0)	129.7 (285.9)	74.8 (164.9)	87.9 (193.8)		
618 (24.33)	673 (26.50)	726 (28.58)	565 (22.24)	628 (24.72)	674 (26.54)	734 (28.90)	584 (22.99)	647 (25.47)	559 (22.01)	609 (23.98)	660 (25.98)	718 (28.27)	564 (22.20)	616 (24.25)		
86.7 (191.2)	122.9 (270.9)	138.7 (305.7)	85.1 (187.6)	106.5 (234.8)	153.5 (338.4)	187.0 (412.3)	134.7 (296.9)	178.4 (393.3)	74.7 (164.7)	81.1 (178.7)	114.2 (251.7)	131.4 (289.6)	76.5 (168.7)	89.6 (197.6)		

m (0.47 inch) from the value in the figure.
8 mm (0.2 inch) to it.
le and optional code, add the following value to "L" (face-to-face length)

Nominal Size: 350 mm to 400 mm				
	L	t	L	t
Grounding Ring Code	S, L, H, V		N	
ish Code is "None"	+0	+0	-10(0.39)	-5(0.20)

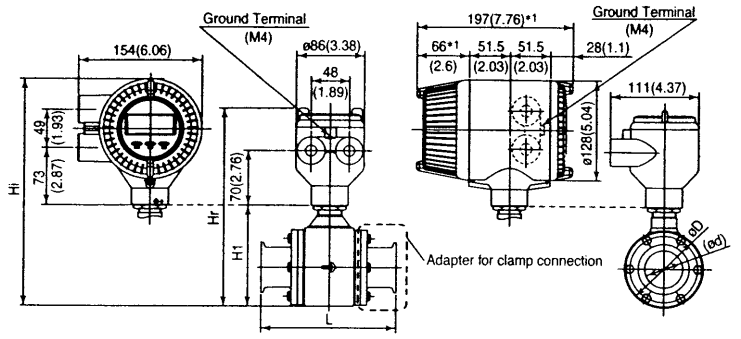
lected, waterproof glands and a 30m long cable are attached.

F33.EPS

● AXF Standard, AXF015-AXF125, Sanitary for Clamp Connection, PFA Lining

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**

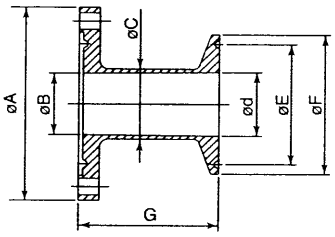


AXF015											
AXF025											
AXF032	*3										
AXF040	D	1						H	A	B	
AXF050 H —	E	2	A	L	1	N	—	H	D	B	1
AXF065	N	N						H	K	B	
AXF080	P										
AXF100											
AXF125											

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Model	Process Connection			HAB / HDB / HKB								
	Size code			015	025	032	040	050	065	080	100	125
	Size			15 (0.5)	25 (1)	32 (1.3)	40 (1.5)	50 (2)	65 (2.6)	80 (3)	100 (4)	125 (5)
	Lining code			A	A	A	A	A	A	A	A	A
Remote Flowtube / Integral Flowmeter	Face-to-face length	L		166 (6.55)	166 (6.55)	166 (6.55)	166 (6.55)	176 (6.94)	196 (7.73)	216 (8.52)	246 (9.70)	316 (12.46)
	Outside dia.	øD		73 (2.87)	73 (2.87)	73 (2.87)	86 (3.39)	99 (3.90)	117 (4.61)	129 (5.08)	155 (6.10)	183 (7.20)
	Inner dia.	ød	HAB	15.7 (0.62)	22.1 (0.87)	–	34.8 (1.37)	47.5 (1.87)	60.2 (2.37)	72.9 (2.87)	97.4 (3.83)	–
			HDB	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)
			HKB	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	135.7 (5.34)
	Height	H1		98 (3.86)	98 (3.86)	98 (3.86)	111 (4.37)	129 (5.08)	147 (5.79)	157 (6.18)	183 (7.20)	212 (8.35)
Remote Flowtube	Max. Height	Hr		222 (8.74)	222 (8.74)	222 (8.74)	235 (9.25)	253 (9.96)	271 (10.67)	281 (11.06)	307 (12.09)	336 (13.23)
	Weight kg (lb)*2			2.7 (6.0)	2.5 (5.5)	2.6 (5.7)	2.9 (6.4)	3.6 (7.9)	4.8 (10.6)	5.7 (12.6)	8.1 (17.9)	12.1 (26.7)
Integral Flowmeter	Max. Height	Hi		260 (10.22)	260 (10.22)	260 (10.22)	273 (10.73)	291 (11.44)	309 (12.15)	319 (12.54)	345 (13.56)	374 (14.70)
	Weight kg (lb)			4.4 (9.7)	4.2 (9.3)	4.3 (9.5)	4.6 (10.1)	5.3 (11.7)	6.5 (14.3)	7.4 (16.3)	9.8 (21.6)	13.8 (30.4)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
*2: When option code DHC is selected, waterproof glands and a 30m long cable are attached. Add 9.5kg(20.9lb) to the weight in the table.



Adapter for clamp connection

Process Connection	HAB (Tri-Clamp)							HDB (DIN 32676 Clamp)									HKB (ISO2852 Clamp)								
Nominal Size	15	25	40	50	65	80	100	15	25	32	40	50	65	80	100	125	15	25	32	40	50	65	80	100	125
øA	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	180 (7.09)	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	180 (7.09)
øB	16 (0.63)	22.2 (0.87)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	123 (4.84)	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	123 (4.84)
øC	19.2 (0.76)	25.4 (1.00)	38.1 (1.50)	50.8 (2.00)	63.5 (2.50)	76.2 (3.00)	101.6 (4.00)	20 (0.79)	30 (1.18)	36 (1.42)	42 (1.65)	54 (2.13)	70 (2.76)	85 (3.35)	104 (4.09)	129 (5.08)	18 (0.71)	25.6 (1.01)	34.3 (1.35)	38.6 (1.52)	51.6 (2.03)	64.1 (2.52)	76.7 (3.02)	102.5 (4.04)	141.2 (5.56)
ød	15.7 (0.62)	22.1 (0.87)	34.8 (1.37)	47.5 (1.87)	60.2 (2.37)	72.9 (2.87)	97.4 (3.83)	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	135.7 (5.34)
øE	—	43.6 (1.72)	43.6 (1.72)	56.3 (2.22)	70.6 (2.78)	83.3 (3.28)	110.3 (4.34)	27.5 (1.08)	43.5 (1.71)	43.5 (1.71)	43.5 (1.71)	56.5 (2.22)	83.5 (3.29)	97 (3.82)	110 (4.33)	146 (5.75)	27.5 (1.08)	43.5 (1.71)	43.5 (1.71)	43.5 (1.71)	56.5 (2.22)	70.5 (2.78)	83.5 (3.29)	110 (4.33)	146 (5.75)
øF	25 (0.98)	50.4 (1.98)	50.4 (1.98)	64 (2.52)	77.4 (3.05)	91 (3.58)	118.9 (4.68)	34 (1.34)	50.5 (1.99)	50.5 (1.99)	50.5 (1.99)	64 (2.52)	91 (3.58)	106 (4.17)	119 (4.69)	155 (6.10)	34 (1.34)	50.5 (1.99)	50.5 (1.99)	50.5 (1.99)	64 (2.52)	77.5 (3.05)	91 (3.58)	119 (4.69)	155 (6.10)
G	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	60 (2.36)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	60 (2.36)
Parts No.	F9811 HU	F9811 HV	F9811 HX	F9811 HY	F9811 HZ	F9811 JA	F9811 JB	F9811 JD	F9811 JE	F9811 JF	F9811 JG	F9811 JH	F9811 JJ	F9811 JK	F9811 JL	F9811 JM	F9811 JN	F9811 JP	F9811 JQ	F9811 JR	F9811 JS	F9811 JT	F9811 JU	F9811 JV	F9811 JW

F34.EPS

● AXF Standard, AXF015-AXF125, Sanitary for Union Connection, PFA Lining

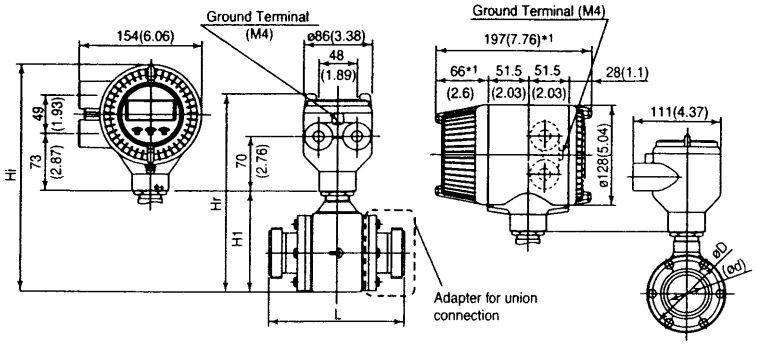
Unit : mm (approx. inch)

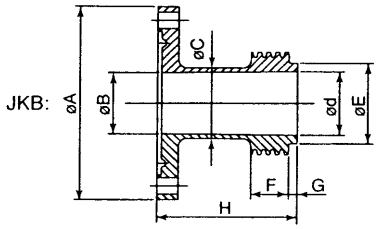
Integral Flowmeter · Remote Flowtube **Integral Flowmeter Remote Flowtube**

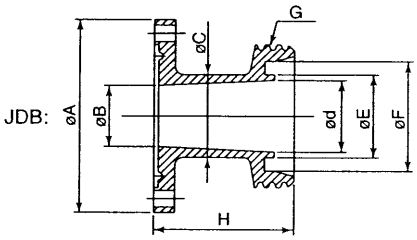
AXF015
AXF025
AXF032
AXF040
AXF050 H — D E N P 1 2 N A L 1 N — J K B J D B 1 J S B
AXF065
AXF080
AXF100
AXF125

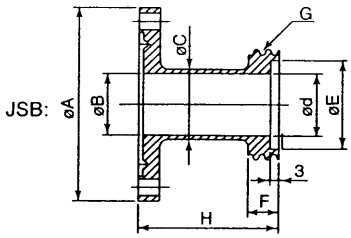
*3

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube









Adapters for union connection

Model	Process Connection			JKB / JDB / JSB								
	Size code			015	025	032	040	050	065	080	100	125
	Size			15 (0.5)	25 (1)	32 (1.3)	40 (1.5)	50 (2)	65 (2.6)	80 (3)	100 (4)	125 (5)
	Lining code			A	A	A	A	A	A	A	A	A
Remote Flowtube	Face-to-face length	L	JKB	166 (6.55)	166 (6.55)	166 (6.55)	166 (6.55)	176 (6.94)	196 (7.73)	216 (8.52)	246 (9.70)	–
			JDB	166 (6.55)	166 (6.55)	166 (6.55)	166 (6.55)	176 (6.94)	196 (7.73)	236 (9.31)	266 (10.49)	326 (12.85)
			JSB	–	166 (6.55)	166 (6.55)	166 (6.55)	176 (6.94)	196 (7.73)	216 (8.52)	276 (10.88)	–
	Outside dia.	øD		73 (2.87)	73 (2.87)	73 (2.87)	86 (3.39)	99 (3.90)	117 (4.61)	129 (5.08)	155 (6.10)	183 (7.20)
Integral Flowmeter	Inside dia.	ød	JKB	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	–
			JDB	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)
			JSB	–	22.5 (0.89)	29.6 (1.17)	35.5 (1.40)	48.5 (1.91)	60.5 (2.38)	72.9 (2.87)	97.6 (3.84)	–
	Height	H1		98 (3.86)	98 (3.86)	98 (3.86)	111 (4.37)	129 (5.08)	147 (5.79)	157 (6.18)	183 (7.20)	212 (8.35)
Remote Flowtube	Max. Height	Hr		222 (8.74)	222 (8.74)	222 (8.74)	235 (9.25)	253 (9.96)	271 (10.67)	281 (11.06)	307 (12.09)	336 (13.23)
	Weight kg (lb)*2			2.6 (5.7)	2.6 (5.7)	2.7 (6.0)	3 (6.6)	3.8 (8.4)	4.9 (10.8)	5.9 (13.0)	8.2 (18.1)	13 (28.7)
Integral Flowmeter	Max. Height	Hi		260 (10.24)	260 (10.24)	260 (10.24)	273 (10.73)	291 (11.44)	309 (12.17)	319 (12.54)	345 (13.56)	374 (14.70)
	Weight kg (lb)			4.3 (9.5)	4.3 (9.5)	4.4 (9.7)	4.7 (10.4)	5.5 (12.1)	6.6 (14.6)	7.6 (16.8)	9.9 (21.8)	14.7 (32.4)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
*2: When option code DHC is selected, waterproof glands and a 30m long cable are attached. Add 9.5kg (20.9lb) to the weight in the table.

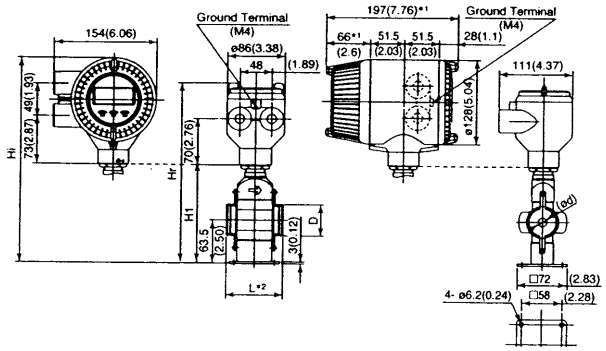
Process Connection	JKB (ISO2853 Union)								JDB (DIN 11851 Union)									JSB (SMS1145 Union)						
Nominal Size	15	25	32	40	50	65	80	100	15	25	32	40	50	65	80	100	125	25	32	40	50	65	80	100
øA	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	180 (7.09)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)
øB	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	123 (4.84)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)
øC	18 (0.71)	25.6 (1.01)	34.3 (1.35)	38.6 (1.52)	51.6 (2.03)	64.1 (2.52)	76.7 (3.02)	102.5 (4.04)	20 (0.79)	30 (1.18)	36 (1.42)	42 (1.65)	54 (2.13)	70 (2.76)	85 (3.35)	104 (4.09)	129 (5.08)	25.4 (1.00)	32 (1.26)	38.1 (1.50)	51 (2.01)	63.5 (2.50)	76.2 (3.00)	102.5 (4.04)
ød	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)	22.5 (0.89)	29.6 (1.17)	35.5 (1.40)	48.5 (1.91)	60.5 (2.38)	72.9 (2.87)	97.6 (3.84)
øE	21.2 (0.83)	29.2 (1.15)	38.2 (1.50)	42.7 (1.68)	56.2 (2.21)	69.9 (2.75)	82.6 (3.25)	108.7 (4.28)	18 (0.71)	30 (1.18)	36 (1.42)	42 (1.65)	54 (2.13)	71 (2.80)	85 (3.35)	104 (4.09)	130 (5.12)	32 (1.26)	40 (1.57)	48 (1.89)	61 (2.40)	73.5 (2.89)	86 (3.39)	120 (4.72)
øF	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	13.5 (0.53)	25.8 (1.02)	39.8 (1.57)	45.8 (1.80)	51.8 (2.04)	63.8 (2.51)	80.8 (3.18)	94.8 (3.73)	113.8 (4.48)	141.8 (5.58)	11 (0.43)	13 (0.51)	15 (0.59)	15 (0.59)	19 (0.75)	19 (0.75)	30 (1.18)
G	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	3 (0.12)	RD34 ×1/8"	RD52 ×1/6"	RD58 ×1/6"	RD65 ×1/6"	RD78 ×1/6"	RD95 ×1/6"	RD110 ×1/4"	RD130 ×1/4"	RD160 ×1/4"	RD40 ×1/6"	RD48 ×1/6"	RD60 ×1/6"	RD70 ×1/6"	RD85 ×1/6"	RD98 ×1/6"	RD132 ×1/6"
H	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	60 (2.36)	60 (2.36)	65 (2.56)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	50 (1.97)	65 (2.56)
Parts No.	F9811 LA	F9811 LB	F9811 LC	F9811 LD	F9811 LE	F9811 LF	F9811 LG	F9811 LH	F9811 KR	F9811 KS	F9811 KT	F9811 KU	F9811 KV	F9811 KW	F9811 KX	F9811 KY	F9811 KZ	F9811 LK	F9811 LL	F9811 LM	F9811 LN	F9811 LP	F9811 LQ	F9811 LR

F35.EPS

● Replacement model for Earlier ADMAG or ADMAG AE, AXF002-AXF015, Wafer Type, PFA Lining

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**



AXF002 G
AXF005 W — D E N P 1 2 N *4 A □ 1 □ — A □ □ 2
AXF010 C
AXF015

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Model	Size code		002	005	010	015
	Size		2.5(0.1)	5(0.2)	10(0.4)	15(0.5)
	Lining code		A	A	A	A
Remote Flowtube / Integral Flowmeter	Face-to-face length	L*2	85(3.35)			
	Outside dia.	D	44(1.73)			
	Inner diameter of Grounding ring	Ød	15(0.59)			
	Height	H1	144(5.67)			
Remote Flowtube	Max. Height	Hr	265(10.43)			
	Weight kg (lb)*3		2.4(5.3)			
Integral Flowmeter	Max. Height	Hi	306(12.03)			
	Weight kg (lb)		4.1(9.0)			

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+22(0.87)	-6(0.24)
	GA, GC, GD (Special Gaskets)	+2(0.08)	+24(0.94)	-

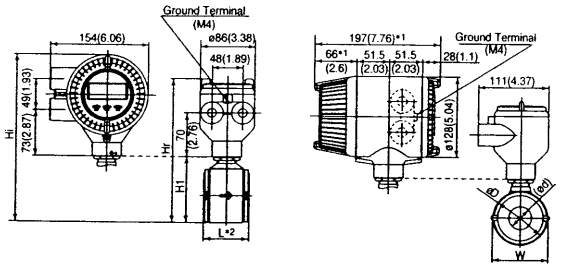
*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F37.EPS

● Replacement model for Earlier ADMAG or ADMAG AE, AXF025-AXF100, Wafer Type, PFA /Polyurethane Rubber Lining

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**



AXF025
AXF040 G
AXF050 W — D E N P 1 2 N *4 A U □ 1 □ — A □ □ 2
AXF080 C
AXF100

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Model	Size code		025	040	050	080	100
	Size		25(1)	40(1.5)	50(2)	80(3)	100(4)
	Lining code		A,U	A,U	A,U	A,U	A,U
Remote Flowtube / Integral Flowmeter	Face-to-face length	L*2	93(3.66)	106(4.17)	120(4.72)	160(6.30)	180(7.09)
Remote Flowtube	Outside dia.	ØD	67.5(2.66)	86(3.39)	99(3.90)	129(5.08)	155(6.10)
	Inner diameter of Grounding ring	Ød	27(1.06)	40(1.57)	52(2.05)	81(3.19)	98(3.86)
Integral Flowmeter	Width	W	67.5(2.66)	86(3.39)	99(3.90)	129(5.08)	155(6.10)
	Height	H1	92(3.62)	111(4.37)	129(5.08)	157(6.18)	183(7.20)
Remote Flowtube	Max. Height	Hr	216(8.50)	235(9.25)	253(9.96)	281(11.06)	307(12.09)
	Weight kg (lb)*3		3.1(6.7)	3.5(7.7)	4.2(9.3)	6.4(14.1)	8.0(17.6)
Integral Flowmeter	Max. Height	Hi	254(9.98)	273(10.73)	291(11.44)	319(12.54)	345(13.56)
	Weight kg (lb)		4.8(10.5)	5.2(11.4)	5.9(13.1)	8.1(17.9)	9.7(21.3)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional

Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+22(0.87)	-6(0.24)
	GA, GC, GD (Special Gaskets)	+2(0.08)	+24(0.94)	-

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F38.EPS

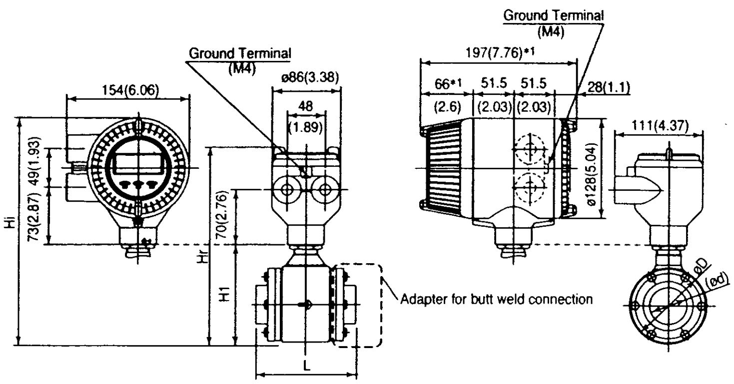
● AXF Standard, AXF015-AXF125, Sanitary for Butt Weld, PFA Lining

Unit : mm (approx. inch)

Integral Flowmeter *Remote Flowtube Integral Flowmeter Remote Flowtube

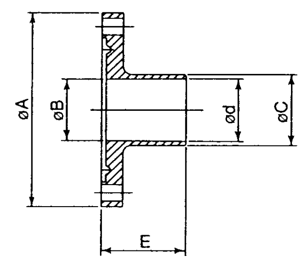
AXF015
AXF025
AXF032
AXF040
AXF050 H — [*3] D / E / N / P — 1 / 2 — A L 1 N — KKB / KDB — 1 / N
AXF065
AXF080
AXF100
AXF125

*3: D, E; Integral Flowmeter,
N, P; Remote Flowtube



Model	Process Connection			KKB / KDB								
	Size code			015	025	032	040	050	065	080	100	125
	Size			15 (0.5)	25 (1)	32 (1.3)	40 (1.5)	50 (2)	65 (2.6)	80 (3)	100 (4)	125 (5)
	Lining code			A	A	A	A	A	A	A	A	A
Remote Flowtube Integral Flowmeter	Face-to-face length	L		126 (4.98)	126 (4.98)	126 (4.98)	126 (4.98)	136 (5.37)	156 (6.16)	176 (6.94)	206 (8.13)	276 (10.88)
	Outside dia.	øD		73 (2.87)	73 (2.87)	73 (2.87)	86 (3.39)	99 (3.90)	117 (4.61)	129 (5.08)	155 (6.10)	183 (7.20)
	Inner dia.	ød	KKB	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	135.7 (5.34)
			KDB	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)
	Height	H1		98 (3.86)	98 (3.86)	98 (3.86)	111 (4.37)	129 (5.08)	147 (5.79)	157 (6.18)	183 (7.20)	212 (8.35)
Remote Flowtube	Max. Height	Hr		222 (8.74)	222 (8.74)	222 (8.74)	235 (9.25)	253 (9.96)	271 (10.67)	281 (11.06)	307 (12.09)	336 (13.23)
	Weight kg (lb)*2			2.6 (5.7)	2.3 (5.1)	2.5 (5.5)	2.8 (6.2)	3.4 (7.5)	4.5 (9.9)	5.3 (11.7)	7.1 (15.7)	11 (24.3)
Integral Flowmeter	Max. Height	Hi		260 (10.24)	260 (10.24)	260 (10.24)	273 (10.73)	291 (11.44)	309 (12.17)	319 (12.54)	345 (13.56)	374 (14.70)
	Weight kg (lb)			4.3 (9.5)	4 (8.8)	4.2 (9.3)	4.5 (9.9)	5.1 (11.2)	6.2 (13.7)	7 (15.4)	8.8 (19.4)	12.7 (28.0)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
*2: When option code DHC is selected, waterproof glands and a 30m long cable are attached. Add 9.5kg (20.9lb) to the weight in the table.



Adapter for butt weld connection

Process Connection	KKB (ISO2037 Butt Weld)									KDB (DIN 1185 Butt Weld)								
Nominal Size	15	25	32	40	50	65	80	100	125	15	25	32	40	50	65	80	100	125
øA	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	180 (7.09)	70 (2.76)	70 (2.76)	70 (2.76)	83 (3.27)	96 (3.78)	114 (4.49)	126 (4.96)	152 (5.98)	180 (7.09)
øB	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	123 (4.84)	16 (0.63)	22.2 (0.87)	29.4 (1.16)	34.6 (1.36)	47.6 (1.87)	59.5 (2.34)	72.3 (2.85)	97 (3.82)	123 (4.84)
øC	18 (0.71)	25.6 (1.01)	34.3 (1.35)	38.6 (1.52)	51.6 (2.03)	64.1 (2.52)	76.7 (3.02)	102.5 (4.04)	141.2 (5.56)	20 (0.79)	30 (1.18)	36 (1.42)	42 (1.65)	54 (2.13)	70 (2.76)	85 (3.35)	104 (4.09)	129 (5.08)
ød	15.2 (0.60)	22.6 (0.89)	31.3 (1.23)	35.6 (1.40)	48.6 (1.91)	60.3 (2.37)	72.9 (2.87)	97.6 (3.84)	135.7 (5.34)	16 (0.63)	26 (1.02)	32 (1.26)	38 (1.50)	50 (1.97)	66 (2.60)	81 (3.19)	100 (3.94)	125 (4.92)
E	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	40 (1.57)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	30 (1.18)	40 (1.57)
Parts No.	F9811 NN	F9811 NP	F9811 NQ	F9811 NR	F9811 NS	F9811 NT	F9811 NU	F9811 NV	F9811 NW	F9811 ND	F9811 NE	F9811 NF	F9811 NG	F9811 NH	F9811 NJ	F9811 NK	F9811 NL	F9811 NM

F36.EPS

115

● Replacement model for Earlier ADMAG or ADMAG AE, AXF150-AXF250, JIS/ANSI/DIN Flange Type, PFA /Polyurethane Rubber Lining

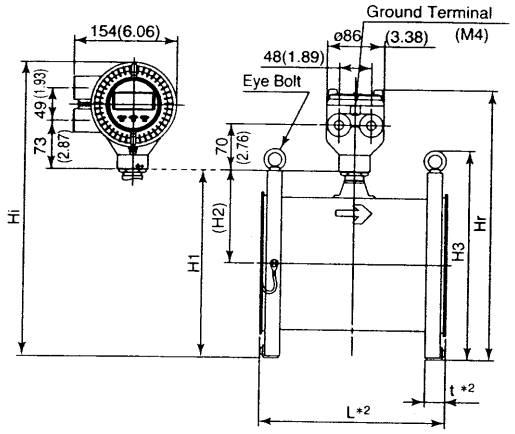
*4

AXF150G
AXF200W — D E N P 1 2 N A U □ 1 2 □ — C A □ C D □ C J □ C G 1 2
AXF250C

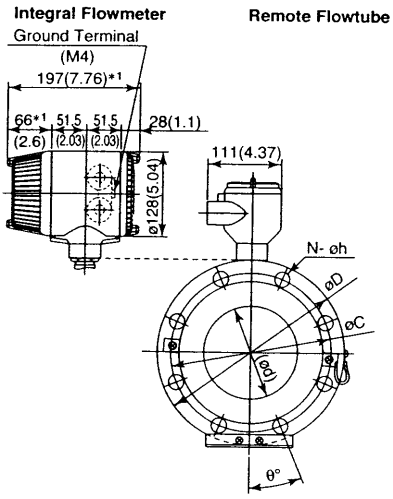
*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube**



Integral Flowmeter **Remote Flowtube**



Model	Process Connection		CJ1(JIS10K)			CJ2(JIS20K)			CG1(JIS F12)			CA1(ANSI Class 150)			CA2(ANSI Class 300)			CD1(DIN PN10)		CD2(DIN PN16)		
	Size code		150	200	250	150	200	250	150	200	250	150	200	250	150	200	250	200	250	150	200	250
	Size		150 (6)	200 (8)	250 (10)	150 (6)	200 (8)	250 (10)	150 (6)	200 (8)	250 (10)	150 (6)	200 (8)	250 (10)	150 (6)	200 (8)	250 (10)	200 (8)	250 (10)	150 (6)	200 (8)	250 (10)
	Lining code		A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U	A,U
Remote flowtube Integral flowmeter	Face-to-face length	L*2	270 (10.63)	340 (13.39)	430 (16.93)	270 (10.63)	340 (13.39)	430 (16.93)	270 (10.63)	340 (13.39)	430 (16.93)	270 (10.63)	340 (13.39)	430 (16.93)	270 (10.63)	340 (13.39)	430 (16.93)	340 (13.39)	430 (16.93)	270 (10.63)	340 (13.39)	430 (16.93)
	Outside dia.	øD	280 (11.02)	330 (12.99)	400 (15.75)	305 (12.01)	350 (13.78)	430 (16.93)	290 (11.42)	342 (13.46)	410 (16.14)	279.4 (11.00)	342.9 (13.50)	406.4 (16.00)	317.5 (12.50)	381.0 (15.00)	444.5 (17.50)	340 (13.39)	395 (15.55)	285 (11.22)	340 (13.39)	405 (15.94)
	Thickness	t *2	31 (1.22)	31 (1.22)	33 (1.30)	37 (1.46)	39 (1.54)	43 (1.69)	31 (1.22)	33 (1.30)	33 (1.30)	34.4 (1.35)	37.4 (1.47)	39.2 (1.54)	47.5 (1.87)	50.1 (1.97)	56.7 (2.23)	33 (1.30)	35 (1.38)	31 (1.22)	33 (1.30)	35 (1.38)
	Inner diameter of Grounding ring	ød	140.7 (5.54)	188.9 (7.44)	239.1 (9.41)	140.7 (5.54)	188.9 (7.44)	239.1 (9.41)	145.4 (5.72)	192.9 (7.59)	239.1 (9.41)	140.7 (5.54)	188.9 (7.44)	239.1 (9.41)	140.7 (5.54)	188.9 (7.44)	239.1 (9.41)	188.9 (7.44)	239.1 (9.41)	140.7 (5.54)	188.9 (7.44)	239.1 (9.41)
	Pitch circle dia.	øC	240 (9.45)	290 (11.42)	355 (13.98)	260 (10.24)	305 (12.01)	380 (14.96)	247 (9.72)	299 (11.77)	360 (14.17)	241.3 (9.50)	298.5 (11.75)	362.0 (14.25)	269.7 (10.62)	330.2 (13.00)	387.4 (15.25)	295 (11.61)	350 (13.78)	240 (9.45)	295 (11.61)	355 (13.98)
	Bolt hole interval	θ°	22.5	15	15	15	15	15	30	22.5	22.5	22.5	22.5	15	15	15	11.25	22.5	15	22.5	15	15
	Hole dia.	øh	23 (0.91)	23 (0.91)	25 (0.98)	25 (0.98)	25 (0.98)	27 (1.06)	19 (0.75)	19 (0.75)	23 (0.91)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	22.4 (0.88)	25.4 (1.00)	28.4 (1.12)	22 (0.87)	22 (0.87)	22 (0.87)	22 (0.87)	26 (1.02)
	Number of holes	N	8	12	12	12	12	12	6	8	8	8	8	12	12	12	16	8	12	8	12	12
	Height	H1	284 (11.18)	334 (13.15)	400 (15.75)	297 (11.69)	344 (13.54)	415 (16.34)	289 (11.38)	340 (13.39)	405 (15.94)	284 (11.18)	340 (13.39)	403 (15.87)	303 (11.93)	360 (14.17)	422 (16.61)	339 (13.35)	397 (15.63)	287 (11.30)	339 (13.35)	402 (15.83)
	Height	H2	141 (5.55)	166 (6.54)	197 (7.76)	141 (5.55)	166 (6.54)	197 (7.76)	141 (5.55)	166 (6.54)	197 (7.76)	141 (5.55)	166 (6.54)	197 (7.76)	141 (5.55)	166 (6.54)	197 (7.76)	166 (6.54)	197 (7.76)	141 (5.55)	166 (6.54)	197 (7.76)
	Height	H3	325 (12.80)	375 (14.76)	454 (17.87)	350 (13.78)	395 (15.55)	484 (19.06)	335 (13.19)	387 (15.24)	464 (18.27)	324 (12.76)	387 (15.24)	460 (18.11)	362 (14.25)	426 (16.77)	499 (19.65)	385 (15.16)	449 (17.68)	330 (12.99)	385 (15.16)	459 (18.07)
Remote flowtube	Max. Height	Hr	408 (16.06)	458 (18.03)	524 (20.63)	421 (16.57)	468 (18.43)	539 (21.22)	413 (16.26)	464 (18.27)	529 (20.83)	408 (16.06)	464 (18.27)	527 (20.75)	427 (16.81)	484 (19.06)	546 (21.50)	463 (18.23)	521 (20.51)	411 (16.18)	463 (18.23)	526 (20.71)
	Weight kg (lb)*3		29 (63.9)	39 (86.0)	64 (141.1)	38.3 (84.4)	53.6 (118.2)	92.5 (203.9)	31.1 (68.6)	44.6 (98.3)	67.4 (148.6)	32.1 (70.7)	50.9 (112.2)	77.4 (170.6)	53.7 (118.4)	80.5 (177.5)	127.0 (279.9)	44.2 (97.5)	67.0 (147.7)	29.9 (65.8)	43.6 (96.2)	68.8 (151.7)
Integral flowmeter	Max. Height	Hi	446 (17.56)	496 (19.53)	562 (22.13)	459 (18.07)	506 (19.92)	577 (22.72)	451 (17.76)	502 (19.76)	567 (22.32)	446 (17.56)	502 (19.76)	565 (22.24)	465 (18.31)	522 (20.55)	584 (22.99)	501 (19.72)	559 (22.01)	449 (17.68)	501 (19.72)	564 (22.20)
	Weight kg (lb)		30.7 (67.7)	40.7 (89.7)	65.7 (144.8)	40.0 (88.2)	55.3 (121.9)	94.2 (207.7)	32.8 (72.3)	46.3 (102.1)	69.1 (152.3)	33.8 (74.4)	52.6 (115.9)	79.1 (174.4)	55.4 (122.1)	82.2 (181.2)	128.7 (283.6)	45.9 (101.2)	68.7 (151.5)	31.6 (69.6)	45.3 (100.0)	70.5 (155.5)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to "L" (face-to-face length) and "t" (thickness of flange).

Nominal Size: 150, 200 mm							
		L	t	L	t	L	t
Grounding Ring Code		S, L, H, V		P, T		N	
Option Code	None	+0	+0	+28(1.1)	+14(0.55)	-6(0.24)	-3(0.12)
	GA, GC, GD (Special Gaskets)	+2(0.08)	+1(0.04)	+30(1.81)	+15(0.59)	-	-

Nominal Size: 250 mm				
	L	t	L	t
Grounding Ring Code	S, L, H, V		N	
Option Code is "None"	+0	+0	-6(0.24)	-3(0.12)

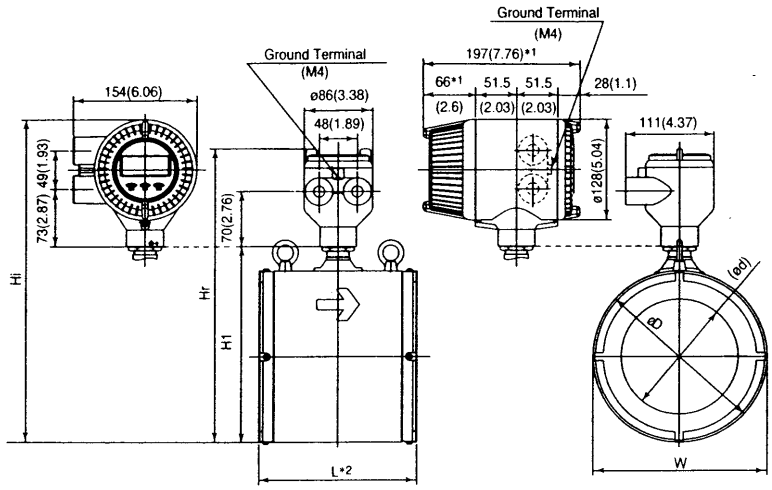
*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

F40.EPS

● Replacement model for Earlier ADMAG or ADMAG AE, AXF150, AXF200, Wafer Type, PFA /Polyurethane Rubber Lining

Unit : mm (approx. inch)

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**



AXF150 AXF200 G W C — *4 D E N P 1 2 N A U □1□ — A□□2

*4: D, E; Integral Flowmeter,
N, P; Remote Flowtube

Model	Size code		150	200
	Size		150(6)	200(8)
	Lining code		A,U	A,U
Remote flowtube / Integral flowmeter	Face-to-face length	L*2	230(9.06)	300(11.81)
Remote flowtube	Outside dia.	ØD	202(7.95)	252(9.92)
Remote flowtube / Integral flowmeter	Inner diameter of Grounding ring	ød	140.7(5.54)	188.9(7.44)
Remote flowtube / Integral flowmeter	Width	W	202(7.95)	252(9.92)
Remote flowtube / Integral flowmeter	Height	H1	243(9.57)	293(11.54)
Remote flowtube	Max. Height	Hr	367(14.45)	417(16.42)
Remote flowtube	Weight kg (lb)*3		17.9(39.5)	26.8(59.1)
Integral flowmeter	Max. Height	Hi	405(15.93)	455(17.89)
Integral flowmeter	Weight kg (lb)		19.6(43.2)	28.5(62.8)

*1: When indicator code N is selected, subtract 12 mm (0.47 inch) from the value in the figure.
In case of explosion proof type with indicator, add 5 mm (0.2 inch) to it.

*2: Depending on the selection of grounding ring code and optional code, add the following value to L (face-to-face length).

Grounding Ring Code		S, L, H, V	P, T	N
Option Code	None	+0	+28(1.1)	-6(0.24)
	GA, GC, GD (Special Gaskets)	+2(0.08)	+30(1.18)	–

*3: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached. Add 9.5kg(20.9lb) to the weight in the table.

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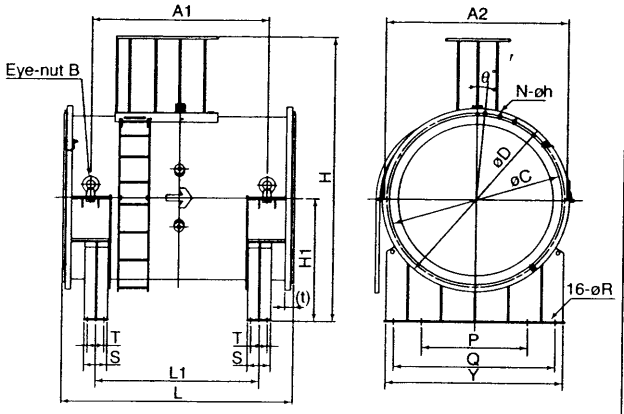
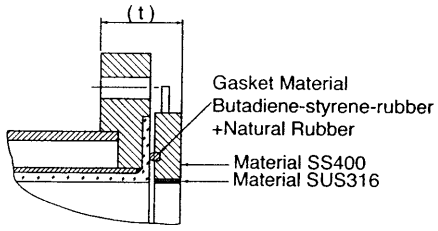
● AXF Standard, AXF16L-AXF26L, JIS Flange Type, Polyurethane Rubber Lining

AXF16L
AXF18L
AXF20L G
AXF22L W — **NNUL 1S — CG11**
AXF24L
AXF26L

Unit : mm (approx. inch)



Flange Detail



Model	Process Connection		CG1(JIS F12)					
	Size code		16L	18L	20L	22L	24L	26L
	Size		1600 (64)	1800 (72)	2000 (80)	2200 (88)	2400 (96)	2600 (104)
	Lining code		U	U	U	U	U	U
Remote Flowtube	Face-to-face length	L	2400 0 -10 (94.49)	2610 0 -10 (102.76)	2800 0 -10 (110.24)	2970 0 -10 (116.93)	3120 0 -10 (122.83)	3300 0 -10 (129.92)
	Eye-nut Interval 1	A1	1834 (72.20)	2022 (79.61)	2191 (86.26)	2325 (91.54)	2421 (95.31)	2550 (100.39)
	Eye-nut Interval 2	A2	1872 (73.70)	2078 (81.81)	2300 (90.55)	2520 (99.21)	2724 (107.24)	2946 (115.98)
	Eye-nut Size	B	M48	M48	M48	M48	M64	M64
	Support Width	S	250 (9.84)	250 (9.84)	250 (9.84)	300 (11.81)	300 (11.81)	300 (11.81)
	Support Length	Y	1850 (72.83)	2000 (78.74)	2220 (87.40)	2420 (95.28)	2620 (103.15)	2820 (111.02)
	Support Interval	L1	1698 (66.85)	1864 (73.39)	2010 (79.13)	2172 (85.51)	2218 (87.32)	2300 (90.55)
	Mounting Bolt Interval	P	1080±3 (42.52)	1180±3 (46.46)	1300±3 (51.18)	1430±3 (56.30)	1560±3 (61.42)	1700±3 (66.93)
		Q	1650±3 (64.96)	1800±3 (70.87)	2000±3 (78.74)	2200±3 (86.61)	2400±3 (94.49)	2600±3 (102.36)
		T	170±1 (6.69)	170±1 (6.69)	170±1 (6.69)	200±1 (7.87)	200±1 (7.87)	200±1 (7.87)
	Mounting Bolt Hole dia.	øR	22 (0.87)	22 (0.87)	22 (0.87)	22 (0.87)	22 (0.87)	22 (0.87)
	Outside dia.	øD	1915 (75.39)	2115 (83.27)	2325 (91.54)	2550 (100.39)	2760 (108.66)	2960 (116.54)
	Thickness	t*1	88 (3.46)	90 (3.54)	92 (3.62)	95 (3.74)	97 (3.82)	101 (3.98)
	Pitch circle dia.	øC	1820 (71.65)	2020 (79.53)	2230 (87.80)	2440 (96.06)	2650 (104.33)	2850 (112.20)
	Bolt hole interval	θ°	5	4.1	3.75	3.5	3.2	3.2
	Hole dia.	øh	39 (1.54)	39 (1.54)	46 (1.81)	46 (1.81)	46 (1.81)	52 (2.05)
	Number of holes	N	36 (1.42)	44 (1.73)	48 (1.89)	52 (2.05)	56 (2.20)	56 (2.20)
	Height	H1	1280 +16 0 (50.39)	1350 +16 0 (53.15)	1450 +16 0 (57.09)	1550 +16 0 (61.02)	1700 +16 0 (66.93)	1700 +16 0 (66.93)
	Max. Height	H	2972 (117.01)	3153 (124.13)	3347 (131.77)	3554 (139.92)	3813 (150.12)	3917 (154.21)
	Weight kg (lb) *2		3650 (8046.9)	5270 (11618.3)	approx. 6500 (14330.0)	approx. 8400 (18518.8)	approx. 10000 (22046.2)	approx. 14500 (31967.0)

*1: The value before the gasket is tightened.
*2: When submersible type or option code DHC is selected, waterproof glands and a 30m long cable are attached.
Add 9.5kg(20.9lb) to the weight in the table.

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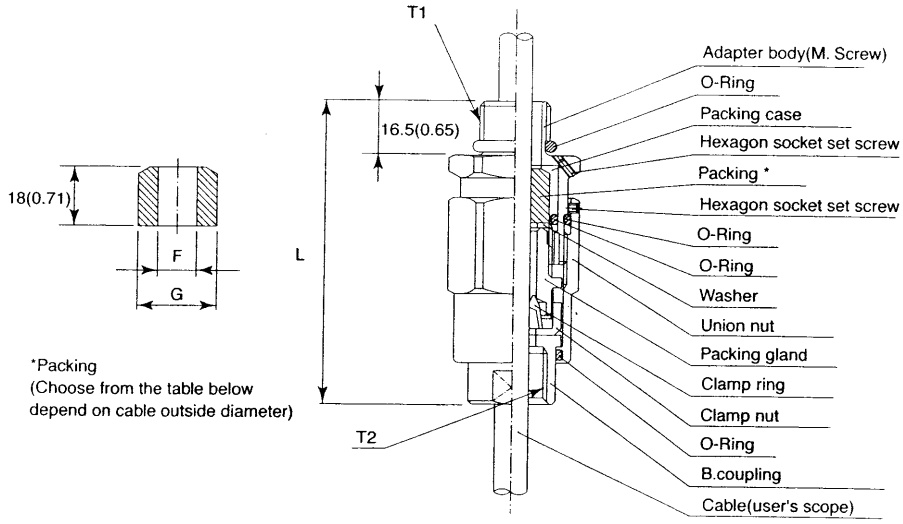
● Flame proof Packing Adapter for TIIS Flame proof Type (Optional code G12 or G11)

Unit : mm
(Approx. inch)



*Packing
(Choose from the table below depend on cable outside diameter)

F43.EPS

Dimension					Cable outer diameter	Packing diameter		Identification mark	Weight kg (lb)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35 (1.38)	39 (1.54)	94.5 (3.72)	ϕ8.0 to ϕ10.0 (0.31 to 0.39)	ϕ10.0(0.39)	ϕ20.0 (0.79)	16 8-10	0.26 (0.57)
					ϕ10.0 to ϕ12.0 (0.39 to 0.47)	ϕ12.0(0.47)		16 10-12	

T31.EPS

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● **Unless otherwise specified, difference in the dimensions are refer to the following table.**

General tolerance in the dimensional outline drawing.

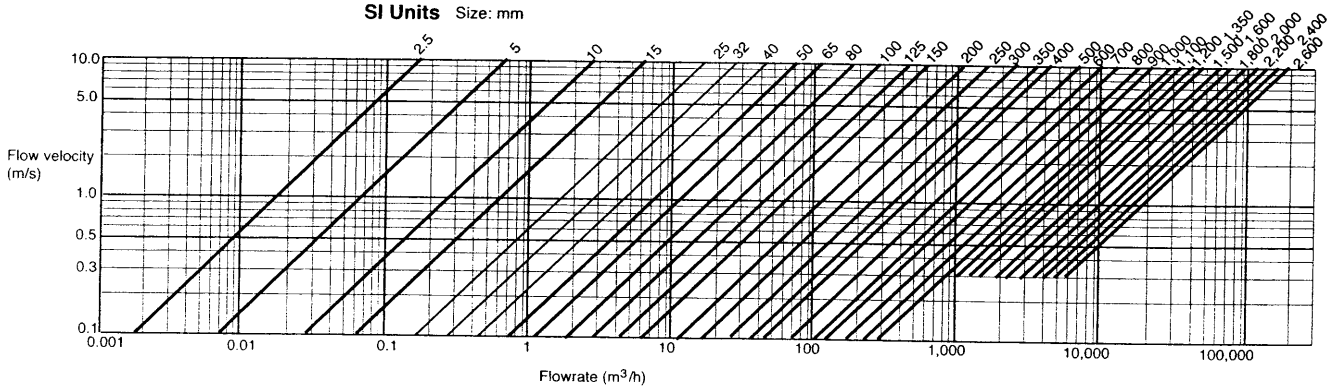
Unit : mm (approx.inch)

Category of basic dimension		Tolerance	Category of basic dimension		Tolerance
Above	Equal or below		Above	Equal or below	
	3 (0.12)	±0.7 (±0.03)	500 (19.69)	630 (24.80)	±5.5 (±2.17)
3 (0.12)	6 (0.24)	±0.9 (±0.04)	630 (24.80)	800 (31.50)	±6.25 (±0.25)
6 (0.24)	10 (0.39)	±1.1 (±0.04)	800 (31.50)	1000 (39.37)	±7.0 (±0.28)
10 (0.39)	18 (0.71)	±1.35 (±0.05)	1000 (39.37)	1250 (49.21)	±8.25 (±0.32)
18 (0.71)	30 (1.18)	±1.65 (±0.06)	1250 (49.21)	1600 (62.99)	±9.75 (±0.38)
30 (1.18)	50 (1.97)	±1.95 (±0.08)	1600 (62.99)	2000 (78.74)	±11.5 (±0.45)
50 (1.97)	80 (3.15)	±2.3 (±0.09)	2000 (78.74)	2500 (98.43)	±14.0 (±0.55)
80 (3.15)	120 (4.72)	±2.7 (±0.11)	2500 (98.43)	3150 (124.02)	±16.5 (±0.65)
120 (4.72)	180 (7.09)	±3.15 (±0.12)			
180 (7.09)	250 (9.84)	±3.6 (±0.14)			
250 (9.84)	315 (12.40)	±4.05 (±0.16)			
315 (12.40)	400 (15.75)	±4.45 (±0.18)			
400 (15.75)	500 (19.69)	±4.85 (±0.19)			

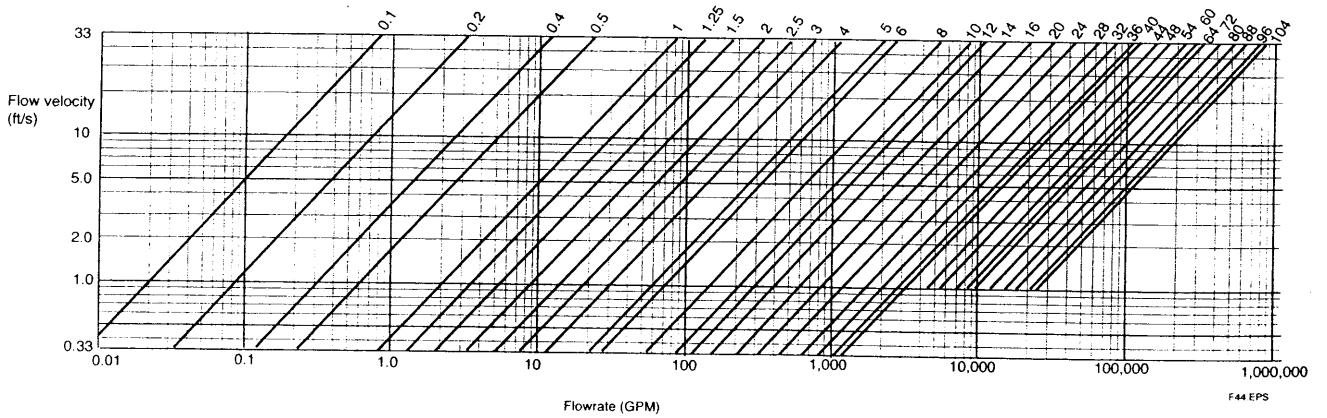
Remarks: The numeric is based on criteria of tolerance class IT18 in JIS B 0401.

■ SIZING DATA (Measurable flow velocity is from 0 m/s.)

SI Units Size: mm



English Units Size: inch



* Measurable flow velocity is from 0 m/s.

■ RECOMMENDED GASKETS BETWEEN FLOWTUBES AND USER'S FLANGES

Use compressed non-asbestos fiber gaskets, PTFE gaskets or gaskets which have equivalent elasticity. For optional codes GA, GC, and GD, use rubber gaskets or others which have equivalent elasticity (such as Teflon-coated rubber gaskets).

7. PED (PRESSURE EQUIPMENT DIRECTIVE)

This chapter describes further requirements and notices concerning the PED (Pressure Equipment Directive). The description in this chapter is prior to other description in this User's Manual.

(1) Technical Data

Module: H
Type of Equipment: Piping
Type of Fluid: Liquids and gas
Group of Fluid: 1 and 2

General-purpose Use / Submersible Type / Explosion Proof Type

MODEL	DN (mm) (*1)	PS (MPa) (*1)	PS DN (MPa · mm)	CATEGORY(*2)
AXF002G/C	2.5	4	10	Article 3, (*3) paragraph 3
AXF005G/C	5	4	20	Article 3, (*3) paragraph 3
AXF010G/C	10	4	40	Article 3, (*3) paragraph 3
AXF015G/W/C	15	4	60	Article 3, (*3) paragraph 3
AXF025G/W/C	25	4	100	Article 3, (*3) paragraph 3
AXF032G/W/C	32	4	128	II
AXF040G/W/C	40	4	160	II
AXF050G/W/C	50	4	200	II
AXF065G/W/C	65	2	130	II
AXF080G/W/C	80	2	160	II
AXF100G/W/C	100	2	200	II
AXF125G/W/C	125	2	250	II
AXF150G/W/C	150	2	300	II
AXF200G/W/C	200	2	400	III
AXF250G/W/C	250	2	500	III
AXF300G/W/C	300	2	600	III
AXF350G/W/C	350	1	700	III
AXF400G/W/C	400	1	800	III

T0701.EPS

Sanitary Type

MODEL	DN (mm) (*1)	PS (MPa) (*1)	PS D (MPa · mm)	CATEGORY (*2)
AXF015H	15	1	15	Article 3, (*3) paragraph 3
AXF025H	25	1	25	Article 3, (*3) paragraph 3
AXF032H	32	1	32	I
AXF040H	40	1	40	I
AXF050H	50	1	50	I
AXF065H	65	1	65	I
AXF080H	80	1	80	I
AXF100H	100	1	100	I
AXF125H	125	1	125	I

T0702.EPS

Note : The sizes of 500 to 2600 mm (20 to 104 in.) are not attached CE marking of PED.
*1: PS: Maximum allowable pressure for Flowtube
DN: Nominal size
*2: For details, see "Table 6 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC."
*3: AXF002G/C to AXF025G/W/C, AXF015H and AXF025H are outside the scope of CE marking of PED.

(2) Installation

⚠ WARNING

- Tighten the bolts of the piping joints according to the prescribed torque values.
- Take measures to protect the flowmeters from forces caused by vibration channeled through the piping.

(3) Operation

⚠ WARNING

- The instrument should be operated with the temperature and pressure of the fluid under normal operating conditions.
- The ambient temperature should be that of normal operating conditions.
- Take measures to prevent excessive pressure such as water hammer, etc. To avoid water hammer prevent the pressure from exceeding the PS (maximum allowable pressure) by setting the system's safety valves, etc. appropriately.
- Should external fire occur, take safety measures at the device itself or system-wide prevent it having an effect on the flowmeters.
- Avoid using fluids exceeding the corrosion proof limitations of the lining and electrodes.
- Take measures not to abrade the metal pipe, and avoid abrading the lining by using fluids such as slurry and sand are contained.

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8. EXPLOSION PROTECTED TYPE INSTRUMENT

In this section, further requirements and differences for explosion proof type instrument are described.

WARNING

- Magnetic flowmeters with the model name AXF□□□C are products which have been certified as explosion proof type instruments. Strict limitations are applied to the structures, installation locations, external wiring work, maintenance and repairs, etc. of these instruments. Sufficient care must be taken, as any violation of the limitations may cause dangerous situations.
  Be sure to read this chapter before handling the instruments.
  For explosion proof type instrument, the description in this chapter is prior to other description in this user's manual.
  For TIIS flame proof type instruments, be sure to read "INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT" at the end of this manual.

WARNING

The terminal box cover and display cover is locked by special screw. In case of opening the cover, please use the hexagonal wrench attached.
The covers of explosion proof type products are locked. Use the attached hexagonal wrench to open and close the cover. Before opening the cover, be sure to check that the power of flowmeter has been turned off. Once the cover is closed, be sure to re-lock the product.
Be sure to lock the cover with the special screw using the hexagonal wrench attached after tightening the cover.

8.1 CENELEC ATEX (KEMA)

WARNING

Only trained persons use this instrument in industrial locations.

(1) Technical Data

No. KEMA 03ATEX2435

*AXF002C – AXF400C

(Integral Flowmeter)

CENELEC ATEX (KEMA) Flame proof Type

Group category: II 2G
EEx dme [ia] IIC T6...T3
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: IP66, IP67

Temperature Class	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T0801.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

CENELEC ATEX (KEMA) Type of Protection "Dust"

Group category: II 1D
Maximum surface temperature:

Maximum Surface Temperature	Maximum Process Temperature
T75°C (+167°F)	+70°C (+158°F)
T85°C (+185°F)	+85°C (+185°F)
T100°C (+212°F)	+120°C (+248°F)
T110°C (+230°F)	+130°C (+266°F)

T0802.EPS

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19.1.2

(Remote Flowtube)
CENELEC ATEX (KEMA) Flame proof Type

Group category: II 2G
EEx dme [ia] IIC T6...T3
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: IP66, IP67

Temperature Class	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T0803.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

CENELEC ATEX (KEMA) Type of Protection "Dust"

Group category: II 1D
Maximum surface temperature:

Maximum Surface Temperature	Maximum Process Temperature
T75°C (+167°F)	+70°C (+158°F)
T85°C (+185°F)	+85°C (+185°F)
T100°C (+212°F)	+120°C (+248°F)
T115°C (+239°F)	+150°C (+302°F)

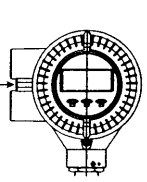
T0804.EPS

(2) Electrical Connection

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

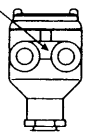
(Integral Flowmeter)

Screw Size	Marking
ISO M20x1.5 female	⚠M
ANSI 1/2NPT female	⚠A



(Remote Flowtube)

Screw Size	Marking
ISO M20x1.5 female	⚠M
ANSI 1/2NPT female	⚠A



F0801.EPS

(3) Installation

⚠ WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazardous locations, the cable entry devices shall be of a certified ATEX flame proof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flame proof certified blanking elements. (The plug attached is flame proof certified.)

(4) Operation

(Integral Flowmeter)

⚠ WARNING

- After de-energizing, delay 20 minutes before opening.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(Remote Flowtube)

⚠ WARNING

- De-energize before opening.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

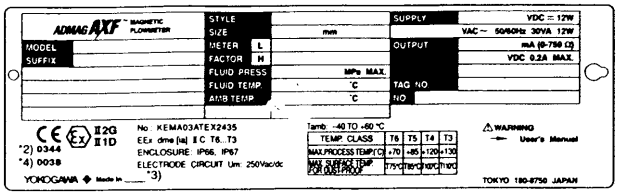
(5) Maintenance and Repair

⚠ WARNING

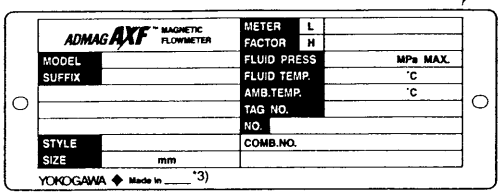
The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the certification.

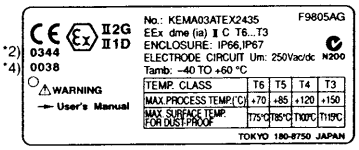
(6) Data Plate

(Integral Flowmeter)



(Remote Flowtube)





MODEL: Specified model code
SUFFIX: Suffix codes of the model code
STYLE: Specified style code
SIZE: Nominal size of apparatus
METER FACTOR: Sensor constant number of apparatus
SUPPLY: Power supply voltage of apparatus
OUTPUT: Output signal of apparatus
FLUID TEMP.: Fluid temperature of apparatus
FLUID PRESS: Fluid pressure of apparatus
AMB. TEMP., Tamb: Ambient temperature
No.: Manufacturing serial number *1)
CE: CE marking
II 2G: Group II Category 2 Gas atmosphere
II 1D: Group II Category 1 Dust atmosphere
No.: KEMA 03ATEX2435:
EC Type Examination certificate number
EEx dme[ia]IIC T6...T3: Protection type and temp. class
ELECTRODE CIRCUIT Um: Voltage of electrode circuit
ENCLOSURE: Enclosure protection code

⚠ **WARNING**: Warning to apparatus
YOKOGAWA ◆ TOKYO 180-8750 JAPAN :
Name and address of manufacturer

*1) The third figure from the last shows the last one figure of the year of production. For example, the year of production of the product engraved as follows is year 2003.
No. F261GA091 313
↑
Produced in 2003

*2) The identification number of the notified body :
0344 KEMA Netherland

*3) The product-producing country

*4) In case of the sizes of 2.5 to 25mm (0.1 to 1.0 in.) , "0038" is not described.

8.2 FM

(1) Technical Data

*AXF002C – AXF400C

(Integral Flowmeter)

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: NEMA 4X

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T0805.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(Remote Flowtube)

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 18 INCHES"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"
Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: NEMA 4X

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T0806.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

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(2) Installation

WARNING

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and Local Electrical Code.
- In hazardous locations, wiring to be in conduit as shown in Figure 8.2.1.
- When installed in Division 2, "SEALS NOT REQUIRED"

(3) Operation

WARNING

- "OPEN CIRCUIT BEFORE REMOVING COVERS."
- "SEALS ALL CONDUITS WITHIN 18 INCHES" in hazardous locations.
- When installed in Division 2, "SEALS NOT REQUIRED"
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(4) 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 approval of Factory Mutual Research Corporation.

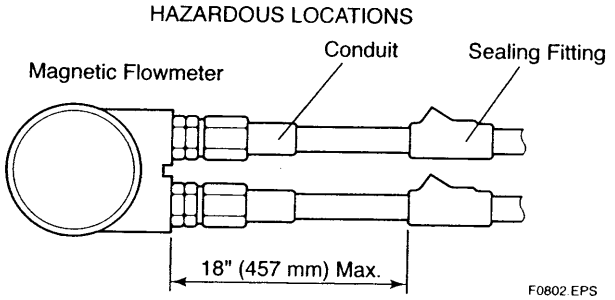

Figure 8.2.1 Conduit Wiring

8.3 CSA

(1) Technical Data

. *AXF002C – AXF400C

(Integral Flowmeter)
For CSA C22. 2 Series

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division 1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

For CSA E79 Series

Flame proof for Zone 1, Ex dme [ia] IIC T6...T3
Intrinsically safe (electrodes) for Zone 0, Ex ia IIC T6...T3

Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 140V max
Enclosure: Type 4X, IP66, IP67

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+130°C (+266°F)	–40°C (–40°F)

T0807.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(Remote Flowtube)
For CSA C22.2 Series

Explosion proof for Class I, Division 1, Group A, B, C, & D.
Dust-ignition proof for Class II/III, Division 1, Group E, F & G.
Intrinsically safe (electrodes) for Class I, Division 1, Group A, B, C, & D.
"SEAL ALL CONDUITS WITHIN 50 cm OF THE ENCLOSURE"
"WHEN INSTALLED IN DIV. 2, SEALS NOT REQUIRED"

For CSA E79 Series

Flame proof for Zone 1, Ex dme [ia] IIC T6...T3
Intrinsically safe (electrodes) for Zone 0,Ex ia IIC T6...T3

Electrode Circuit Um: 250 Vac/dc
Excitation Circuit: 170V max
Enclosure: Type 4X, IP66, IP67

Temperature Code	Maximum Process Temperature	Minimum Process Temperature
T6	+70°C (+158°F)	–40°C (–40°F)
T5	+85°C (+185°F)	–40°C (–40°F)
T4	+120°C (+248°F)	–40°C (–40°F)
T3	+150°C (+302°F)	–40°C (–40°F)

T0808.EPS

Ambient Temp.: –40°C to +60°C (–40°F to +140°F)

(2) Installation

For CSA C22.2 Series

WARNING

- 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 Figure 8.3.1.

WARNING : SEAL ALL CONDUITS WITHIN 50cm OF THE ENCLOSURE'.
UN SCELLEMENT DOIT ÉTRE INSTALLÉ À MOINS DE 50cm DU BOÎTIER.

- When installed in Division 2, "SEALS NOT REQUIRED"

For CSA E79 Series

WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- In hazadous locations, the cable entry devices shall be of a certified flame proof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flame proof certified blanking elements. (The plug attached is flame proof certified.)

(3) Operation

For CSA C22.2 Series

WARNING

WARNING : 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 locations.

For CSA E79 Series

(Integral Flowmeter)

WARNING

WARNING : AFTER DE-ENERGIZING, DELAY 20 MINUTES BEFORE OPENING.
APRÉS POWER-OFF, ATTENDRE 20 MINUTES AVANT D'OUVRIR.

- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

(Remote Flowtube)

WARNING

WARNING : DE-ENERGIZE BEFORE OPENING.
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 locations.

(4) Maintenance and Repair

WARNING

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

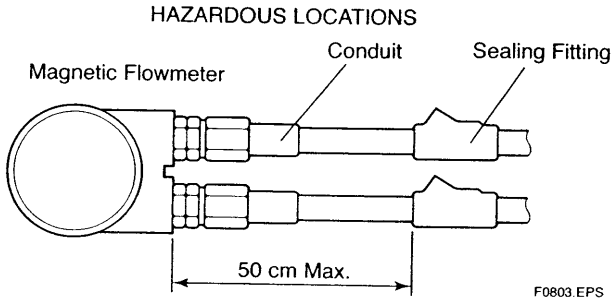

Figure 8.3.1 Conduit Wiring

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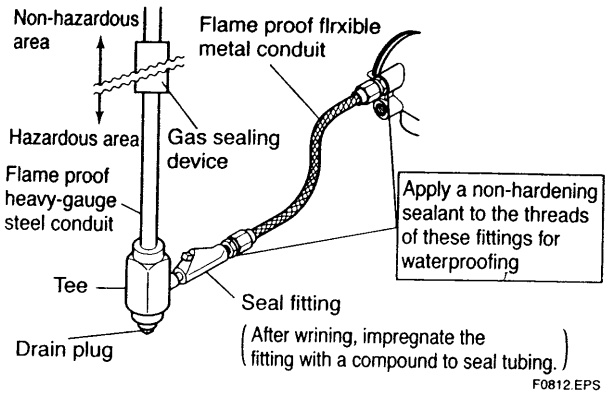

Figure 8.4.4 Typical Wiring Using Flame proof Metal Conduit

INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS FLAME PROOF EQUIPMENT

Apparatus Certified Under Technical Criteria
(IEC-compatible Standards)

1. General

The following describes precautions on electrical apparatus of flameproof construction (hereinafter referred to as flameproof apparatus) in explosion-protected apparatus.

Following the Labour Safety and Health Laws of Japan, flameproof apparatus is subjected to type tests to meet either the technical criteria for explosionproof electrical machinery and equipment (standards notification no. 556 from the Japanese Ministry of Labour) (hereinafter referred to as technical criteria), in conformity with the IEC Standards, or the "Recommended Practice for Explosion-Protected Electrical Installations in General Industries," published in 1979. These certified apparatus can be used in hazardous locations where explosive or inflammable gases or vapours may be present.

Certified apparatus includes a certification label and an equipment nameplate with the specifications necessary for explosion requirements as well as precautions on explosion protection. Please confirm these precautionary items and use them to meet specification requirements.

For electrical wiring and maintenance servicing, please refer to "Internal Wiring Rules" in the Electrical Installation Technical Standards as well as "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

To meet flameproof requirements, equipment that can be termed "flameproof" must:

(1) Be certified by a Japanese public authority in accordance with the Labour Safety and Health Laws of Japan and have a certification label in an appropriate location on its case, and
(2) Be used in compliance with the specifications marked on its certification label, equipment nameplate and precautionary information furnished.

2. Electrical Apparatus of Flameproof Type of Explosion-Protected Construction

Electrical apparatus which is of flameproof construction is subjected to a type test and certified by the Japanese Ministry of Labour aiming at preventing explosion caused by electrical apparatus in a factory or any location where inflammable gases or vapours may be present. The flameproof construction is of completely enclosed type and its enclosure shall endure explosive pressures in cases where explosive gases or vapours entering the enclosure cause explosion. In addition, the enclosure construction shall be such that flame caused by explosion does not ignite gases or vapours outside the enclosure.

In this manual, the word "flameproof" is applied to the flameproof equipment combined with the types of protection "e", "o", "i", and "d" as well as flameproof equipment.

3. Terminology

(1) Enclosure

An outer shell of an electrical apparatus, which encloses live parts and thus is needed to configure explosion-protected construction.

(2) Shroud

A component part which is so designed that the fastening of joint surfaces cannot be loosened unless a special tool is used.

(3) Enclosure internal volume

This is indicated by:— the total internal volume of the flameproof enclosure minus the volume of the internal components essential to equipment functions.

(4) Path length of joint surface

On a joint surface, the length of the shortest path through which flame flows from the inside to outside of the flameproof enclosure. This definition cannot be applied to threaded joints.

(5) Gaps between joint surfaces

The physical distance between two mating surfaces, or differences in diameters if the mating surfaces are cylindrical.

Note: The permissible sizes of gaps between joint surfaces, the path length of a joint surface and the number of joint threads are determined by such factors as the enclosure's internal volume, joint and mating surface construction, and the explosion classification of the specified gases and vapours.

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4. Installation of Flameproof Apparatus

(1) Installation Area

Flameproof apparatus may be installed, in accordance with applicable gases, in a hazardous area in Zone 1 or 2, where the specified gases are present. Those apparatus shall not be installed in a hazardous area in Zone 0.

Note: Hazardous areas are classified in zones based upon the frequency of the appearance and the duration of an explosive gas atmosphere as follows:
Zone 0: An area in which an explosive gas atmosphere is present continuously or is present for long periods.
Zone 1: An area in which an explosive gas atmosphere is likely to occur in normal operation.
Zone 2: An area in which an explosive gas atmosphere is not likely to occur in normal operation and if it does occur it will exist for a short period only.

(2) Environmental Conditions

The standard environmental condition for the installation of flameproof apparatus is limited to an ambient temperature range from –20°C to +40°C (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to +60°C as indicated on the instrument nameplates. If the flameproof apparatus are exposed to direct sunshine or radiant heat from plant facilities, appropriate thermal protection measures shall be taken.

5. External Wiring for Flameproof Apparatus

Flameproof apparatus require cable wiring or flameproof metal conduits for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. For metal conduits, attach sealing fittings as close to wiring connections as possible and completely seal the apparatus. All non-live metal parts such as the enclosure shall be securely grounded. For details, see the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

(1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.
- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated form Zone 1 or 2 hazardous location to any different location or non-hazardous location through the protective pipe or duct, apply sealing of the protective pipes in the vicinity of individual boundaries, or fill the ducts with sand appropriately.
- When branch connections of cables, or cable connections with insulated cables inside the conduit pipes are made, a flameproof or increased-safety connection box shall be used. In this case, flameproof or increased-safety cable glands meeting the type of connection box must be used for cable connections to the box.

(2) Flameproof Metal Conduit Wiring

- For the flameproof metal conduit wiring or insulated wires shall be used as recommended by the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry, published in 1994.
- For conduit pipes, heavy-gauge steel conduits conforming to JIS C 8305 Standard shall be used.
- Flameproof sealing fittings shall be used in the vicinity of the wiring connections, and those fittings shall be filled with sealing compounds to complete sealing of the apparatus. In addition, to prevent explosive gases, moisture, or flame caused by explosion form being propagated through the conduit, always provide sealing fittings to complete sealing of the conduit in the following locations:
  (a) In the boundaries between the hazardous and non-hazardous locations.
  (b) In the boundaries where there is a different classification of hazardous location.
- For the connections of the apparatus with a conduit pipe or its associated accessories, G-type parallel pipe threads (JIS B 0202) shall be used to provide a minimum of five-thread engagement to complete tightness. In addition, since these parallel threads do not have sealing property, nonhardening sealant such as liquid gaskets shall thus be applied to those threads for ensuring waterproofness.
- If metal conduits need flexibility, use flameproof flexible fittings.

6. Maintenance of Flameproof Apparatus

To maintain the flameproof apparatus, do the following. (For details, see Chapter 10 "MAINTENANCE OF EXPLOSION-PROTECTED ELECTRICAL INSTALLATION" in the USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry.)

(1) Maintenance servicing with the power on.

Flameproof apparatus shall not be maintenance-serviced with its power turned on. However, in cases where maintenance servicing is to be conducted with the power turned on, with the equipment cover removed, always use a gas detector to check that there is no explosive gas in that location. If it cannot be checked whether an explosive gas is present or not, maintenance servicing shall be limited to the following two items:

(a) Visual inspection
Visually inspect the flameproof apparatus, metal conduits, and cables for damage or corrosion, and other mechanical and structural defects.

(b) Zero and span adjustments
These adjustments should be made only to the extent that they can be conducted from the outside without opening the equipment cover. In doing this, great care must be taken not to cause mechanical sparks with tools.

(2) Repair

If the flameproof apparatus requires repair, turn off the power and transport it to a safety (non-hazardous) location. Observe the following points before attempting to repair the apparatus.

(a) Make only such electrical and mechanical repairs as will restore the apparatus to its original condition. For the flameproof apparatus, the gaps and path lengths of joints and mating surfaces, and mechanical strength of enclosures are critical factors in explosion protection. Exercise great care not to damage the joints or shock the enclosure.

(b) If any damage occurs in threads, joints or mating surfaces, inspection windows, connections between the transmitter and terminal box, shrouds or clamps, or external wiring connections which are essential in flameproofness, contact Yokogawa Electric Corporation.

⚠ CAUTION

Do not attempt to re-process threaded connections or refinish joints or mating surfaces.

(c) Unless otherwise specified, the electrical circuitry and internal mechanisms may be repaired by component replacement, as this will not directly affect the requirements for flameproof apparatus (however, bear in mind that the apparatus must always be restored to its original condition). If you attempt to repair the flameproof apparatus, company-specified components shall be used.

(d) Before starting to service the apparatus, be sure to check all parts necessary for retaining the requirements for flameproof apparatus. For this, check that all screws, bolts, nuts, and threaded connections have properly been tightened.

(3) Prohibition of specification changes and modifications

Do not attempt to change specifications or make modifications involving addition of or changes in external wiring connections.

7. Selection of Cable Entry Devices for Flameproof Type

⚠ CAUTION

The cable glands (cable entry devices for flameproof type) conforming to IEC Standards are certified in combination with the flameproof apparatus. So, Yokogawa-specified cable entry devices for flameproof type shall be used to meet this demand.

References:

(1) Type Certificate Guide for Explosion-Protected Construction Electrical Machinery and Equipment (relating to Technical Standards Conforming to International Standards), issued by the Technical Institution of Industrial Safety, Japan

(2) USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry (1994), issued by the Japanese Ministry of Labour, the Research Institute of Industrial Safet

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