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**User's  
Manual**

**Model UYF200, UYFA21**

**Ultrasonic Vortex  
Flowmeters  
(Style Code:S2)**

**ULTRA  
YEW FLO**

IM 1F5B2-01E

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# Contents

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<b>1.</b>	<b>INTRODUCTION .....</b>	<b>1-1</b>
<b>2.</b>	<b>HANDLING PRECAUTIONS .....</b>	<b>2-1</b>
2.1	Cross-check of the Model Code and Specifications .....	2-1
2.2	Precautions Regarding Transportation .....	2-1
2.3	Precautions Regarding Storage Location .....	2-2
2.4	Precautions Regarding Installation Location .....	2-2
2.5	Precautions Regarding Pipelines .....	2-3
2.6	Precautions Regarding Use of Transceivers .....	2-4
2.7	Precautions Regarding Insulation Resistance and Withstanding Voltage Tests .....	2-4
2.8	Notes on JIS Flameproof Flowmeters .....	2-5
2.9	Installation Precautions for CENELEC (KEMA) Intrinsic Safty .....	2-5
2.10	Installation Precautions for CENELEC (KEMA) Explosionproof .....	2-6
<b>3.</b>	<b>COMPONENTS OF ULTRA YEWFLO .....</b>	<b>3-1</b>
<b>4.</b>	<b>MOUNTING .....</b>	<b>4-1</b>
4.1	Piping Precautions .....	4-1
4.2	Mounting ULTRA YEWFLO .....	4-7
4.2.1	Mounting a Wafer Type of ULTRA YEWFLO .....	4-7
4.2.2	Installing a Flange Type of ULTRA YEWFLO .....	4-10
4.3	Mounting remote type converter .....	4-12
4.4	Repositioning the Indicator/Totalizer Component .....	4-12
4.5	Swiveling the Indicator/Totalizer Component .....	4-13
4.6	Insulating the Piping .....	4-14
<b>5.</b>	<b>WIRING .....</b>	<b>5-1</b>
5.1	Selecting the Cable .....	5-1
5.2	Connecting Field Mounting Indicator (applies to analog output only) .....	5-2
5.3	Wiring .....	5-3
5.4	Grounding .....	5-5
5.5	Signal cable end finish procedure .....	5-6
5.6	Power Supply Voltage and Load Resistance .....	5-7
5.7	Pulse output .....	5-8
5.8	Simultaneous Analog-Pulse Output .....	5-9
<b>6.</b>	<b>PREPARING FOR OPERATION .....</b>	<b>6-1</b>
6.1	Checking the Flowrate Range .....	6-1
6.2	Pressure Loss and Cavitation .....	6-3
6.3	Zero Adjustment .....	6-3
6.4	Resetting totalized value .....	6-3
6.5	Action Against Power Failure .....	6-4
6.6	Precautions During Startup .....	6-4

<b>7.</b>	<b>WORKING WITH THE BT200 BRAIN TERMINAL .....</b>	<b>7-1</b>
7.1	Connection of a BT200 Terminal and Notes on Use .....	7-1
7.1.1	Connection of a BT200 Terminal .....	7-1
7.1.2	Notes on Use .....	7-2
7.2	Working with the BT200 .....	7-3
7.2.1	Layout of Keys .....	7-3
7.2.2	Functionality of Operating Keys .....	7-4
7.3	Configuring Parameters with the BT200 .....	7-5
7.3.1	Screens for Parameter Setup .....	7-5
7.3.2	Configuring Parameters .....	7-6
7.4	Parameter Summary .....	7-7
7.5	Self-checking .....	7-10
7.5.1	Checking for Failures .....	7-10
7.5.2	Information on Failures and Corrective Measures .....	7-11
<b>8.</b>	<b>MAINTENANCE .....</b>	<b>8-1</b>
8.1	Equipment Needed for Maintenance .....	8-2
8.2	Adjustment .....	8-3
8.2.1	Zero Adjustment .....	8-3
8.2.2	Span Adjustment .....	8-3
8.2.3	Trigger Level Adjustment (TLA) (Parameter H10) .....	8-4
8.2.4	Loop Tests (Parameters F10 and F20) .....	8-4
8.3	Disassembly and Reassembly .....	8-5
8.3.1	Removing the Indicator/Totalizer Component .....	8-5
8.3.2	Removing the Amplifier Unit .....	8-6
8.3.3	Replacing the Sensor Assembly .....	8-7
8.4	Troubleshooting.....	8-10
8.4.1	Basic Troubleshooting Flow .....	8-10
8.4.2	Specific Troubleshooting Flows .....	8-11
8.4.3	Instructions on Use of Check Terminals of Amplifier Unit .....	8-15
<b>9.</b>	<b>STANDARD SPECIFICATIONS.....</b>	<b>9-1</b>
9.1	STANDARD SPECIFICATION .....	9-1
9.2	Model and Suffix Codes .....	9-4
9.3	Option Specifications .....	9-6
9.4	EXTERNAL DIMENSIONS .....	9-7

## **INSTALLATION AND OPERATING PRECAUTIONS FOR JIS FLAMEPROOF EQUIPMENT ..... EX-B01E**

**Customer Maintenance Parts List ..... CMPL 1F5B2-01E**

**Customer Maintenance Parts List ..... CMPL 1F5B2-03E**

**Customer Maintenance Parts List ..... CMPL 1F5B2-04E**

# 1. INTRODUCTION

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The UYF200 series of ultrasonic vortex flowmeters, one in the family of YEWFO flowmeters, has been fine-tuned to your order specifications prior to shipment. Before use, read this manual thoroughly and familiarize yourself fully with the features, operations and handling of ULTRA YEWFO to have the instrument deliver its full capabilities and to ensure its efficient and correct use.

## ■ Notices 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 document may be reproduced or transmitted in any form or by any means without the written permission of Yokogawa Electric Corporation (hereinafter simply referred to as Yokogawa).
- This manual does not warrant the marketability of this instrument nor does it warrant that the instrument will suit a particular purpose of the user.
- Every effort has been made to ensure accuracy in the contents of this manual. However, should any questions arise or errors come to your attention, please contact your nearest Yokogawa sales office that appears on the back of this manual or the sales representative from which you purchased the product.
- This manual is not intended for models with custom specifications.
- Revisions may not always be made in this manual in conjunction with changes in specifications, constructions and/or components if such changes are not deemed to interfere with the instrument's functionality or performance.

## ■ Notices Regarding Safety and Modification

- For the protection and safety of personnel, the instrument and the system comprising the instrument, be sure to follow the instructions on safety described in this manual when handling the product. If you handle the instrument in a manner contrary to these instructions, Yokogawa does not guarantee safety.
- As for explosion-proof model, if you yourself repair or modify the instrument and then fail to return it to its original form, the explosion-protected construction of the instrument will be impaired, creating a hazardous condition. Be sure to consult Yokogawa for repairs and modifications.
- The following safety symbols and cautionary notes are used on the product and in this manual:



### **WARNING**

This symbol is used to indicate that a hazardous condition will result which, if not avoided, may lead to loss of life or serious injury. This manual describes how the operator should exercise care to avoid such a risk.



### **CAUTION**

This symbol is used to indicate that a hazardous condition will result which, if not avoided, may lead to minor injury or material damage. This manual describes how the operator should exercise care to avoid a risk of bodily injury or damage to the instrument.



### **IMPORTANT**

This symbol is used to call your attention to a condition that must be observed in order to avoid the risk of damage to the instrument or system problems.



### **NOTE**

This symbol is used to call your attention to information that should be referred to in order to know the operations and functions of the instrument.

## **For Safe Use of ULTRA YEFWLO**



### **WARNING**

- If the process fluid is harmful to personnel, handle ULTRA YEFWLO carefully even after it has been removed from the process line for maintenance or other purposes. Exercise extreme care to prevent the fluid from coming into contact with human flesh and to avoid inhaling any residual gas.



### **CAUTION**

- When carrying ULTRA YEFWLO around, exercise extreme care to avoid dropping it accidentally and causing bodily injury.



### **CAUTION**

- The /JF1 option code indicates that the model in question is an officially certified explosion-protected instrument. Stringent regulations, therefore, apply with regard to the construction, installation location, external wiring, maintenance and repair of ULTRA YEFWLO. Care must be taken since using ULTRA YEFWLO in disregard of these regulations may create a hazardous condition. **ALWAYS** before handling ULTRA YEFWLO, be sure to read “Installation and Operating Precautions for Flameproof Explosion-Protected Instruments” at the end of this manual.

## Warranty

- The warranty of this instrument shall cover the period noted on the quotation presented to the Purchaser at the time of purchase. The Seller shall repair the instrument at free of charge when the failure occurred during the warranty period.
  - All inquiries on instrument failure should be directed to the Seller's sales representative from whom you purchased the instrument or your nearest sales office of the Seller.
  - Should the instrument fail, contact the Seller specifying the model and instrument number of the product in question. Be specific in describing details on the failure and the process in which the failure occurred. It will be helpful if schematic diagrams and/or records of data are attached to the failed instrument.
  - Whether or not the failed instrument should be repaired free of charge shall be left solely to the discretion of the Seller as a result of an inspection by the Seller.
- **The Purchaser shall not be entitled to receive repair services from the Seller free of charge, even during the warranty period, if the malfunction or damage is due to:**
- improper and/or inadequate maintenance of the instrument in question by the Purchaser.
  - handling, use or storage of the instrument in question beyond the design and/or specifications requirements.
  - use of the instrument in question in a location not conforming to the conditions specified in the Seller's General Specification or Instruction Manual.
  - retrofitting and/or repair by a party other than the Seller or a party to whom the Seller has entrusted repair services.
  - improper relocation of the instrument in question after delivery.
  - reason of force measure such as fires, earthquakes, storms/floods, thunder/lightning, or other reasons not attributable to the instrument in question.

# 2. HANDLING PRECAUTIONS

- All of the instruments in the UYF200 series of ultrasonic vortex flowmeters are thoroughly tested at the factory before shipment.
- After you have received the ordered ULTRA YEWFLO flowmeter, visually check it to ensure that the flowmeter is free from damage.
  - This chapter contains cautionary notes that must be observed when handling ULTRA YEWFLO. Carefully read this chapter first.
  - For topics other than those found in this chapter, refer to the relevant heading of a chapter, section or subsection.
  - If any questions arise, contact the vendor from whom you purchased ULTRA YEWFLO or your nearest office of the Yokogawa service network.

## 2.1 Cross-check of the Model Code and Specifications

The model code and specifications are indicated on the data plate attached to the case of ULTRA YEWFLO. Cross-check this information with that in the table in Section 9.2, “Model and Suffix Codes,” to ensure that ULTRA YEWFLO is as specified in the order instructions.

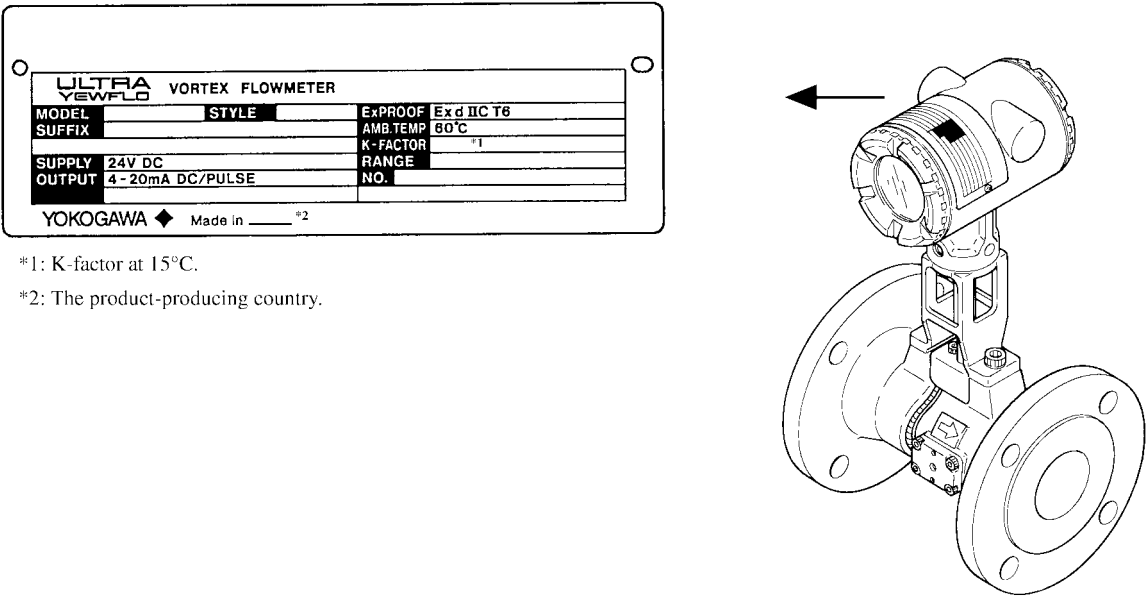


Figure 2.1 Example of Data Plate

## 2.2 Precautions Regarding Transportation

To protect against accidental damage to ULTRA YEWFLO while transporting it to a new location, pack it in the original packing as when shipped from the Yokogawa factory.

## 2.3 Precautions Regarding Storage Location

Deterioration in insulation or corrosion can occur for unexpected reasons if ULTRA YEFWLO is left uninstalled for a prolonged period after delivery. If ULTRA YEFWLO is likely to be stored over a prolonged period, observe the following precautions.

### ■ Choose a storage location that satisfies the following requirements:

- Not exposed to rain or splashwater.
- Less susceptible to mechanical vibration or shock.
- Kept within the temperature and humidity ranges shown in the following table, preferably at normal temperature and humidity (approximately 25°C and 65%).

Temperature	-40° to +85°C
Humidity	5 to 100% (non-condensing)

## 2.4 Precautions Regarding Installation Location

ULTRA YEFWLO is designed to operate even under harsh environmental conditions, virtually placing no limits to your choice of installation location. When determining the location, however, consider the following for easy routine inspection and operation and for use in a stable condition with high accuracy over a prolonged period.

### ■ Ambient Temperature

Whenever possible, avoid mounting ULTRA YEFWLO in a location with a great temperature gradient and/or temperature variation. If ULTRA YEFWLO is likely to be exposed to heat radiating from the plant, insulate ULTRA YEFWLO or mount it where there is adequate ventilation.

### ■ Atmospheric Conditions

Whenever possible, avoid mounting ULTRA YEFWLO in a corrosive atmosphere. If ULTRA YEFWLO needs to be used in such an area, insure that ULTRA YEFWLO is installed where there is adequate ventilation. Care must also be taken to prevent rainwater from getting inside and/or remaining inside the cable conduit.

### ■ Mechanical Shock or Vibration

ULTRA YEFWLO is designed to withstand mechanical shock or vibration. Whenever possible, however, mount ULTRA YEFWLO in a location that is less susceptible to such shock or vibration. If ULTRA YEFWLO needs to be mounted on a pipeline where relatively strong mechanical vibration is present, equip the line with a pipe support (see Figure 2.4).

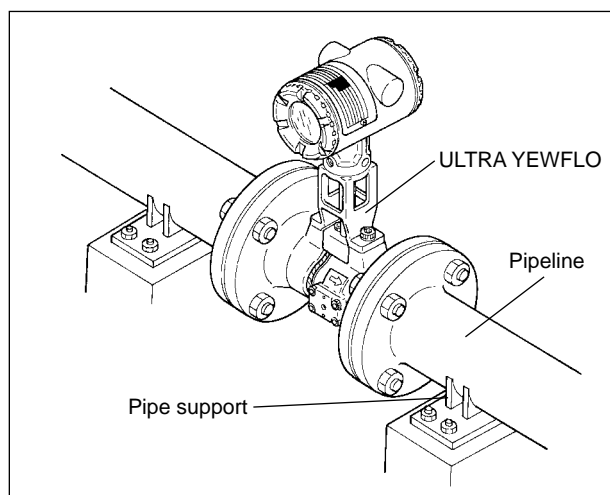
### ■ Requirements for Piping and Process Fluid

Restrictions apply to the piping and process fluid. Before mounting ULTRA YEFWLO, be sure to read Section 4.1, “Piping Precautions.”

### ■ Installation of Explosion-protected Instruments

ULTRA YEFWLO can be mounted and used in a hazardous area, as specified in the flameproof certification mentioned in this manual. Important cautionary notes are found in “Installation and Operating Precautions for Flameproof Explosion-Protected Instruments” at the end of this manual. Be sure to read the notes when mounting ULTRA YEFWLO.





**Figure 2.4 Example of Pipe Support**

#### ■ Other Considerations

- Choose a location where there is sufficient clearance around ULTRA YEWFLO to allow such work as routine inspections.
- Choose a location that ensures easy wiring and piping.
- It will be to your advantage if you equip the installation location with lighting for night-time maintenance and inspections, power outlets for measuring instruments and wired phone jacks for contact with the supervisory control room.

## 2.5 Precautions Regarding Pipelines

When turning on a process fluid through a pipeline, observe the following instructions to use ULTRA YEWFLO to the intended degree of safety.

- Make sure the bolts that fasten ULTRA YEWFLO and the pipeline together are securely tightened.
- Make sure no fluid is leaking from the pipeline.
- Do not apply a pressure exceeding the specified limit.



- ULTRA YEWFLO is under constant pressure while a process fluid is flowing. Do **NOT** loosen the bolts that fasten the flanges. If you loosen the bolts, there is a risk of the process fluid gushing out of the pipeline.
  - If the process fluid is toxic or otherwise harmful to personnel, exercise extreme care to prevent the fluid from coming into contact with the eyes or skin and to avoid inhaling any released gas.
-

## 2.6 Precautions Regarding Use of Transceivers



### IMPORTANT

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- ULTRA YEWFLO is designed with full consideration of and measures against interference from high-frequency noise. It is likely, however, that ULTRA YEWFLO is affected by such noise if you use a transceiver near the instrument or the cable wired to it. When using a transceiver, assess its influence on the loop where ULTRA YEWFLO is connected by first locating it a few meters away from the ULTRA YEWFLO's converter component and then bringing it gradually closer in. Use the transceiver at distances that do not cause a problem.
- 

## 2.7 Precautions Regarding Insulation Resistance and Withstanding Voltage Tests

- Insulation resistance and withstanding voltage tests can deteriorate insulation and degrade safety even if the testing voltages are at levels that may not cause the insulation to break down. Keep the application of these tests to a minimum.
- During insulation resistance testing, do not apply voltages exceeding 500 V DC.
- During withstanding voltage testing, do not apply voltages exceeding 500 V AC.
- Follow the procedures summarized below to run these tests. During testing, leave the cable of the transmission line disconnected.
- **Insulation Resistance Test Procedure**
  - <1> Wire a cross-over cable from the SUPPLY "+" terminal through the PULSE "+" to "-" terminals.
  - <2> Connect an insulation resistance meter (with the power switched off) between the cross-over cable and the grounding terminal. Use the cross-over cable as the positive-polarity test point and the grounding terminal as the negative-polarity test point.
  - <3> Turn on the insulation resistance meter and measure the insulation resistance.
  - <4> After the completion of testing, remove the insulation resistance meter, connect a 100-k $\Omega$  resistor across the cross-over cable and the grounding terminal, and allow at least one second for the accumulated electricity to discharge. (Do not touch the terminals during discharge.)
- **Withstanding Voltage Test Procedure**
  - <1> Wire a cross-over cable from the SUPPLY "+" terminal through the PULSE "+" to "-" terminals.
  - <2> Connect a withstanding voltage tester between the cross-over cable and the grounding terminal. Connect the ground-side terminal to the grounding terminal.
  - <3> Gradually raise the testing voltage from 0 V to the specified level.
  - <4> Keep the voltage at the specified level for one minute.
  - <5> After the completion of testing, gradually lower the testing voltage to prevent a power surge.

## 2.8 Notes on JIS Flameproof Flowmeters



Models of ULTRA YEWFO with the optional JIS flameproof feature are designed to operate even in a hazardous atmosphere (Class 1 or Class 2 Area) that may produce the explosive gas or gases indicated in the Users' Guidelines for Explosion-Protected, Factory-Use Electrical Equipment (Protection against Explosive Gas Atmospheres—1994).

Adequate precautions must be taken to ensure safety when mounting, wiring and piping equipment of flameproof construction. For safety reasons, regulations are imposed on the maintenance and repair of such equipment. Before doing any such work, **ALWAYS** be sure to read "Installation and Operating Precautions for Flameproof Explosion-Protected Instruments" at the end of this manual.

## 2.9 Installation Precautions for CENELEC (KEMA) Intrinsic Safety

### • 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:

$$U_{\max} = 30V$$

$$I_{\max} = 165mA$$

$$P_{\max} = 0.9W$$

Effective internal capacitance  $C_i = 6nF$

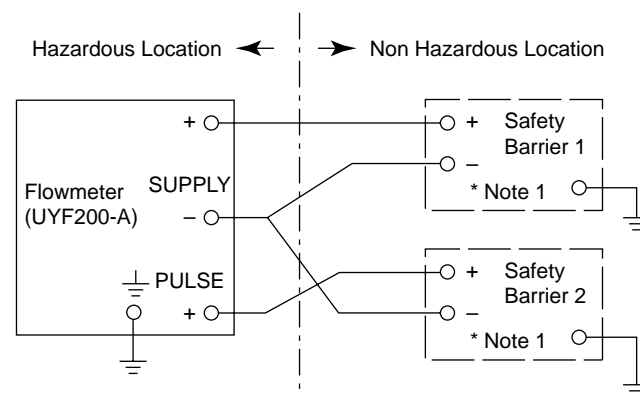
Effective internal inductance  $L_i = 730\mu H$

### • Installation

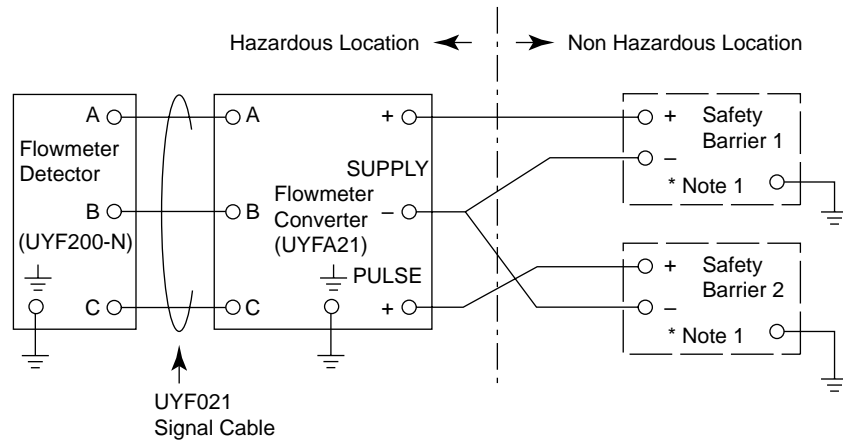
All wiring shall comply with local installation requirements. (Refer to the installation diagram)

### Installation Diagram

#### \* Integral Type



**\* Remote Type**



Note 1: In any safety barrier used output current must be limited by a resistor 'R' such that  $I_o = U_o/R$

Note 2: The instrument modification or parts replacement by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void KEMA Intrinsically safe Certification.

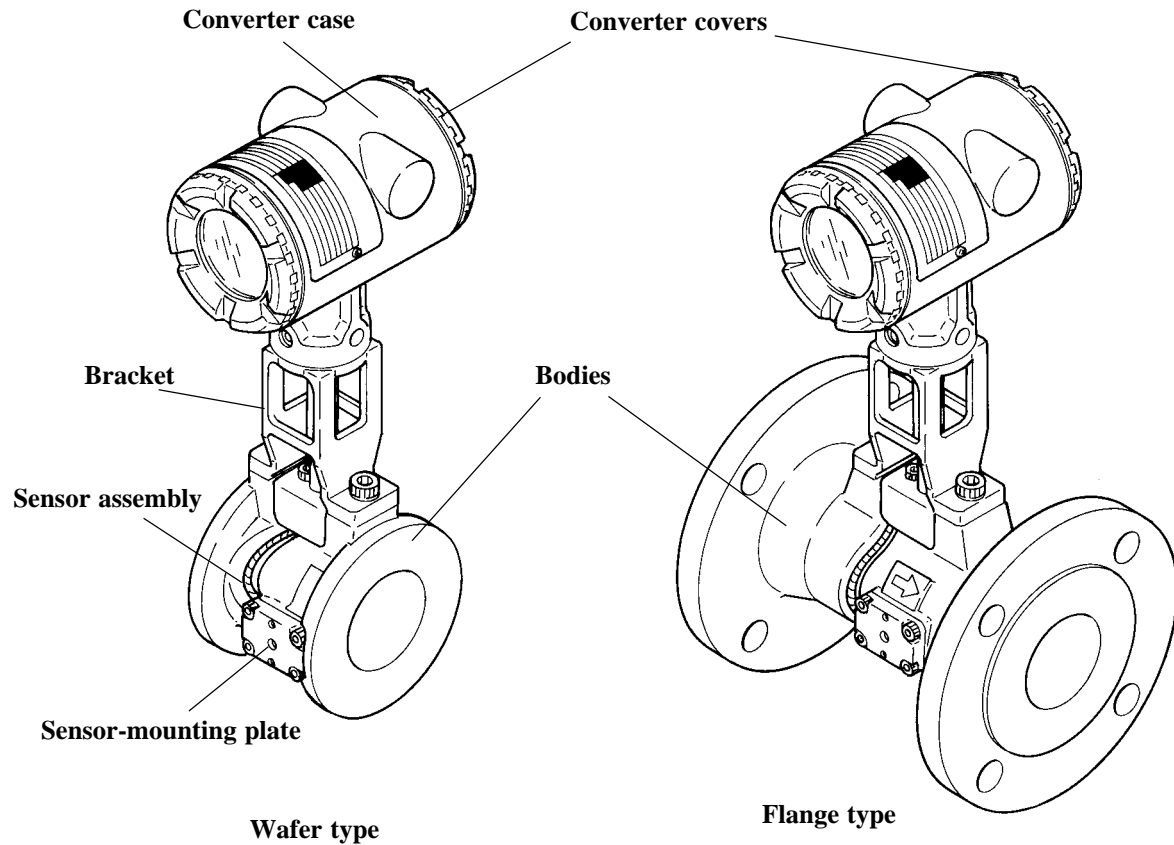
## 2.10 Installation Precautions for CENELEC (KEMA) Explosionproof

Suitable heat-resisting cables (heat-resisting over 90°C) shall be used for the ULTRA YEFWLO Model UYF200 Serie Ultrasonic Voltex Flowmeter when the ambient temperature exceeds +70°C and/or the process temperature exceeds 135°C.

The cable entry devices shall be certified in type of protection flameproof enclosure "d" and suitable for the conditions of use and correctly installed.

### 3. COMPONENTS OF ULTRA YEFWFO

■The integral type of ultrasonic vortex flowmeter (wafer, flange type)



■The remote type of ultrasonic vortex flowmeter (Converter, Detector)

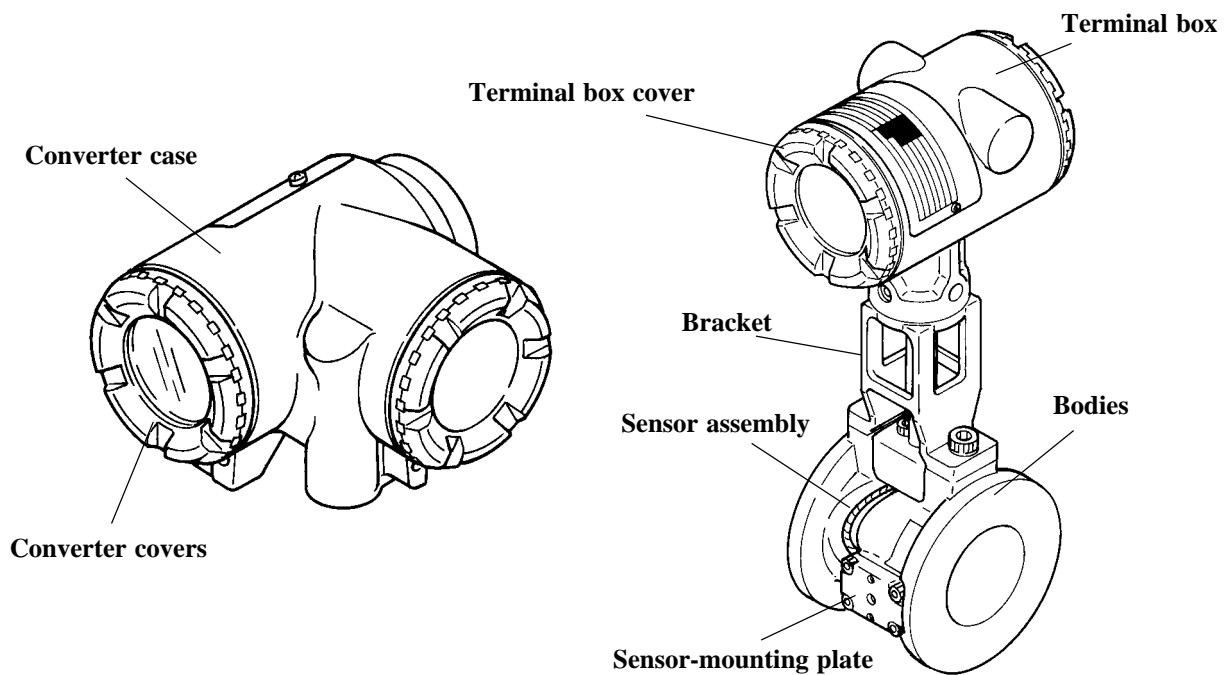


Figure 3.1 Components of ULTRA YEFWFO

## 4. MOUNTING

Before mounting ULTRA YEWFLO, see Section 2.4, “Precautions Regarding Installation Location.” For the environmental conditions of the installation location, see Section 9.1, “Standard Specifications.”

### 4.1 Piping Precautions



#### IMPORTANT

- Be sure to observe the precautions in this section. Failure to observe these precautions will result in an adverse effect to your flowrate measurement.



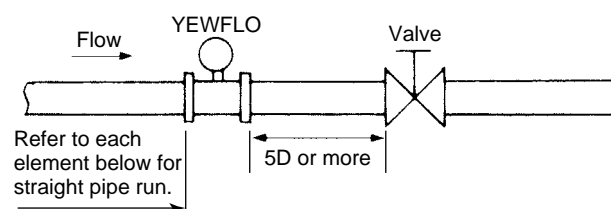
#### IMPORTANT

- Avoid mounting ULTRA YEWFLO on a pipeline where:
  - the process fluid is mixed with bubbles of gas.
  - the process fluid is mixed with an excessive amount of slurry or foreign matter that has accumulated on the inner walls.
  - a highly pulsating flow or pressure is present.

#### ■ Valve Mounting and Straight Lengths of a Pipeline

##### ■ Valve position and straight pipe length:

Install the valve on the downstream side of the flowmeter. The upstream straight pipe length dependent on the element located on the upstream such as reducer/expander, bent and etc., refer to description as below. Keep 5D or more for downstream straight pipe length.



In case the valve has to be installed on the upstream of the flowmeter, ensure the upstream straight pipe length to be 20D or more (for /HAC version is 30D), and the downstream straight pipe length be 5D or more.

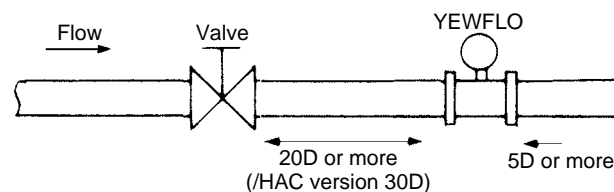
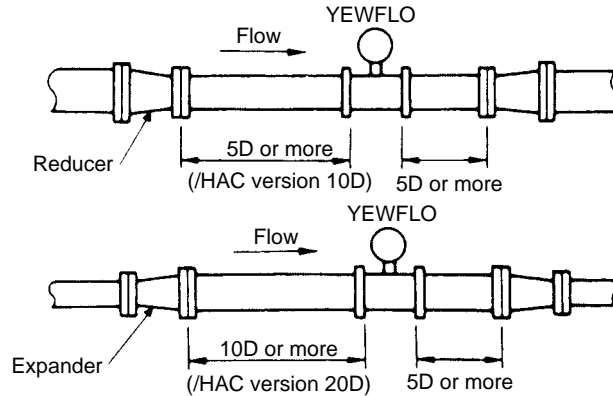


Figure 4.1-1 Valve Mounting and Straight Lengths of Pipe

## ■ Connection of Reducing and Expanding Pipes and Their Straight Lengths

### ■ Reducer or expander pipe:

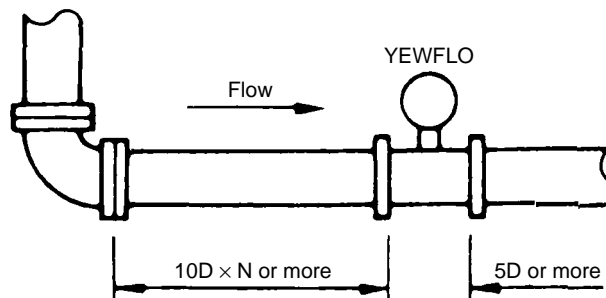
Ensure the upstream straight pipe length be 5D or more (for /HAC version is 10D), and the downstream straight pipe length to be 5D or more for per reducer pipe. Ensure the upstream straight pipe length be 10D or more (for /HAC version is 20D), and the downstream straight pipe length be 5D or more for per expander pipe.



**Figure 4.1-2 Connection of Reducing and Expanding Pipes and Their Straight Lengths**

### ■ Bent pipe and straight pipe length:

Ensure the upstream straight pipe length to be 10D or more, and the downstream straight pipe length be 5D or more for per bent pipe.

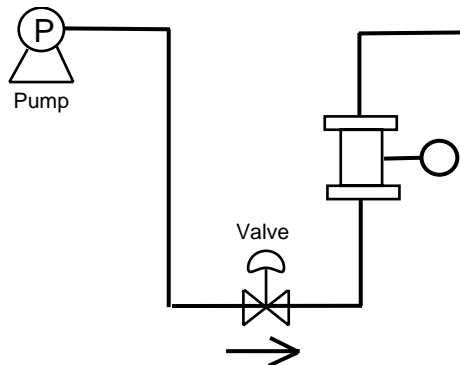


**Figure 4.1-3 Connection of Bent Pipe and Straight Lengths of Pipe**

### ■ In case of pulsating pressure existing:

- When pulsating pressure caused by a pump exist, install the valve on the upstream of the flowmeter.

Installation Example



**Figure 4.1-4a Piping Where Pulsating Pressure Caused by a Pump**

- When pulsating pressure caused by a T-type piping exist, install the valve on the upstream of the flowmeter.

Example: As shown in the figure below, when the valve V1 is turned off, the fluid flow through B, as to meter A the flow is zero. But due to the pulsating pressure is detected, the meter's zero point become fluctuating. To avoid this, change the valve V1 location to V1'.

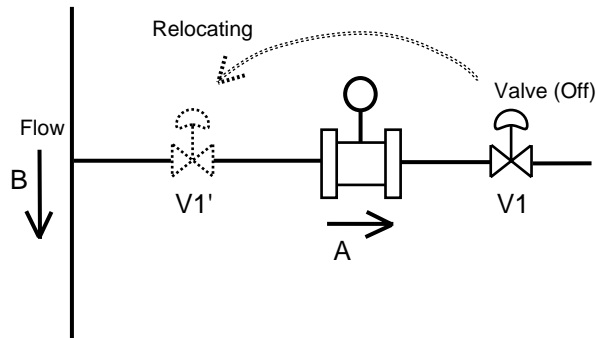


Figure 4.1-4b Piping where Pulsating Pressure Caused by a T-type Piping

#### ■ Piping That Prevents Cavitation from Occurring



#### IMPORTANT

- Avoid mounting ULTRA YEFWLO with its downstream side open to the atmosphere. Otherwise, there will be an increased risk of cavitation.

#### ■ The case of downstream open to the air:

If downstream open to the air, the cavitation possibly occurs. Avoid this kind use.

If such piping cannot avoid, up and down the downstream pipe as shown the figure below, or, install a valve on the downstream side.

Installation Example

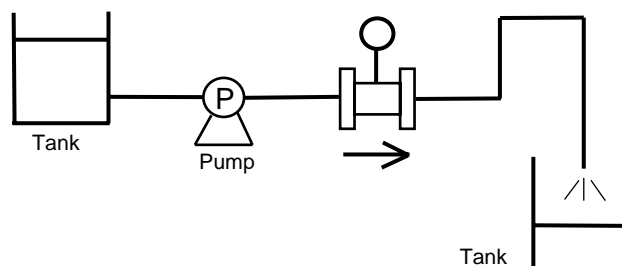


Figure 4.1-5 Piping when downstream open to the air

#### ■ Joint Pipes

For joint pipes, use pipes with an inner diameter greater than that of ULTRA YEFWLO (use pipes with a schedule number no larger than 80 for joint pipes with a nominal inner diameter ranging from 25 mm to 100 mm).



#### IMPORTANT

- Exercise care to prevent the gaskets inserted between ULTRA YEFWLO and the joint pipes from protruding into the flow path.



## ■ Waterproof Construction



- The waterproof construction of ULTRA YEFWLO is designed to comply with the JIS C0920 standard for water-tight equipment (compatible with IEC IP67 or NEMA4X) which does not allow it to be immersed in water during use.

## ■ Mounting Position

ULTRA YEFWLO can be mounted vertically, horizontally or in any other position. For a vertical pipe, mount ULTRA YEFWLO so that the process fluid is flowing upward, always keeping ULTRA YEFWLO filled with the fluid.



### IMPORTANT

- Mount ULTRA YEFWLO in such a manner that the pipe is constantly filled with the running process fluid (see Figure 4.1-8).

## ■ Flushing of the Pipeline (Cleaning)

If scale or sludge (fur and/or dirt) is likely to be present inside the piping after the installation of a new line or the repair of an existing line, flush the line before operation.

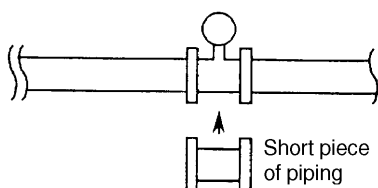


Figure 4.1-6 Flushing of Pipeline

## ■ Piping That Prevents Bubbles of Gas from Becoming Trapped



### IMPORTANT

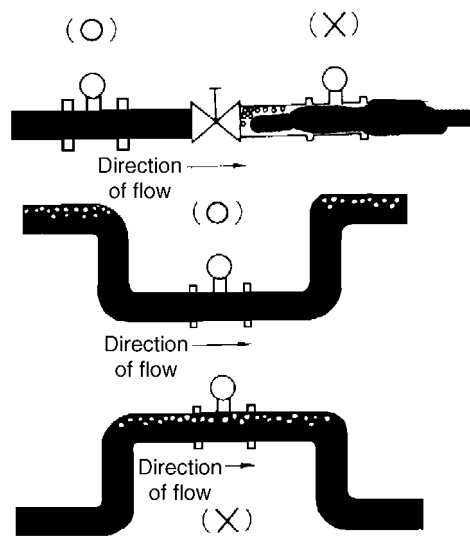
Avoid the application where the gas bubbles may be contained in the fluid to be metered

When the flow contains bubbles, it is difficult to carry out metering. Therefore, avoid such application. For example: when disburden fluid from tank car, it is possible to produce the bubbles by the phenomenon occurred when the liquid level decreases.



## IMPORTANT

- Starting the flow of any gas-liquid two-phase fluid in the pipeline will impede your measurement. Care must be taken to avoid flowing any fluid containing gas bubbles. Gas bubbles can occur, however, for a number of reasons. Pipe ULTRA YEFWLO so that no such bubbles remain inside ULTRA YEFWLO.
- During such times as the startup of plant operation, a process fluid may take the form of a gas-liquid two-phase stream temporarily at the start of flow. Note that, in that case, the indicator may overshoot or fail to give readings.



**Figure 4.1-7 Example of Piping That Prevents Bubbles of Gas from Becoming Trapped**

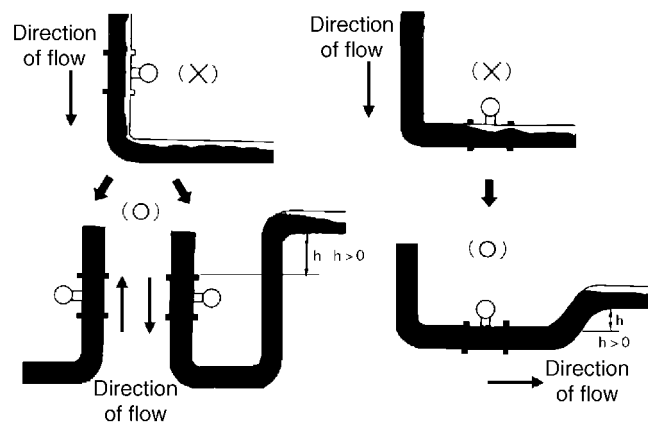
### ■ Piping That Keeps ULTRA YEFWLO Filled with Process Fluid



## IMPORTANT

- If not filled with the process fluid, ULTRA YEFWLO will fail to operate properly because it faces the difficulty of transmitting and receiving ultrasonic signals. Observe the following precaution when piping ULTRA YEFWLO.

Allow the process fluid to flow upward through the pipeline. This strategy keeps ULTRA YEFWLO constantly filled with fluid. Should it be unavoidable for the fluid to flow downward, raise the downstream side of the pipeline to the height shown in Figure 4.1-8. This strategy will also ensure that ULTRA YEFWLO is always filled with process fluid.



**Figure 4.1-8 Example of Piping That Keeps ULTRA YEFWLO Filled with Process Fluid**

## 4.2 Mounting ULTRA YEFWLO

When mounting ULTRA YEFWLO, position it in such a manner that the direction in which the process fluid is flowing matches the direction of flow indicated on ULTRA YEFWLO's body. For information on how to rotate the indicator/totalizer component, see Section 4.3.

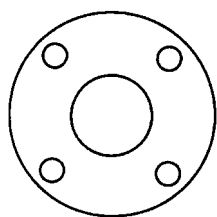
### 4.2.1 Mounting a Wafer Type of ULTRA YEFWLO

- When mounting a wafer type of ULTRA YEFWLO in a pipeline, make sure that ULTRA YEFWLO is lined up with the pipeline along its central axis.
- Stud bolts and nuts (material: SUS304) for mounting are supplied with ULTRA YEFWLO upon request (specify suffix code “/BLT” for this optional feature).
- If you are planning to procure stud bolts by yourself, refer to Table 4.2 that summarizes their required outer diameters as classified by the standards for flanges.
- It is always the user's responsibility to procure gaskets for flowmeter mounting (see Figure 4.2-1). (In order to prevent gaskets from protruding into the flow path, use gaskets with pre-cut bolt holes whenever possible.)

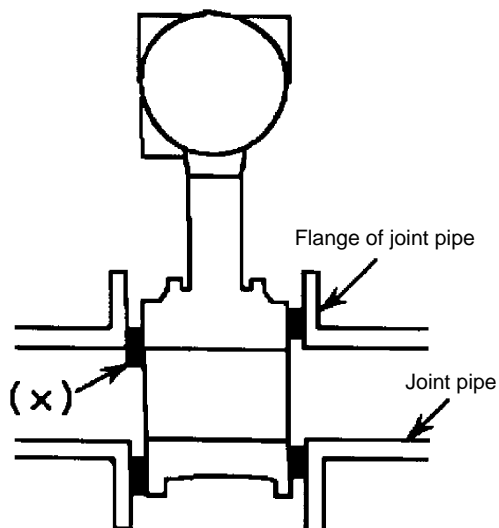
**Table 4.2 Mounting Studs for ULTRA YEFWLO's Wafer Type**

Nominal Diameter	Ratings of Flanges	Stud Bolt	
		Outer Diameter (mm)	Length (mm)
25 mm (1 in.)	JIS 10K, 20K ANSI 150 ANSI 300	16	160
		12.7	155
		15.9	160
40 mm (1 1/2 in.)	JIS 10K, 20K ANSI 150 ANSI 300	16	160
		12.7	155
		19.1	170
50 mm (2 in.)	JIS 10K, 20K ANSI 150 ANSI 300	16	200
		15.9	200
		15.9	200
80 mm (3 in.)	JIS 10K JIS 20K ANSI 150 ANSI 300	16	220
		20	240
		15.9	240
		19.1	240
100 mm (4 in.)	JIS 10K JIS 20K ANSI 150 ANSI 300	16	220
		20	240
		15.9	240
		19.1	240

- The numbers under 'Length' are the approximate lengths of the stud bolts supplied by Yokogawa as specified by the **BLT** suffix code.
- When procuring stud bolts by yourself, care must be taken since their required length varies depending on the thickness of the nuts and gaskets used.



**Figure 4.2-1 Gasket with Pre-cut Bolt Holes (for Four-hole Flanges)**



**Figure 4.2-2 Installation of Gaskets**



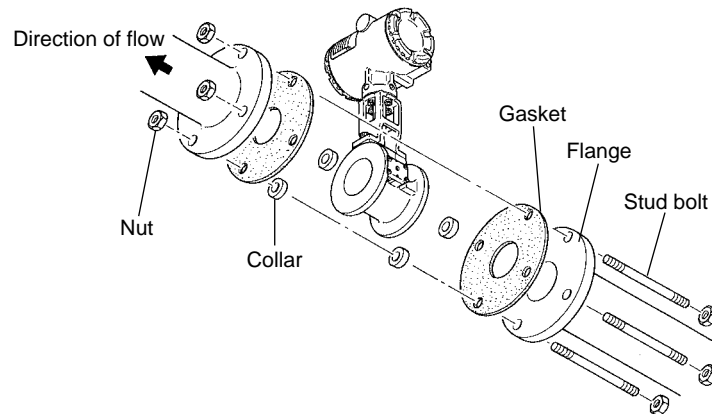
### **IMPORTANT**

- Use gaskets whose inner diameter is greater than those of ULTRA YEFWLO and the joint pipe. Exercise extreme care to prevent the gaskets from protruding into the flow path.

■ The procedure for mounting a wafer type of ULTRA YEFWLO is the same no matter which type of flange you use.

#### **Horizontal Mounting**

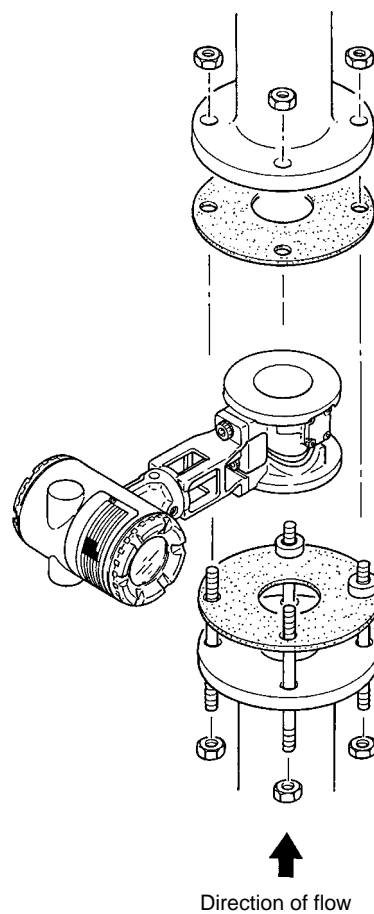
- <1> Thread two collars each through each of the lower two bolts as shown in fig 4.2-3.
- <2> Evenly fasten the nuts and bolts, tightening both edges of ULTRA YEFWLO's brim onto each pair of collars.
- <3> Make sure the process fluid is not leaking.



**Figure 4.2-3 Horizontal Mounting**

**Vertical Mounting**

- <1> Thread one collars each through each of the lower two bolts as shown in fig 4.2-4.
- <2> Make sure, at that point, that both edges of ULTRA YEWFO's brim are in proper contact with each pair of collars.
- <3> Evenly fasten the bolts and nuts, tightening the edges onto the collars.
- <4> Make sure the process fluid is not leaking.



**Figure 4.2-4 Vertical Mounting**



## IMPORTANT

- In vertical mounting, **ALWAYS** make sure ULTRA YEFWLO is mounted with the wiring port facing downward, as shown in Figure 4.2-3, to prevent against the ingress of rainwater, etc.

### 4.2.2 Installing a Flange Type of ULTRA YEFWLO

- Using stud bolts, nuts and gaskets, install ULTRA YEFWLO as shown in Figures 4.2-5 and 4.2-6.
- It is always the user's responsibility to procure gaskets for flowmeter mounting (see Figure 4.2-1). (In order to prevent gaskets from protruding into the flow path, use gaskets with pre-cut bolt holes whenever possible.)



## IMPORTANT

- Use gaskets whose inner diameter is greater than those of ULTRA YEFWLO and the joint pipe. Exercise extreme care to prevent the gaskets from protruding into the flow path.

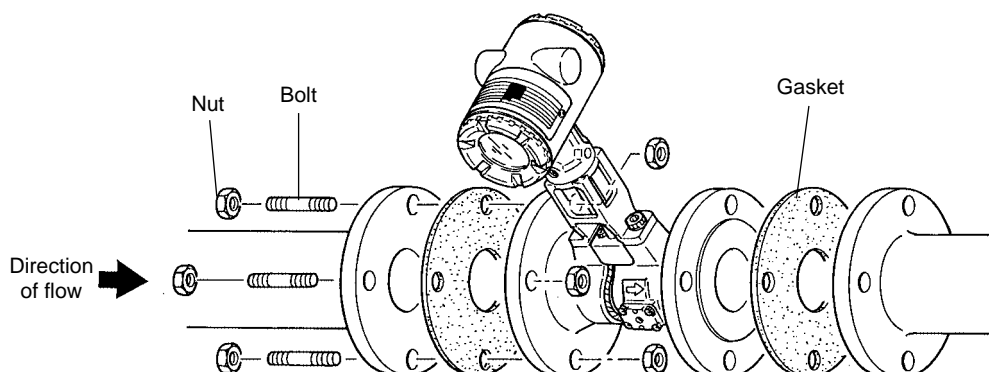
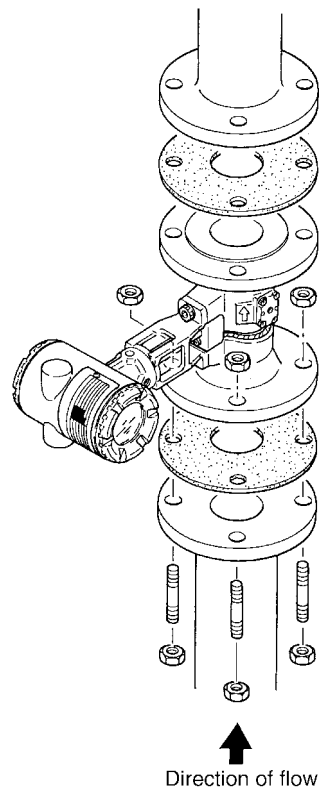


Figure 4.2-5 Horizontal Mounting



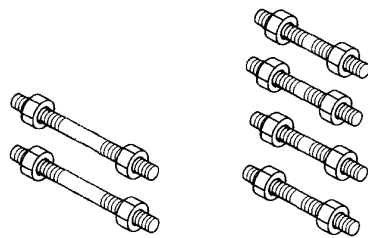
## IMPORTANT

- In vertical mounting, **ALWAYS** make sure ULTRA YEFWLO is mounted with the wiring port facing downward, as shown in Figure 4.2-3, to prevent against the ingress of rainwater, etc.

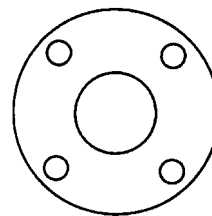


**Figure 4.2-6 Vertical Mounting**

Parts that the user should procure when installing ULTRA YEFWLO (either a wafer or flange type):



Nuts and bolts



Gasket with pre-cut bolt holes



## 4.3 Mounting remote type converter



### IMPORTANT

For the remote type, using UYF021 signal cable to connect the converter and remote type flowmeter.

The maximum signal cable length is 65ft (20m).

The converter is mounted on a 2-inch (60.5mm outer dia.) stanchion or horizontal pipe.

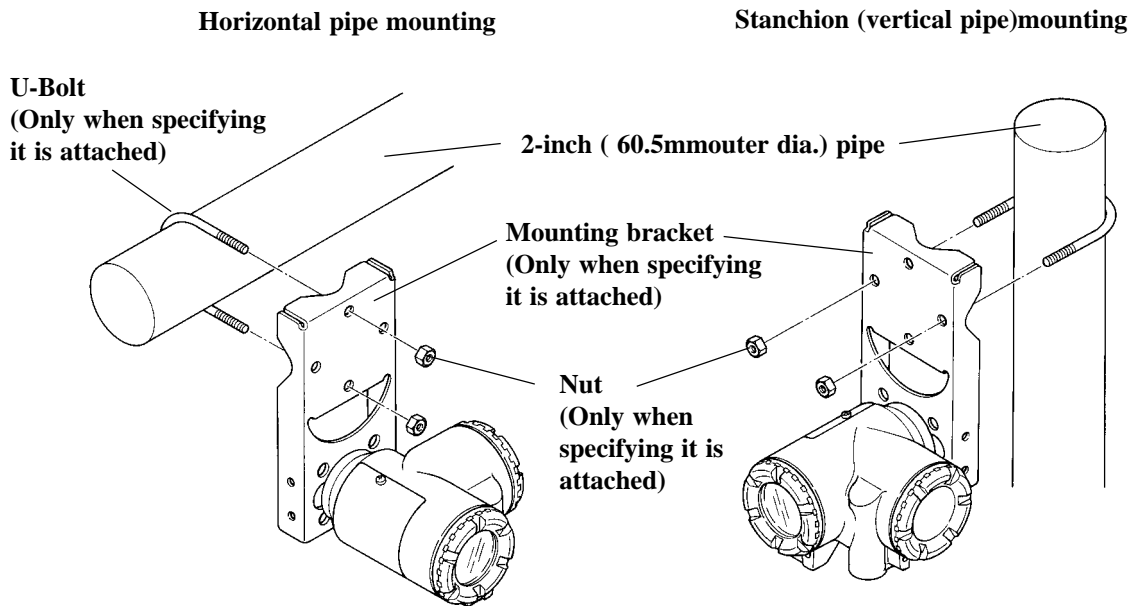


Figure 4.3 Mounting remote type converter

## 4.4 Repositioning the Indicator/Totalizer Component

- The indicator/totalizer component of ULTRA YEWFO can be turned 90° either clockwise or counterclockwise. For example, you can install ULTRA YEWFO on a vertical pipe, as shown in Figure 4.3, by removing the component and then repositioning the joint pin (see Subsection 8.3.1).

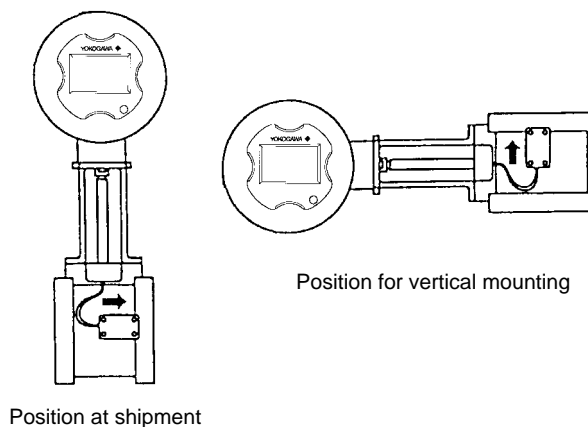
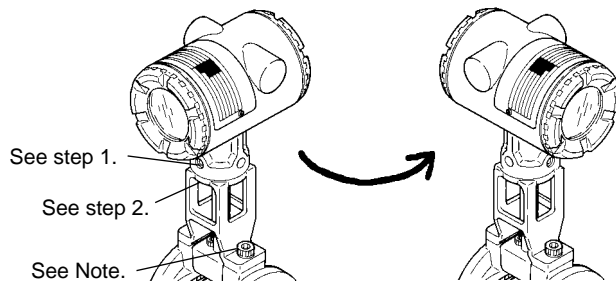


Figure 4.4 Repositioning of the Indicator/Totalizer Component

## 4.5 Swiveling the Indicator/Totalizer Component

The indicator/totalizer component can be swiveled around the neck in increments of 90°. To change the orientation of the component, follow the procedure described below.



**Figure 4.5 Swiveling the Indicator/Totalizer Component**

- (1) Loosen the setscrew at the neck of the converter case for just one turn.
- (2) Remove the four screws that join the case and bracket and, preventing the case from lifting off the bracket, swivel the indicator/totalizer component so it faces the desired direction.
- (3) Reverse the operation noted in step 2 above to replace the component.

**Note:** To swivel the component 180°, remove the two screws that join the body and bracket. This strategy makes your work easier.



### CAUTION

- When swiveling the indicator/totalizer component or, in other words, the converter case, exercise care to avoid damaging the leadwires by pulling up on them.
- Do not swivel the converter case more than 180° in either direction.

## 4.6 Insulating the Piping

- When insulating the piping, exercise care to avoid covering the bracket with the insulation to prevent heat from getting into the converter.



### IMPORTANT

- Do not cover the bracket.

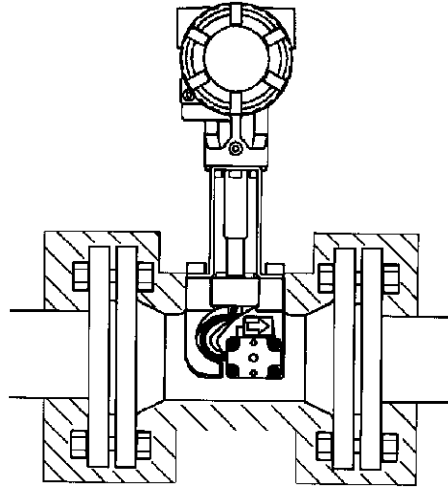


Figure 4.6 Insulating the Piping

## 5. WIRING

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### IMPORTANT

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- When wiring ULTRA YEFWLO, avoid locating it near such sources of noise as transformers, motors or electromotive power supplies with large current capacities.
- Remove the terminal cover and dust-prevention plug on the wiring port before wiring ULTRA YEFWLO.
- ALWAYS waterproof all threaded parts. (A silicon-resin, non-hardening sealing material is recommended for the waterproof treatment.)
- To protect against noise, do not allow the signal cable and electromotive cables to run through the same duct.
- Explosion-proof models of ULTRA YEFWLO must be wired in compliance with applicable regulations to ensure explosion-proof performance.  
Refer to “Installation and Operating Precautions for Flameproof Instruments” at the end of this manual to wire ULTRA YEFWLO correctly.

### 5.1 Selecting the Cable

Observe the following precautions when choosing cables for use with the transmission loop line.

- Use a twisted cable equal to or better than 600V grade polyvinyl chloride insulated wiring (JIS C3307).
- When wiring ULTRA YEFWLO in an area susceptible to noise, use a shielded cable. If ULTRA YEFWLO will be used in a simultaneous analog-pulse output mode, separately shielded two-wire cables may become necessary. (See Section 5.5 for more information.)
- When wiring ULTRA YEFWLO in an area where the ambient temperature is comparatively high or low, use a cable suited for the place of use.
- When using ULTRA YEFWLO in an area where a harmful gas, liquid, oil and/or solvent is present, use a cable resistant to these substances.
- Crimp-on terminals (for 4-mm screws) with insulated sleeves are recommended as the cable-end configuration.



**CAUTION**

For the remote type, using UYF021 signal cable to connect the converter and remote type flowmeter.

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## 5.2 Connecting Field Mounting Indicator (applies to analog output only)

- When using such field mounting indicator, wire them as shown in Figure 5.2.  
Yokogawa Electric's Model 4915 (standard) or 4914 (flameproof) field mounting indicator is recommended for this use.

### • Integral type

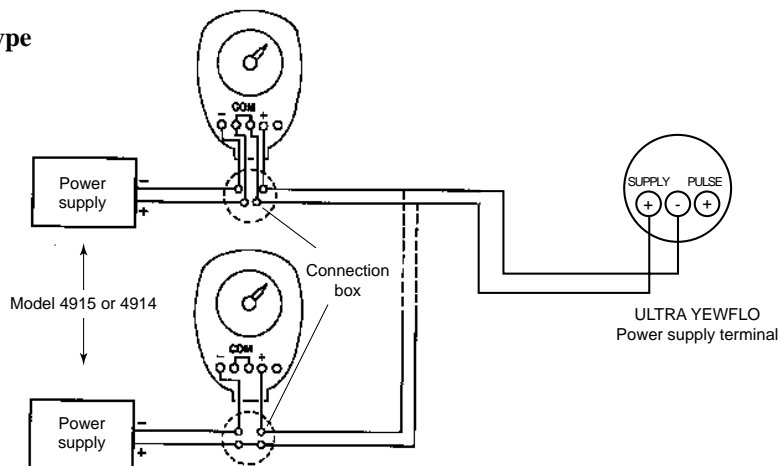


Figure 5.2-1 Connection of Field Mounting Indicator

### • Remote type

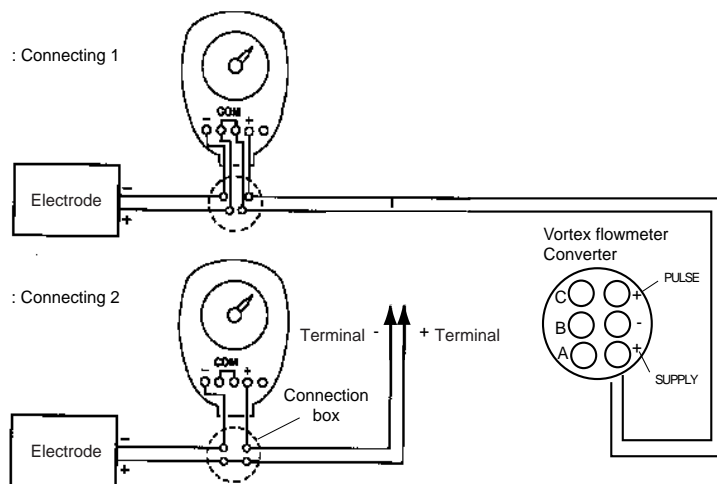


Figure 5.2-2 Connection of Field Mounting Indicator

## 5.3 Wiring

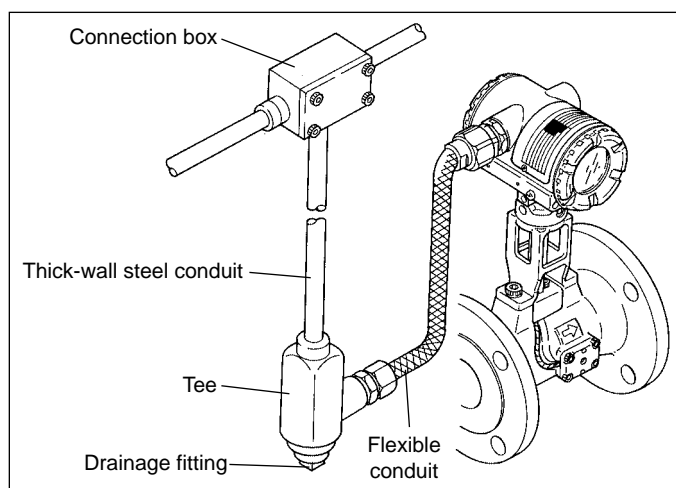


For JIS Flameproof type:

- Stringent restrictions apply to the wiring materials and methods of flameproof instruments, including their peripheral devices. Before doing any wiring, **ALWAYS** be sure to read “Installation and Operating Precautions for Flameproof Explosion-Protected Instruments” at the end of this manual.
- Do not open the cover for two minutes after turn-off the power supply.
- In case of the metal conduit wiring, the temperature limit for insulated wire must be over 75°C.

■ Follow the procedure below to wire ULTRA YEFWLO.

- For reasons of waterproofing or protection of cables against damage, the use of cable conduits and ducts is recommended for wiring. (See Figure 5.3-1.)
- To open the cover of a flameproof model of ULTRA YEFWLO, turn the lock screw clockwise. When you have closed the cover after wiring, **ALWAYS** turn the lock screw counterclockwise so the cover is securely fastened.
- Use Yokogawa Electric’s flameproof packings adaptor or conduits for external wiring of a flameproof model of ULTRA YEFWLO.



**Figure 5.3-1 Example of Wiring Using Conduits (Standard Model of ULTRA YEFWLO)**

■ Follow the procedure below to attach a flameproof packing adapter (optional) (see Figure 5.3-2).

- <1> Turn the lock screw clockwise to remove the cover on the terminal box.
- <2> Measure the outer diameters of the cable being used, in two different directions, to an accuracy of 0.1 mm.
- <3> Determine the average of the outer diameters in two directions. Choose the packing whose inner diameter is closest to the average from the three supplied packings (see Table 5.3).
- <4> Screw the adapter's main assembly into the wiring port of ULTRA YEFWLO and fasten the assembly with the locknut. (Be sure to insert the O-ring.)
- <5> Insert the pressure nut, union coupling, plate packing, washer, rubber packing and washer, in this order, into the cable. Connect each wire of the cable to their respective terminals through the main assembly of the flameproof packing adapter.
- <6> Fasten the pressure nut to fix the adapter. For a proper tightening torque, apply another two or two-and-a-half turns to the pressure nut at a point where the rubber packing begins to compress.
- <7> Fasten the stop screw on the pressure nut.
- <8> Reinstall the cover on the terminal box. Turn the lock screw counterclockwise to fasten the cover.

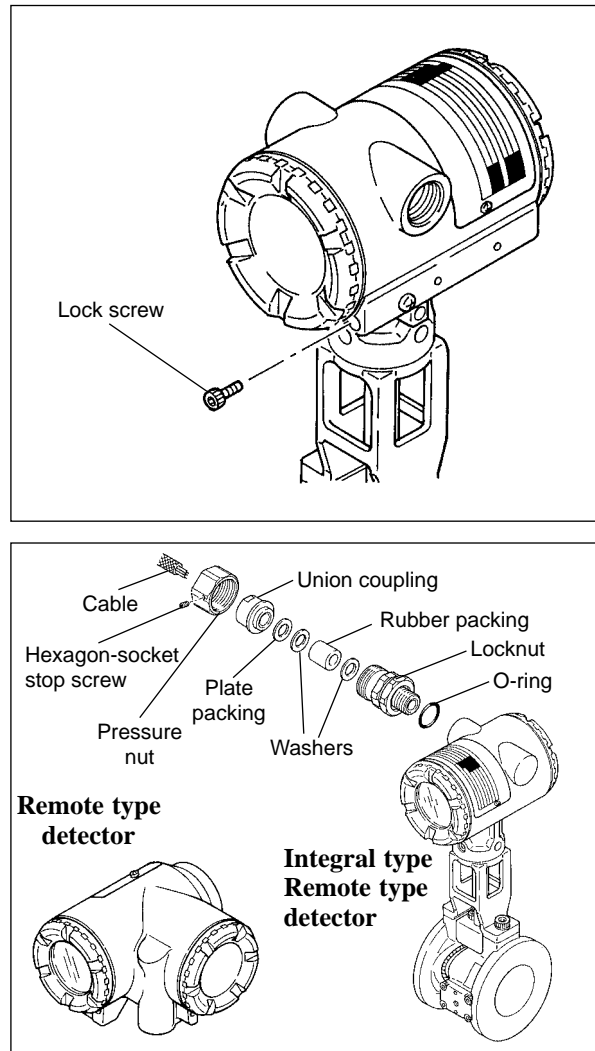


Figure 5.3-2 Attachment of Flameproof Packing Adapter



## IMPORTANT

- ALWAYS waterproof all threaded parts. (A silicon-resin, non-hardening sealing material is recommended for the waterproof treatment.)

**Table 5.3 Types of Packings and Applicable Outer Diameters of Cables**

Suffix Code	Diameter of Thread on Wiring Port	Outer Diameter of Applicable Cable (mm)	Identification Marking	Part Number
PG5	G1/2	8.5 to 9 9.1 to 10 10.1 to 11	9 φ 10 φ 11 φ	G9601AD

## 5.4 Grounding

- For an analog output application, connect a grounding wire from ULTRA YEFWLO to the ground.
- For a pulse output application, connect a grounding wire from ULTRA YEFWLO to the ground. Also ground the shielded cable that connects ULTRA YEFWLO to the pulse receiver.
- Use the Class 3 Grounding method (grounding resistance of no greater than 100 Ω).
- Use a 600V grade polyvinyl chloride insulated wiring for grounding.



## 5.5 Signal cable end finish procedure

For finishing signal cable end, following the procedure as below:

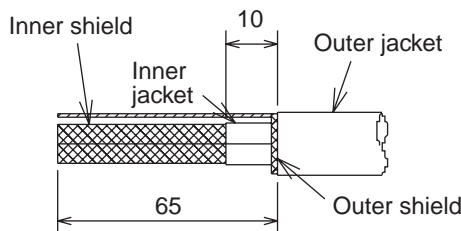


### IMPORTANT

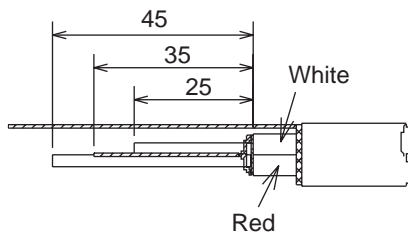
The length of signal cable must be less than 20m.

Unit : mm

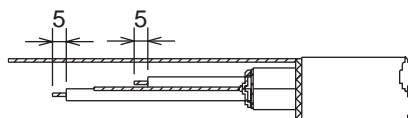
- (1) Remove the outer jacket, outer shield and inner jacket as shown in the figure below.



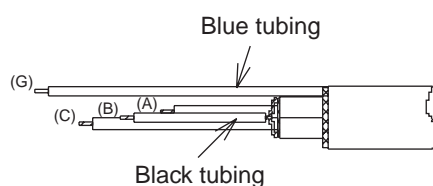
- (2) Remove inner shield, intertwine two drain wires, and cut each tip.



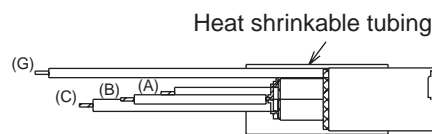
- (3) Remove the wire insulation and twist each wire as shown below.



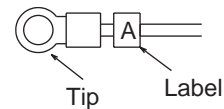
- (4) Insert insulation tubing over B and G until it stops inside the shield. Cut the tubing off leaving only 0.2 inch (5mm) of the inner shield exposed. Remove 0.2 inch of insulation from the tips of the two wires.



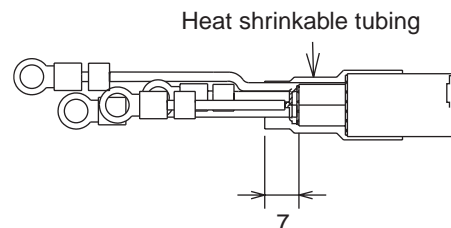
- (5) Insert the heat shrinkable tubing as shown below.



- (6) As shown in the figure below, install the tip on each wire and label of the sign which corresponds to the each line.



- (7) Heat all of shrinkable tube with a heat blower or heat gun, and then shrink them.



## 5.6 Power Supply Voltage and Load Resistance

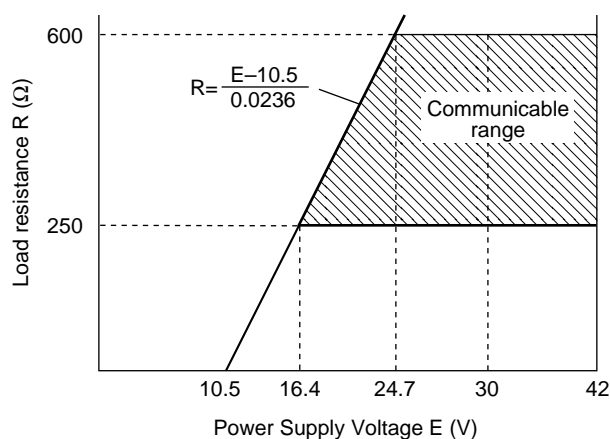
### Analog Output

- ULTRA YEWFO uses two-wire transmission and, therefore, the cable is used both as the power supply line and as a signal line. A DC power supply is needed for the transmission loop line. (The distributors listed in Table 5.6 are available from Yokogawa Electric. Contact the manufacturer as necessary.)
- The maximum communicable distance over a transmission cable is 2 km when a CEV cable is used.
- Communication via the amplifier board is always possible irrespective of the wiring conditions.

**Table 5.6 Distributors**

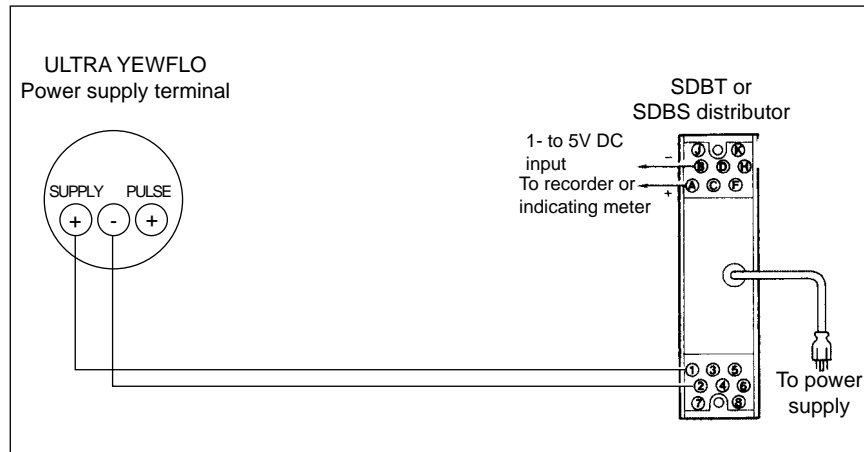
Model	Type of Insulation	Power Supply to Distributor	Connectable Number of ULTRA YEWFO's	Maximum Resistance of Conducting Wire
SDBT-110	Loop-insulated	AC/DC-powered	1	350 Ω
SDBT-210	I/O-insulated	AC/DC-powered	1	350 Ω
SDBS-140	Loop-insulated	AC/DC-powered	4	350 Ω

- When configuring a loop, make sure the load resistances of both instruments, such as a distributor, and conducting wires, which are to be installed in the loop, fall within the shaded area of Figure 5.6-1.
- The load resistance should preferably be connected to the negative-polarity terminal of the power supply if no distributors are used. Figure 5.6-2 shows an example of connection between ULTRA YEWFO and a distributor.



Note: In the case of CENELEC intrinsic safety, the power supply voltage should be under 30 VDC.

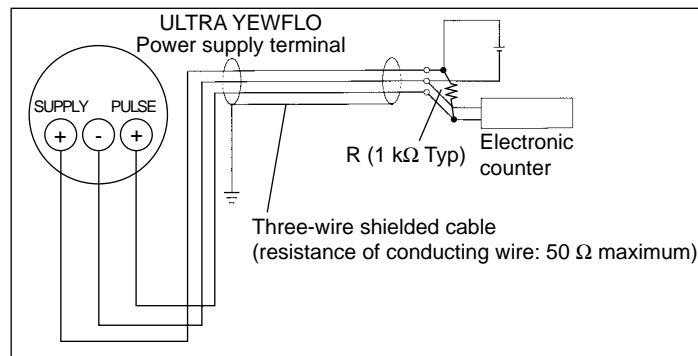
**Figure 5.6-1 Relationship Between Power Supply Voltage and Load Resistance (Analog Output)**



**Figure 5.6-2 Wiring of ULTRA YEFWLO (Analog Output)**

## 5.7 Pulse Output

- ULTRA YEFWLO provides a pulse output through transistor contacts using three-wire transmission. The contacts are rated at a maximum of 30 V DC and 120 mA DC.
- The low level is 0-2 V.
- The range of the pull-up resistance is as noted below.
- The pulse output is connected to such devices as an electronic counter. See Figure 5.6-3.
- No communication is possible over a transmission line.
- Communication via the amplifier board is always possible irrespective of the wiring conditions.



**Figure 5.6-3 Wiring of ULTRA YEFWLO (Pulse Output)**

### • Range of Pull-up Resistance

The range of the pull-up resistance for pulse output is restricted for reasons of the rated current and output frequency, as shown below:

$$\frac{E \text{ (V)}}{120} \leq R \text{ (k}\Omega\text{)} \leq \frac{0.1}{C \text{ (}\mu\text{F)} \times f \text{ (kHz)}}$$

where

E = pull up supply voltage

C = cable capacitance

f = frequency of pulse output



## IMPORTANT

Pull-up Resistance is necessary for pulse output. ( When resistance is low, amplifier will be wrong.)

Pull-up Resistance is basically 1kΩ, 1W. Depend on the cable length and pulse output frequency, transmission may be disrupted. Determine the resistance value by equation (1), and electric power of resistance by equation (2).

$$R(k\Omega) = \frac{0.1}{C(\mu F)^{(*1)} \times f(kHz)} \text{ ----- (1)}$$

Over 200Ω is necessary for R.  
C : Capacitance of the cable    f : Pulse output frequency

In case of (\*1)CEV cable (2SQ),  
0.1μF/km

$$P_R(W) = \frac{E^2}{R} \text{ ----- (2)}$$

E: Power supply voltage                      P<sub>R</sub>: Electricity of resistance



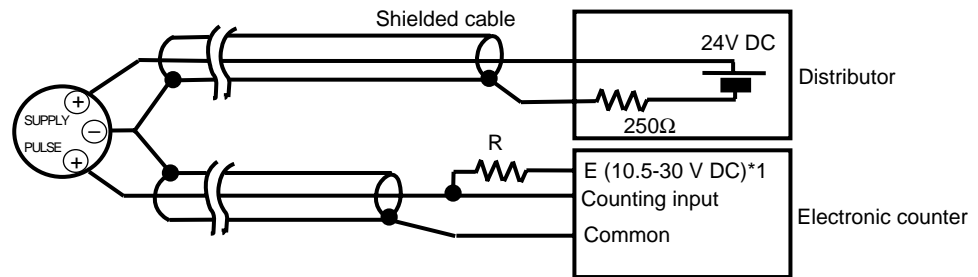
**CAUTION**

Take care of hot resistance.

## 5-8 Simultaneous Analog-Pulse Output

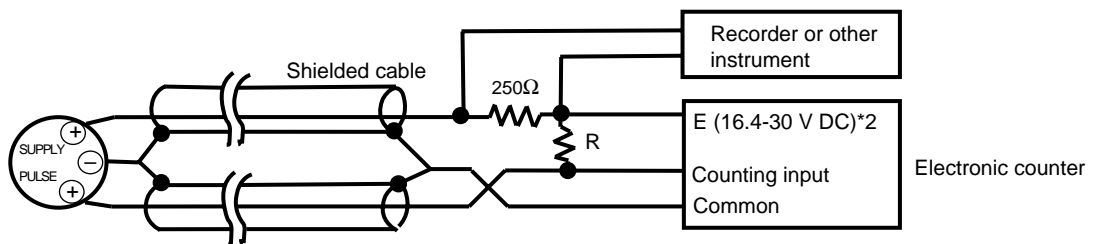
- When using ULTRA YEFWLO in the simultaneous analog-pulse output mode, the communicable distance of the transmission line is restricted depending on the wiring method. Figure 5.6-4 illustrates three examples of flowmeter installation for this output mode.
- Communication via the amplifier board is always possible irrespective of the wiring conditions.

- **First of Three Examples – Communication is possible (up to a distance of 2 km when a CEV cable is used).**



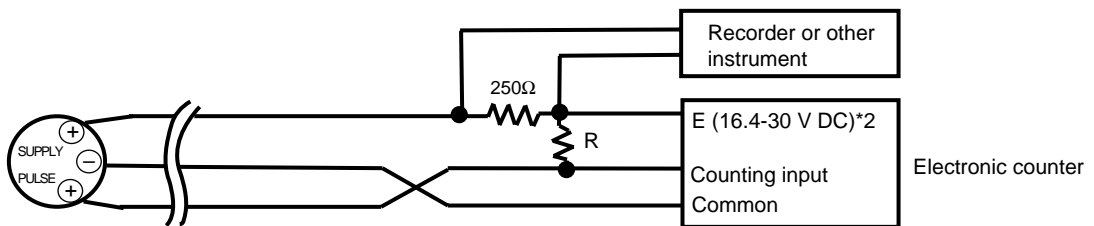
\*1: This supply voltage requires a power source with a maximum output current of no less than  $E/R$ .

- **Second of Three Examples – Communication is possible (up to a distance of 200 m when the pull-up resistance is 1 kΩ).**



\*2: This supply voltage requires a power source with a maximum output current of no less than  $E/R + 25 \text{ mA}$ .  
The inductance of the power output should be less than 1/1000 of Pull-up resistance (R).

- **Third of Three Examples – No communication is possible (except when there is no process fluid flowing).**



\*2: This supply voltage requires a power source with a maximum output current of no less than  $E/R + 25 \text{ mA}$ .

**Figure 5.6-4 Wiring of ULTRA YEFWLO (Simultaneous Analog-Pulse Output)**



## IMPORTANT

- For the shielded cables in the first and second examples of flowmeter installation, use two-wire separately shielded cables.

## 6. PREPARING FOR OPERATION

### 6.1 Checking the Flowrate Range

- If your ULTRA YEWFLO is new, it is already calibrated to the specified range for the flow rate.
- When changing the range, determine the required range for the flow rate using the following procedure.

**Table 6.1 Measuring Ranges**

**Measurable Range of Flow Velocity (range including flow velocities with non-guaranteed accuracy)**

Minimum Flow Velocity	Maximum Flow Velocity
Whichever is larger, 0.2 m/s(0.3m/s, ULTRA YEWFLO's nominal diameter is 15mm) or the flow velocity given by Reynolds number 5,000	6 m/s

**Range of Flow Velocity with Guaranteed Accuracy (range for accuracy within  $\pm 1.0\%$ )**

Minimum Flow Velocity	Maximum Flow Velocity
Whichever is larger, 0.2 m/s (0.3 m/s, if the ULTRA YEWFLO's nominal diameter is 15, 25 mm) or the flow velocity given by Reynolds number 20,000	6 m/s

**Range of Flow Velocity with Guaranteed Accuracy (range for accuracy within  $\pm 0.5\%$ )—applies only to models with suffix code /HAC, but except for size 25mm, 150mm and 200mm.**

Minimum Flow Velocity	Maximum Flow Velocity
Whichever is larger, 0.2 m/s or the flow velocity given by the Reynolds number calculated as <i>nominal diameter</i> $\times 1,000$	Whichever is smaller, 6 m/s or the flow velocity given by the Reynolds number calculated as <i>nominal diameter</i> $\times 4,000$

NOTE: Flow velocities not included in the ranges shown in Table 6.1 comply with an accuracy rating of  $\pm 1.0\%$ .

- **Equation for determining the Reynolds number:**

$$Re = \frac{354 \times 10^3 \times Qf}{v \times D}$$

- **Equation for determining the kinematic viscosity:**

$$v = \frac{\mu}{\rho f} \times 10^3$$

■ Equation for determining the volumetric flowrate (Qf) of ULTRA YEWFLO under operating conditions:

$$Q_f = \frac{v \times D^2}{354}$$

where

Re = Reynolds number (dimensionless)

Qf = volumetric flow rate under operating conditions (m<sup>3</sup>/h)

D = inner diameter of ULTRA YEWFLO (mm)

v = kinematic viscosity under operating conditions (cSt)

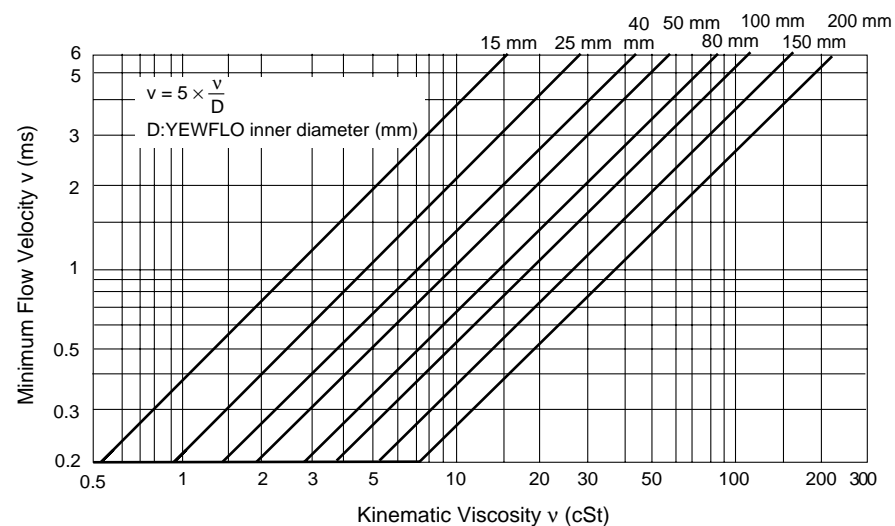
ρf = density under operating conditions (kg/m<sup>3</sup>)

μ = viscosity under operating conditions (cP)

v = flow velocity (m/s)

- If the obtained flow velocity falls within any of the ranges shown in Table 6.1, you can measure the flowrate properly.
- Using the graph in Figure 6.1, you can determine flow velocities for cases where the Reynolds number is 5,000. Multiplying the given value by 4 gives you the flow velocity for a Reynolds number of 20,000.

Nominal Diameter	Inner Diameter (mm)
15 mm	12.8
25 mm	23.4
40 mm	36.6
50 mm	47.5
80 mm	71.0
100 mm	93.8
150mm	138.8
200mm	185.6



**Figure 6.1** Relationship Between Minimum Flow Velocity and Kinematic Viscosity (curves for a Reynolds number of 5,000)

# 6.2 Pressure Loss and Cavitation

When changing the range, **ALWAYS** make sure the line's back pressure level will not lead to adverse effects due to pressure loss or cause cavitation.

## ■ Pressure Loss

- The pressure loss is calculated by  

$$\Delta P = 108 \times 10^{-5} \times \rho f \cdot v^2 \dots\dots\dots (1)$$
or  

$$\Delta P = 135 \times \rho f \cdot \frac{Qf^2}{D^4} \dots\dots\dots (2)$$

where  
 $\Delta P$  = pressure loss (kPa)  
 $Qf$  = volumetric flow rate under operating conditions (m<sup>3</sup>/h)  
 $D$  = inner diameter of ULTRA YEWFLO (mm)  
 $v$  = flow velocity (m/s)  
 $\rho f$  = density under operating conditions (kg/m<sup>3</sup>)

## ■ Cavitation (Minimum Back Pressure of the Line)



### IMPORTANT

Cavitation may occur in fluid measurements if the line pressure is too low and the flow velocity is too high, resulting in failure to measure the correct flow rate. Before measurement, **ALWAYS** make sure the line's back pressure level will not cause cavitation.

No cavitation occurs if the minimum back pressure of the line at the maximum flowrate is sufficiently low compared with the actual line pressure.

- The minimum line pressure is calculated by  

$$P = 3.8 \times \Delta P + 1.3 \times P_o \dots\dots\dots (3)$$

where  
 $P$  = line pressure at a point two to seven times the nominal diameter downstream from the ULTRA YEWFLO (kPa abs)  
 $\Delta P$  = pressure loss (kPa)  
 $P_o$  = liquid's saturation vapor pressure under operating conditions (kPa abs)

# 6.3 Zero Adjustment

No zero adjustment is necessary since the zero point does not shift.

# 6.4 Resetting totalized Value

- On the Brain Terminal (BT200), choose EXECUTE from the menu in parameter E10 (TOTAL RESET).
- Or, press the RESET switch located on the indicator/totalizer component.



## 6.5 Action Against Power Failure

- In the case of a power failure, the totalized data value is protected by the EEPROM. ULTRA YEWFLO cannot operate during a power failure, however, resulting in an interruption in totalization. It resumes totalization upon recovery from the power failure (restarts totalization, beginning with the value given immediately before the power failure) and automatically restores normal operation.
- No backup batteries are necessary for the EEPROM.

## 6.6 Precautions During Startup

- Because of effects due to external noise, ULTRA YEWFLO may not indicate 0% when the flowrate is zero, giving an output greater than 0%. If this occurs, first make sure ULTRA YEWFLO is filled with the process fluid. Then, make a TLA adjustment according to the instructions in Subsection 8.2.3.  
If the pipeline is empty during startup, ULTRA YEWFLO may continue to give a 0% output or remain unstable until it fills with the process fluid.



### **IMPORTANT**

---

- Whenever possible, pipe ULTRA YEWFLO while exercising care to prevent bubbles of gas from mixing with the process fluid. (See Section 4.1, “Piping Precautions.”)
-

## 7. WORKING WITH THE BT200 BRAIN TERMINAL

ULTRA YEFWLO is equipped with a communication function called “BRAIN.” ULTRA YEFWLO thus communicates with a BT200 BRAIN Terminal, enabling you to change the range or set the tag number from a remote location. This chapter explains how to set or change parameters using a BT200 terminal. For more information on a BT200 terminal, see the *BT200 BRAIN Terminal* instruction manual (IM 1C0A11-01E).

### 7.1 Connection of a BT200 Terminal and Notes on Use

#### 7.1.1 Connection of a BT200 Terminal

- A BT200 terminal can be linked with ULTRA YEFWLO through the transmission line in different ways. Connect the terminal to the connecting hooks in a terminal box or to the relay terminals on the transmission line, using BT200 communication cable with IC clip, as shown in Figure 7.1-1.
- You can also communicate with ULTRA YEFWLO via the amplifier board. To do this, connect the BT200 terminal across the HHT and COM terminals.

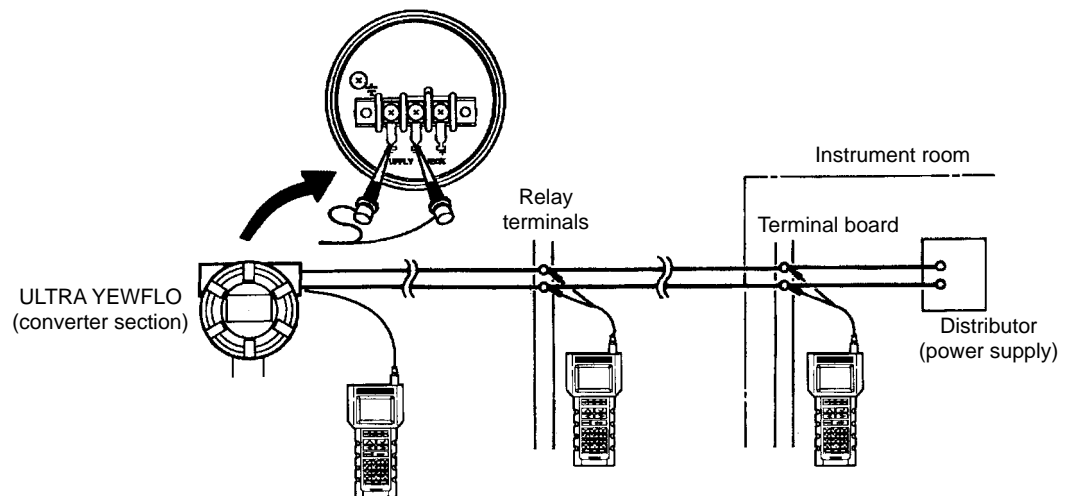


Figure 7.1-1 Connection of BT200

### 7.1.2 Notes on Use



#### CAUTION

Connect the terminal to the connecting hooks in a terminal box or to the relay terminals on the transmission line, using BT200 communication cable with IC lip, as shown in Figure 7.1-1.

- All your settings of parameters will be canceled if you turn ULTRA YEFWLO off less than 30 seconds after the parameter setup. Keep ULTRA YEFWLO turned on for at least 30 seconds after setting up parameters.
- 



#### NOTE

- 
- <1> With Auto Power-off, the BT200 automatically turns off if it senses no access to the keys for more than five minutes. This feature does not work, however, if the parameters described in item 2 below are on the display.
  - <2> Parameters “A10: FLOW RATE (%)” “A20: FLOW RATE” and “A30: TOTAL,” when on display, are updated with new data every five seconds.
  - <3> Use the UPLOAD or DOWNLOAD command when copying the parameters of one ULTRA YEFWLO to another. Parameters that can be copied are all the items in the B and C menus shown later in Section 7.4. (Except for B10: TAG NO and B26: K-FACTOR)
-

## 7.2 Working with the BT200

### 7.2.1 Layout of Keys

■ Figure 7.2-1 shows the layout of keys on the BT200.

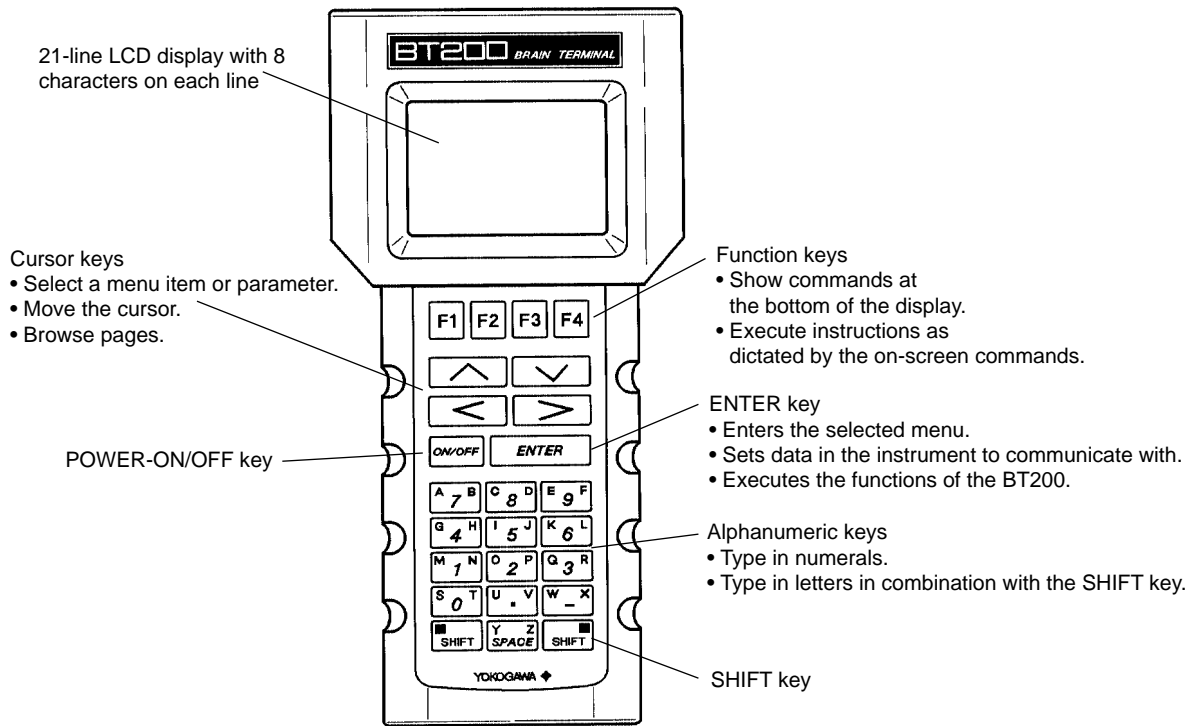
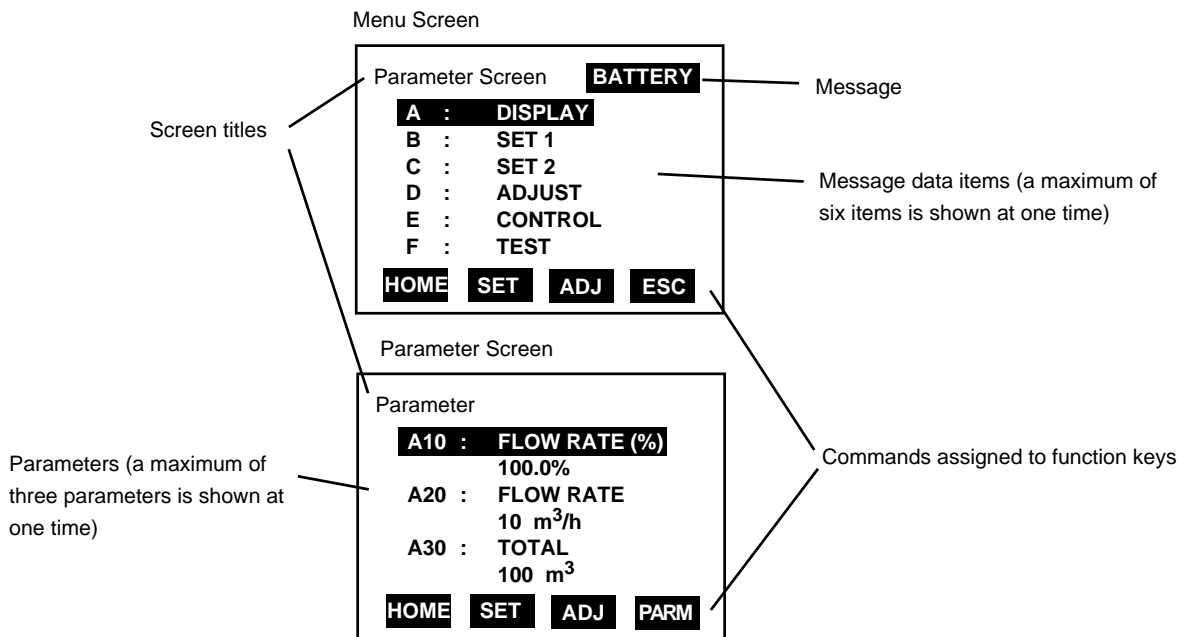
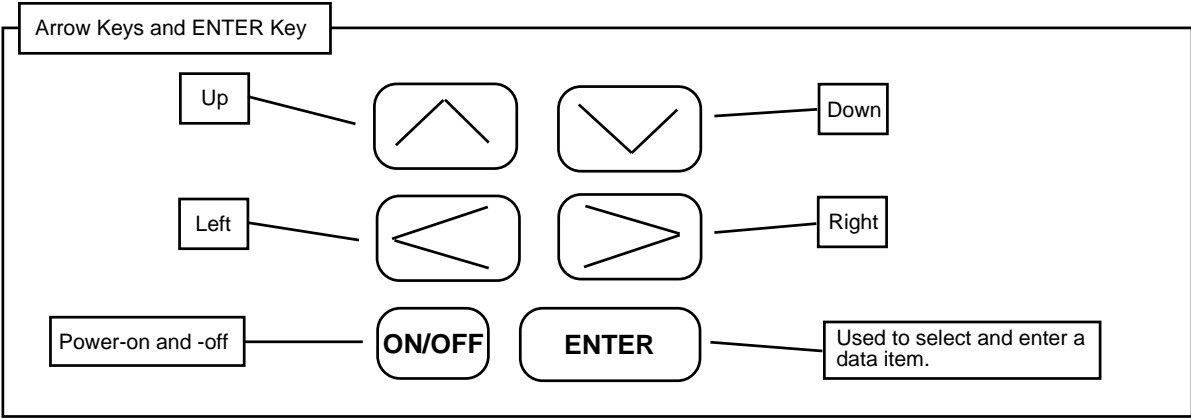
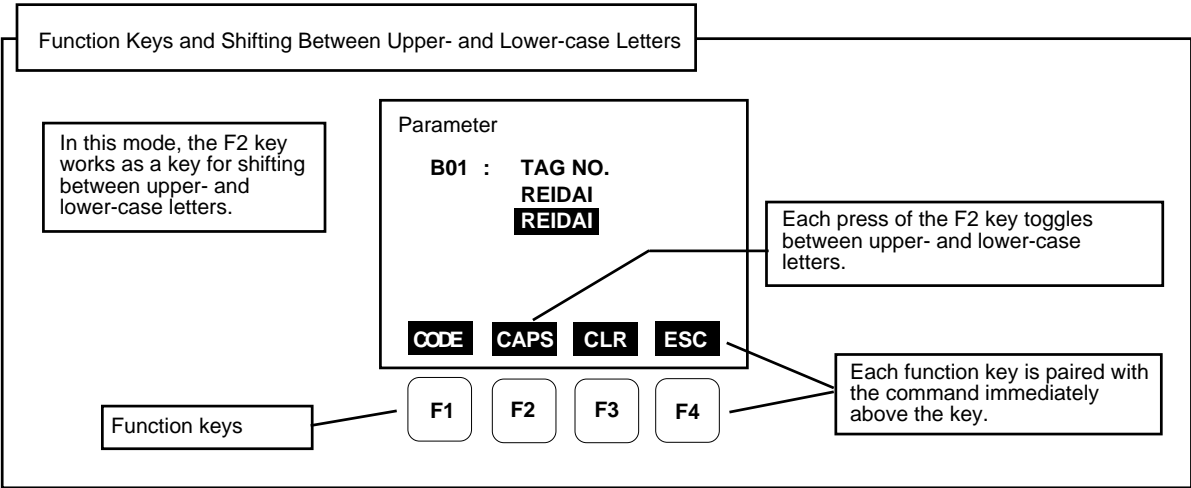
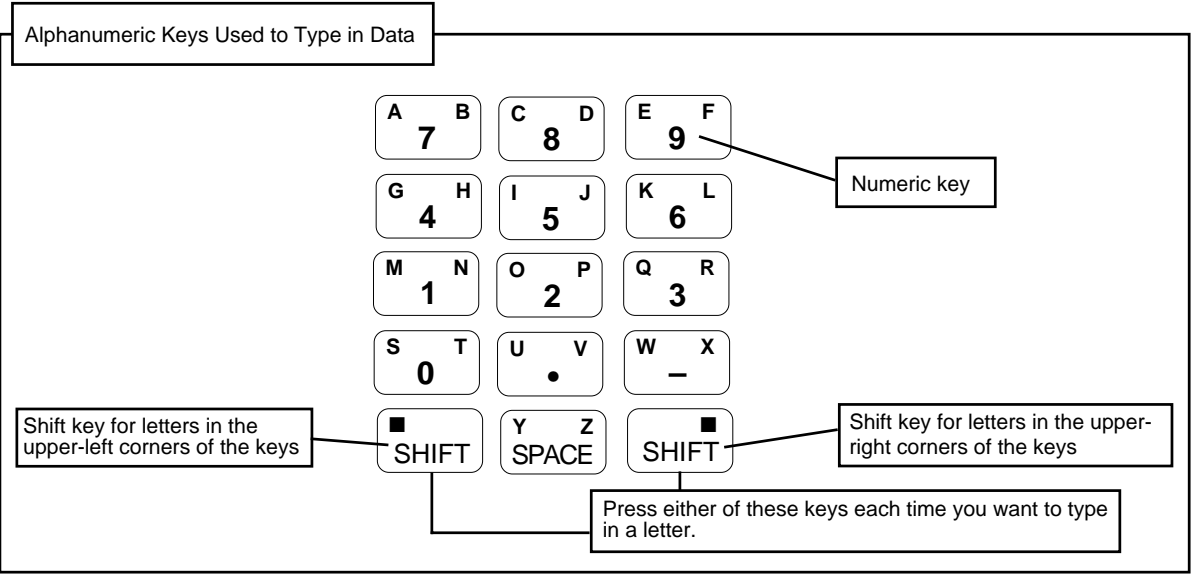


Figure 7.2-1 Layout of Keys on the BT200



7.2.2      Functionality of Operating Keys

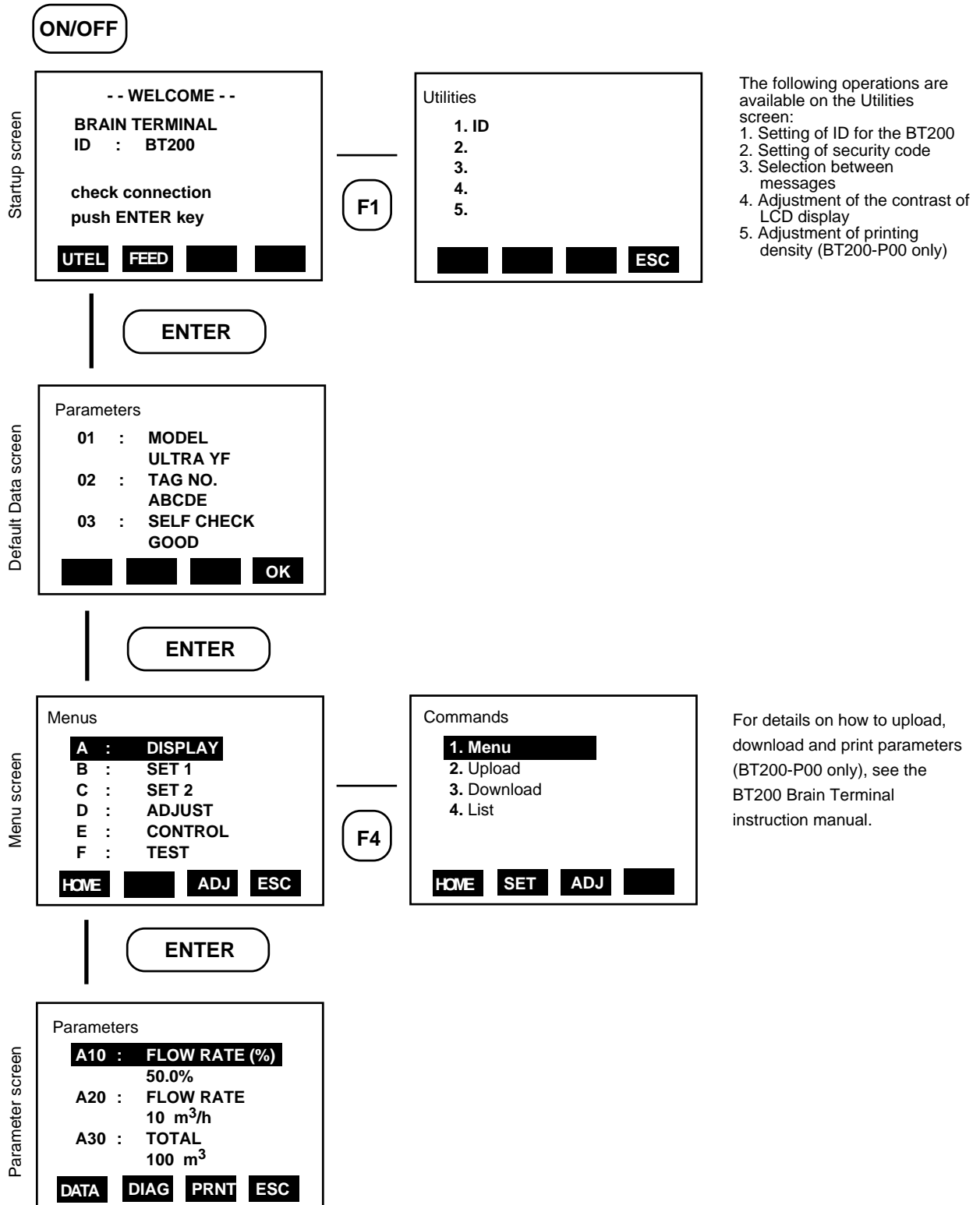
■ The following figures explain the functionality of the operating keys on the BT200.



## 7.3 Configuring Parameters with the BT200

### 7.3.1 Screens for Parameter Setup

- Refer to Section 7.4, “Parameter Summary,” to choose the parameter you want to access. On the Menu screen, choose from the menu items to have access from one parameter to another.

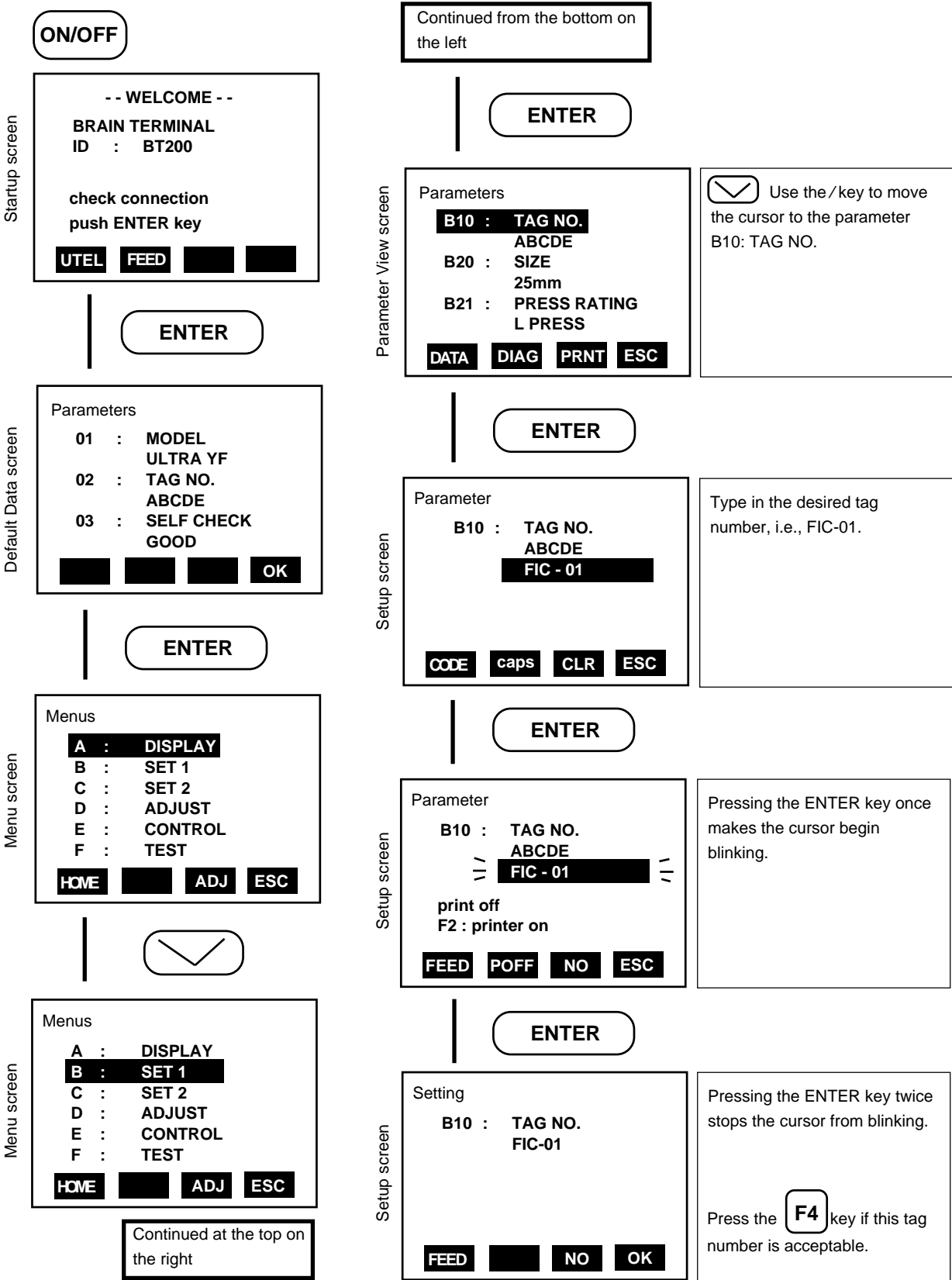


7.3.2     **Configuring Parameters**

- The following is a typical example of the procedure for configuring a parameter. Use this example as a reference when configuring other parameters.

- **Example: Setting a Tag Number (Parameter B10)**

In this example, you type the tag number as **FIC-01**.



## 7.4 Parameter Summary

This section summarizes parameters. Configure or change any of these parameters as necessary. After configuration, always be sure to press the DIAG key to ensure that the resulting self-test parameter x60: SELF CHECK reads GOOD.

No.	Parameter	Description	Read	Write	Data Range	Unit	Default
A	DISPLAY	Viewed Item					
A10	FLOW RATE (%)	Instantaneous flowrate (%)	Yes	No	0.0 to 110.0	%	-
A20	FLOW RATE	Instantaneous flowrate in engineering unit	Yes	No	0 to 65535	B42	-
A30	TOTAL	Totalized Value	Yes	No	0 to 999999	B40	-
A60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
B	SET1	Setup Parameter 1					
B10	TAG NO.	Tag number	Yes	Yes	16 alphanumeric characters		blank
B20	SIZE	Choice of nominal diameter	Yes	Yes	25, 40, 50, 80, 100, 150 or 200mm		Specified value
B21	PRESS RATING	Pressure rating	Yes	Yes	Low pressure		Low pressure
B25	K-FACT UNIT	Choice of unit for K factor (KM)	Yes	Yes	p/l		p/l
B26	K-FACTOR	K factor (KM) at 15°C	Yes	Yes	0.00001 to 32000	B25	Appropriate value
B30	TEMP UNIT	Choice of unit for temperature	Yes	Yes	deg C		deg C
B31	TEMP f	Regular temperature	Yes	Yes	-40 to 200	B30	Specified value
B32	DENSITY UNIT	Choice of unit for density	Yes	Yes	kg/m <sup>3</sup>		kg/m <sup>3</sup>
B33	DENSITY f	Regular density	Yes	Yes	0.00001 to 32000	B32	Specified value
B40	FLOW UNIT	Choice of unit for flowrate	Yes	Yes	m <sup>3</sup> , l, kg, ton or SPE (Note1)		Specified unit
B41	TIME UNIT	Choice of time unit for flowrate	Yes	Yes	/s, /m, /h and /d		Specified unit
B42	FLOW SPAN	Maximum (full-scale) flowrate	Yes	Yes	0.00001 to 32000	B40 + B41	Specified value
B50	DAMPING	Choice of damping time	Yes	Yes	0, 1, 2, 4, 8, 16, 32 or 64 sec		4 sec
B60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-

Note1: To use the unit other than those contained in parameters, select [SPE], and set parameter [C30], [C31] and [C32].



- All of your parameter settings will be canceled if you turn ULTRA YEFWLO off less than 30 seconds after the parameter setup. Keep ULTRA YEFWLO turned on at least 30 seconds after setting up the parameters.



No.	Parameter	Description	Read	Write	Data Range	Unit	Default
C	SET 2	Setup Parameter 2					
C10	TOTAL MODE	Choice of totalization mode	Yes	Yes	Scaled or unscaled	%	Scaled
C11	TOTAL RATE	Rate of totalization	Yes	Yes	0.00001 to 32000 (Note 2)	p/B40	1
C20	PULSE MODE	Choice of pulse output mode	Yes	Yes	Scaled or unscaled		Scaled
C21	PULSE RATE	Rate of pulse output	Yes	Yes	0.00001 to 32000	p/B40	1
C30	SPECIAL UNIT	Special unit	Yes	Yes	8 alphanumeric characters (Note 3)	p/B40	SPE.
C31	BASE UNIT	Basic unit for conversion to special unit	Yes	Yes	m <sup>3</sup> , l, kg or ton	p/B40	m <sup>3</sup>
C32	UNIT CONV FA	Coefficient for conversion to special unit	Yes	Yes	0.00001 to 32000	S/C31	1
C60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
D	ADJUST	Corrective Parameter					
D10	TRIM 4 mA	Fine-tuning for 4-mA output	Yes	Yes	-1 to 10	%	0.0
D11	TRIM 20 mA	Fine-tuning for 20-mA output	Yes	Yes	-10 to 10	%	0.0
D20	USER ADJUST	Correction factor in user application	Yes	Yes	0.00001 to 32000		1
D60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
E	CONTROL	Control Parameter					
E10	TOTAL RESET	Resetting of totalized value	Yes	Yes	Execute or not to execute		Not to execute
E20	DISP SELECT	Choice from data items on display	Yes	Yes	Rate (%), rate, total, rate (%) & total, rate & total or rate (%) & rate		Rate (%)
E60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
F	TEST	Test Parameter					
F10	SET % MODE	Output of current	Yes	Yes	0 to 110	%	0.0
F20	SET F MODE	Pulse output	Yes	Yes	0 to 6000	Hz	0.0
F60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-

Note 2: The display does not show any unit for the totalized value if you set a value other than 1.

Note 3: Only the first six characters are displayed.

### C11

- **Setting the totalization rate (applies only to models with an indicator/totalizer component)**  
The totalization rate is a parameter that sets the kg per rate of the totalizer value for a case where the value is shown on the indicator. The flowrate set in parameter B40 applies as the totalizer value.  
Example: Setting to totalize as 100 counting per 1kg.  
<1> Make sure in parameter B40, 'kg' is selected as the unit of flowrate.  
<2> Make sure in parameter C10, 'SCALED' is selected.  
<3> In this parameter C11, set the rate at 100.

### C21

- **Setting the pulse output rate**  
The pulse output rate is a parameter that sets the liter per rate for a case where the pulse output is fed to a counter or other device. The flowrate set in parameter B40 applies as the pulse output.  
Example: Setting to output as 1000 pulse 1 liter.  
<1> Make sure in parameter B40, 'l' is selected as the unit of flowrate.  
<2> Make sure in parameter C20, 'SCALED' is selected.  
<3> In this parameter C21, set the rate at 1000.

**C30, C31, C32**

● **Setting a special unit**

A special unit of flowrate which is not found in the choices in parameter B40 can be set and used with these parameters.

Example: Setting the special unit 'Sm<sup>3</sup>/h'

<1> In parameter C30, type Sm<sup>3</sup>/h.

<2> In parameter C31, set the basic unit (m<sup>3</sup> in this case).

<3> In parameter C32, specify the coefficient of conversion from the basic unit (for example, ×0.95).

No.	Parameter	Description	Read	Write	Data Range	Unit	Default
G	CHECK DATA	Check-data Parameter					
G10	FREQUENCY	Vortex frequency	Yes	No	-	Hz	-
G11	SPAN F	Full-scale frequency	Yes	No	-	Hz	-
G20	VELOCITY	Flow velocity	Yes	No	-	m/s	-
G21	SPAN V	Full-scale flow velocity	Yes	No	-	m/s	-
G30	SOUND SPEED	Speed of sound	Yes	No	-	m/s	-
G60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
H	MAINTENANCE	Maintenance Parameter					
H10	TLA	Trigger Level Adjustment	Yes	Yes	-1 to 2	%	0
H20	L.C.FLOWRATE	Cut-off-low-flowrate feature	Yes	Yes	X to 32000 (X: See Note 4.)	B42	(Note 5)
H30	N.J.SEL	Noise elimination function	Yes	Yes	Active or not active		Not active
H31	MODULATION F	Modulation factor	Yes	No	-		-
H32	L.C.MF	Modulation factor for cut-off-low-flowrate feature	Yes	Yes	0 to 1		0.2
H40	CLR ERR2	Span setting error clear	Yes	Yes	Active or not active		Not active
H45	ERROR RECORD	History of errors	Yes	Yes	GOOD or ERROR indication		-
H50	REVISION	Revision number of program	Yes	No	-		-
H60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-
M	MEMO	Memorandum Parameter					
M10	MEMO 1	Memo 1	Yes	Yes	16 alphanumeric characters		Blank
M20	MEMO 2	Memo 2	Yes	Yes	16 alphanumeric characters		Blank
M30	MEMO 3	Memo 3	Yes	Yes	16 alphanumeric characters		Blank
M60	SELF CHECK	Self-test message	Yes	No	GOOD or ERROR indication		-

Note 4: The flowrate equivalent to that at a velocity of 0.1 m/s.

Note 5: The flowrate equivalent to that at a velocity of 0.2m/s.

# 7.5 Self-checking

## 7.5.1 Checking for Failures

### (1) Checking for Failures Using the BT200

Verify that:

- BT200 is connected correctly;
  - BT200 is operating correctly; and
  - Parameters are configured correctly;
- while referring to the following examples of failures.

● Example 1: Failure in Connection

BRAIN terminal  
ID :  
Check cable connection.  
Press the ENTER key.

UTEL FEED

Connect the BT200 to ULTRA YEWFLO and press the ON/OFF key. After the screen on the left appears, press the ENTER key.

Communication failure.

ESC

Since communication is not possible if the BT200 is improperly connected to ULTRA YEWFLO, the message on the left appears. Recheck the connection. After rechecking, press the F4 key (ESC).

● Example 2: Failure in Configuration of Parameters

Parameters  
01 : MODEL  
ULTRA YF  
02 : TAG NO.  
FIC-01  
03 : SELF CHECK  
ERROR

OK

The Default Data screen shows the current results of a self-check on ULTRA YEWFLO.

Parameters  
B10 : TAG NO.  
FIC-01  
B20 : SIZE  
25mm  
B21 : PRESS RATING  
L PRESS

DATA DIAG PRNT ESC

Pressing the F2 key (DIAG) on the Parameters screen enters the self-check screen "x60: SELF CHECK."

Self-check  
B60 : SELF CHECK  
ERROR  
< ERROR >  
< SPAN SET ERROR >

FEED PRNT ESC

The Self-check screen shows an error message if there is an error.

### (2) Checking for Failures Using the Indicator/Totalizer Component



#### NOTE

- If any failure is found as a result of self-checking, the display of the indicator/totalizer component shows an error number. If there is more than one failure, the display changes from one error number to another at two-second intervals. For details on the meanings of error numbers, see Table 7.5.1.

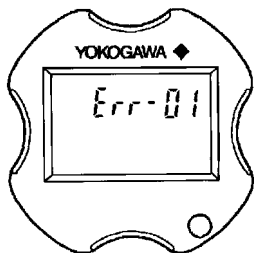


Figure 7.5-1 Checking for Failures Using the Indicator/Totalizer Component

## 7.5.2 Information on Failures and Corrective Measures

- Table 7.5.1 summarizes the alarm messages, along with information on the failures and corrective measures.

**Table 7.5.1 Alarm Messages**

Reading on Indicator/Tot-alizer Component	Reading on BT200	Cause of Failure	Behavior of Output Upon Failure	Corrective Action
None	GOOD			
-	ERROR			
Err-01	OVER OUTPUT	The output signal has exceeded 110% of the defined maximum (full-scale) flowrate.	The current's output is held at a 110% value, while the pulse output behaves normally.	Check the flowrate range and change the setting of the maximum (full-scale) flowrate.
Err-02	SPAN SET ERROR	The defined maximum (full-scale) flowrate has exceeded the value appropriate for a flow velocity of 6 m/s.	Both the current's output and pulse output continue to behave normally.	Check the flowrate range and change the setting of the maximum (full-scale) flowrate.
Err-04	PULSE OUT OVER	Actual, or when 100%, the pulse output has exceeded 6 kHz.	The current's output behaves normally, while the pulse output is held at a value 6 kHz.	Change the rate of the pulse output.
Err-05	EEPROM ERROR	The EEPROM has failed.	The current's output is held at a 110% value, while the pulse output becomes disabled.	Consult Yokogawa's service personnel.
Err-10	SIGNAL ERROR	The pipeline is empty or the sensor assembly has failed.	The current's output is held at a 0% value, while the pulse output becomes disabled.	Fill the pipeline with fluid. If the alarm persists, consult Yokogawa's service personnel.
Err-11	SIGNAL FLUCTUATE	A large number of gas bubbles is mixed in with the fluid in the pipeline.	The setting of the damping time automatically quadruples, though the current's output fluctuates between 0% and 100%.	Stop bubbles of gas from mixing in with the fluid.
-	CPU FAULT	The CPU is a stopped state.	The current output is over 110%, the pulse output irregularly.	Consult Yokogawa's service personnel.

## 8. MAINTENANCE

---

This chapter explains the adjustment procedure needed for maintenance and the procedures used to disassemble and reassemble ULTRA YEWFO for parts replacement. When doing maintenance on ULTRA YEWFO, thoroughly read the instructions and cautionary notes hereinafter given in order to handle the flowmeter correctly.



### WARNING

- If the process fluid is harmful to personnel, handle ULTRA YEWFO carefully even after it has been removed from the process line for maintenance or other purposes. Exercise extreme care to prevent the fluid from coming into contact with human flesh and to avoid inhaling any residual gas.



### IMPORTANT

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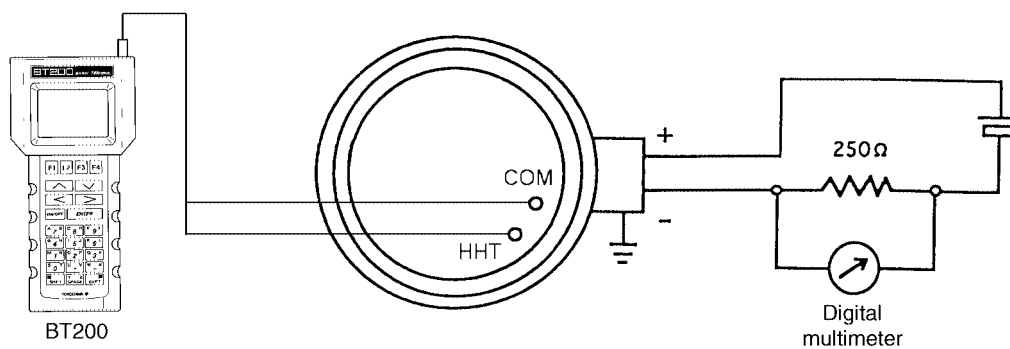
- Precautions in Handling the Amplifier Assembly  
Some of the parts used in the amplifier assembly may functionally succumb to electrostatic discharge. Therefore when handling the assembly, use a protective device such as an antistatic grounding strap. Exercise extreme care to avoid directly touching any of the electronic parts and circuits in the assembly. Also, keep the removed amplifier assembly in an antistatic bag.
-

## 8.1 Equipment Needed for Maintenance

Table 8.1 summarizes the pieces of equipment needed to maintain ULTRA YEFWFO. Use maintenance-purpose equipment whose functionality has been adequately maintained and controlled.

**Table 8.1 Equipment Needed for Maintenance**

Equipment	Yokogawa-recommended Model	Remarks
Power supply	SDBT or SDBS distributor	for 4-20 mA signals (Output voltage: 24 V DC $\pm 10\%$ )
Load resistance	2792 standard resistance ( $250\ \Omega \pm 0.005\%$ )	for 4-20 mA signals If the distributor is used, its load resistance can serve as this resistance.
Voltmeter	2506A digital multimeter (accuracy: $\pm 0.05\%$ )	for 4-20 mA signals
Oscilloscope	DL1200, DL1300 or DL1540	



**Figure 8.1-1 Wiring of Equipment for Maintenance**



- When using any test-purpose measuring instruments, do not ground them.
- All of your parameter settings will be canceled if you turn ULTRA YEFWFO off less than 30 seconds after the parameter setup. Keep ULTRA YEFWFO turned on at least 30 seconds after setting up the parameters.

## 8.2 Adjustment

This section explains the procedure used to adjust the ULTRA YEWFLO converter to change the range or for other purposes. Adjust the converter in a maintenance room complete with the equipment necessary for adjustment.

### 8.2.1 Zero Adjustment

- No zero adjustment is necessary since the zero point does not shift.



#### IMPORTANT

- Because of the effect of electrical noise, ULTRA YEWFLO may provide an output even when the flowrate is zero. In that case, properly eliminate the source of the noise.

### 8.2.2 Span Adjustment

- Before span adjustment, check whether the range of the flowrate is adjustable or not by following the instructions in Section 6.1, “Checking the Flowrate Range.” Spans are automatically determined and set when you configure required parameters with a BT200 BRAIN Terminal. Therefore, in normal applications, you need not confirm the spans once they are set up. If you are verifying the analog output, follow the procedure on the Verification Procedure.

#### Verification Procedure

- <1> Wire the necessary pieces of equipment as shown in Figure 8.1-1. Allow at least three minutes for the equipment to warm up.
- <2> Configure the necessary parameters.
- <3> Set span frequency with parameter F20: SET F MODE. (See the equation noted below.)
- <4> If the load resistance is 250  $\Omega$ , the digital multimeter should read 5 V. Make sure the multimeter indicates the value calculated from  $R \times 20$  (mA) when a resistor of a known value ( $R \Omega$ ) is used.
- <5> Next, set parameter F20 at a frequency equal to 50% of the full-scale frequency. Make sure the analog output is within the specified limits of accuracy.
- <6> Finally, set parameter F20 at 0 to make sure the analog output is still within the specified limits of accuracy.

#### • Equation for Determining the Span Frequency

$$f = KM \cdot [1 - 5.25 \times 10^{-5} \times (t - 15)] \cdot Qf$$

where

f = span frequency (Hz)

Qf = maximum (span) flowrate (l/s)

KM = K-factor (p/l) (indicated on the data plate)

t = temperature of the fluid under operating conditions ( $^{\circ}\text{C}$ )

- Simply configure the necessary parameters. The built-in microprocessor automatically calculates the frequency at the maximum flowrate (span frequency). The span frequency is indicated under parameter G11: SPAN F.

### 8.2.3 Trigger Level Adjustment (TLA) (Parameter H10)

- TLA helps suppress the effects of external noise.
- Parameter H10 (TLA) is adjusted to 0 as the default when ULTRA YEWFO is shipped from the factory.
- ULTRA YEWFO in principle is hardly affected by mechanical vibration. Make a trigger level adjustment, however, if external noise is an issue or if ULTRA YEWFO gives a reading larger than the true value while the flowrate is zero.
- Setting parameter H10 at a larger value (for example, a value from 0 to 2) heightens the trigger level. This strategy will help reduce the effect of noise.



#### IMPORTANT

- Care must be taken when making a trigger level adjustment. If you set the parameter for TLA at a value larger than necessary, the measurable lower limit of the flow velocity rises to an unacceptable level, possibly impeding your measurement.

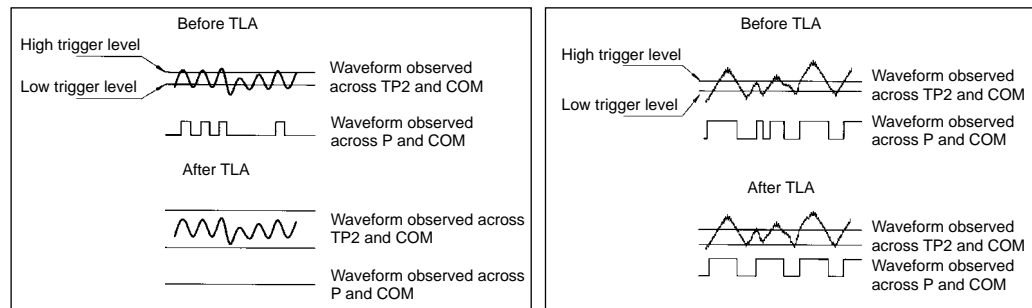


Figure 8.2-3 Trigger Level Adjustment (at Lower Flowrates)

### 8.2.4 Loop Tests (Parameters F10 and F20)

- You can have ULTRA YEWFO provide either a 4-20 mA DC output of 0.0% to 110.0% (parameter F10: SET % MODE) or a pulse output of 0 to 6,000 Hz (parameter F20: SET F MODE) for your loop tests.



## 8.3 Disassembly and Reassembly

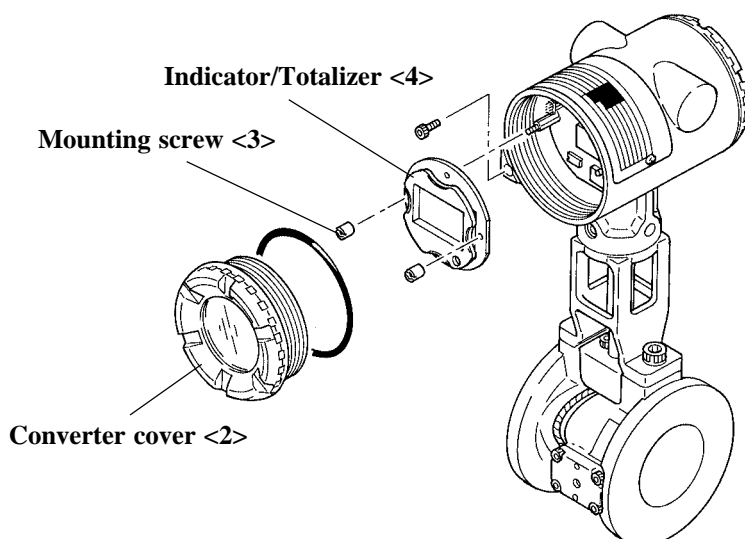
When disassembling or reassembling ULTRA YEFWFO for a part replacement or maintenance, **ALWAYS** turn off both the flowmeter and flow of the process fluid. Use the appropriate tools for the disassembly/reassembly of ULTRA YEFWFO.



- The maintenance work described hereinafter can be done at the location where ULTRA YEFWFO is installed if it is a standard model. If your ULTRA YEFWFO is an explosion-protected model, however, it is an established rule that you relocate it to a non-hazardous area, do the maintenance work, and then reassemble it in its original form. See “Installation and Operating Precautions for Flameproof Explosion-Protected Instruments” at the end of this manual for more information.
  - No user modification is permitted on flameproof models of ULTRA YEFWFO. You therefore are not allowed to add any additional indicator/totalizer component to those models of ULTRA YEFWFO nor can you use ULTRA YEFWFO with the component removed. If such modification is unavoidably necessary, consult Yokogawa Electric Corporation.
  - When disassembling a flameproof model of ULTRA YEFWFO, first turn the lock screw clockwise with a special tool (Allen wrench) to unlock the cover, and then remove the cover. After having replaced the cover, **ALWAYS** turn the lock screw counterclockwise to lock the cover.
- 

### 8.3.1 Removing the Indicator/Totalizer Component

- When removing the indicator/totalizer component to change the way it is viewed, follow the procedure described below.
  - <1> Turn off ULTRA YEFWFO.
  - <2> Remove the cover on the converter.
  - <3> Using a flat-blade screwdriver, remove the two setscrews from the indicator/totalizer component.
  - <4> Take the component out by hand.
  - <5> When reassembling the component into the converter after the component is repositioned, follow these steps in their reverse order, while aligning the component's screw holes with the bolts in the converter and then fastening the two set screws.

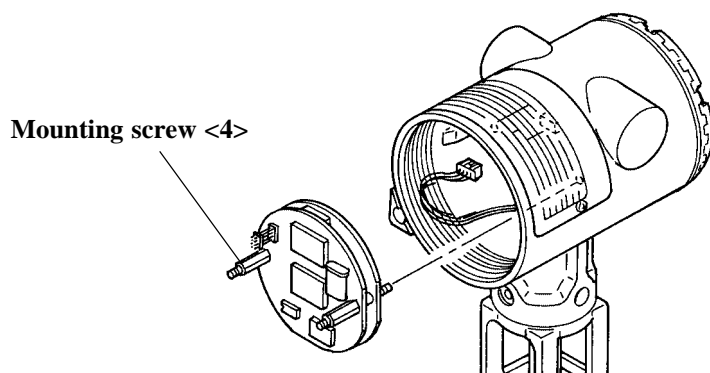


**Figure 8.3-1 Removing the Indicator/Totalizer Component**

### 8.3.2 Removing the Amplifier Unit

When removing the amplifier unit, follow the procedure described below.

- <1> Turn off ULTRA YEWFO.
- <2> Remove the cover on the converter.
- <3> If your ULTRA YEWFO is a model with a built-in indicator/totalizer component, remove the component according to the procedure in Subsection 8.3.1.
- <4> Using a 5.5-mm hex size nut driver, remove the two bolts that clamp the amplifier unit, while loosening the bolts alternately. Take the unit out keeping it level.



**Figure 8.3-2 Removing the Amplifier Unit**



- Do not twist the amplifier unit when removing it. Otherwise, the pins of the connector may be bent.
- Exercise care to avoid applying excess force to the amplifier unit.

### 8.3.3 Replacing the Sensor Assembly

#### (1) Removing the Sensor Assembly



#### NOTE

Sensor assemblies can be replaced only if your ULTRA YEFWLO is a flange model.

- When removing the sensor assembly to replace it, follow the procedure described below.
- <1> Remove the amplifier unit according to the procedure in Subsection 8.3.2. (Refer to Subsection 8.3.1 to remove an amplifier unit of ULTRA YEFWLO that has an indicator/totalizer component.)
- <2> Unplug the terminal pin at the tip of the sensor assembly from the terminal board.
- <3> Loosen the clamp screw at the neck of the case.
- <4> Remove the screws on the bracket that couples the sensor assembly with the body. Remove the bracket together with the converter case.
- <5> Remove the bracket that couples the case with the body.
- <6> Remove the four screws on the plate that mounts the sensor assembly on the body.
- <7> Remove the sensor assembly from the body, while exercising care to avoid forcibly bending the assembly.

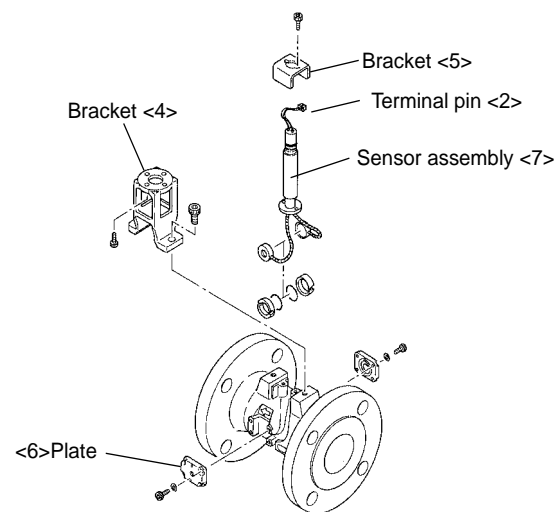
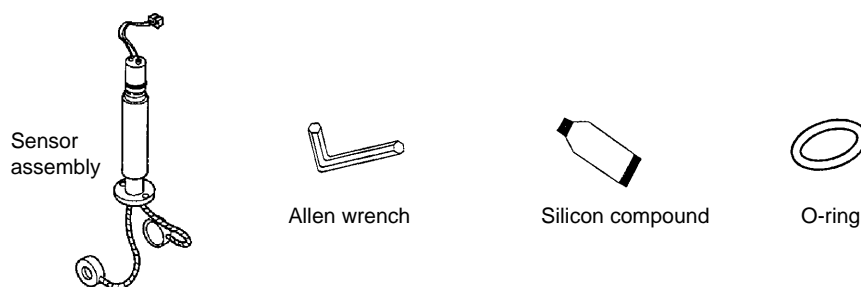


Figure 8.3-3 Removing the Sensor Assembly

### Accessories for Sensor Replacement (provided separately)



#### (2) Mounting a Sensor Assembly

When mounting a new sensor assembly for replacement, follow the procedure described below.

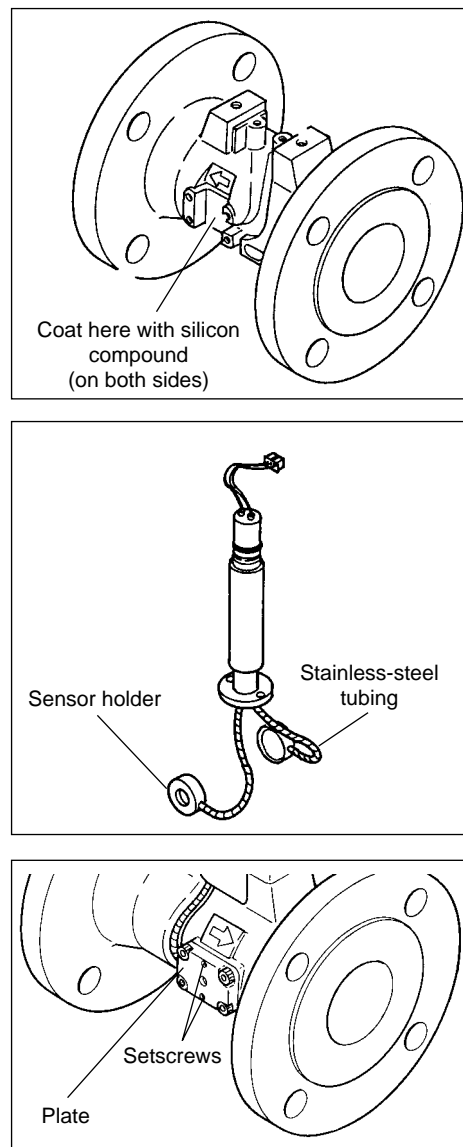
- <1> Make sure the stainless-steel tubing of the new sensor assembly fits properly into the grooves on the body. (The tubing is preformed when shipped. If it does not fit properly, however, reshape it so it fits into the grooves perfectly.)
- <2> Using an organic solvent, clean the bottom surfaces of the sensor holders and the surfaces of the body where the sensor holders are being mounted.
- <3> Engage the metal ring with each sensor holder from the bottom surface of the holder. Fit the O-ring coated with a uniform film of grease into the groove on one side of the holder. At this point, exercise care to prevent the bottom surface of the holder from getting grease on it.



**CAUTION**

- Exercise care to prevent the surfaces where the emitter/detector of the sensor assembly are mounted from becoming damaged or contaminated with dust.

- <4> Loosen the two setscrews on the plate beforehand with the supplied tool.
- <5> Coat the middle of the emitter/detector's bottom surface with an adequate amount of silicon compound.
- <6> Place the emitter/detector in the approximate middle of the sensor-mounting surface on the body.
- <7> Engage the projection of the plate with the hole (concave spot) on the back of the sensor holder to position the plate in place.
- <8> Fasten the plate with the four screws.
- <9> After having fastened the plate, fasten the two setscrews to pressurize the metal ring so the O-ring comes into tight contact with the body.
- <10> For reassembly of parts other than the sensor assembly, follow these steps in the reverse order of disassembly.

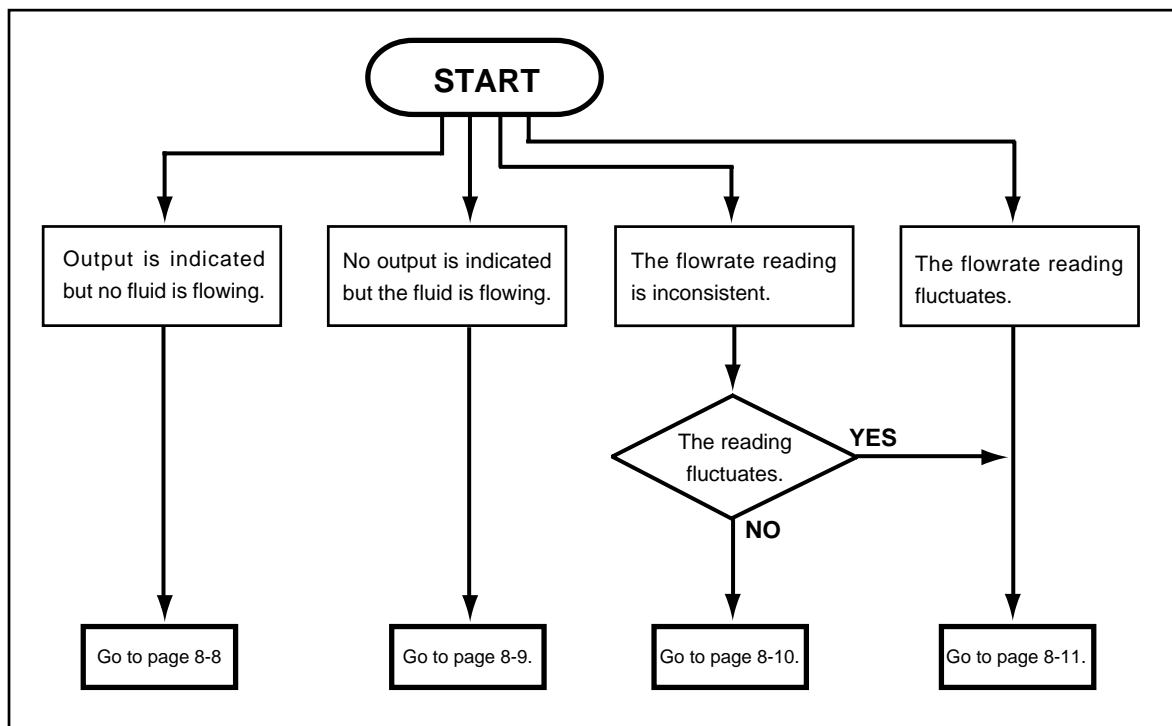


**Figure 8.3-4 Mounting the Sensor Assembly**

## 8.4 Troubleshooting

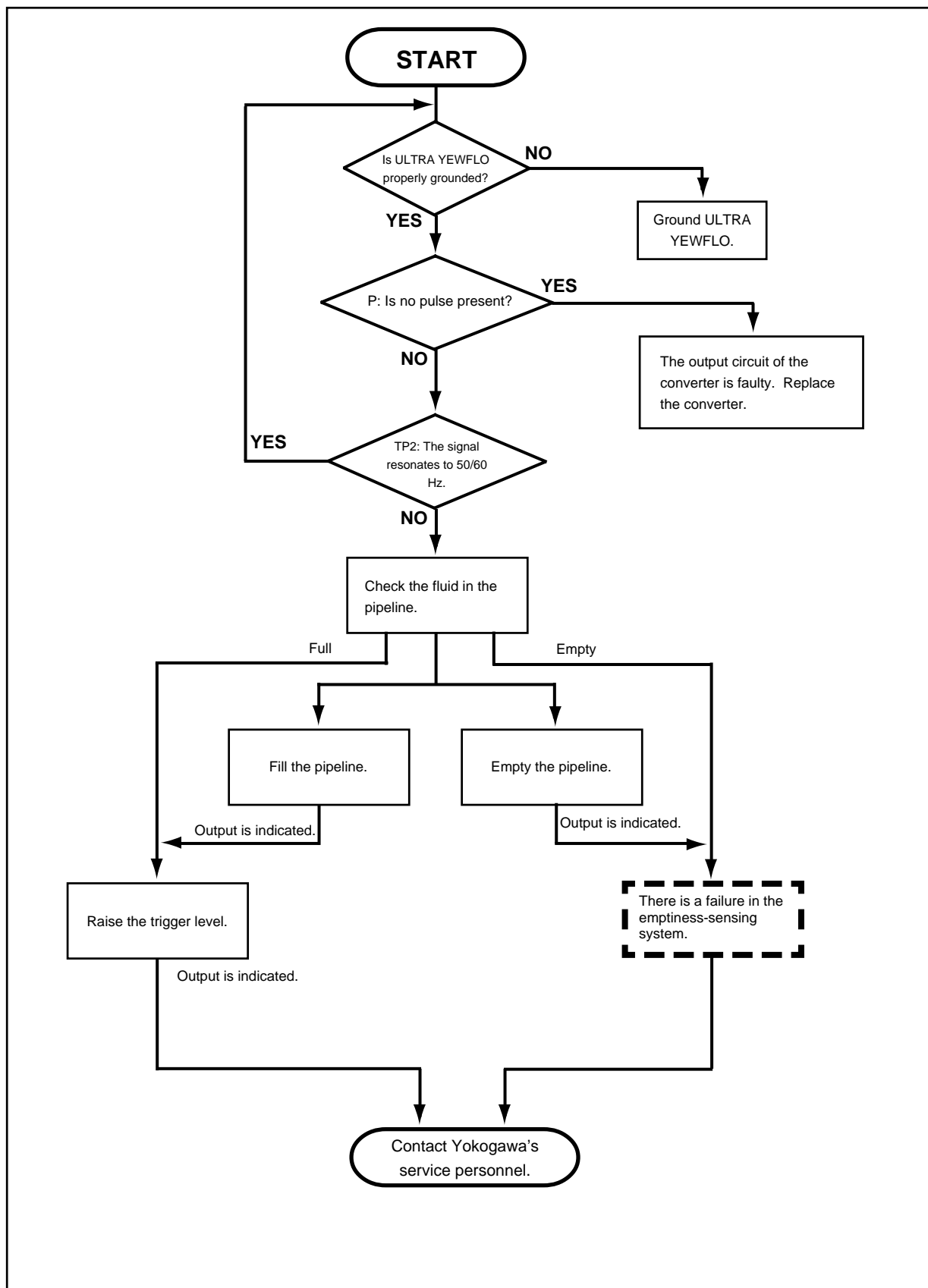
ULTRA YEFWFO, among other instruments, is less likely to malfunction if handled and used correctly. Problems may arise, however, if any failure exists in its phases of application such as mounting or piping. If ULTRA YEFWFO fails to operate normally, take corrective measures while referring to the troubleshooting flows hereinafter described. Some causes of failure may be too complex to localize by using only those troubleshooting flows. If any given failure seems to be too difficult to cope with, consult Yokogawa's service personnel.

### 8.4.1 Basic Troubleshooting Flow

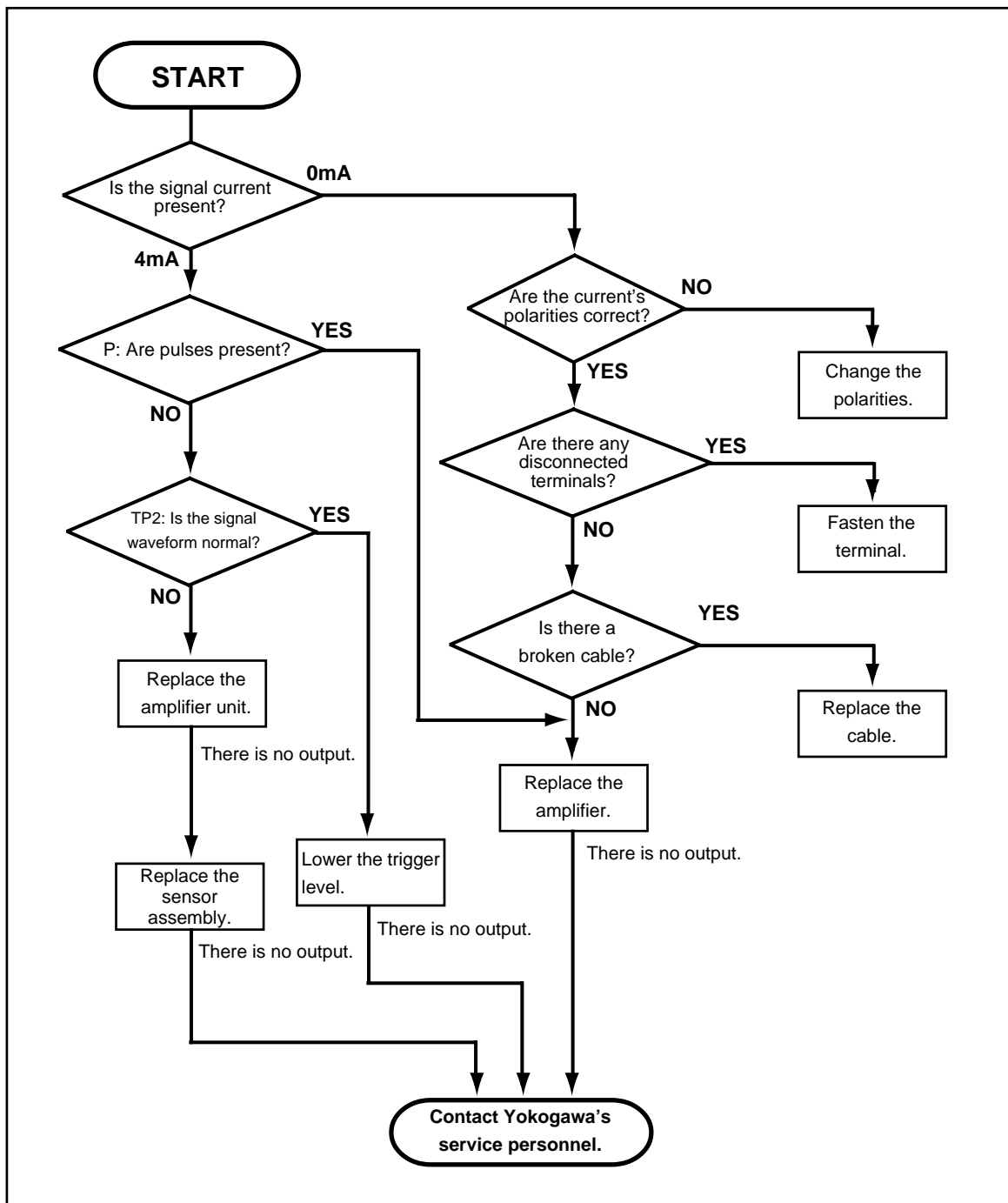


### 8.4.2 Specific Troubleshooting Flows

■ Output is indicated but no fluid is flowing.

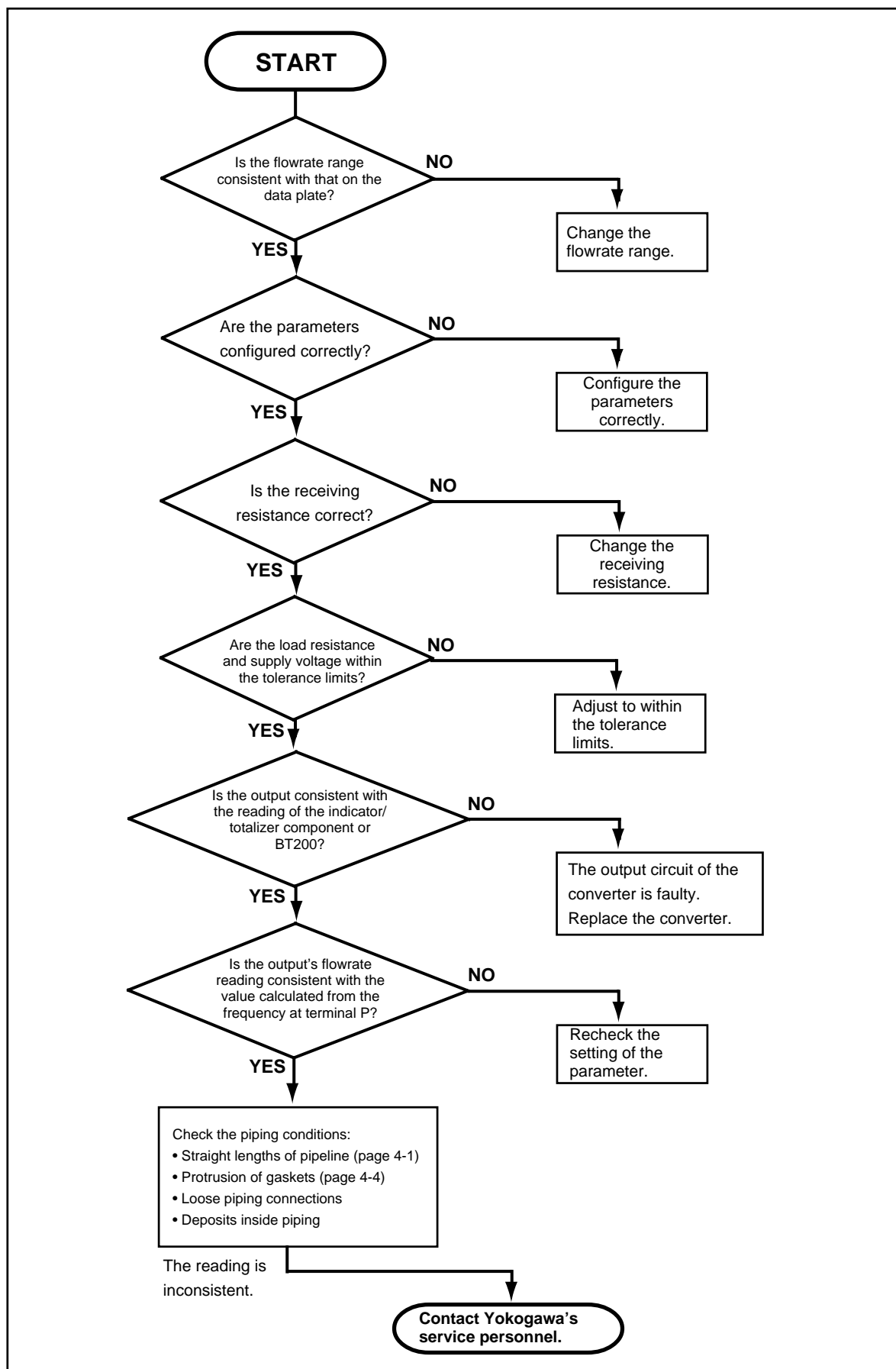


■ No output is indicated but the fluid is flowing.

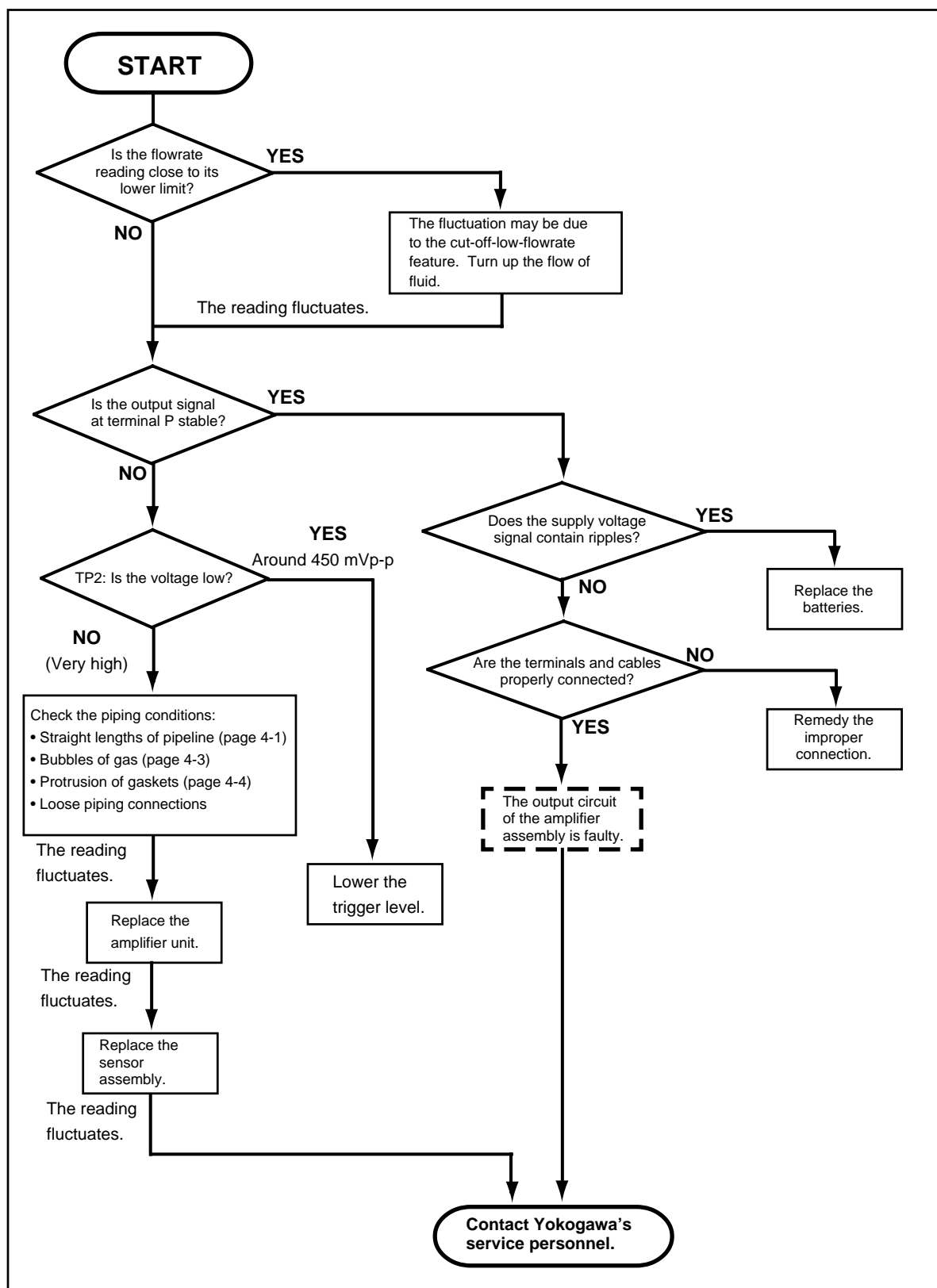




■ The flowrate reading is inconsistent.



■ The flowrate reading fluctuates.

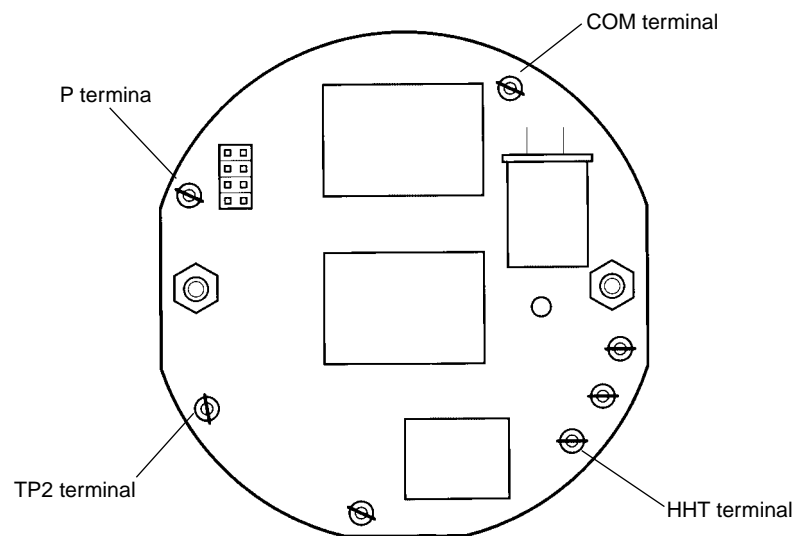


### 8.4.3 Instructions on Use of Check Terminals of Amplifier Unit

Test all the check items hereinafter discussed in this subsection at the test points between terminals P and COM and between terminals TP2 and COM.



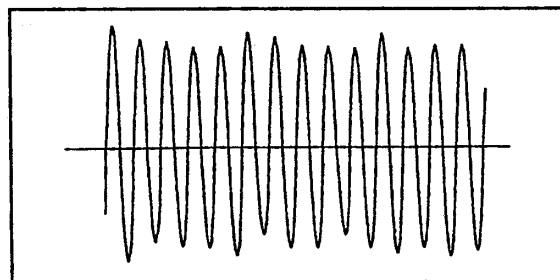
- Do not ground any test-purpose measuring instruments.



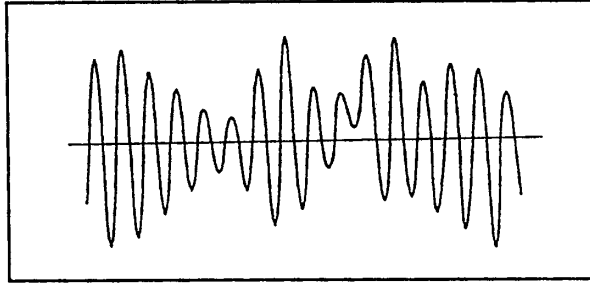
**Figure 8.4-1 Check Terminals of Amplifier Unit**

#### (1) TP2 Terminal

- Used for trigger level adjustment. See Subsection 8.2.3.
- Using an oscilloscope, observe the voltage waveform appearing across terminals TP2 and COM. Make sure the ultrasonic emitter/detector of the sensor assembly and related circuits are operating normally.
  - A waveform with the vortex frequency shown in Figure 8.4-2 should be observed at this test point. The waveform should be neither at the power supply frequency nor at a frequency at which the pipeline vibrates.
  - If piping conditions are inferior, the waveform should look like the one in Figure 8.4-3.



**Figure 8.4-2 Normal Waveform at Terminal TP2**



**Figure 8.4-3 Waveform of Disturbed Flow at Terminal TP2**

(2) **P terminal**

■ Used for trigger level adjustment. See Subsection 8.2.3.

# 9. STANDARD SPECIFICATIONS

---

## 9.1 STANDARD SPECIFICATION

**Fluid to be Measured:** Liquid

**Measuring condition:** Sound speed 500 to 2000 m/s

Be sure there are no bubbles in the flow.

Avoid severe sticky and slurry fluid meterings.

Do not use this meter where pulsating flow/pulsating pressure exist.

**Measurable Flow Rates:** Refer to item 6.1.

**Accuracy:**  $\pm 1.0\%$  of reading  
 $\pm 0.5\%$  of reading is also available as an option.  
 (refer to item 6.1)

**Note:** The above shows the accuracy of pulse output. For analog output, add up  $\pm 0.1\%$  of full scale to the above values.

**Repeatability:**  $\pm 0.2\%$  of reading

**Process Temperature Range:**  $-40$  to  $200\text{ }^{\circ}\text{C}$  ( $-40$  to  $150\text{ }^{\circ}\text{C}$  for 15A)

**Process Pressure Limit:** Up to flange rating.

**Ambient Temperature Range:**

$-40$  to  $85\text{ }^{\circ}\text{C}$  (general type)

$-30$  to  $80\text{ }^{\circ}\text{C}$  (with Indicator/Totalizer)

$-40$  to  $75\text{ }^{\circ}\text{C}$  (CENELEC Explosion proof type)

$-20$  to  $60\text{ }^{\circ}\text{C}$  (CENELEC Intrinsic safety type)

$-20$  to  $60\text{ }^{\circ}\text{C}$  (JIS Flameproof type)

(Model UYF200 is affected by fluid temperature. See Figure 9.1-2)

**Ambient Humidity Range:** 5 to 100% Relative Humidity (at  $40\text{ }^{\circ}\text{C}$ )  
 (non-condensing)

**Power Supply Voltage:** 10.5 to 42 V DC

(Refer to Figure 9.1-1 Relationship Between Power Supply Voltage and Load Resistance)

**Output signal:** Analog, Pulse  
 Both Analog and Pulse output can be obtained simultaneously.  
 In this case refer to the item 5.5.

**Analog:** 4 to 20 mA DC, 2-wire system.

**Pulse:** transistor contact (open drain), 3-wire system.

**Contact rating:** 30 V DC, 120 mA DC

**Low level:** 0 to 2 V DC.

**Pulse frequency:** Max. 6 kHz

**Duty cycles:** Approx. 50% (1:2 to 2:1)

**Dumping time constant:** 0 to 64 Sec (can be set in 8 steps)

**Delay time:** 0.5 Sec

**Analog output circuit time constant:** 0.3 Sec

**Mounting:** Model UYF200; flange mounting or wafer mounting by flange adjacent to the pipeline.  
Model UYFA21; 2 inch pipe or wall mounting.  
Refer to item Remarks on Installation for details.

**Material:** Model UYF200; body and shedder bar: SCS 14A casting stainless steel (equivalent to CF8M, SUS316)  
Sensor; SUS316 stainless steel  
Bracket; SCS13 casting stainless steel  
Model UYF200, UYFA21;  
Converter case; Aluminum alloy

**Coating Color:** Converter case, cover, Terminal box, cover; Deep sea moss green (Polyurethane anticorrosion coating)

**Enclosure Classification:** Designed to meet JIS C0920 watertight (equivalent to IEC IP67, NEMA4X)

**Electrical Classification:** Approved by JIS Flameproof, certified for Ex d IIC T6

**Electrical Connection:** JIS G1/2 Female, ANSI 1/2 Female, DIN Pg13.5 Female, M20mm Female.

**Signal Cable:** Model UYF021, used for remote detector and converter.  
Max. length: 20m.  
Outer Sheath Material: Heat resistance vinyl.  
Durable Temperature; 100°C

**Weight:** Refer to the external dimension item 9.4.

**Calibration:** This flowmeter is factory-calibrated using a water flow.

**Communication signal:** BRAIN communication signal  
(superimposed on a 4 to 20 mA DC signal)

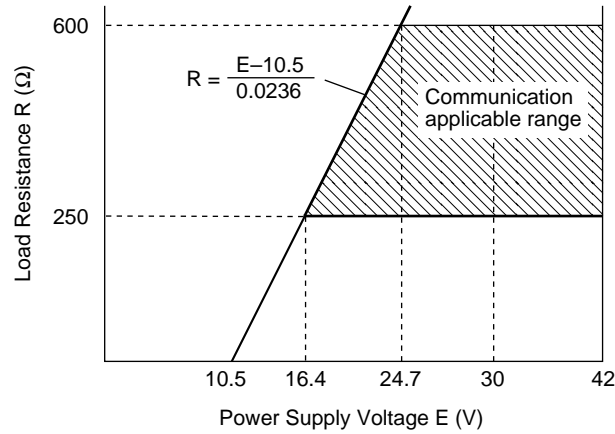
**Communication-line Condition:**  
Load resistance; 250 to 600 W (includes cable resistance)  
Region within communication: 2 km (when CEV cables are used)  
Load capacitance: 0.22  $\mu$  F Max.  
Load inductance: 3.3 mH Max.  
Refer to Figure 9.1-1.  
Communication cables must be laid at least 15 cm away from power lines. Do not lay the cables parallel to power lines. Instruments connected for receiving resistance: Input impedance 10 k $\Omega$  or greater (at 2.4 kHz)

**Indicator/Totalizer:** Six-digit LCD display. Totalizer value is protected by an EEPROM at the time of a power failure.  
The totalized flow as well as instantaneous flow rate in engineering unit or percent (%) of span can be displayed.  
Alternative display is also possible.  
In mounting direction, the right and left 90° is rotatable.

**Approved by CENELEC Explosion-proof**  
KEMA No.: Ex-97. D. 2342  
EEx d IIC T6...T3

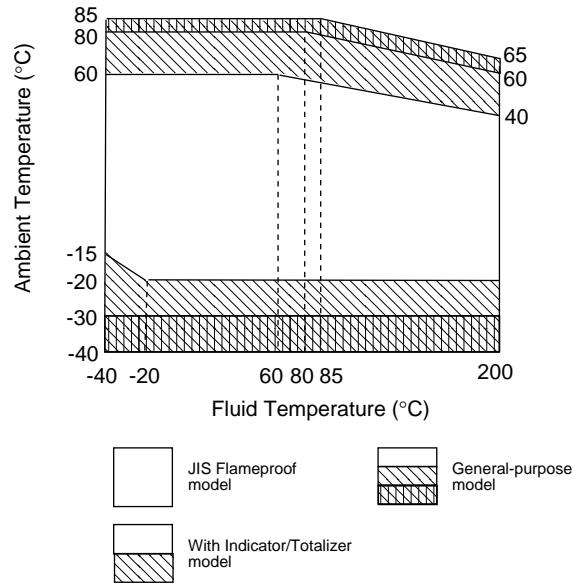
**Approved by CENELEC Intrinsic Safety**

KEMA No.: Ex-97. D. 4156  
 EEx ia IIc T3, T4  
 Maximum voltage  $V_{max}=30V$  DC  
 Maximum current  $I_{max}=165mA$   
 Maximum power  $P_{max}=0.9W$   
 Internal capacitance  $C_{int}=6nF$   
 Internal inductance  $L_{int}=730\mu H$



Note: In the case of CENELEC intrinsic safety, the power supply voltage should be under 30 VDC.

**Figure 9.1-1 Relationship Between Power Supply Voltage and Load Resistance**



**Figure 9.1-2 Operating Temperature Limit (for model UYF200)**

**Table 9.2-1 Paint Color and Codes**

Codes	Munsell Renotation Code	Color
P1	N1.5	Black
P2	7.5BG4/1.5	Jade green
P7	—	Metallic silver

**Table 9.2-2 Pressure Test Value**

Flange Rating	Pressure
JIS 10K	2.1 MPa (21 kgf/cm <sup>2</sup> )
JIS 20K	5.0 MPa (51 kgf/cm <sup>2</sup> )
ANSI Class 150	2.9 MPa (29 kgf/cm <sup>2</sup> )
ANSI Class 300	7.5 MPa (76 kgf/cm <sup>2</sup> )

## 9.2 Model and Suffix Codes

### Model and Suffix Codes (Style Code: S2)

#### UYF200 Ultrasonic Vortex Flowmeter (Integral type, Remote type detector)

Model	Suffix Code	Description
UYF201J	.....	15 mm (1/2inch)
UYF202J	.....	25 mm (1 inch)
UYF204J	.....	40 mm (1-1/2 inch)
UYF205J	.....	50 mm (2 inch)
UYF208J	.....	80 mm (3 inch)
UYF210J	.....	100 mm (4 inch)
UYF215J	.....	150 mm (6 inch)
UYF220J	.....	200 mm (8 inch)
Converter	-A..... -N.....	Integral Type Remote Type
Output Signal	D..... N.....	4 to 20 mA DC, Pulse, BRAIN communication Remote Type
Body Material	-S.....	Casting stainless steel (SCS 14A)
Process Connection (Note 1)	J1..... J2..... A1..... A2..... K1..... K2..... B1..... B2..... H1..... H2.....	JIS10K Flange JIS20K Flange ANSI Class 150 Flange ANSI Class 300 Flange JIS10K Wafer JIS20K Wafer ANSI Class 150 Wafer ANSI Class 300 Wafer JPI Class 150 Wafer JPI Class 300 Wafer
Electrical Connection	0..... 2..... 3..... 4.....	JIS G1/2 Female ANSI 1/2 NPT Female DIN Pg 13.5 Female ISO M20X1.5 Female
Indicator/ Totalizer (Note 2)	-D... -N...	With Indicator/Totalizer None
Electrical Classification	/JF1 /FF1 /FS1 /KF1 /KS1 /CS1	JIS Explosionproof FM Explosionproof FM Intrinsic Safety CENELEC Explosionproof CENELEC Intrinsic Safety CSA Intrinsic Safety
Options	/□	Refer to table Option Specifications

**Table 9.2-3 Flowmeter Selection Guide**

		Nominal Size mm (inch)						
Body Material	Process Connection	25 (1)	40 (1-1/2)	50 (2)	80 (3)	100 (4)	150 (6)	200 (8)
Casting Stainless Steel	Wafer Type	YES	YES	YES	YES	YES	NO	NO
	Flange Type	YES	YES	YES	YES	YES	YES	YES



**UYFA21 Ultrasonic Vortex Flowmeter Converter (Remote type)**

Model	Suffix Code	Description
<b>UYFA21J</b>	.....	Ultrasonic Vortex Flow Converter
Output Signal	<b>-D</b> .....	4 to 20 mA DC, Pulse, BRAIN communication
Electrical Connection	<b>0</b> ..... <b>2</b> ..... <b>3</b> ..... <b>4</b> .....	JIS G1/2 Female ANSI 1/2 NPT Female DIN Pg 13.5 Female M20 mm Female
Indicator/Totalizer	<b>-D</b> ..... <b>-N</b> .....	With Indicator/Totalizer None
Mounting Bracket	<b>A</b> ..... <b>B</b> ..... <b>N</b> .....	SECC For 2 inch Pipe Mounting SUS304 For 2 inch Pipe Mounting None
Electrical Classification	<b>/JF1</b> <b>/FF1</b> <b>/FS1</b> <b>/FU1</b> <b>/KF1</b> <b>/KS1</b> <b>/CS1</b>	JIS Flame proof FM Explosion proof FM Intrinsically safe Combined "FF1" and "FS1" CENELEC (KEMA) Flame proof CENELEC (KEMA) Intrinsically safe CSA Intrinsically safe
Options	<b>/□</b>	Refer to table Option Specifications

**UYF021 Signal Cable**

Model	Suffix Code	Description
<b>UYF021J</b>	.....	Ultrasonic Vortex Flow Converter
Cable End	<b>-0</b> ..... <b>-1</b> .....	Without End finish (Note 3) With End finish
Cable Length	<b>-05</b> ..... <b>-10</b> ..... <b>-15</b> ..... <b>-20</b> ..... <b>-□□</b> .....	5 m 10 m 15 m 20 m □□ m (Note 4)
Options	<b>/C□</b> (Note 5)	Cable end finish part

Note 1: Refer to table 9.2-3.

Note 2: Indicator/Totalizer is not available for remote type detector.

Note 3: One set of end finish part is attached.

Note 4: Fill in two digit figure per 5 m unit.

The cable can be cut at required length within 20 m at customer side. In this case, select Cable End Code [-0].

Note :5 An entered digit figure shows required set quantity.

## 9.3 Option Specifications

### Option Specifications (for model UYF200, UYFA21)

Item	Specifications	Applicable Model	Code
Electrical Classification	JIS Flameproof Ex d IIC T6 Certified by TIIS (Note 2).	All Models (Note 1)	JF1
	CENELEC Explosion Proof Type	All Models (Note 6)	KF1
	CENELEC Intrinsic Safety type	All Models (Note 3,6)	KS1
	FM Flameproof Explosion proof type	All Models (Note 5)	FF1
	FM Intrinsic Safety type	All Models (Note 5)	FS1
	CSA Intrinsic Safety type	All Models (Note 7)	CS1
JIS Flameproof Packing Adapter	Electrical connection should be : G1/2 female thread. Applicable Cable $\phi 8.5$ to $\phi 11$ .	All Models	PG5
Stainless Steel Bolt & Nut Assembly	Used when a wafer type is installed for a process. Material SUS304.	UYF200 wafer type	BLT
Stainless Steel Tag Plate	SUS304 tag plate hung on converter case.	All Models	SCT
Paint Color Change	Only for converter covers. Refer to Table 9.2.1.	All Models	See Table 9.2.1
Material Certificate	Reproduced material certificate for body from material manufacture.	UYF200J	M01
Static Pressure and Leakage Test Certificate	Refer to Table 3 for Pressure test value. Test time 10 minutes.	UYF200J	T01
Degrease Treatment (Note 5)	The body is cleaned by trichloroethylene.	UYF200J	K1
Epoxy Coating	Epoxy coating for meter case and cover.	All Models	X1
Converter Installing Direction 180° Change	Converter installing direction 180° change inversely when shipped.	UYF200J	CRC
Lightning Protector	There is an arrester is inside converter for power supply line. Max. power supply voltage: 30 VDC	UYF200J-A UYFA21J	A
Down-Scale burnout in case of CPU failure (Note 6)	Set output under 3.6 mA (low) when burn-out occurred.	UYF200J-A UYFA21J	C1
Accuracy $\pm 0.5\%$ Type	For accuracy guaranteed range refer item "Sizing".	UYF200J (Note 7)	HAC

Note 1: In the case of JIS Flame proof (/JF1), specify JIS G1/2 female for electrical connection and also specify in the option code with Flameproof packing adapter (PG5) for the cable wire construction.

Note 2: TIIS is the abbreviation of Technology Institution of Industrial Safety

Note 3: The JIS G1/2 female is not applicable for electrical connection.

Note 4: • In case of specifying JIS Flameproof Explosion proof type, JIS G1/2 female is applied for wiring connection.

• Specify in the option code with Flame proof packing ground (/PG5) for the cable wire construction.

Note 5: In case of specifying FM explosion proof type, ANSI 1/2 NPT female is applied for wiring connection.

Note 6: In case of specifying CENELEC explosion proof type, ANSI 1/2 NPT female, DIN Pg 13.5female or ISO M20×1.5 female is applied for wiring connection.

Note 7: In case of specifying CSA explosion proof type, ANSI 1/2 NPT female is applied for wiring connection.

Note 8: There is a case that a little calibration water should stay in the meter tube. So this is not degrease treatment in strict sense.

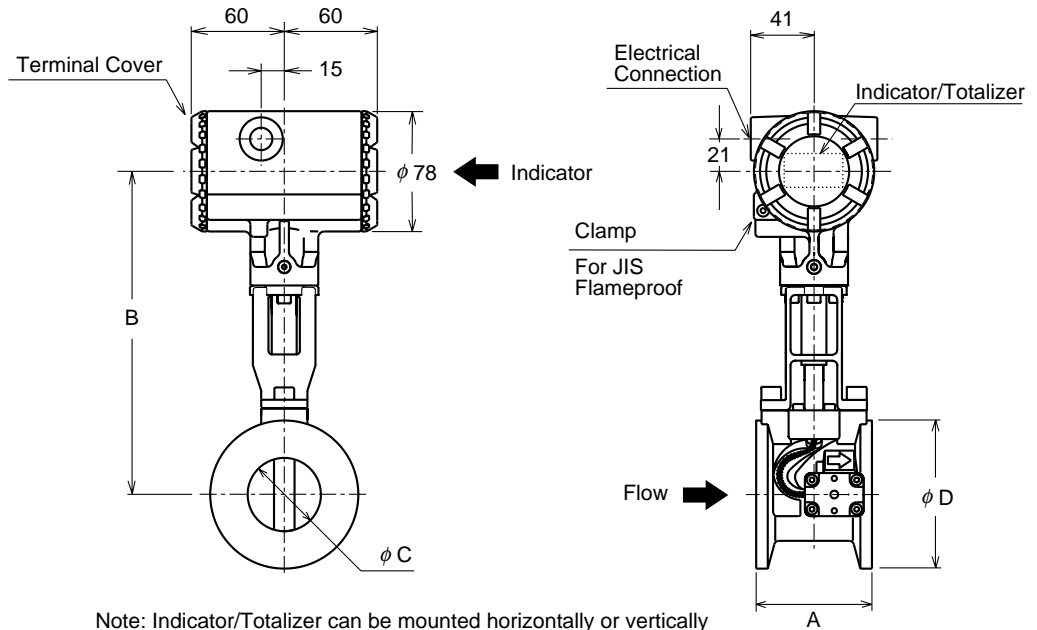
Note 9: When this option is chosen, the output is set at low level (3.6 mA) when burn-out. Otherwise is set at over high level (21.6 mA) at shipping.

Note 10: Model UYF202J (25 mm), UYF215J (150mm), UYF220J (200mm) is not applicable.

## 9.4 EXTERNAL DIMENSIONS

### ■ Model UYF200 (Integral type, Remote type detector)

#### ● Wafer type



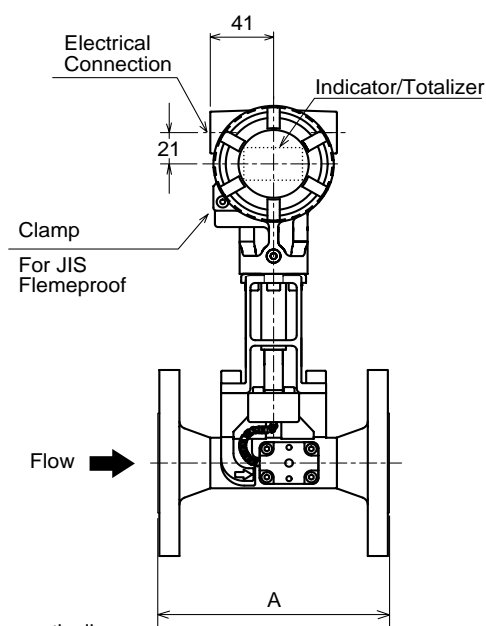
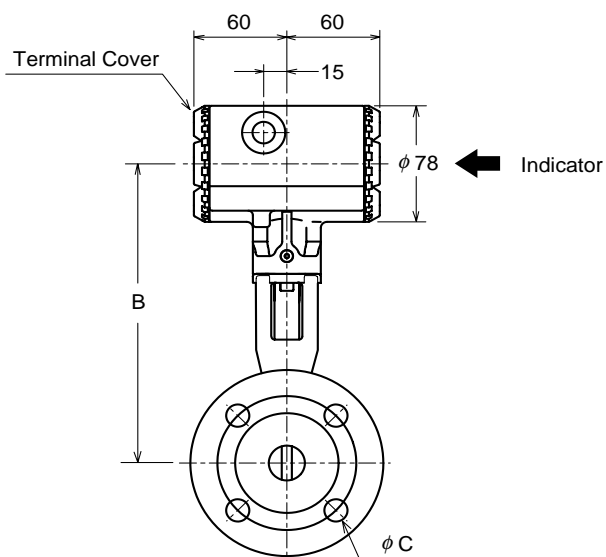
Note: Indicator/Totalizer can be mounted horizontally or vertically

Nominal Size	A	B	$\phi$ C	$\phi$ D	Mass (kg)
25 mm	70	202	23.4	51	2.2
40 mm	70	204	36.6	73	2.6
50 mm	75	210	47.5	96	3.5
80 mm	100	224	71.0	126	5.0
100 mm	120	237	93.8	152	7.1

Note: For flowmeter with Indicator/Totalizer, add 0.1 kg.

## ■ Integral type

### ● Flange type



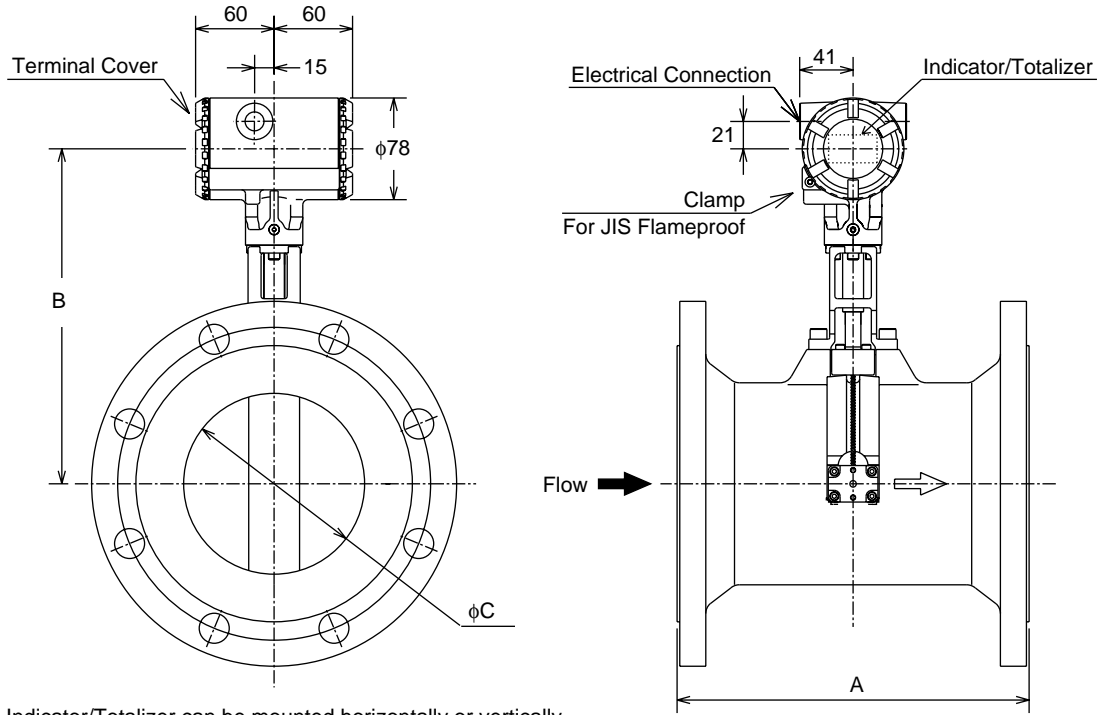
Note: Indicator/Totalizer can be mounted horizontally or vertically

Mass (kg)

Nominal Size	A	B	$\phi$ C	Nominal Size	JIS Flange		ANSI Flange	
					10K	20K	class 150	class 300
15 mm	130	202	12.8	15 mm	4.8	5.1	4.2	5.3
25 mm	150	202	23.4	25 mm	4.8	5.1	4.2	5.3
40 mm	150	204	36.6	40 mm	6.1	6.5	5.9	8.2
50 mm	170	210	47.5	50 mm	7.3	8.0	8.4	9.5
80 mm	200	224	71.0	80 mm	11.0	13.0	14.0	17.0
100 mm	220	237	93.8	100 mm	16.0	19.0	20.0	28.0

Note: For flowmeter with Indicator/Totalizer, add 0.1 kg.

Unit: mm



Note: Indicator/Totalizer can be mounted horizontally or vertically

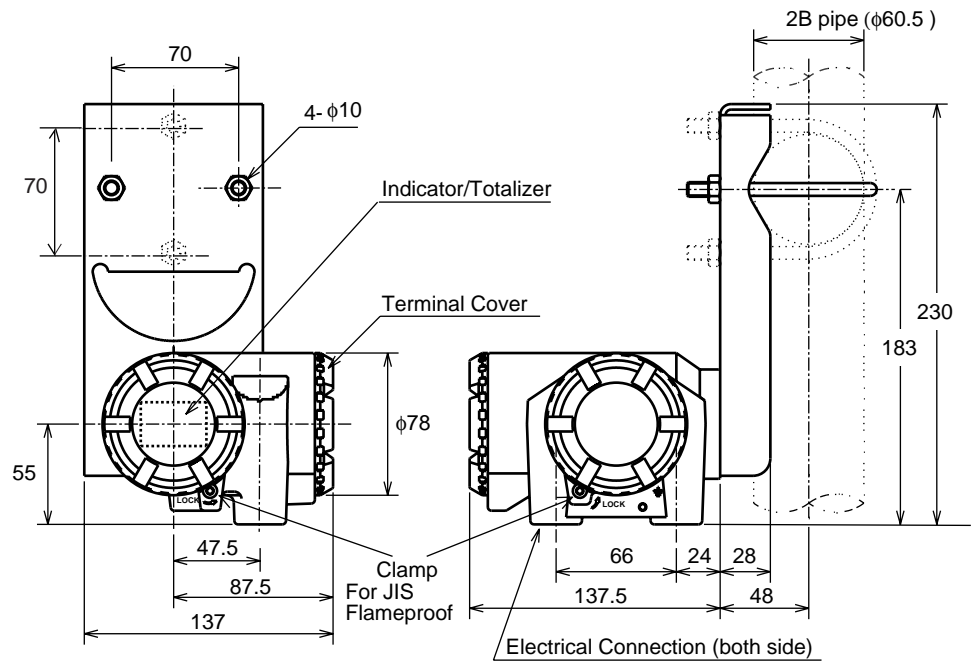
Mass (kg)

Nominal Size	A	B	φC
150mm	270	257	138.8
200mm	310	282	185.6

Nominal Size	JIS Flange		ANSI Flange	
	10K	20K	class 150	class 300
150mm	27.0	34.0	29.0	45.0
200mm	37.0	48.0	46.0	70.0

Note: For flowmeter with Indicator/Totalizer, add 0.1 kg.

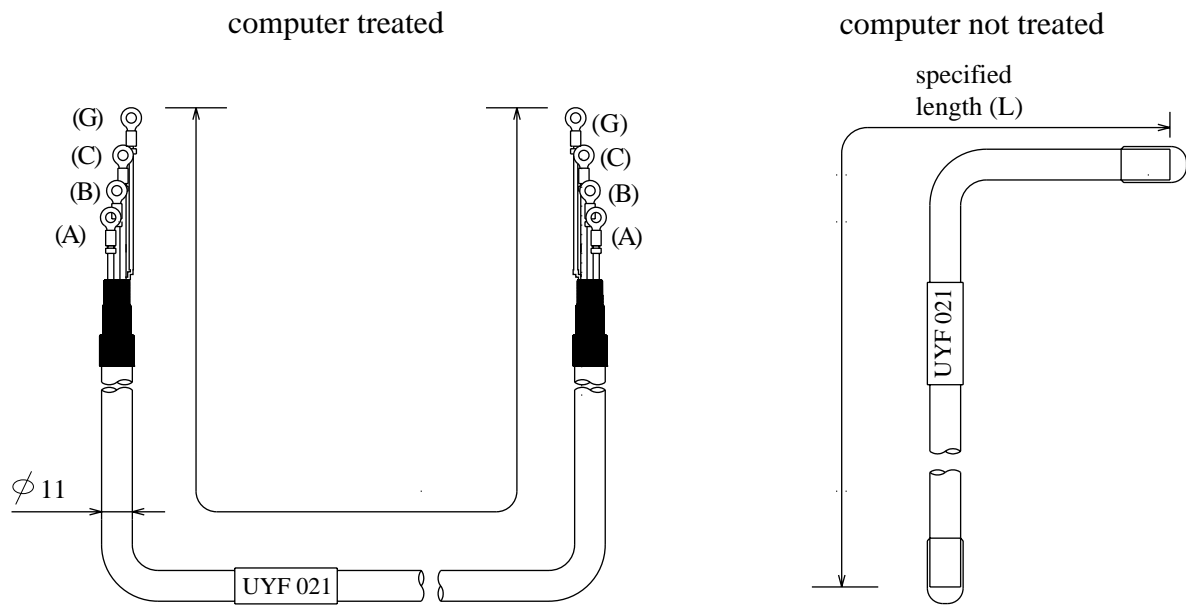
## ■ Model UYFA21



Mass : 2.3 kg

Note : For flowmeter with Indicator/Totalizer, add 0.1 kg.

■ Model UYF021

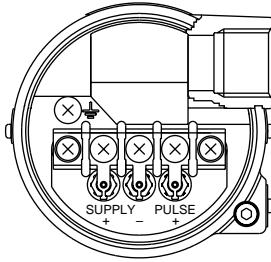


**IMPORTANT**

(A),(B),(C) connect their each terminal. (G) connect ground terminal.

## ■ Terminal Configuration and Terminal Wiring

### Terminal configuration

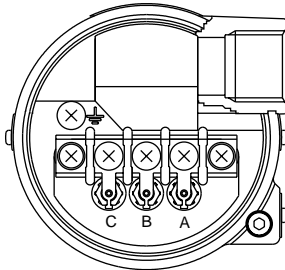


### Terminal Wiring

SUPPLY +	}	Power and 4 to 20 mA DC output
-		
PULSE +	}	Pulse output
-		
⏏		Ground terminal

### • Remote Type (Detector Part)

### Terminal configuration



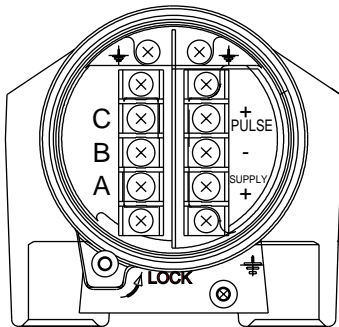
### Terminal Wiring

A	}	Terminal to remote converter
C		
B	Common terminal	
$\frac{1}{=}$		Ground terminal

\* Use UYF021 Signal Cable

### • Remote Type (Converter Part)

### Terminal configuration



### Terminal Wiring

SUPPLY +	}	Power and 4 to 20 mA DC output
-		
PULSE +	}	Pulse output
-		
A	}	Terminal to remote detector
C		
B	Common terminal	
⏏		Ground terminal

\* Use UYF021 Signal Cable



## IMPORTANT

If the connection is wrong, ULTRA YEFWLO will fail to operate properly.

# INSTALLATION AND OPERATING PRECAUTIONS FOR JIS FLAMEPROOF 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.

### 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.

#### **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- or PF-type parallel pipe threads (JIS C 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 (conforming to JIS C 3401) shall be used as recommended by the “USER’S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry,” published in 1994.
- \* If 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 from 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, 600-V PVC insulated wires (JIS C 3307) 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 from 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- or PF-type parallel pipe threads (JIS C 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**

### **IMPORTANT**

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 Safety