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**User's  
Manual**

**Model DY**  
**Vortex Flowmeter**  
(Integral Type, Remote Type)  
**Model DYA**  
**Vortex Flow Converter**  
(Remote Type)

digitalYEWFLOW

IM 01F06A00-01E

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**vigilantplant.®**

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# INTRODUCTION

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The DY series of vortex flowmeters have 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 digitalYEWFLOW 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 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 neither does warrant the marketability of this instrument nor it does 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.
- If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired.
- As for explosionproof 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.

## ■ Safety and Modification Precautions

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



### WARNING

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

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### CAUTION

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

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### IMPORTANT

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

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### NOTE

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

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⏏ Functional grounding terminal

— Direct current

## 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 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 an other party 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.

## ■ Using the Vortex Flowmeter Safely



### WARNING

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#### (1) Installation

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

#### (2) Wiring

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

#### (3) Operation

- Only expert engineer or skilled personnel are permitted to open the cover.

#### (4) Maintenance

- Maintenance on the vortex flowmeter should be performed by expert engineer or skilled personnel. No operator shall be permitted to perform any operations relating to maintenance.
- Always conform to maintenance procedures outlined in this manual. If necessary, contact Yokogawa.

- Care should be taken to prevent the build up of dirt, dust or other substances on the display panel glass or data plate. If these surfaces do get dirty, wipe them clean with a soft dry cloth.

#### (5) Explosion Protected Type Instrument

- For explosion proof type instrument, the description in Chapter 10 “EXPLOSION PROTECTED TYPE INSTRUMENT” is prior to the other description in this user’s manual.
- Only trained persons use this instrument in the industrial location.
- The functional grounding  $\perp$  must be connected to a suitable IS grounding system.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

#### (6) European Pressure Equipment Directive (PED)

- When using the instrument as a PED-compliant product, be sure to read Chapter 11 before use.
  - Do not open the cover in wet weather or high humidity.  
If the cover is opened, provided protection with the enclosure is not warrantable.
-

## ■ ATEX Documentation

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

GB

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

DK

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

I

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

E

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

NL

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

SF

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

P

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

F

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

D

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

S

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

GR

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



SK

Všetky návody na obsluhu pre prístroje s ATEX Ex sú k dispozícii v jazyku anglickom, nemeckom a francúzskom. V prípade potreby návodu pre Ex-prístroje vo Vašom národnom jazyku, skontaktujte prosím miestnu kanceláriu firmy Yokogawa.

CZ

Všechny uživatelské příručky pro výrobky, na něž se vztahuje nevybušné schválení ATEX Ex, jsou dostupné v angličtině, němčině a francouzštině. Požadujete-li pokyny týkající se výrobků s nevybušným schválením ve vašem lokálním jazyku, kontaktujte prosím vaši nejbližší reprezentační kancelář Yokogawa.

LT

Visos gaminiø ATEX Ex kategorijos Eksploatavimo instrukcijos teikiami anglø, vokieèiø ir prancûzø kalbomis. Norëdami gauti prietaisø Ex dokumentacijà kitomis kalbomis susisiekite su artimiausiu bendrovës “Yokogawa” biuru arba atstovu.

LV

Visas ATEX Ex kategorijas izstrādājumu Lietošanas instrukcijas tiek piegādātas angļu, vācu un franču valodās. Ja vēlaties saņemt Ex ierīšu dokumentāciju citā valodā, Jums ir jāsazinās ar firmas Jokogava (Yokogawa) tuvāko ofisu vai pārstāvi.

EST

Kõik ATEX Ex toodete kasutamishendid on esitatud inglise, saksa ja prantsuse keeles. Ex seadmete muukeelse dokumentatsiooni saamiseks pöörduge lähima Iokagava (Yokogawa) kontori või esindaja poole.

PL

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

SLO

Vsi predpisi in navodila za ATEX Ex sorodni izdelki so pri roki v angleščini, nemščini ter francoščini. Če so Ex sorodna navodila potrebna v vašem tujejnem jeziku, kontaktirajte vaš najbliži Yokogawa office ili predstavnika.

H

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

BG

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

RO

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

M

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

# 1. HANDLING PRECAUTIONS

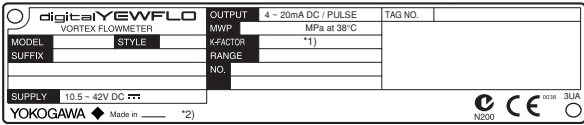
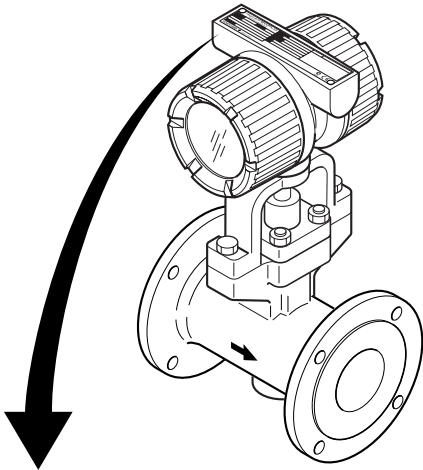
The Model DY Vortex Flowmeter and Model DYA Vortex Flow Converter are thoroughly tested at the factory before shipment. When these instruments are delivered, perform a visual check to ascertain that no damage occurred during shipment.

This section describes important cautions in handling these instruments. Read carefully before using them.

If you have any problems or questions, contact your nearest YOKOGAWA service center or sales representative.

## 1.1 Model and Specifications

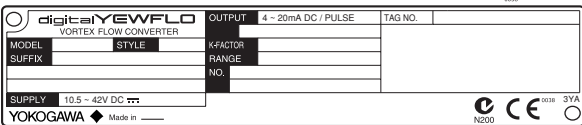
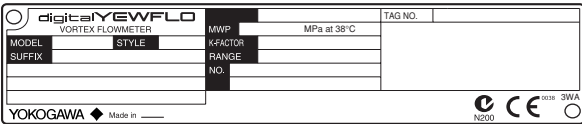
The model and important specifications are indicated on the data plate attached to the case. Verify that they are the same as those specified in the original order, referring to paragraph 9.2 to 9.5. In any correspondence, always give model (MODEL), serial number (NO) and calibrated range (RANGE) from the data plate.



\*1): K factor at 15°C  
 \*2): The product - producing country.

F010101.EPS

Figure 1.1(a) Example of Name Plate for Integral Type



F010102.EPS

Figure 1.1(b) Example of Name Plate for Remote Type

## 1.2 Precautions Regarding Transportation and Storage Location

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

### ! WARNING

The Vortex Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled.

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

- Store the vortex flowmeter with forwarded statement.
- 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, 65%)

Temperature	-40°C to +80°C
Humidity	5 to 100% (no condensation)

T010201.EPS

## 1.3 Precautions Regarding Installation Locations

### (1) Ambient Temperature

Avoid an area which has wide temperature variations. When the installation area is subjected to heat radiation from process plant, ensure adequate heat prevention or ventilation.

### (2) Atmospheric Conditions

Avoid installing the vortex flowmeter in a corrosive atmosphere. When the vortex flowmeter must be installed in a corrosive atmosphere, adequate ventilation must be provided.

### (3) Mechanical Shock or Vibration

The vortex flowmeter is of sturdy construction, but select an area subject to minimize mechanical vibrations or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 1.2.

### (4) Other Considerations

- Choose a location where is sufficient clearance around digitalYEWFLOW exist to allow such work as routine inspections.
- Choose a location that ensures easy wiring and piping.

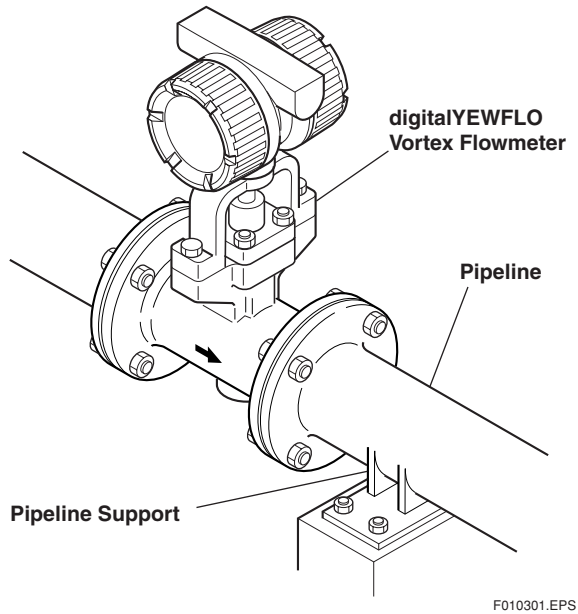


Figure 1.2

## 2. INSTALLATION



### WARNING

This instrument must be installed by expert engineer or skilled personnel. The procedures described in this chapter are not permitted for operators.

### 2.1 Precautions Regarding Installation Locations

#### (1) Ambient Temperature

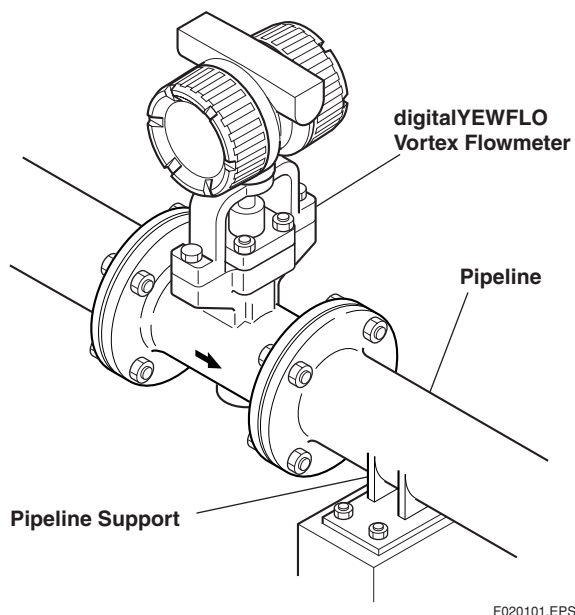
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#### (3) Mechanical Shock or Vibration

The vortex flowmeter is of sturdy construction, but select an area subject to minimize mechanical vibration or impact shock. If the flowmeter is subject to vibrations, it is recommended that pipeline supports to be provided as shown in Figure 2.1.



F020101.EPS

Figure 2.1

#### (4) Precautions Regarding Piping

- (a) Ensure that the process connector bolts are tightened firmly.
- (b) Ensure that no leak exists in the process connection pipeline.
- (c) Do not apply a pressure higher than the specified maximum working pressure.
- (d) Do not loosen or tighten the flange mounting bolts when the assembly is pressurized.
- (e) Handle the vortex flowmeter carefully when measuring dangerous liquids, so that the liquids do not splash into eyes or on face. When using dangerous gases, be careful not to inhale them.

### 2.2 Piping

See Table 2.1 about Valve Position and Straight Pipe Length and so on.

●Piping support

Typical vibration immunity level is 1G for normal piping condition. Piping support should be fixed in case of over 1G vibration level.

●Installation direction

If a pipe is always filled with liquids, the pipe can be installed vertically or at inclined angle.

●Adjacent pipes

The process pipeline inner diameter should be larger than the digitalYEWFlo inner diameter.

Use the following adjacent pipe.

Model Code DY015 up to DY050 : Sch 40 or less.  
DY025-/R1 up to DY080-/R1  
DY040-/R2 up to DY100-/R2

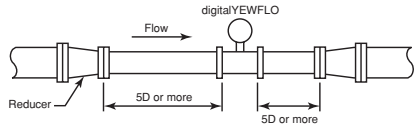
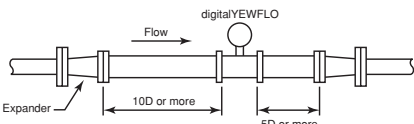
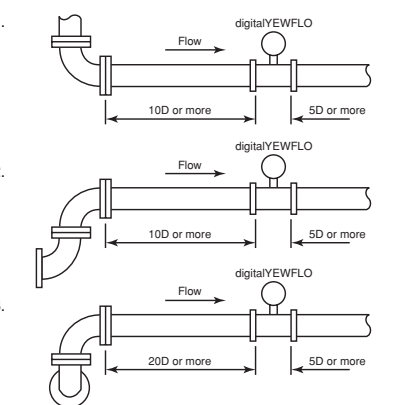
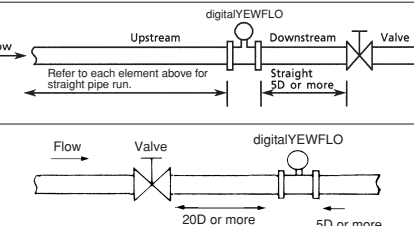
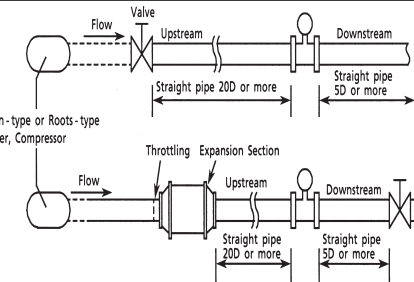
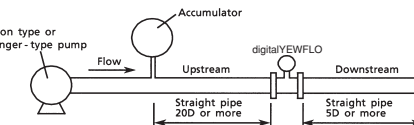
Model Code DY080 up to DY300 : Sch 80 or less.  
DY100-/R1 up to DY200-/R1  
DY150-/R2 up to DY200-/R2

●Straight pipe length

\*D: piping diameter

\*K-factor may be influenced about 0.5% in case that straight pipe length of upstream is less than values below.

Table 2.1 Installation

Description	Figure
<p><b>Reducer pipe:</b> Ensure the upstream straight pipe length to be 5D or more, and the downstream straight pipe length to be 5D or more for per reducer pipe.</p>	
<p><b>Expander pipe:</b> Ensure the upstream straight pipe length to be 10D or more, and the downstream straight pipe length to be 5D or more for per expander pipe.</p>	
<p><b>Bent pipe and straight pipe length:</b> 1. Single bent pipe 2. Double bent pipe; coplanar 3. Double bent pipe; non coplanar</p>	
<p><b>Valve position and straight pipe length:</b> ■ 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 above. 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, and the downstream straight pipe length be 5D or more.</p>	
<p><b>Fluid vibration:</b> For a gas line which uses a position-type or roots-type blower compressor or a high-pressure liquid line (about 1MPa or more) which uses piston-type or plunger-type pump, fluid vibrations may be produced. In these case, install valve on the upstream side of digitalYEWFlo. For inevitable fluid vibration, put a vibration damping device such as throttling plate or expansion section in the upstream side of digitalYEWFlo.</p>	
<p><b>Piston-type or plunger pump:</b> Install the accumulator on the upstream side of digitalYEWFlo to reduce fluid vibrations.</p>	

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Description	Figure
<p><b>Valve positon (T-type piping exist):</b>                      When pulsation causes by a T-type piping exist, install the valve on the upstream of the flowmeter.                      Example:As shown in the figure, when the valve V1 is turned off, the fluid flow throught B as to meter A the flow is zero. But due to the pulsating pressure is detected, the meter is zero point become fluctuating. To avoid this, change the valve V1 location to V1'.</p> <ul style="list-style-type: none"> <li>In case of the Reduced Bore type, moisture may be remained upstream of the flowmeter. Drain it appropriately.</li> </ul>	
<p><b>Pressure and Temperature Taps:</b>                      Pressure tap outlet: install this tap between 2D and 7D on the downstream side of a flowmeter.                      Temperature tap outlet: install this on the downstream side 1D to 2D away from a pressure tap.</p>	
<p><b>Mounting Gasket:</b>                      Avoid mounting gaskets which protrude into the pipe line. This may cause inaccurate readings.                      Use the gaskets with bolt holes, even if digitalYEWFLOW is the wafer type.                      When using a spiral gasket(without bolt holes), confirm the size with the gasket -manufacturer, as standard items may not be used for certain flange ratings.</p>	
<p><b>Heat-Insulation:</b>                      When an integral-type flowmeter or a remote type detector is installed and the pipe carrying higt-temperature fluids is heat-insulated, do not wrap adiabatic materials around the installation bracket of the converter.                      • Refer to “2.5 Cryogenic and High Process Temperature Version Insulation” and install it rightly.</p>	
<p><b>Flushing of the pipe line:</b>                      Flush and clean scale, incrustation and sludge on the inside of pipe for newly installed pipe line and repaired pipe line before the operation. For flushing, the flow should flow through bypass-piping to avoid damaging the flowmeter. If there is no bypass-piping, install short pipe instead of the flowmeter.</p>	

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## 2.3 Precautions Regarding Installation

**⚠ WARNING**

In case of high process temperature, care should be taken not to burn yourself because the surface of body and case reach a high temperature.

### (1) Gas or Steam Measuring Precautions

• **Piping to Prevent Standing Liquid**

Mount digitalYEWFLO in a vertical pipeline to avoid liquid traps. When digitalYEWFLO is installed horizontally, raise that part of the pipeline in which the digitalYEWFLO is installed.

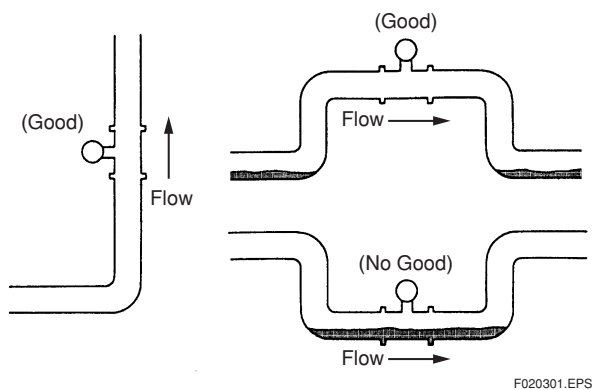


Figure 2.2

### (2) Liquid Measurement Precautions

To insure accurate measurement, the digitalYEWFLO must always have a full pipe.

• **Piping Requirements for Proper Operation**

Allow the flow to flow against gravity. When the flow is moving with gravity, lift the down-stream pipe length above the digitalYEWFLO installation level to maintain full pipeline.

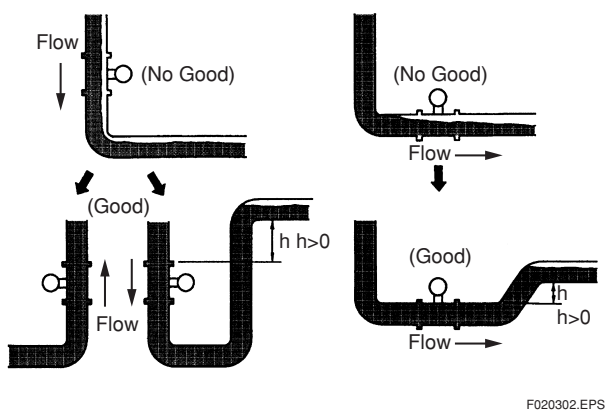


Figure 2.3

• **Piping for Avoiding Bubbles**

Flows containing both gas and liquid cause problems. Avoid gas bubbles in a liquid flow. Piping should be carried out to avoid bubble generation.

Install the valve on the downstream side of the flowmeter because pressure drop across the control valve may cause gas to come out of the solution.

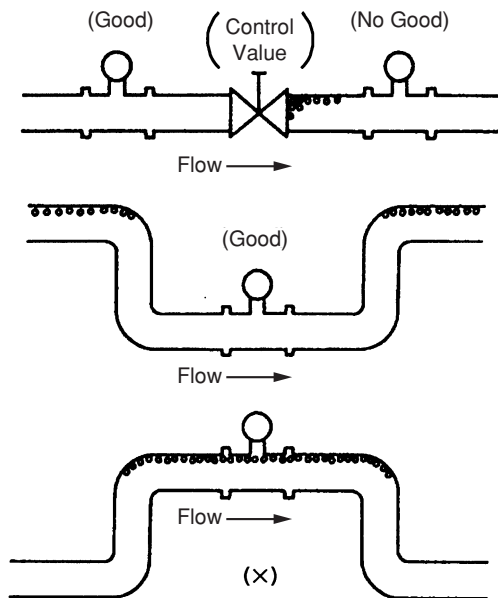


Figure 2.4

### (3) Multi-Phase Flow

digitalYEWFLO can measure gas, liquid and steam when there is no change in state. However, accurate measurement of mixed flows (e.g. gas and liquid) is not possible.

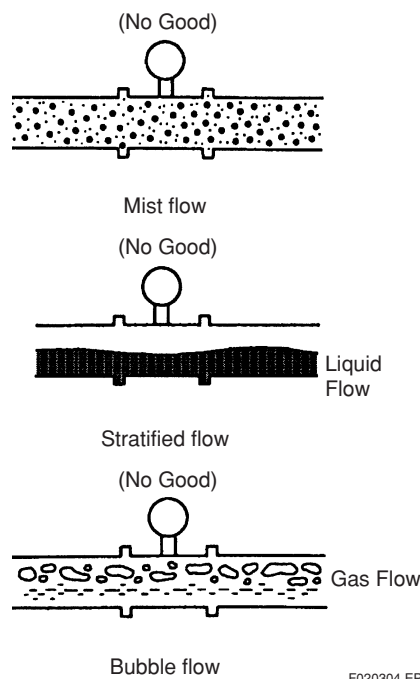


Figure 2.5



#### (4) Pipeline Diameter and digitalYEWFL0

The process pipeline inner diameter should be slightly larger than the vortex flowmeter inner diameter, schedule 40 or lower pipe should be used for 1/2 to 2 inch flowmeters and schedule 80 or lower pipes for 3 to 8 inch flowmeters.

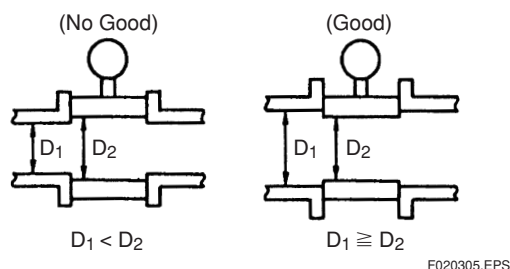


Figure 2.6

#### (5) Waterproof Construction

The vortex flowmeter is of IP67, NEMA4X tight protection. However, it cannot be used under water.

## 2.4 Piping to Improve Durability

### (1) Pipe cleaning

- Flushing of pipe line (Cleaning)  
Flush and clean scale, incrustation and sludge on the inside of pipe wall for newly installed pipe line and repaired pipe line before the operation.
- Fluid Carrying Solids  
Do not measure fluids that carry solids (e.g. sand and pebbles). Make sure users periodically remove solids adhering to the vortex shedder.
- Obstruction of flow fluids may cause to make a chemical reaction and the fluid will be crystallized and hardened, and be deposited on the pipe wall and shedder bar.  
In those cases, clean shedder bar.

### (2) Bypass piping

Bypass piping is convenient for the maintenance of digitalYEWFL0 (vortex shedder cleaning, etc.).

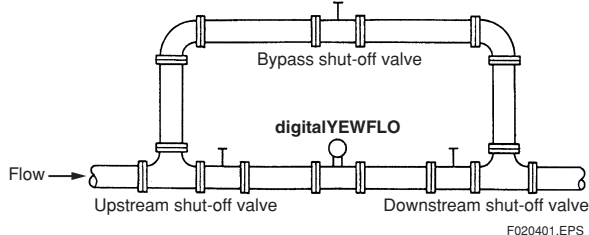


Figure 2.7

## 2.5 Cryogenic and High process Temperature Version Insulation

When you are using cryogenic type and high process temperature version of digitalYEWFL0 Vortex Flowmeter (Option code/HT /LT), refer to illustrated insulation method as shown in Figure 2.8

### (1) Installing Cryogenic Vortex Flowmeter

For cryogenic applications, use stainless steel mounting bolts and nuts to install the flowmeter. These can be ordered separately from YOKOGAWA. Cover the flowmeter body with heat insulating material so that the flowmeter can be maintained at ultra-low temperatures (refer to the Figure 2.8).

### (2) Maintenance for Cryogenic Applications

DY/LT uses special materials that produce vortex flowmeter for cryogenic applications. When you are replacing a shedder bar, specify cryogenic type shedder bar. To avoid condensing in the terminal box, ensure that the wire connecting port is well sealed.

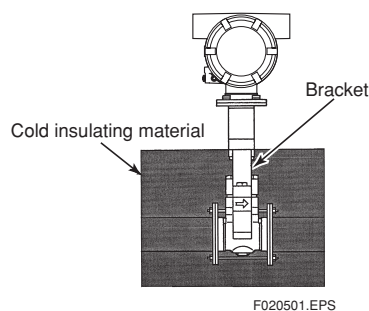


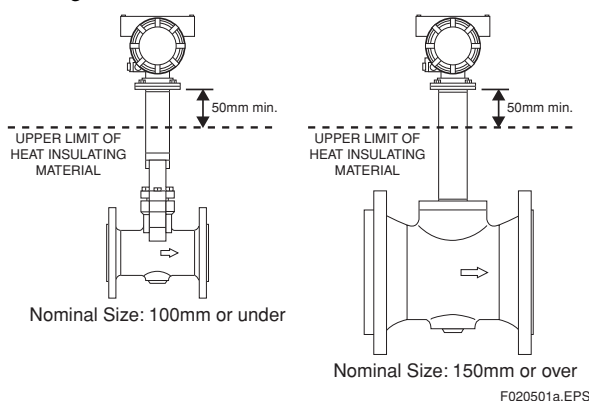
Figure 2.8

### (3) Installing High Process Temperature Vortex Flowmeter

Installation of the flowmeter is the same as the standard type. Cover the flowmeter body with heat insulating material following instruction of "CAUTION".

#### ! CAUTION

Keep the upper limit of heat insulating material to prevent overheating of the terminal box. Seal the heat insulating material to avoid hot-air leakage.



### (4) Maintenance for High Process Temperature Applications

DY/HT uses special materials that produce vortex flowmeter for High Process Temperature applications. When you are replacing a shedder bar or a gasket, specify High Process Temperature type.



## 2.6 Installing the Vortex Flow-meter



### WARNING

The Vortex Flowmeter is a heavy instrument. Please be careful to prevent persons from injuring when it is handled.

Before installing the instrument verify the following. The direction of flow should match to the arrow mark on the instrument body. When changing the orientation of the terminal box, refer to "7.1."

Installation of Vortex flowmeter of the wafer and flange type is shown in Table 2.3.

When installing the wafer type vortex flowmeter, it is important to align the instrument bore with the inner diameter of the adjacent piping.

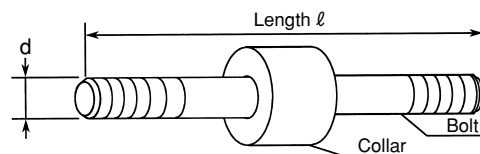
To establish alignment, use the four collars supplied with the instrument.

- Four collars are supplied for 1/2 inch (15mm) to 1- 1/2 inch (40mm), 2 inch of JIS 10K or ANSI class 150 or JPI class 150, and 3 inch of ANSI class 150 or JPI class 150. Install the instrument as illustrated in Table 2.2.
- If the adjacent flanges have eight bolt holes, insert the stud bolts in the holes on the instrument shoulder. Refer to Figure 2.9.  
Stainless steel bolts and nuts are available on order. When they are to be supplied by the user, refer to Table 2.2 for bolt length. Gaskets must be supplied by the user.
- Gasket:  
Avoid mounting gaskets which protrude into the pipeline. This may cause inaccurate readings.  
Use gaskets with bolt holes, even if digitalYEWFLOW is of the wafer type. Refer to Figure 2.10.  
When using a spiral gasket (without bolt holes), confirm the size with the gasket-manufacturer, as standard items may not be used for certain flange ratings.

Table 2.2

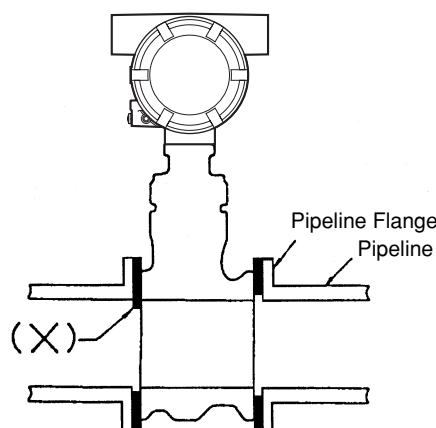
Size mm (inch)	Flange Rating	Major Diameter of External Thread of Stud Bolt d (mm)	Length $\ell$ (mm)
15mm (1/2B)	JIS 10K, 20K/DIN 10, 16, 25, 40	12	160
	JIS 40K	16	160
	ANSI 150, 300, 600	12.7	155
25mm (1B)	JIS 10K, 20K, 40K	16	160
	ANSI 150	12.7	155
	ANSI 300, 600	15.9	160
	DIN 10, 16, 25, 40	12	160
40mm (1-1/2B)	JIS 10K, 20K/DIN 10, 16, 25, 40	16	160
	JIS 40K	20	170
	ANSI 150	12.7	155
	ANSI 300, 600	19.1	170
50mm (2B)	JIS 10K, 20K, 40K/DIN 10, 16, 25, 40	16	} 200
	ANSI 150, 300, 600	15.9	
80mm (3B)	JIS 10K/DIN 10, 16, 25, 40	16	} 220
	JIS 20K, 40K	20	
	ANSI 150	15.9	} 240
	ANSI 300, 600	19.1	
100mm (4B)	JIS 10K/DIN 10, 16	16	220
	JIS 20K/DIN 25, 40	20	240
	JIS 40K	22	270
	ANSI 150	15.9	240
	ANSI 300	19.1	240
	ANSI 600	22.2	270

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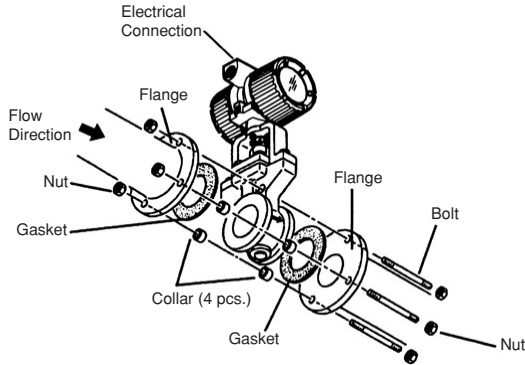
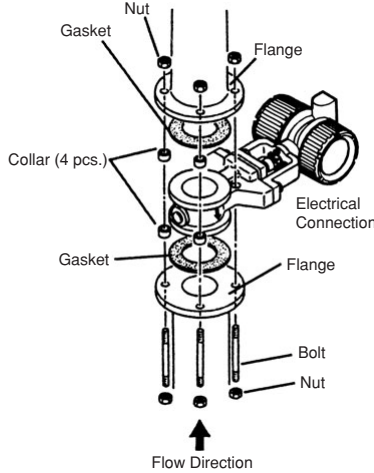
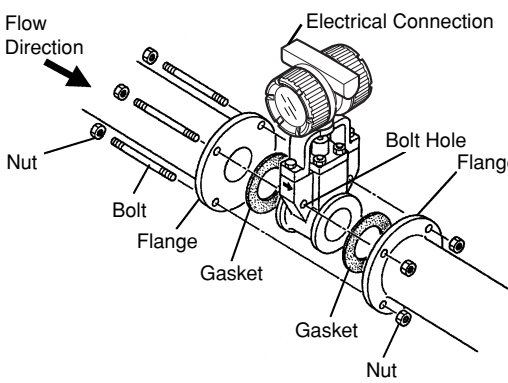
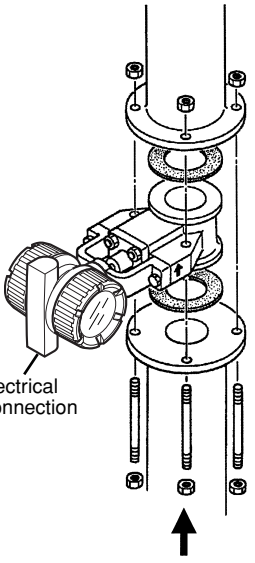
Figure 2.9



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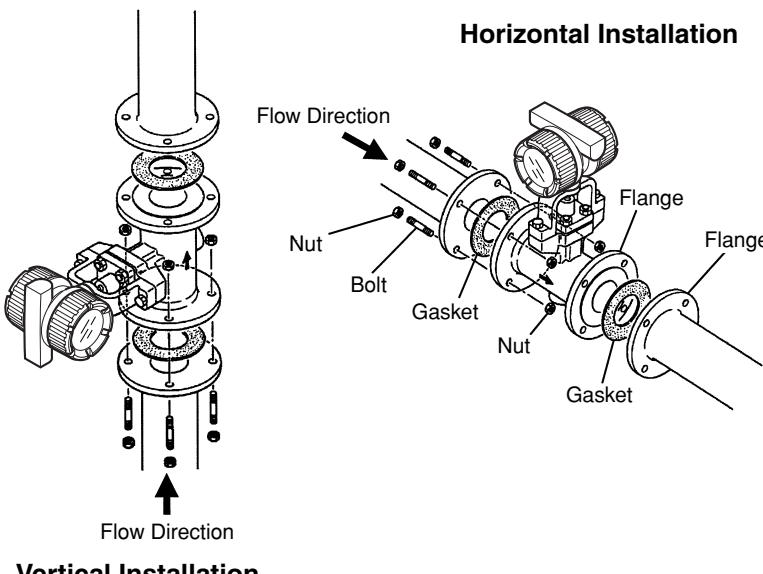
Figure 2.10

Table 2.3(a) Installation of Wafer Type Vortex Flowmeter

Wafer type	Description								
<p>When Installation Collar are required, the installation vortex flowmeters applied to the following line sizes and flange ratings.</p> <table border="1" data-bbox="180 405 603 584"> <thead> <tr> <th>Size mm(inch)</th> <th>Flange Rating</th> </tr> </thead> <tbody> <tr> <td>15 to 40 (1/2 to 1-1/2)</td> <td>All ratings</td> </tr> <tr> <td>50(2)</td> <td>JIS 10K, ANSI class 150, DIN PN10 to PN40</td> </tr> <tr> <td>80(3)</td> <td>ANSI class 150, JPI class 150</td> </tr> </tbody> </table> <p><b>! WARNING</b> The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline.</p> <p><b>! WARNING</b> When installing the Flowmeter vertically in the open air, change the electrical connection port direction to the ground. If the electrical connection port is installed upwards, rain water might leak in.</p> <p><b>! WARNING</b> In case of vertical installation, two collars in the upper part might move after the installation. But it doesn't influence the performance, please use the flowmeter under such condition.</p>	Size mm(inch)	Flange Rating	15 to 40 (1/2 to 1-1/2)	All ratings	50(2)	JIS 10K, ANSI class 150, DIN PN10 to PN40	80(3)	ANSI class 150, JPI class 150	<p><b>Horizontal Installation</b></p>  <p><b>Vertical Installation</b></p>  <ol style="list-style-type: none"> <li>(1) Insert two collars on each two bolts of bottom side of the flowmeter.</li> <li>(2) Fit the flowmeter body to the collars. And tighten the four bolts and nuts uniformly.</li> <li>(3) Check for leakage from the flange connections.</li> </ol>
Size mm(inch)	Flange Rating								
15 to 40 (1/2 to 1-1/2)	All ratings								
50(2)	JIS 10K, ANSI class 150, DIN PN10 to PN40								
80(3)	ANSI class 150, JPI class 150								
<p>When Installation Collars are not required, the installation vortex flowmeters applied to the following line sizes and flanges.</p> <table border="1" data-bbox="180 1496 603 1733"> <thead> <tr> <th>Size mm(inch)</th> <th>Flange Rating</th> </tr> </thead> <tbody> <tr> <td>50(2)</td> <td>JIS 20K, 40K ANSI class 300,600 JPI class 300,600</td> </tr> <tr> <td>80(3)</td> <td>JIS 10K, 20K, 40K ANSI class 300, 600 JPI class 300,600</td> </tr> <tr> <td>100(4)</td> <td>JIS 10K, 20, 40K ANSI class 150, 300, 600 JPI class 150,300,600</td> </tr> </tbody> </table>	Size mm(inch)	Flange Rating	50(2)	JIS 20K, 40K ANSI class 300,600 JPI class 300,600	80(3)	JIS 10K, 20K, 40K ANSI class 300, 600 JPI class 300,600	100(4)	JIS 10K, 20, 40K ANSI class 150, 300, 600 JPI class 150,300,600	<p><b>Horizontal Installation</b></p>  <p><b>Vertical Installation</b></p>  <ol style="list-style-type: none"> <li>(1) Insert two bolts in the bolt holes on the flowmeter shoulder to align the instrument body with the inner diameter of the adjacent piping.</li> <li>(2) Tighten all bolts uniformly and check that there is no leakage between the instrument and the flanges.</li> </ol>
Size mm(inch)	Flange Rating								
50(2)	JIS 20K, 40K ANSI class 300,600 JPI class 300,600								
80(3)	JIS 10K, 20K, 40K ANSI class 300, 600 JPI class 300,600								
100(4)	JIS 10K, 20, 40K ANSI class 150, 300, 600 JPI class 150,300,600								

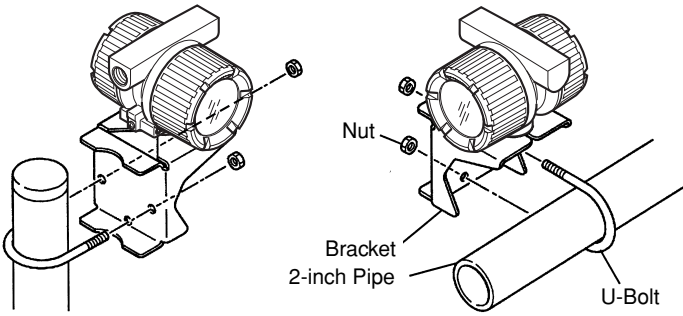
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Table 2.3(b) Installation of Flange Type Vortex Flowmeter

Flange type	Description
<p>Use the bolts and nuts supplied with the flowmeter of the user. The gaskets should be supplied by the user.</p> <p><b>CAUTION</b> The inside diameter of the gasket must be larger than the pipe inner diameter so that it will not disturb the flow in the pipeline.</p>	 <p><b>Horizontal Installation</b></p> <p><b>Vertical Installation</b></p>

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Table 2.3(c) Installation of remote Type Converter

Remote type converter	Description
<p><b>CAUTION</b> A signal cable (DYC) is used between the remote type flowmeter and the converter. The maximum signal cable length is 97.5ft (30m).</p>	<p>The converter is mounted on a 2-inch (60.5mm outer dia.) stanchion or horizontal pipe. Do not mount the converter on a vertical pipe. It makes wiring and maintenance difficult. The converter mounting orientation can be changed as illustrated below.</p> <p><b>Stanchion Mounting</b>      <b>Horizontal Pipe Mounting</b></p>  <p><b>Stanchion Mounting</b></p> <p><b>Horizontal Pipe Mounting</b></p> <p>Nut</p> <p>Bracket</p> <p>2-inch Pipe</p> <p>U-Bolt</p>

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## 3. WIRING



### WARNING

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



### CAUTION

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

## 3.1 Wiring Precautions

Be sure to observe the following precautions when wiring:



### CAUTION

- In cases where the ambient temperature exceeds 50°C (122°F), use external heat-resistant wiring with a maximum allowable temperature of 70°C (158°F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- Be sure to turn power off before opening the cover.
- Before turning the power on, tighten the cover securely.
- Explosion protected types must be wired in accordance with specific requirement (and, in certain countries, legal regulations) in order to preserve the effectiveness of their explosion protected features.
- The terminal box cover is locked by the clamp. In case of opening the terminal box cover, use the hexagonal wrench attached.
- Be sure to lock the cover by the clamp using the hexagonal wrench attached after installing the cover.

## 3.2 Wiring for Output Condition

Table 3.1 shows the connection method of several output conditions.

### (1) Analog Output (4 to 20 mA DC)

This converter uses the same two wires for both, the signal and power supply. A DC power supply is required in a transmission loop. The total leadwire resistance including the instrument load and power distributor (supplied by the user) must conform to a value in the permissible load resistance range. Refer to Figure 3.1 shows.

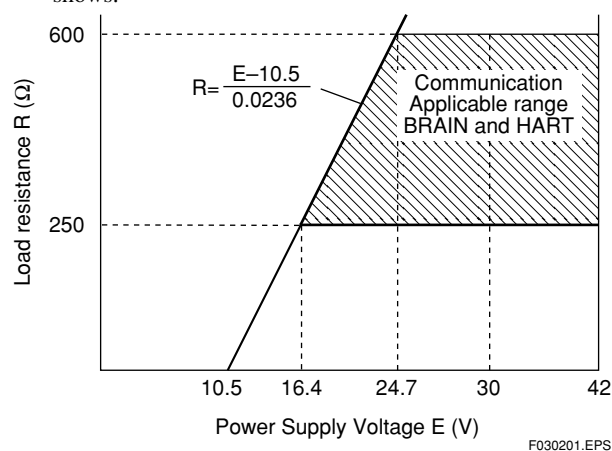


Figure 3.1 Relationship between Power Supply Voltage and Load Resistance (4 to 20 mA DC Output)

### (2) Pulse output and Alarm, Status Output

This version uses three wires between the converter and the power supply. A DC power and load resistance are required, and pulse output is connected to a totalizer or an electric counter. Low level of the pulse output is 0 to 2V. No communication is possible over a transmission line. Communication via the amplifier board is always possible irrespective of the wiring condition.

### (3) Simultaneous Analog-Pulse Output

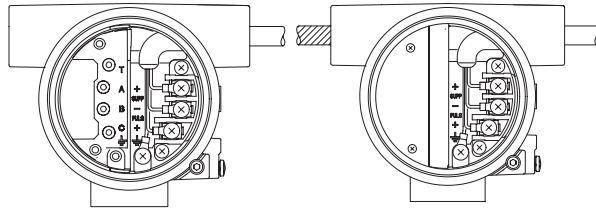
When using digital YEWFL0 in the simultaneous analog-pulse output mode, the communicable distance of the transmission line is restricted on the wiring method. Table 3.1 shows the examples of connection for this output mode. Communication via the amplifier board is always possible irrespective of the wiring condition.

**IMPORTANT**

For pulse output and the simultaneous analog-pulse output, use the load resistance. Refer to Table 3.1.

**3.3 Connection**

Table 3.1 shows the connection sample of connection for power supply and load resistance. The terminal position of each connection is shown in Figure 3.2.



Integral type

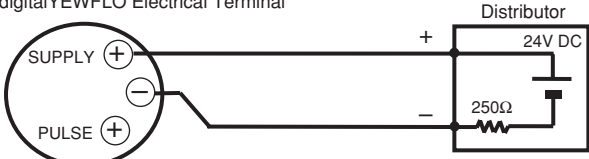
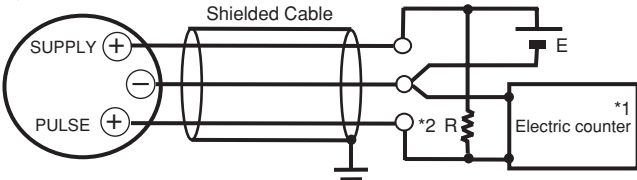
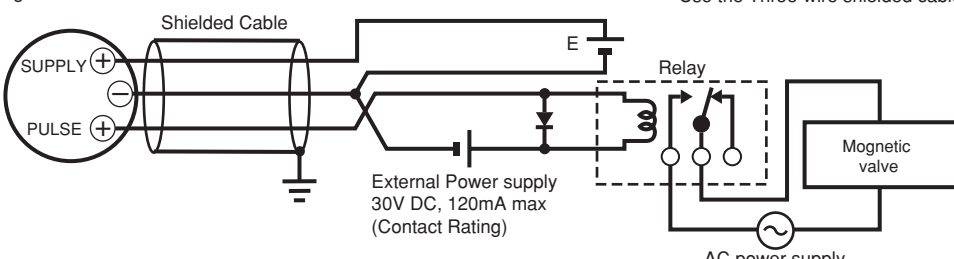
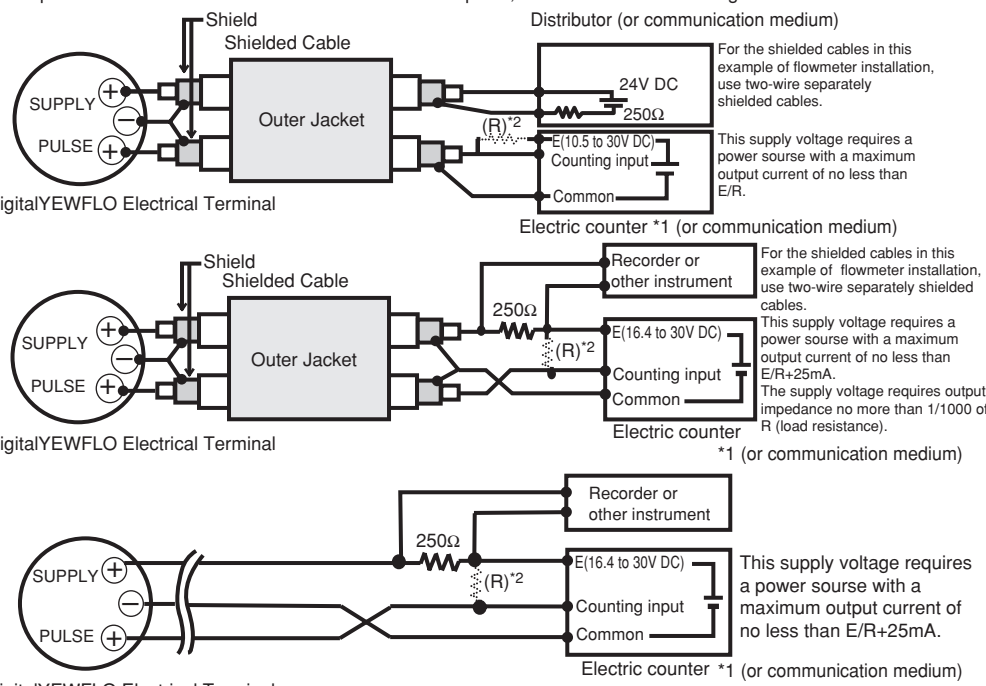
Remote type

T	Input Terminal from built-in temperature sensor	Supply + -	4 to 20 mA DC Output Power Supply and Output Signal Terminals
A B	Input Terminals from vortex detector	Pulse +	Pulse Output Terminal
C	Common Terminal	$\perp$ =	Grounding Terminal

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**Figure 3.2**

Table 3.1 The connection example for simultaneous analog and pulse and alarm, status output.

Connection	Description
<p><b>Analog Output</b></p> <p>In this case, Communication is possible (up to a distance of 2km when a CEV cable is used.)</p>	<p>digitalYEWFLO Electrical Terminal</p> 
<p><b>Pulse Output</b></p> <p>In this case, No communication is possible.</p>	<p>digitalYEWFLO Electrical Terminal</p>  <p>Use the Three-wire shielded cable.</p> <p>This supply voltage requires a power source with a maximum output current of no less than E/R.</p>
<p><b>Status Output Alarm Output</b></p> <p>In this case, No communication is possible.</p>	<p>digitalYEWFLO Electrical Terminal</p>  <p>Use the Three-wire shielded cable.</p> <p>External Power supply 30V DC, 120mA max (Contact Rating)</p> <p>AC power supply</p>
<p><b>Simultaneous Analog -Pulse Output</b></p> <p>Example 1 In this case, Communication is possible (up to a distance of 2km when a CEV cable is used).</p> <p>Example 2 In this case, Communication is possible (up to a distance of 200m when a CEV cable is used) and R = 1kΩ).</p> <p>Example 3 In this case, No communication is possible (when shielded cable is not used).</p>	<p>When analog and pulse output are used, the length of communication line is subjected to wiring conditions. Refer to example 1 to 3. If the communication carries out from amplifier, no need to consider wiring conditions.</p>  <p>Distributor (or communication medium)</p> <p>For the shielded cables in this example of flowmeter installation, use two-wire separately shielded cables.</p> <p>This supply voltage requires a power source with a maximum output current of no less than E/R.</p> <p>Electric counter *1 (or communication medium)</p> <p>For the shielded cables in this example of flowmeter installation, use two-wire separately shielded cables.</p> <p>This supply voltage requires a power source with a maximum output current of no less than E/R+25mA.</p> <p>The supply voltage requires output impedance no more than 1/1000 of R (load resistance).</p> <p>Electric counter *1 (or communication medium)</p> <p>This supply voltage requires a power source with a maximum output current of no less than E/R+25mA.</p> <p>Electric counter *1 (or communication medium)</p>
<p><b>The range of load resistance R for the pulse output.</b></p>	<p>The load resistance should be selected by calculation as shown below.</p> $\frac{E (V)}{120} \leq R (k\Omega) \leq \frac{0.1}{C (\mu F) \times f (kHz)}$ <p>Example of CEV cable capacitance = 0.1μF/km</p> $P (mW) = \frac{E^2 (V)}{R (k\Omega)}$ <p>Where          E = Supply voltage (V)          f = Frequency of pulse output (kHz)          R = Value of load resistance (kΩ)          C = Cable capacitance (μF)          P = Power ratio of the load resistance (mW)</p>

\*1 : To avoid the influence of external noise, use an electric counter which fits to the pulse frequency.

\*2 : Resistor is not necessary in case of an electric counter which can receive contact pulse signal directly.

### 3.4 Wiring Cables and Wires

The following should be taken into consideration when selecting cables for use between the converter and distributor.

- (1) Use 600V PVC insulated wire or equivalent standard wire or cable.
- (2) Use shielded wire in areas susceptible to electrical noise (both analog and pulse output versions).
- (3) In areas with high or low ambient temperatures, use wires or cables suitable for such temperatures.
- (4) In atmospheres where oils or solvents, corrosive gases or liquids may be present, use suitable wires or cables.
- (5) Use cable which withstand temperature up to 60°C and more, when ambient temperature is more than 60°C.



#### IMPORTANT

For the remote type, use DYC signal cable to connect the converter and remote type flowmeter(DY-N).

### 3.5 Connection of the Remote Type Signal Cable

The remote type signal cable is shown in Figure 3.3 and 3.4, and the terminal is shown in Figure 3.5.

The maximum cable length is 30 m (97.5 feet).

Remove terminal box cover and wiring connection dust-cap before wiring.

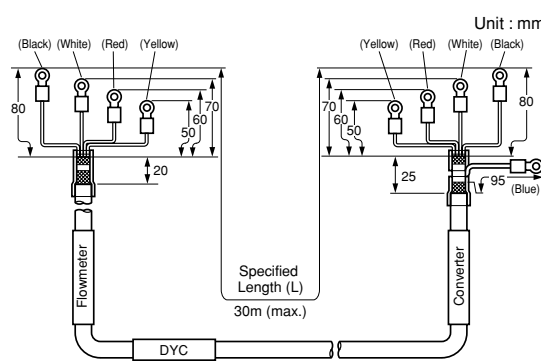
For remote type the converter has two electrical connections (cable inlets). Use the left connection as viewed from the terminal box for the DYC signal cable and the right connection for the transmission cable.

If a signal cable kit is supplied by YOKOGAWA, both ends of the cable must be finished in accordance with the following instructions as shown in 3.6.1 and 3.6.2.



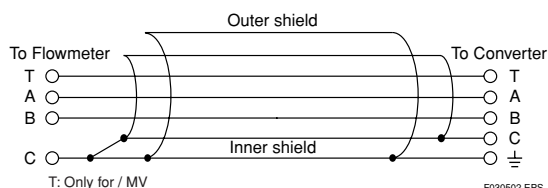
#### CAUTION

After completing the signal cable connections, install the shielded cover to signal cable terminal as shown in Figure 3.6.



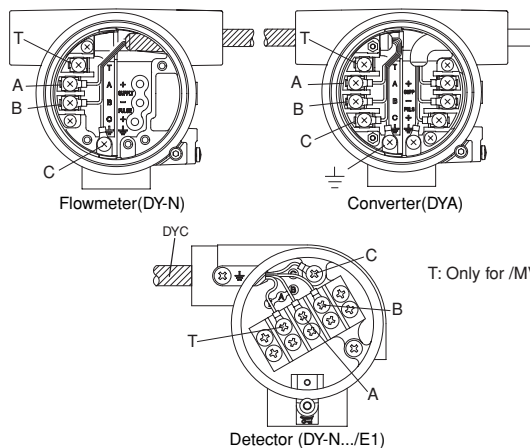
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Figure 3.3 DYC Signal Cable



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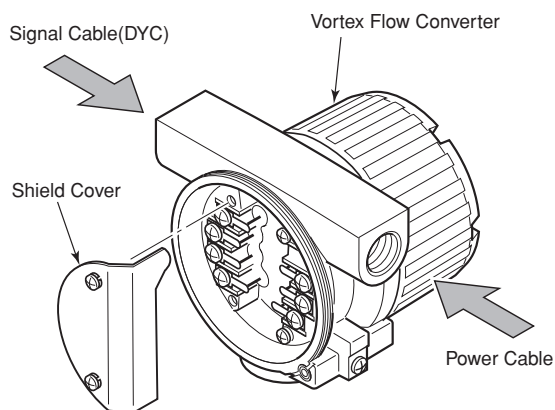
Figure 3.4 Construction of Remote Type Signal Cable



T	Input Terminal from built-in temperature sensor	Supply + -	4 to 20 mA DC Output Power Supply and Output Signal Terminals
A B	Input Terminals from vortex detector	Pulse + -	Pulse Output Terminal
C	Common Terminal	⊥	Grounding terminal

F030503.EPS

Figure 3.5 Terminal of Detector and Converter



F030504.EPS

Figure 3.6 Shielded Cover

### 3.6 Method of Finishing the Signal Cable End(DYC)

#### 3.6.1 For Vortex Flowmeter (DY-N)

	Description	Figure
1	Strip off the outer polyethylene jacket, outer braided shield and inner jacket, and inner braided shield as per the dimensions below.	<p>Unit : mm (approx. inches)</p>
2	Strip off the black conductive layer covering two wires completely, as per the dimensions below. Twist each of the conductor and drain wires so that there are no free strands.	
3	Do not short-circuit the conductive layer and the terminals (A, B, C and T).	
4	Strip off about 5 mm (0.2 in.) of insulation for each of wires A, B, and T, and twist the strands of each wire. Twist the inner and outer drain wires together.	
5	Slide FEP (fluorinated ethylene propylene) tubing over the twisted inner and outer drain wires C until the tubing cannot be slid any further, and then cut off the tubing leaving 5 mm (0.2 in.) of the stranded drain wires exposed.	
6	Slide heat shrinkable tubing over the cable end so that the tubing covers the braided shield and overlaps both the polyethylene jacket and loose wires A, B, C, and T.	
7	Slide a short piece of heat shrinkable tubing over each of wires A, B, C, and T. Install a crimp-on terminal lug at the tip of each wire. Crimp and solder each lug.	
8	Slide each short piece of heat shrinkable tubing over the crimp sleeve. Heat all pieces of heat shrinkable tubing with a heat blower or dryer.	
9	<p>Attach an identification label to the end of the cable.</p> <p><b>NOTE</b></p> <p>Check that the insulation resistance between each wire including the inner shield is 10MΩ or greater at 500V DC. Ensure that both ends of the wires are disconnected (open-circuited) during the check.</p>	

(\*1): Only for /MV

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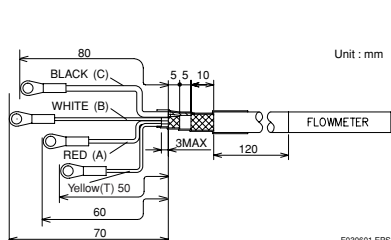


Figure 3.7

**NOTE**

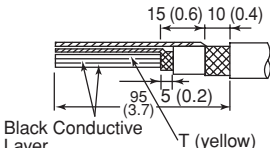
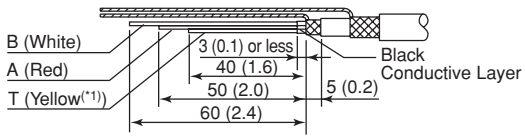
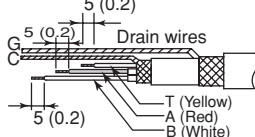
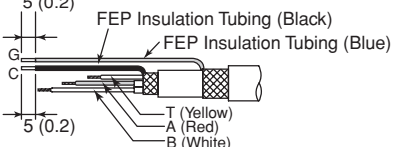
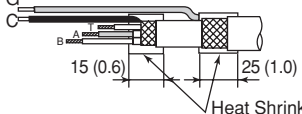
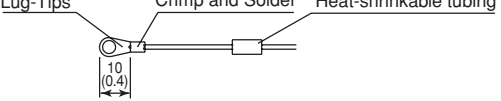


In case that the cable end finish parts assembly is necessary after delivery, contact your nearest Yokogawa sales office or the sales representative from which you purchased the product.

**CAUTION**

Do not touch the "conductive layer" (black area covering the signal cables A and B) to the converter case, terminal, and other leadwires. If it is touched, operation of the converter may be incorrect. When the cable is terminated, remove the conductive layer properly.



3.6.2 For Vortex Flow Converter (DYA)

	Description	Figure
1	Strip off the outer polyethylene jacket, outer braided shield and inner jacket, and inner braided shield as per the dimensions as shown.	 <p style="text-align: right;">Unit : mm (approx. inches)</p>
2	Cut off the black conductive layers (covering the two wires) completely, as per the dimensions below. Twist each of the conductor and drain wires so that there are no free strands.	
3	Do not short-circuit the conductive layer and the terminals (A, B, C, G and T).	
4	Strip off about 5 mm (0.2 in.) of insulation for each of wires A, B, and T, and twist the strands of each wire.	
5	Slide black FEP (fluorinated ethylene propylene) tubing over the inner shield drain wire C and blue FEP tubing over outer shield drain wire G until the tubing cannot be slid any further, and then cut off the tubing leaving 5 mm (0.2 in.) of the drain wires exposed.	
6	Slide heat shrinkable tubing over the cable end so that the tubing covers the braided shield and overlaps both the polyethylene jacket and loose wires A, B, C, G, and T.	
7	Slide a short piece of heat shrinkable tubing over each of wires A, B, C, G, and T. Install a crimp-on terminal lug at the tip of each wire. Crimp and solder each lug.	
8	Slide each short piece of heat shrinkable tubing over the heat sleeve. Heat all pieces of heat shrinkable tubing with a heat blower or dryer.	
9	<p>Attach an identification label to the end of the cable.</p> <p><b>NOTE</b></p> <p>Check that the insulation resistance between each wire including the inner shield is 10MΩ or greater at 500V DC. Ensure that both ends of the wires are disconnected (open-circuited) during the check.</p>	

(\*1): Only for /MV

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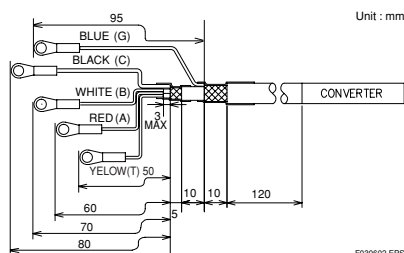


Figure 3.8

**NOTE**

In case that the cable end finish parts assembly is necessary after delivery, contact your nearest Yokogawa sales office or the sales representative from which you purchased the product.

**CAUTION**

Do not touch the "conductive layer" (black area covering the signal cables A and B) to the converter case, terminal, and other leadwires. If it is touched, operation of the converter may be incorrect. When the cable is terminated, remove the conductive layer properly.

### 3.7 Wiring Cautions

- (1) Lay wiring as far as possible from electrical noise sources such as large transformers, motors and power supplies.
- (2) It is recommended that crimp-on type solderless lugs be used for large wire ends.
- (3) For general use, it is recommended that conduits and ducts or racks be used to protect wiring from water or mechanical damage. A rigid steel conduit or flexible metal conduit is recommended. See Figure 3.9.

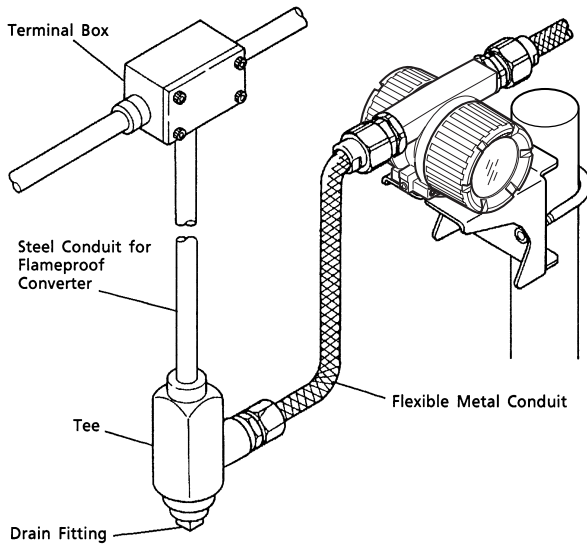


Figure 3.9

### 3.8 Grounding



#### IMPORTANT

When a lightning protector (option code: /A) is selected, use a grounding resistance of  $10\Omega$  or less.

- (1) The grounding terminals  $\perp$  are located on the inside and outside of the terminal area. Either terminal may be used.
- (2) For pulse output version, ground the flowmeter. Also ground the shielded cable between the converter and the pulse receiver.
- (3) Grounding should satisfy Class D requirements (ground resistance  $100\Omega$  or less).
- (4) Use 600V PVC insulated wire for grounding.

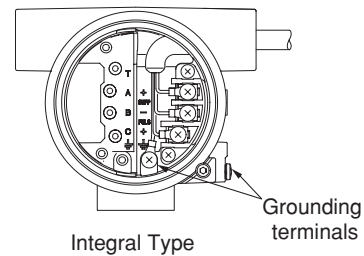


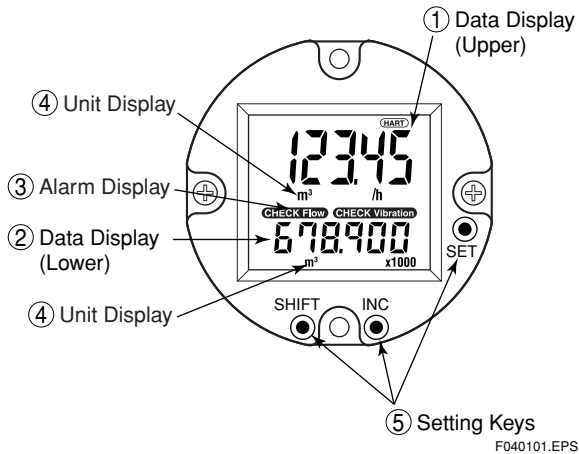
Figure 3.10

## 4. BASIC OPERATING PROCEDURES

Data setting can be performed with the three keys on the front panel (SET,SHIFT and INC) or using a handheld BRAIN(BT200) terminal and HART communicator.

### 4.1 Construction of the Display

Figure 4.1 shows the configuration of the digital YEW FLO display panel (if equipped).



**Figure 4.1 Construction of the Display**

- ① Data Display(Upper) : Flowrate data, setting data, total data and temperature data (/MV).
- ② Data Display(Lower) : Total data, alarm data and temperature data (/MV).
- ③ Alarm Display : Alarm of a flow error and a vibration error.
- ④ Unit Display : Flowrate unit.
- ⑤ Setting Keys : These keys are used to change flow rate data displays and type of setting data.

## 4.2 Display Contents in Display Section

The display content items are classified in the following three items.

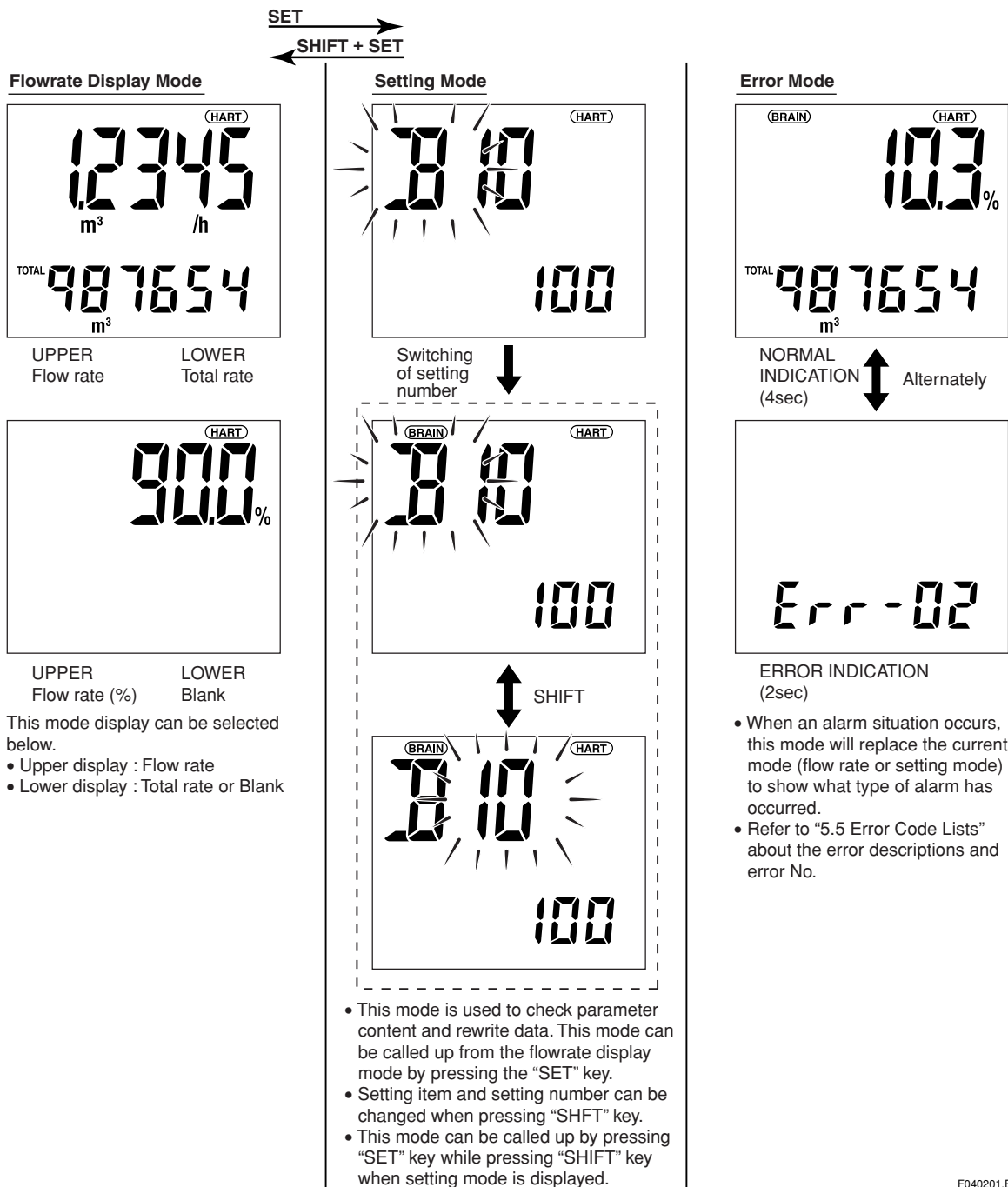
**Table 4.2 Mode Name List**

Mode (status) Name	Display Contents
Flowrate display mode	A mode in which instantaneous flow rates or totalized values are displayed. Display content is usually selected either in display content selection mode or by setting parameters via BRAIN communication.
Setting mode	In this mode, parameter contents are confirmed or data is updated using the setting section. The mode is changed to this mode when [SET] key is pressed in normal mode.
Alarm number display mode	This mode is overlapped when an alarm is occurring in display mode. The alarm number presentation to indicate alarm contents (about 2 sec) and the normal data display (about 4 sec) are repeated alternately.

Mode represents that the system is in a state where the relevant setting or display is possible.

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### ● Display Example



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## 4.3 Display Contents in Display Section

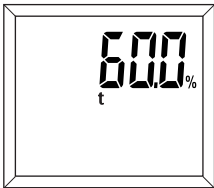
The display mode is a mode in which instantaneous flow rates or totalized flow are displayed. In display mode, there are six display modes as shown in Table 4.3.

**Table 4.3 Display Mode**

Name	Contents	Upper Display	Lower Display
% Display (Flow rate)	Instantaneous % flow rate is displayed.	○	×
Engineering Display Unit	Instantaneous flow rate in an engineering unit is displayed.	○	×
Totalized Display	Totalized flow displayed without indicating the decimal point.	×	○
% Display (Temperature) (*1)	Instantaneous temperature is displayed. In this case, "t" is displayed simultaneously (Refer to Figure 4.2).	○	×
Temperature display(*1)	Temperature value is displayed.	×	○
Blank	—	×	○

(\*1) When option code /MV is selected, this function is available.

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**Figure 4.2 Example**

Display mode can be changed using the BT200 terminal or the indicator setting section.

- For operation using BT200, perform changes using the parameter item " B30:UPPER DISP" and "B31:LOWER DISP" referring to section 5. Parameters.
- For operation using indicator, change B30 and B31 parameter item number to display an appropriate display.



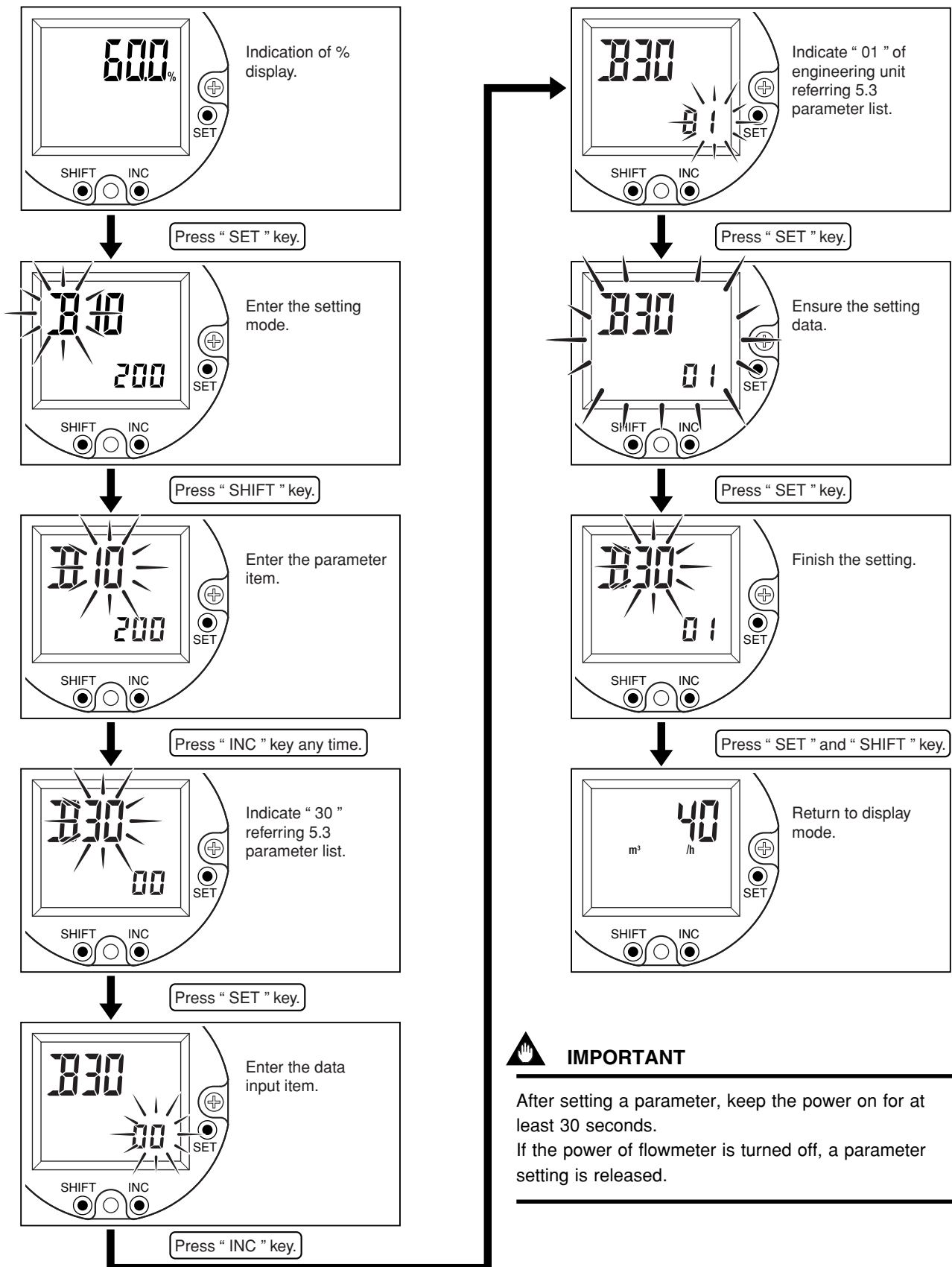
### IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.

If the power of flowmeter is turned off, a parameter setting is released.

### 4.3.1 Change the Display Mode from % Display to Engineering Unit

The display mode can be changed referring 5.3 parameter list.

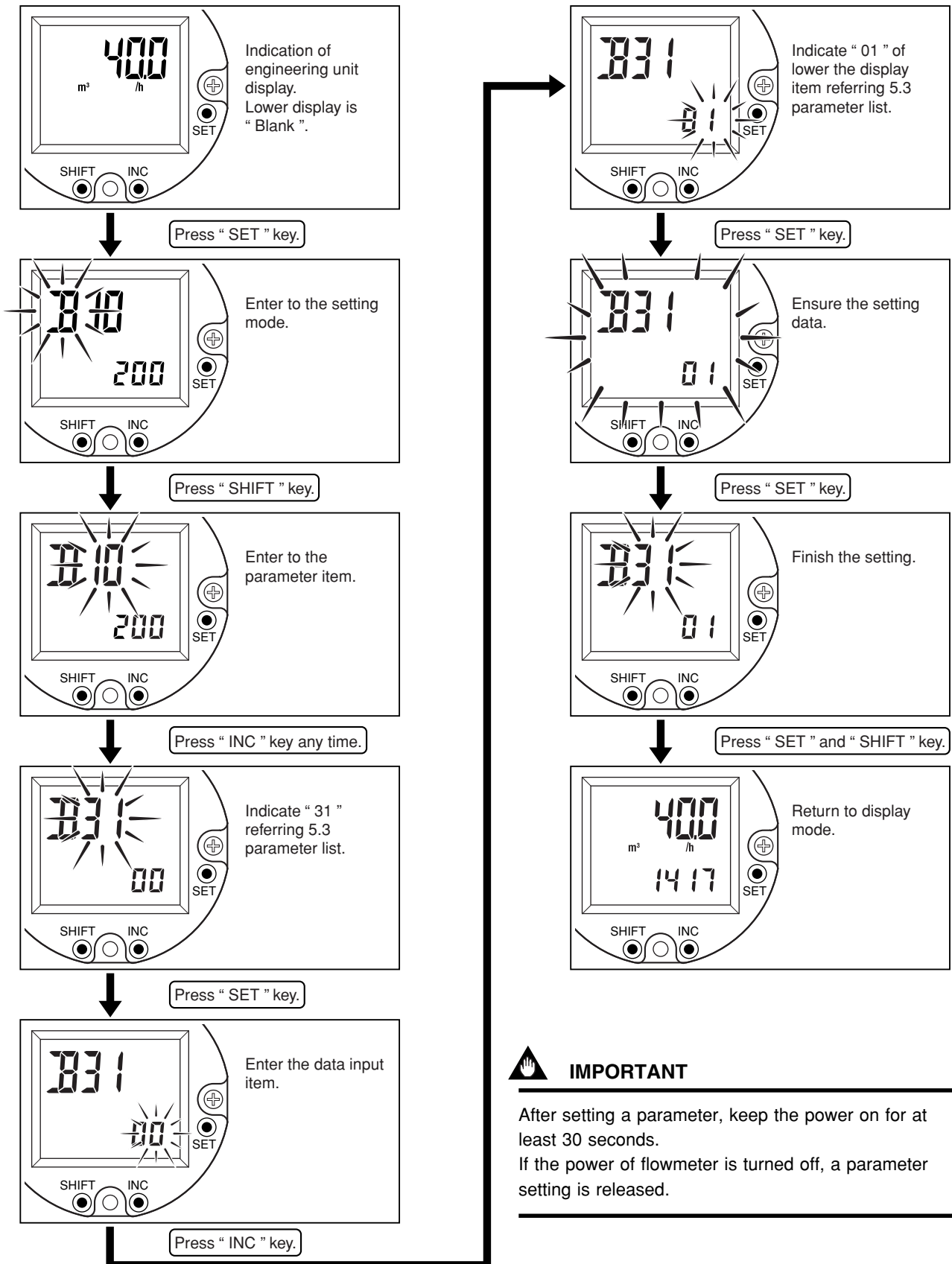


**IMPORTANT**

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

### 4.3.2 Indicate the Total Rate in the Lower Display

The display mode can be changed referring 5.3 parameter list.



**IMPORTANT**

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

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## 4.4 Setting Mode

The setting mode is used for checking parameters and rewriting data. The following is an overview of the setting mode.



### NOTE

- Refer to 5.3 Parameter List and 5.4 Parameter description for information on how to change setting.



### IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.

If the power of flowmeter is turned off, a parameter setting is released.

### 4.4.1 Structure of Setting Mode Display

#### Simple parameter sheet

IN this sheet, a setting flow chart and the parameter list required to operate digitalYEWFLO is indicated.

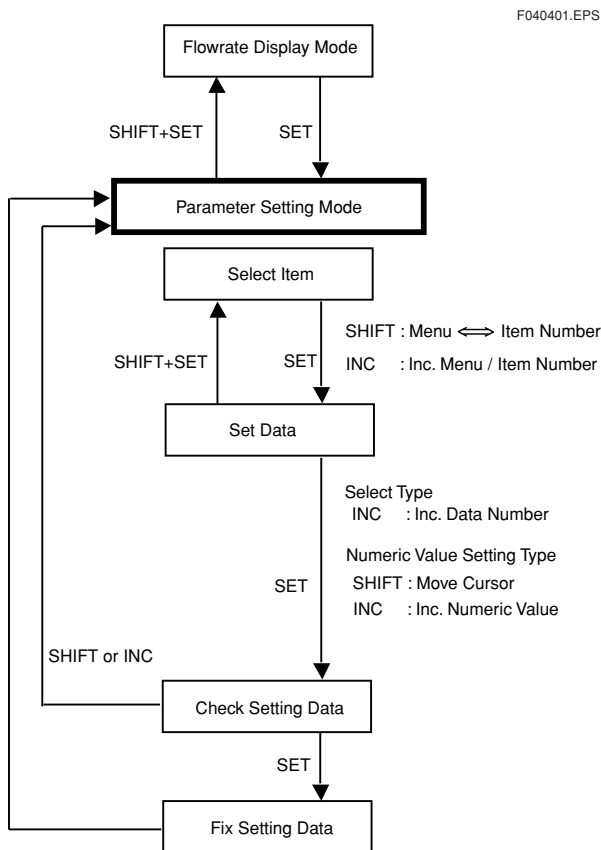
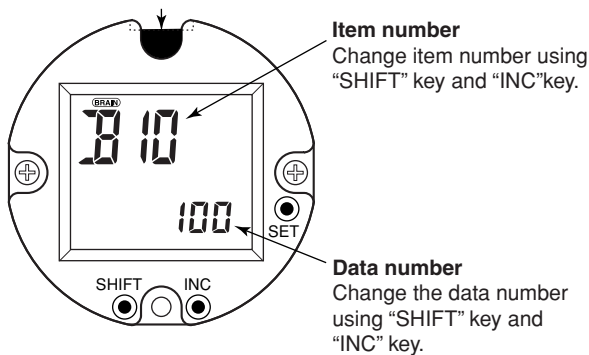


Figure 4.3 Indicator Construction and Parameter Setting Procedure

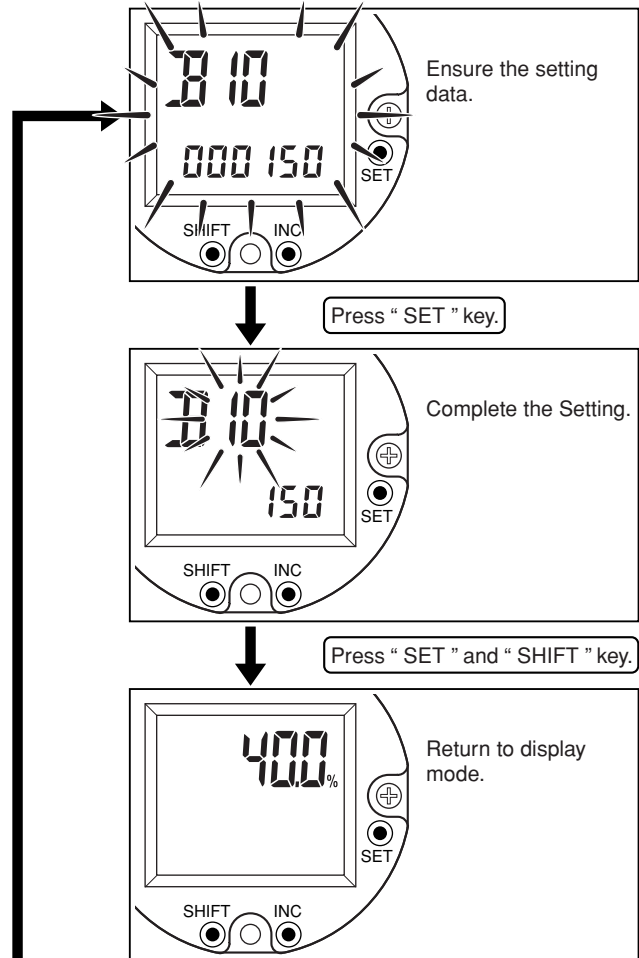
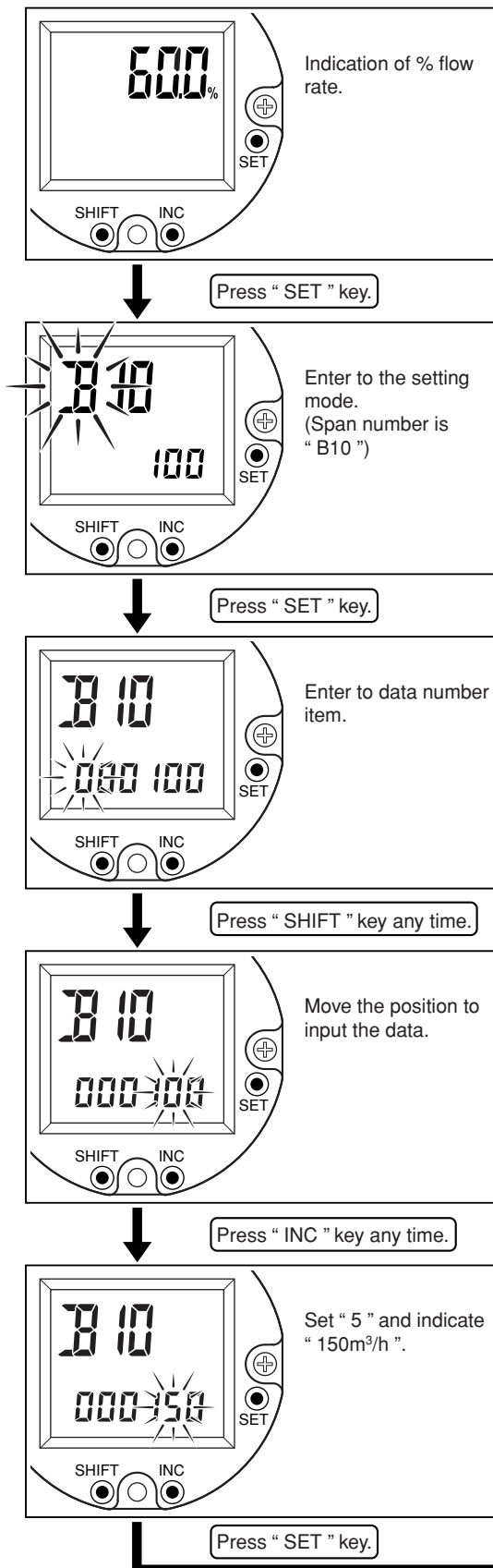
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### 4.4.2 Method of Parameter Setting

#### Input method of numeric data

Example 1: Change the span from 100m<sup>3</sup>/h to 150m<sup>3</sup>/h  
 The setting mode can be changed referring 5.3 parameter list



 **IMPORTANT**

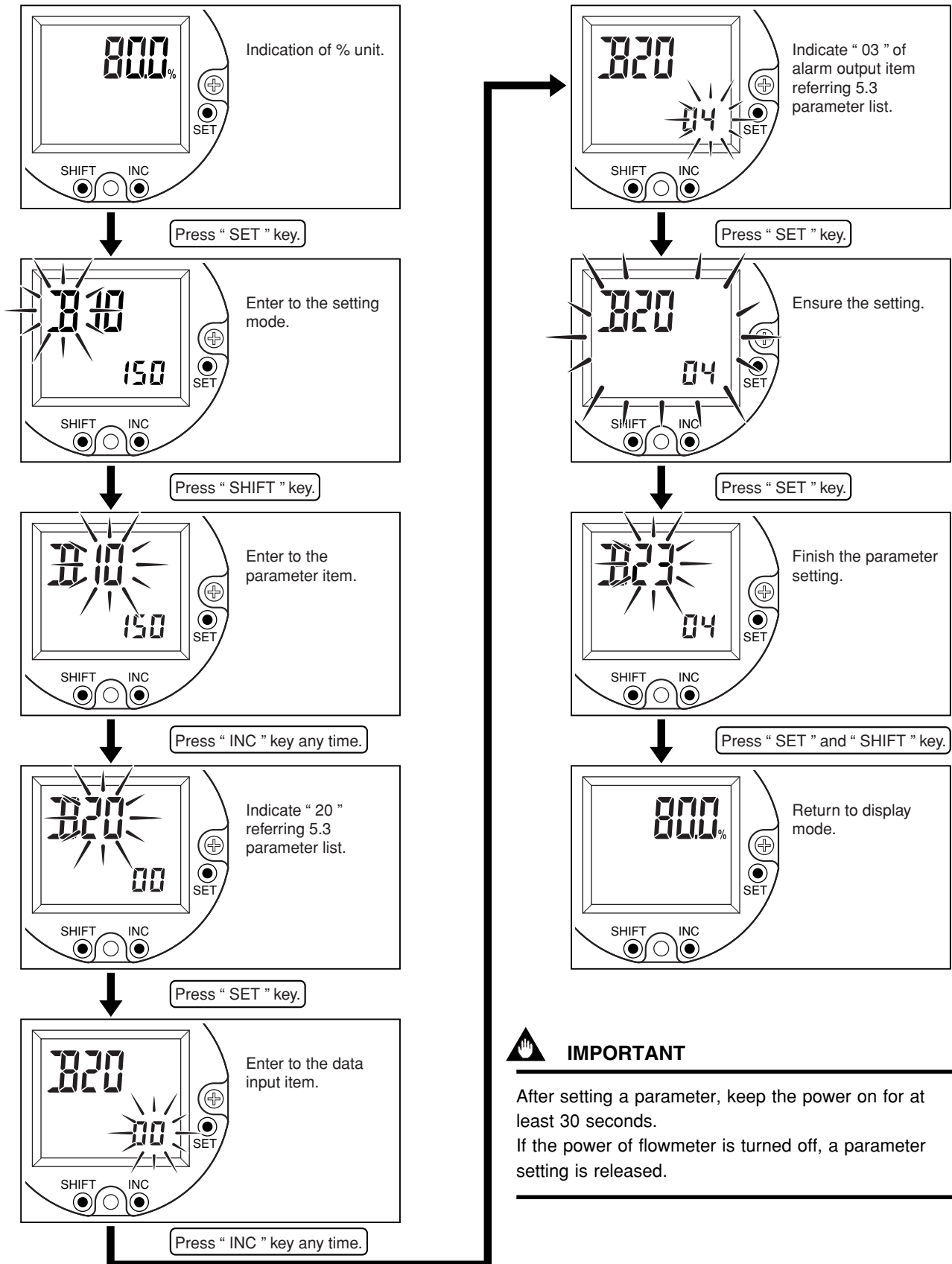
After setting a parameter, keep the power on for at least 30 seconds.

If the power of flowmeter is turned off, a parameter setting is released.

■ Input method of selection items

Example 2: Change the pulse output to alarm output.

The setting mode can be changed referring 5.3 parameter list



**IMPORTANT**

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

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## 4.5 Operation for the BRAIN Terminal (BT200)

This section describes the operation procedures using a BRAIN Terminal (BT200). For details on the functions of the digitalYEWFL0, refer to 5.3 Parameter List. And also, see the “Model BT200 BRAIN TERMINAL” Instruction Manual (IM 1C0A11-01E) for more detailed Information.

### 4.5.1 Connection Method for the BT200

#### (1) Connecting the BT200 to a 4 to 20mA DC Transfer Line

The communication signal of the digitalYEWFL0 is superimposed onto the 4 to 20mA DC analog signal to be transferred.

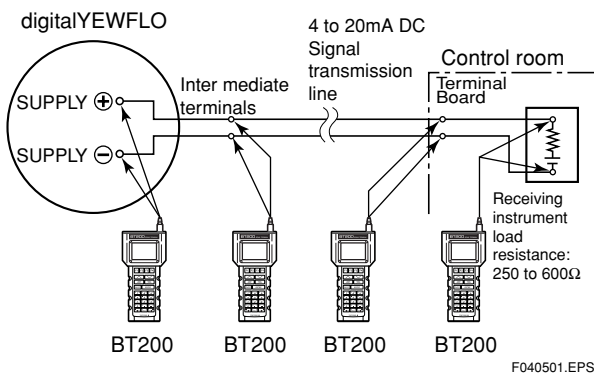


Figure 4.4 Communicating for a 4 to 20mA DC Signal Line



#### IMPORTANT

The communicable distance of the transmission line is restricted depending on the wiring method. Refer to 3. WIRING.



#### IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

#### (2) Connecting BT200 to Flow Converter

Removing a cover and indicator, the terminals for brain communication are provided on the circuit board. Connect BT200 to the terminal of HHT-COM on the circuit board.

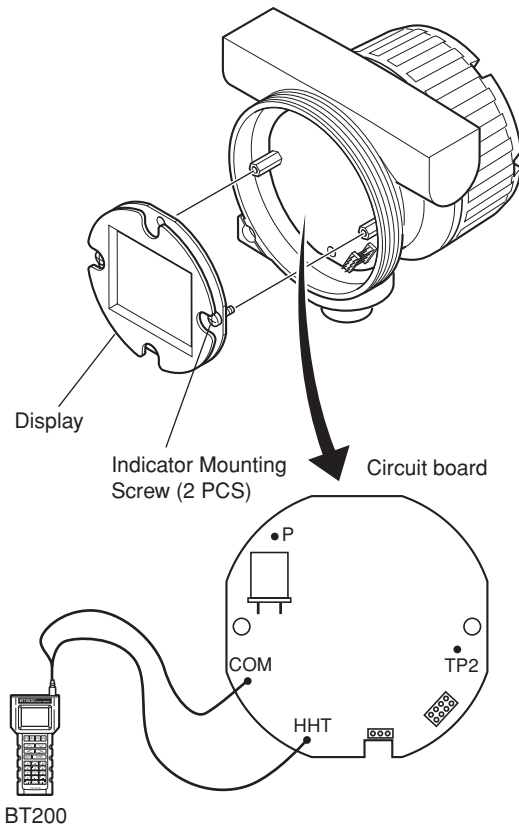
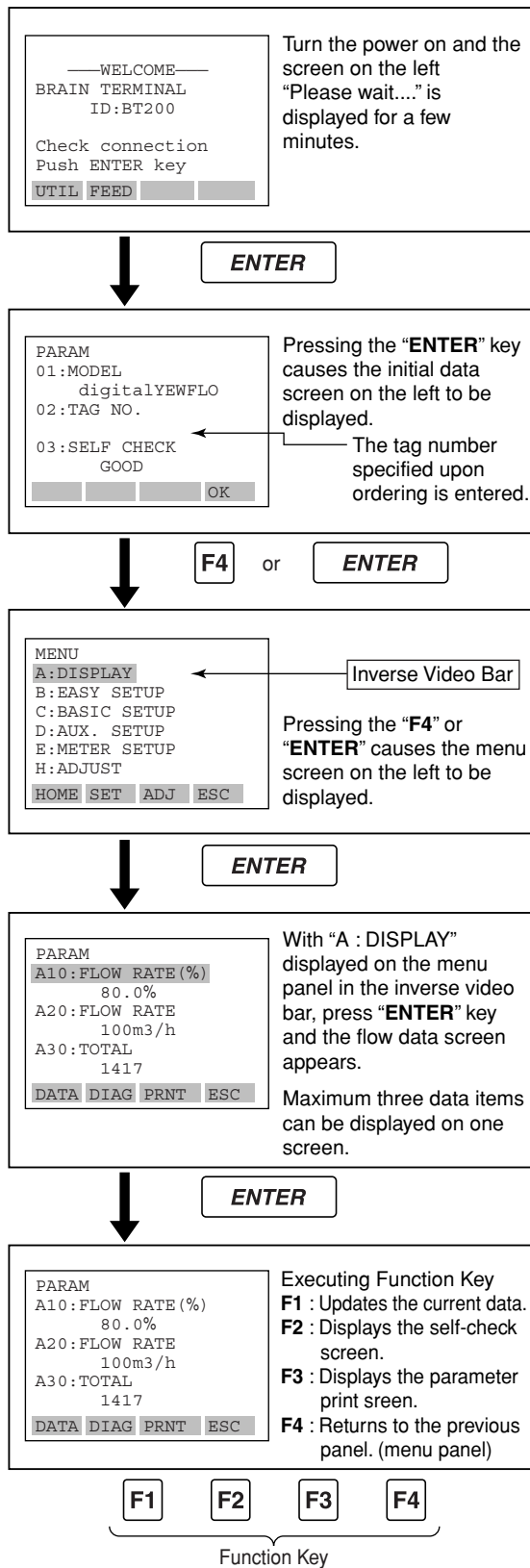


Figure 4.5 Connection of BT200 to Flow Converter

### 4.5.2 Displaying Flow Rate Data

Flowrate data can be displayed on the BT200 screen according to the following procedure.



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### ● Function key

The functions of the function keys vary with the commands being displayed on the display panel.

Table 4.4

Command	Description
ADJ	Calls up the adjustment menu.
CAPS/caps	Changes the uppercase / lowercase mode.
CLR	Clears entered data / deletes all data.
COPY*	Prints parameters on the screen.
DATA	Updates parameter data.
DEL	Deletes one character.
DIAG	Calls up the self-check screen.
ESC	Returns to the preceding screen.
FEED*	Paper feed.
HOME	Calls up the home menu (A : DISPLAY).
LIST*	Prints all parameters of the menus.
NO	Setting stop / re-setting. Returns to the previous screen.
OK	Goes to the next screen.
PARM	Parameter number setting mode.
PON/POFF*	Printer output of data whose setting was changed Mode on / off.
PRNT*	Changes to the prints mode.
SET	Calls up the setting menu (B : SETTING).
SLOT	Returns to the slot selection screen.
GO*	Starts print out.
STOP*	Stops printing.
UTIL	Transfers to the utility screen.

\*The command is available only for BT-200-P00

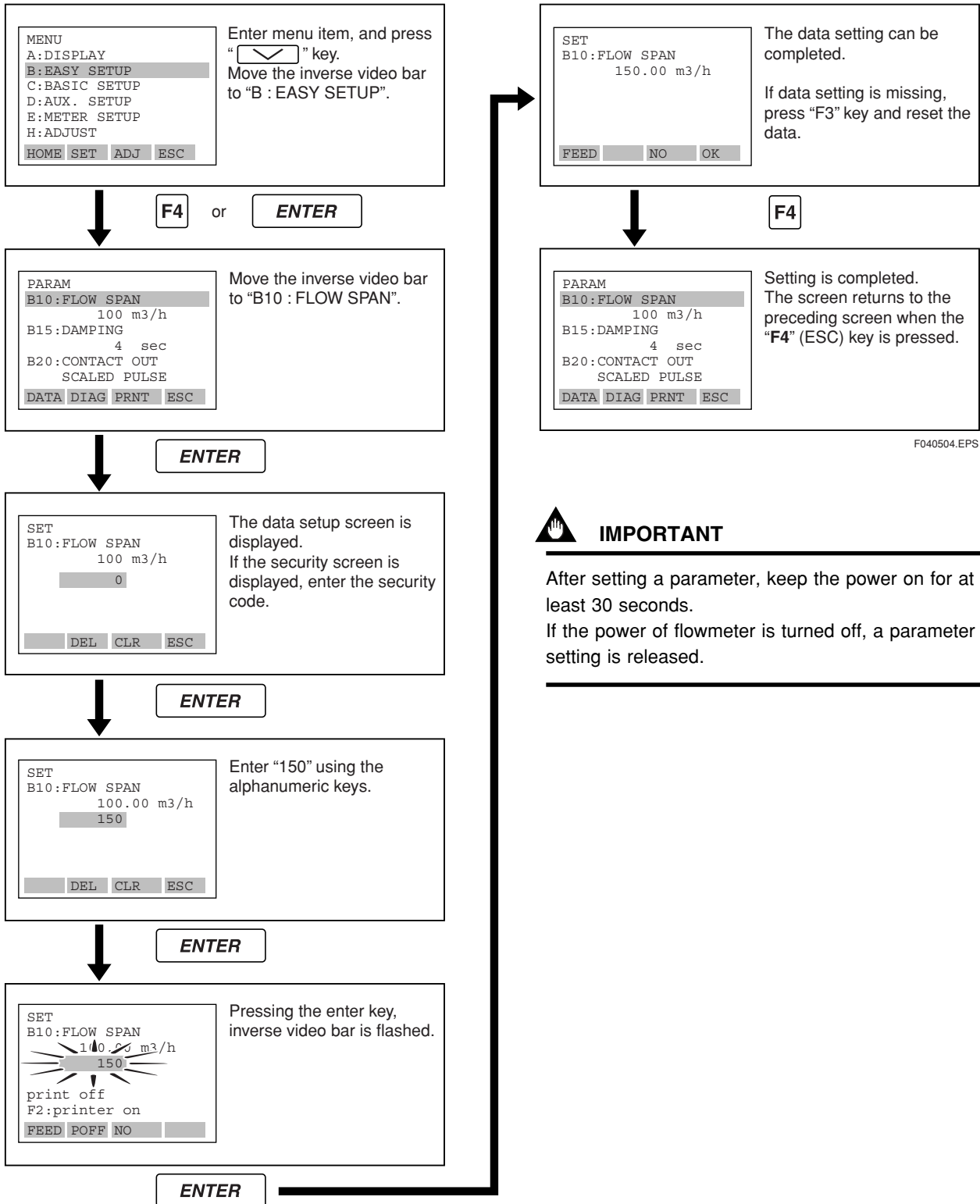
T040501.EPS

### 4.5.3 Setting Parameters

This section describes the setting method using a BRAIN Terminal (BT200). For details on the method, refer to 5.3 Parameter List.

#### (1) Setting Flow Span

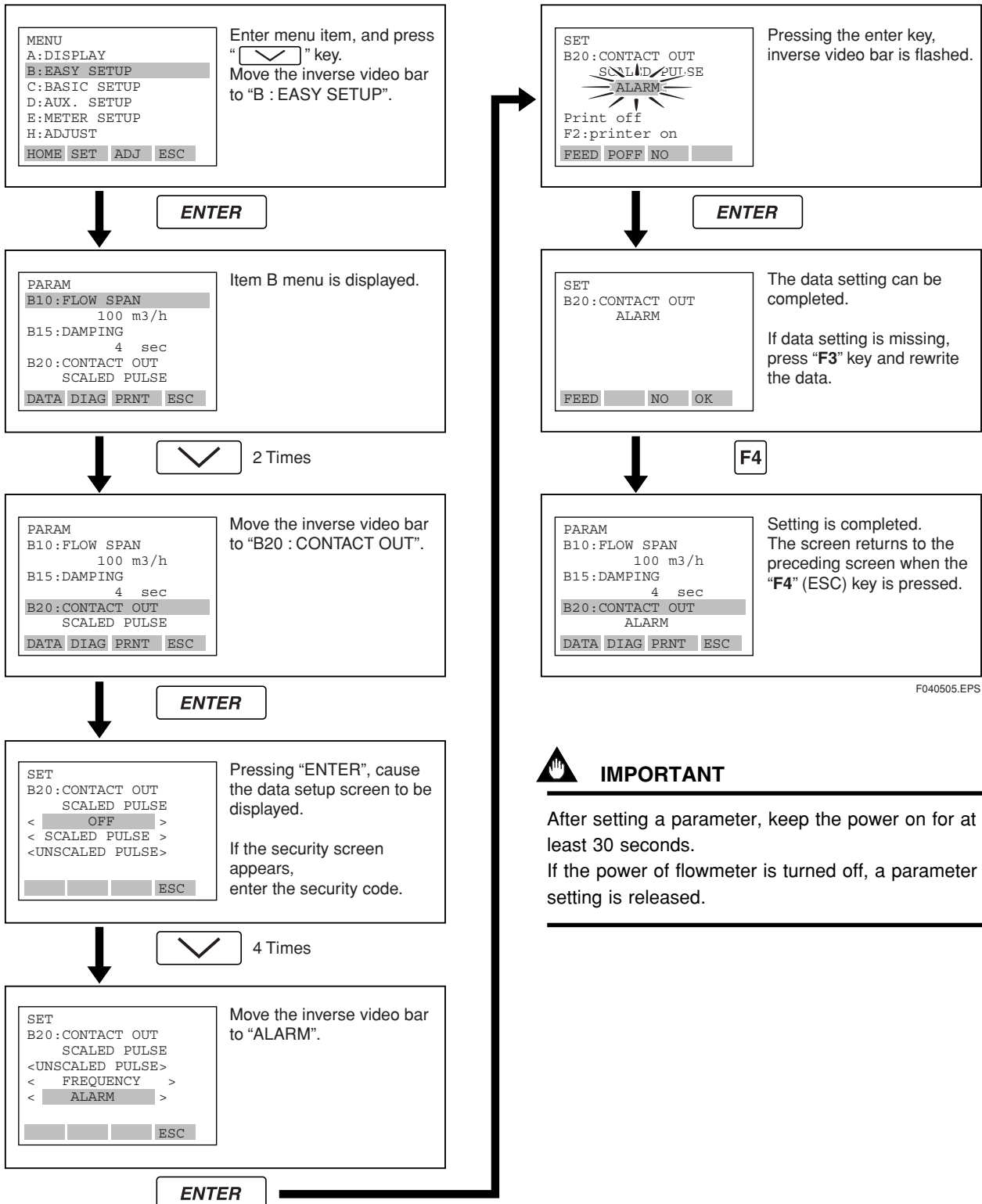
Example : Change flow span 100m<sup>3</sup>/h to 150m<sup>3</sup>/h



#### IMPORTANT

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

(2) Change the Pulse Output to Alarm Output.



**IMPORTANT**

After setting a parameter, keep the power on for at least 30 seconds.  
If the power of flowmeter is turned off, a parameter setting is released.

## 4.6 Operation via HART configuration tool



### NOTE

This chapter describes the digitalYEWFO as an example.

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

### 4.6.1 Matching of instrument (digitalYEWFO) DD and HART Configuration Tool's DD

Before using the HART Configuration Tool (such as FieldMate), confirm that the DD (Device Description) of the digitalYEWFO is installed in the Configuration Tool before using.

The DD revisions for digitalYEWFO and Configuration Tool's can confirm in accordance with the following steps.

If the correct DD is not installed in the HART Configuration Tool, download them from the official HART programming sites, otherwise, contact the respective vendors of the Configuration Tool for its upgrade information.

1. Confirmation of the device revision for digitalYEWFO
  - (1) Connect the Configuration Tool to the digitalYEWFO.
  - (2) Select the “**5.Device information**” menu.
  - (3) Open the “**7.Revision numbers**” menu.
  - (4) The device revision of the digitalYEWFO is displayed at “**2.Fld dev rev.**”
2. Confirmation of the device revision for the HART Configuration Tool
  - (1) Turn on the power of the Configuration Tool under the standalone condition.
  - (2) Confirm the installed DD revision in accordance with the procedure of the Configuration Tool. Refer to its manual how to confirm it in detail. The first 2 digits of the DD file are expressed the device revision, and its last 2 digits are expressed the DD revision.

01 01.XXX

└─ DD revision  
└─ Device revision

### 4.6.2 Interconnection between digitalYEWFO and HART Configuration Tool

The HART Configuration Tool can interface with the digitalYEWFO from the control room, the digitalYEWFO site, or any other wiring termination point in the loop, provided there is a minimum load resistance of 250 Ω between the connection and the receiving instrument. To communicate, it must be connected in parallel with the digitalYEWFO, and the connections must be non-polarized. Figure 4.6 illustrates the wiring connections for a direct interface at the digitalYEWFO site. The HART Configuration Tool can be used for remote access from any terminal strip as well.

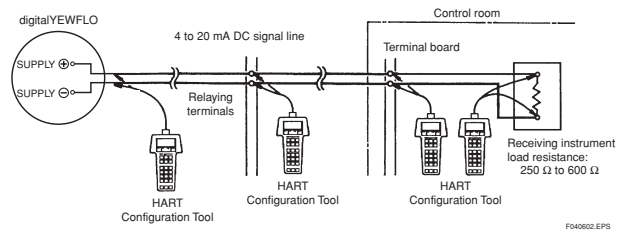


Figure 4.6 Connecting the HART Communicator



### WARNING

Be sure to set parameters as “Protect” on the write protect function after finish of parameter setting work. Refer to 4.6.7 Write Protect how to use the write protect function in detail.



### IMPORTANT

If the power of flowmeter is turned off within 30 seconds after parameters have been set, these settings will be canceled. Accordingly, please keep the power on for at least 30 seconds after setting parameters.



### NOTE

Before updating any setting, remember to always check the data content you want to change as described in 5.4: Parameter Description.

### 4.6.3 Basic Setup

#### ■ Tag and Device Information

The tag number and device information can be checked as follows:

- The location for the tag number and device information

Item	Precedure
Tag	1. Device setup → 3. Basic setup → 1. Tag
Descriptor	1. Device setup → 4. Detailed setup → 5. Device information → 3. Descriptor
Message	1. Device setup → 4. Detailed setup → 5. Device information → 4. Message
Date	1. Device setup → 4. Detailed setup → 5. Device information → 5. Date

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When changing the tag number or device information, enter the information directly within the following limitations.

Item	Number and characters
Tag	8
Descriptor	16
Message	32
Date	2/2/2 (mm/dd/yy) • mm : month • dd : day • yy : year

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### 4.6.4 Parameter configuration

The parameter structure of the HART configuration tool is hierarchical.

Refer to 4.6.10, Menu Tree Example for the corresponding parameters. The menu tree shows a cross-reference of the parameters for HART configuration Tool and BRAIN Terminal.

See 5.4 Parameter Description for the functions of parameters.

Note that some display parameters of digitalYEWFLO are different from those of HART Configuration Tools.

### 4.6.5 Data Renewing and Upload/download function

#### (1) Data renewing

Following data are renewed in 0.5 to 2 seconds cycle.  
PV, PV%, rnge, PVAO1, Total  
Temp, TV% rnge, AO3: /MV only

#### (2) Upload/download function

Upload/download parameters from digitalYEWFLO to the HART Configuration Tool.  
Refer to the Menu Tree for the applicable parameters.

### 4.6.6 Self-diagnostic

The self-diagnostic function of the digitalYEWFLO is explained in 5.5 Error Code Lists.

It is also possible to carry out this function via HART Configuration Tool.

The location in the 4.6.10 Menu Tree is:

1. Device Setup → 2. Diag/Service → 2. **Self/test status**

### 4.6.7 Software Write Protect

digitalYEWFLO configured data is saved by using a write protect function. The write protect status is set to “Yes” when 8 alphanumeric characters are entered in the **New password** field and transferred to the transmitter. When write protect is set to “Yes,” the transmitter does not accept parameter changes. When the same eight alphanumeric string entered in the **New password** field is also entered in the **Enable wrt 10min** field and transferred to the digitalYEWFLO, it will be possible to change transmitter parameters during a 10 minute period.

To change the digitalYEWFLO from the write protect “Yes” status back to Write protect “No” status, use **Enable wrt 10min** to first release the write protect function and then enter eight spaces in the **New password** field.

### 4.6.8 HART Specific Functions

#### ■ Burst Mode

digitalYEWFLO continuously sends the data via HART Configuration Tool when the burst mode is set on (any one of PV, PV % range, or AO1). The data is sent intermittently as a digital signal at 3 times a second.

The burst mode is set as follows.

#### (1) Setting the data to be sent

The location in 4.6.10 Menu Tree is:

1. Device Setup → 4. Detailed Setup → 3. Configure outputs → 5. HART Output → 4. **Burst option**

Select the type of data to be sent from the following options:

- Instantaneous flow rate (PV)
- Output in % and current output (% range/current)
- 4 to 20 mA output (Process vars/crnt)

#### (2) Setting the burst mode

The location in 4.6.10 Menu Tree is:

1. Device Setup → 4. Detailed Setup → 3. Configure outputs → 5. HART Output → 4. **Burst mode**

Then, select “On” at the menu to start the burst mode.

To release from the burst mode, call up the burst mode display, and set to “Off.”

The default setting is “Off.”



## ■ Multidrop Mode

When set in the multidrop mode, up to 15 field devices in a single communications line can be connected. To activate multidrop communication, the address of the field devices must be set to a number from 1 to 15. This deactivates the 4 to 20 mA analog output, fixing it to 4 mA. Burn out is also disabled.

The multidrop mode is set as follows.

(1) Setting the polling address

The location in 4.6.10 Menu Tree is:

1. Device Setup → 4. Detailed Setup → 3. Configure outputs → 5. HART Output → **1. Poll addr**

Set a number from 1 to 15 to Poll addr.

(2) Activating the multidrop mode

The location in 4.6.10 Menu Tree is:

Online ↓ Utility → Configure Communication →

**Polling**

Confirm that any parameter of Polling is set to “**Always Poll**,” “**Ask Before Polling**,” or “**Digital Poll**.”



### NOTE

1. If “**Never Poll**” or “Poll Using Tag” is selected in “**Polling**”, the “**Online Menu**” cannot be called up and displayed. Be sure to select “**Digital Poll**” in “**Polling**” after assigned the polling address.
2. When the same polling address is assigned for two or more field devices in multidrop mode, communication with these field devices is disabled.

(3) Communication when set in the multidrop mode

1. The HART Configuration Tool searches a field device that is set in the multidrop mode when the HART Configuration Tool is turned on.

When the HART Configuration Tool is connected to the field device, the polling address and the tag will be displayed.

2. Select the field device, and then communication with it is possible. The communication speed is slow in this case.
3. To communicate with another field device, turn off the power once and then turn it back on, or call up “**Online**” menu, and select “**Online**.”

The polling address and the tag will appear. Select the field device.

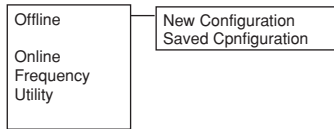
(4) Release of the multidrop mode

Call up the “**Poll addr**” display, and set the address to “**0**.”

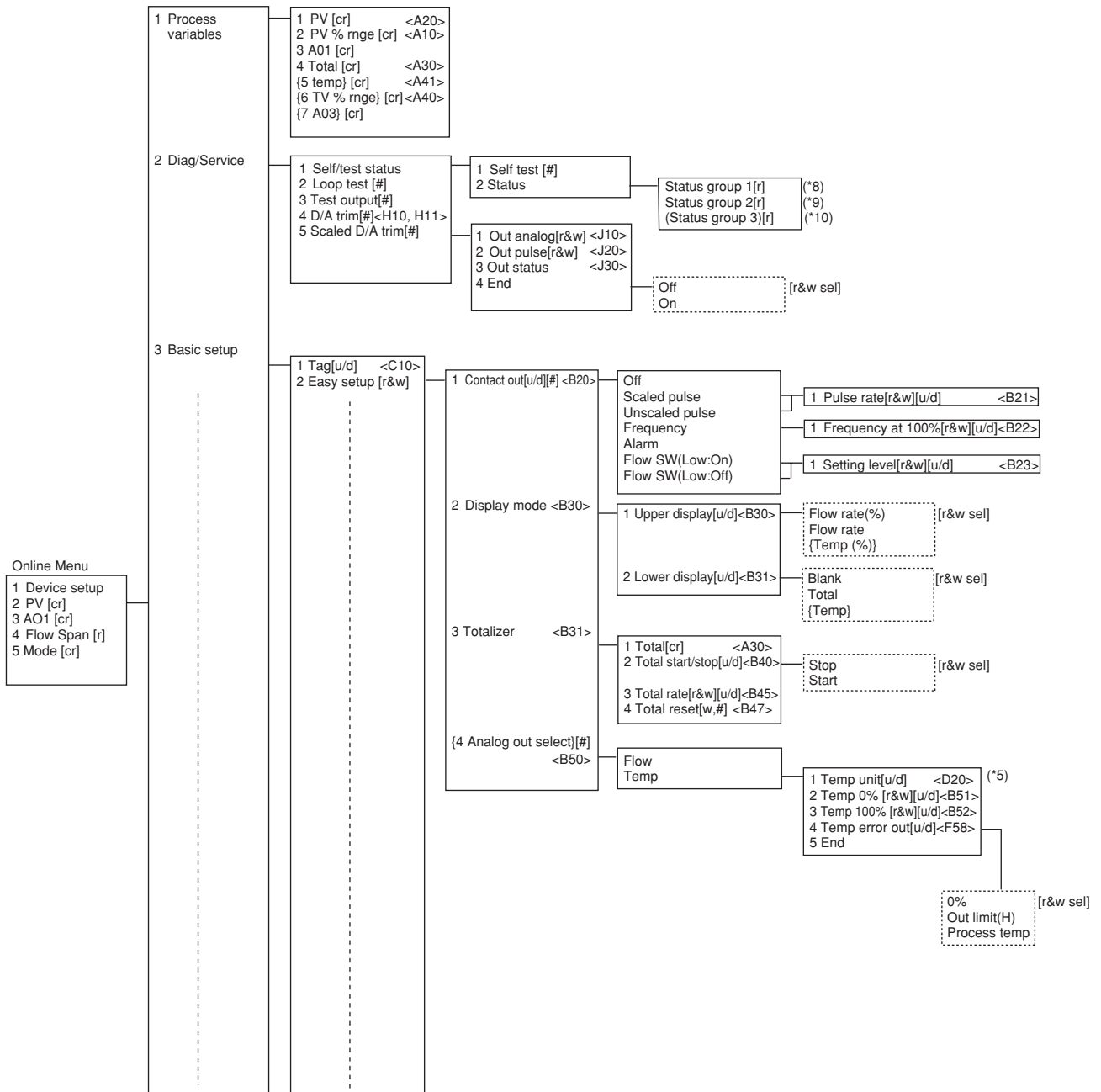
## 4.6.9 Other operations for the HART Configuration Tool

Regarding other operations for the HART Configuration Tool, refer to the HART Configuration Tool operations manual.

4.6.10 Menu Tree



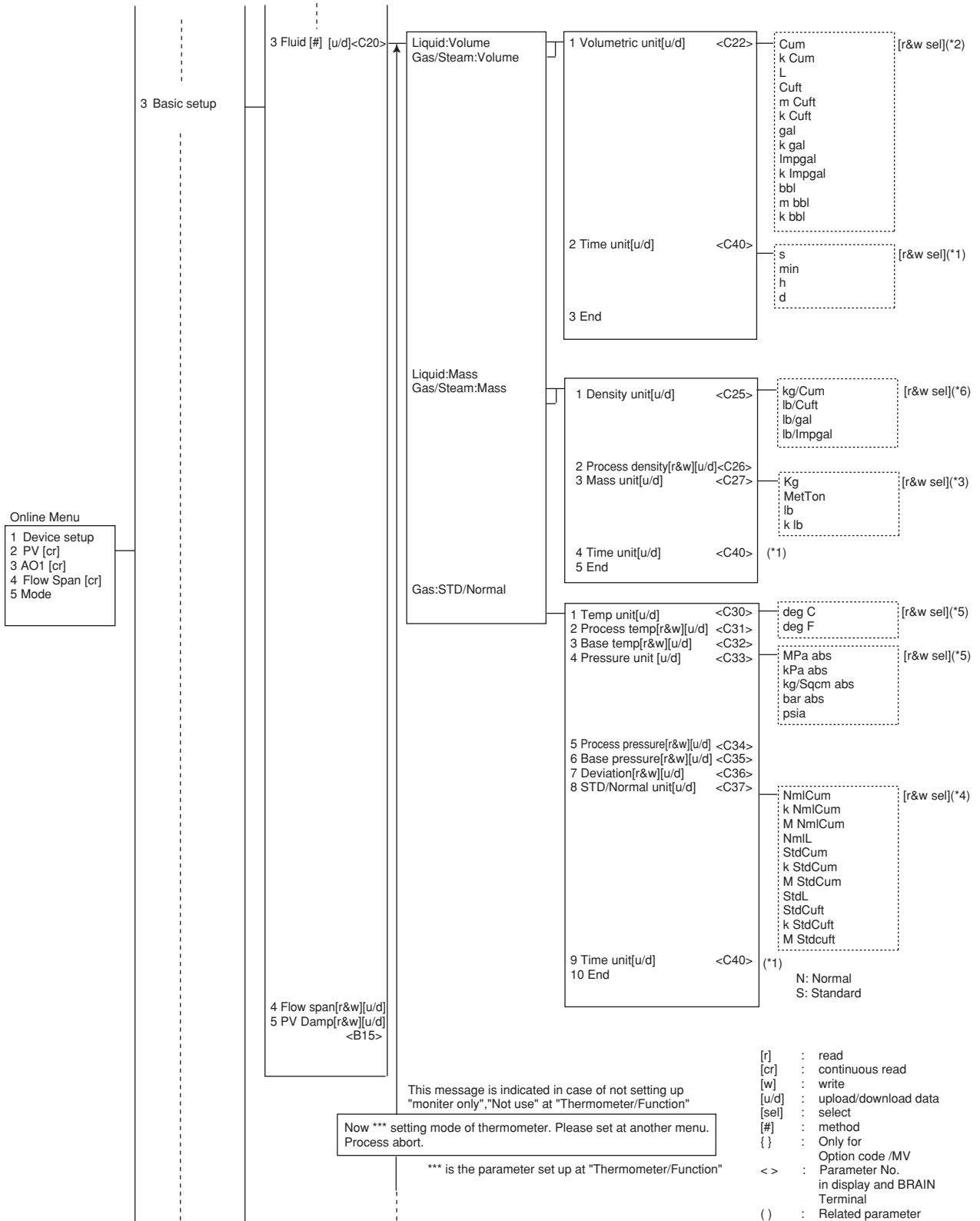
- [r] : read
- [cr] : continuous read
- [w] : write
- [u/d] : upload/download data
- [sel] : select
- [#] : method
- { } : Only for Option code /MV
- < > : Parameter No. in display and BRAIN Terminal
- ( ) : Related parameter



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#### 4. BASIC OPERATING PROCEDURES

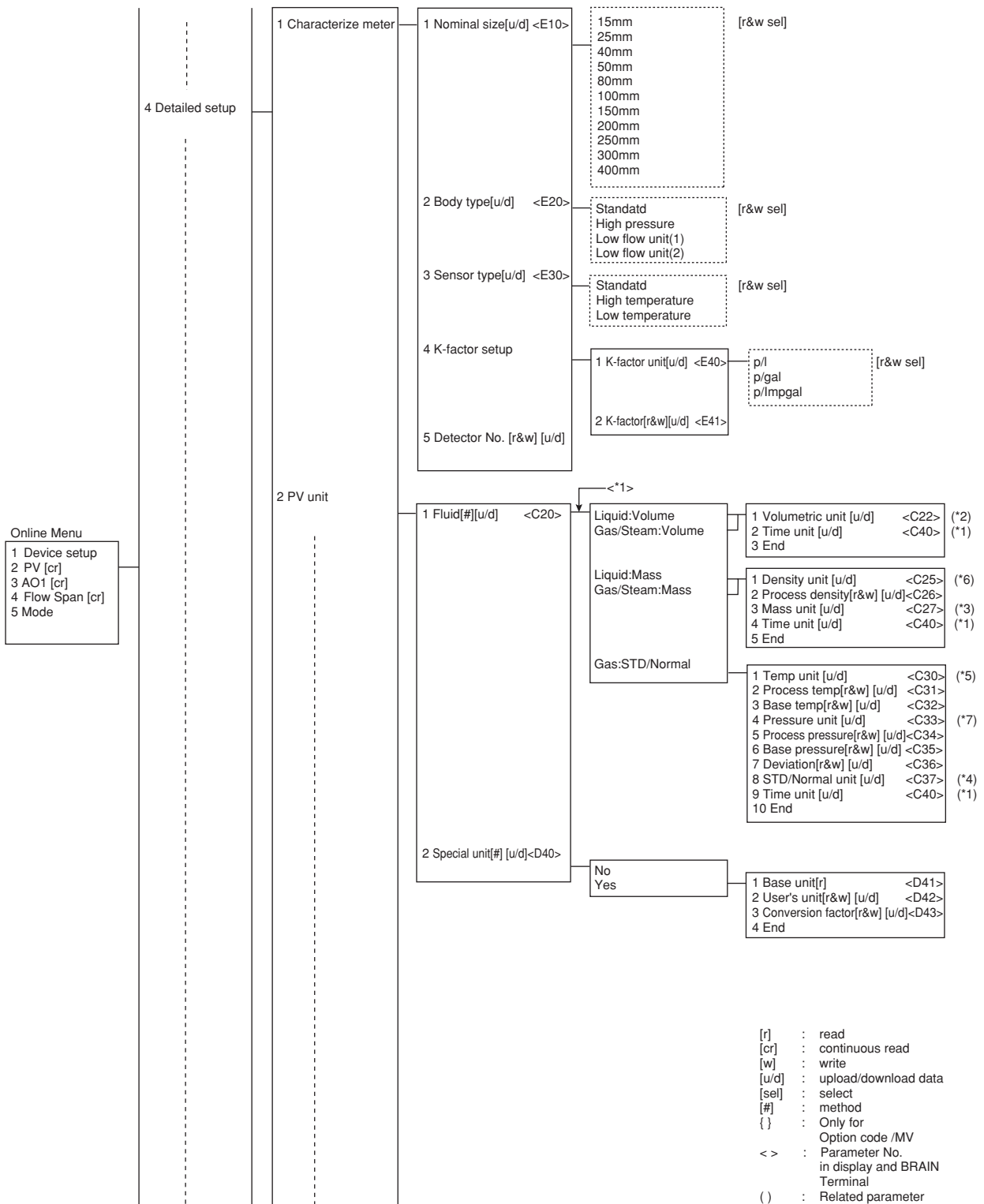


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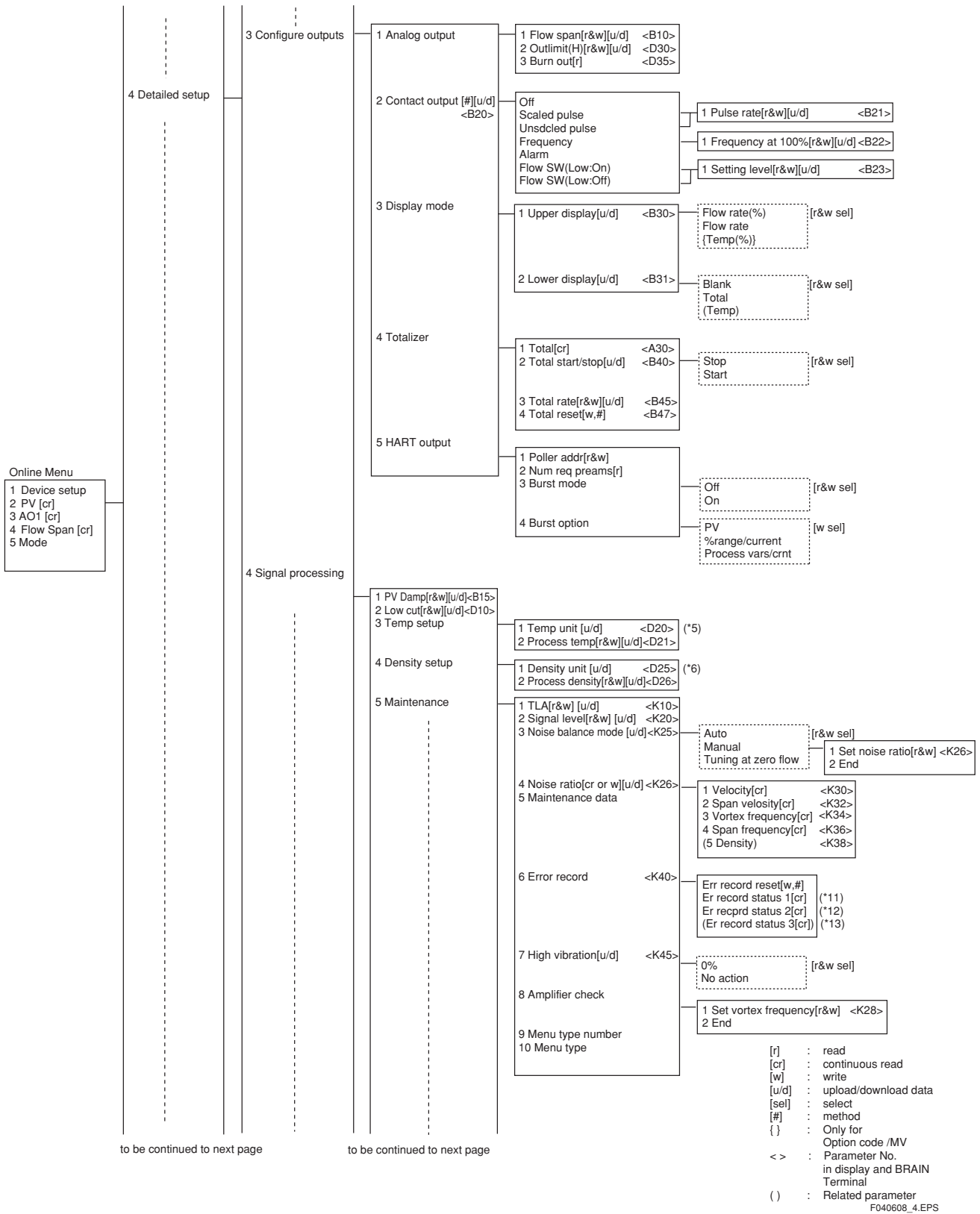
#### 4. BASIC OPERATING PROCEDURES



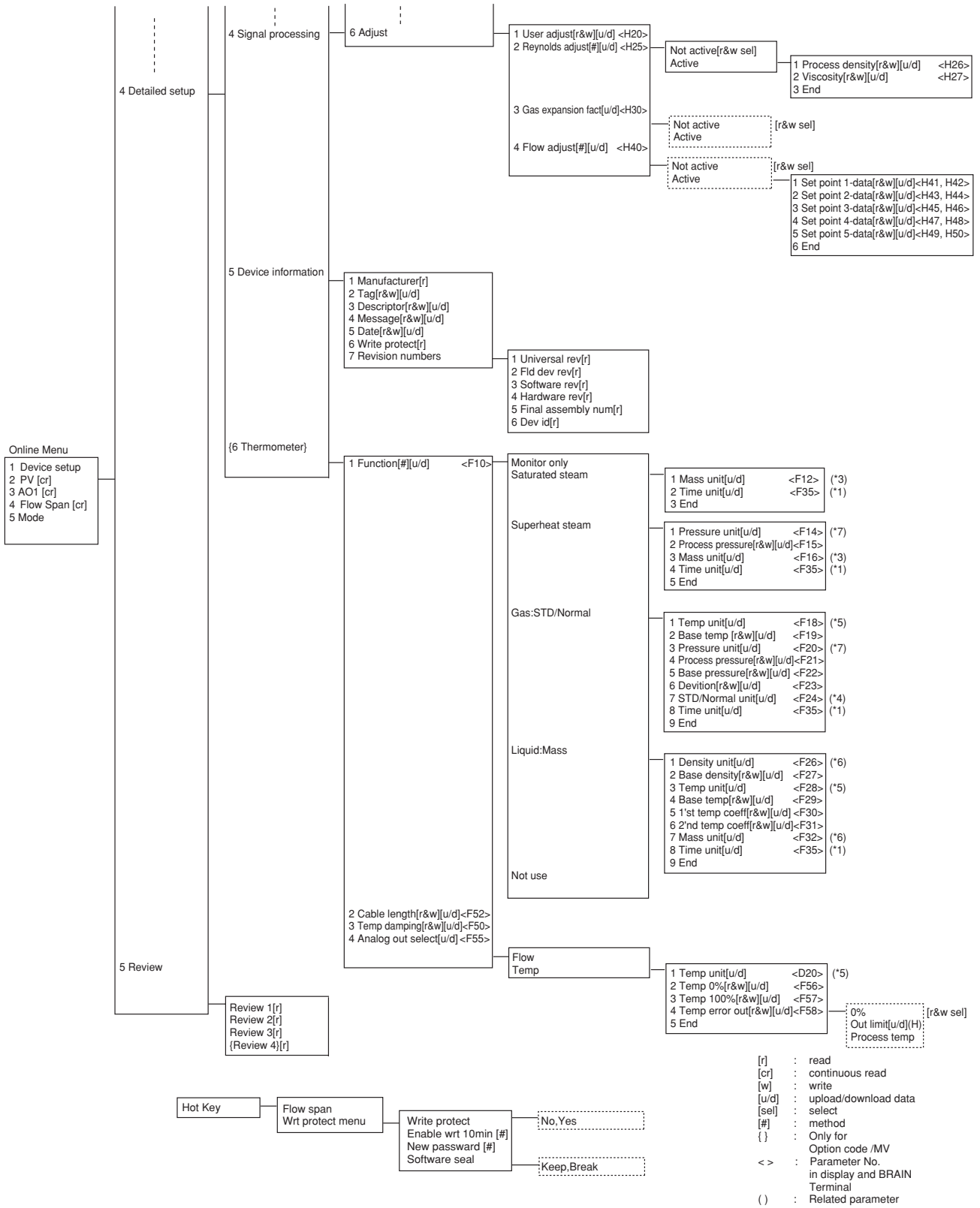
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## 4. BASIC OPERATING PROCEDURES



#### 4. BASIC OPERATING PROCEDURES



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## 5. PARAMETER SETUP

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### 5.1 Parameter Setup

The parameters are set before factory shipment. Set the required parameter of changing fluid, contact out and indication of display.

### 5.2 Multi-Variable Type Parameter (Only for /MV)

Parameter item F is indicated when /MV is selected.

The parameters are set before factory shipment, but it is necessary to set the analog output of temperature, span of temperature output.



#### IMPORTANT

For the remote type, be sure to set the cable length (F52) for DYA, remote type converter, because of effect of the cable length.

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### 5.3 Parameters List

This section describes the parameter of digitalYEWFL0.

- Contents of parameter lists.

Item	Description
Parameter number	Parameter item number.
Name	Parameter name.
R / W (Read and write)	Indicates parameter attributes. R : Display only (writing is not permitted). W : Writing is permitted.
Data range	Shows data setting ranges for numerical value entry. Shows data to be selected for data selection. ( ) in parentheses, data code is shown for the display.
Unit	Engineering unit.
Remarks	Remarks such as a description of the contents are given.
Disp.	D : Display can set parameter.
U / D	L : Parameter can be set by UP LOAD and DOWN LOAD. (Check all parameters after setting by DOWN LOAD.)
Initial value	Indicates the initial set values.

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**(1) Item A : Indication**

These items are for the indication of flowrate and total.

Item	Name	R/W	Data Range	Unit	Decimal point	Remark	Initial value	Disp.	U/D
A00	DISPLAY					Menu A (Display)			
A10	FLOW RATE(%)	R	0.0 to 110.0	%	1	Flow rate			
A20	FLOW RATE	R	0.0 to 65535	FU+C40	0 to 5	Flow rate (in engineering unit)			
A30	TOTAL	R	0 to 999999	FU	0 to 5	Totalized value			
(Indicate only within Temperature sensor)									
A40	TEMP(%)(*1)	R	0.0 to 110.0	%	1	Temperature Values (%)			
(Indicate only for Temperature sensor)									
A41	TEMPERATURE(*1)	R	-999.9 to 999.9	D20	1	Temperature Values			
A60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit

(\*1): Only for Option Code /MV

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**(2) Item B : Easy Setting**

These items are for the principal items to operate digitalYEWFLOW.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal point	Remark	Initial value	Disp.	U/D
B00	EASY SETUP					Menu B			
B10	FLOW SPAN	W	0.00001 to 32000	FU+C40	0 to 5	Flow Span	10	D	L
B15	DAMPING	W	0 to 99	sec	0	Damping Time	4	D	L
B20	CONTACT OUT	W	OFF (0) SCALED PULSE (1) UNSCALED PULSE (2) FREQUENCY (3) ALARM (4) FLOW SW(LOW:ON) (5) FLOW SW(LOW:OFF) (6)			Contact Output Type	(0)	D	L
(Indicate and Set only for B20 : SCALED PULSE, UNSCALED PULSE)									
B21	PULSE RATE	W	0.00001 to 32000	FU / P	0 to 5	Pulse Output Rate	1.0	D	L
(Indicate and Set only for B20 :FREQUENCY)									
B22	FREQ AT 100%	W	0 to 10000	PPS	0	Pulse Output Rate at sec / 100%	1000	D	L
(Indicate and Set only for B20 :FLOW SW (ON), FLOW SW (OFF))									
B23	SET LEVEL	W	0.00001 to 32000	FU +C40	0 to 5	Flow Switch (Actual Flow rate)	0	D	L
B30	UPPER DISP	W	FLOW RATE (%) (0) FLOW RATE (1) TEMP(%)(*1)			Selection of Upper Display	(0)	D	L
B31	LOWER DISP	W	BLANK (0) TOTAL (1) TEMP(*1)			Selection of Lower Display	(0)	D	L
B40	TOTAL START	W	STOP (0) START (1)			Start / Stop of Totalizer (1) (1)	(0)	D	L
B45	TOTAL RATE	W	0.00001 to 32000	(0) FU / P	0 to 5	Total Rate	1.0	D	L
B47	TOTAL RESET	W	NOT EXECUTE (0) EXECUTE (1)			Totalizer Reset	(0)	D	L
(Indicate and Set only for Option code /MV)									
B50	A / OUT SELECT	W	FLOW (0) TEMP (1)			Selection of Analog Output	(0)	D	L
(Indicate and Set only for B50: TEMP)									
B51	TEMP 0%	W	-999.9 to 999.9	D20	1	Set Temperature Value at 0%	-40	D	L
B52	TEMP 100%	W	-999.9 to 999.9	D20	1	Set Temperature Value at 100%	260	D	L
B60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit

(\*1) : Only for Option Code /MV

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**(3) Item C : BASIC SETUP**

These items are for the basic parameters with setting before shipment.

The parameters, C20 to C50, are not indicated when option code “/MV” is selected and parameter item is selected in F10 except “Monitor only” or “Not use”.

A value in “( )” is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal point	Remark	Initial value	Disp.	U/D
C00	BASIC SETUP					Menu C (Meter characterize)			
C10	TAG NO.	W	16 characters			Tag Number			
C20	FLUID	W	LIQUID:Volume (0) GAS/STEAM:Volume (1) LIQUID:Mass (2) GAS/STEAM:Mass (3) GAS:STD/Normal (4)			Selection of FLUID type	(0)	D	L
(Indicate and Set only for C20 : LIQUID : Volume, GAS / STEAM : Volume)									
C22	VOLUME UNIT	W	m <sup>3</sup> (0) k m <sup>3</sup> (1) l (2) cf (3) m cf (4) k cf (5) USgal (6) k USgal (7) UKgal (8) k UKgal (9) bbl (10) m bbl (11) k bbl (12)			Selection of Flow Units for Flow Rate	(0)	D	L
(Indicate and Set only for C20 : LIQUID : MASS, GAS / STEAM : MASS)									
C25	DENSITY UNIT	W	kg/m <sup>3</sup> (0) lb/c f (1) lb/USgal (2) lb/UKgal (3)			Selection of Density Unit	(0)	D	L
C26	DENSITY f	W	0.00001 to 32000	C25	0 to 5	Operating Density (Manual Setting Value)	1024	D	L
C27	MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of Mass Flow Unit	(0)	D	L
(Indicate and Set only for C20 : GAS : STD / Normal)									
C30	TEMP UNIT	W	deg C (0) deg F (1)			Selection of Temperature Unit	(0)	D	L
C31	TEMP f	W	-999.9 to 999.9	C30	1	Operating Temperature (Manual Setting Value)	15.0	D	L
C32	TEMP b	W	-999.9 to 999.9	C30	1	Standard / Normal Temperature	15.0	D	L
C33	PRESS UNIT	W	MPa abs (0) kPa abs (1) bar abs (2) kg/cm <sup>2</sup> a (3) psia (4)			Selection of Pressure Unit	(0)	D	L
C34	PRESS f	W	0.00001 to 32000	C33	0 to 5	Absolute Pressure at Operating Condition (Manual Setting Value)	0.1013	D	L
C35	PRESS b	W	0.00001 to 32000	C33	0 to 5	Absolute Pressure at Standard Condition	0.1013	D	L
C36	DEVIATION	W	0.001 to 10.0		3	Deviation Factor	1.0	D	L
C37	STD/NOR UNIT	W	Nm <sup>3</sup> (0) k Nm <sup>3</sup> (1) M Nm <sup>3</sup> (2) NI (3) Sm <sup>3</sup> (4) k Sm <sup>3</sup> (5) M Sm <sup>3</sup> (6) Sl (7) scf (8) k scf (9) M scf (10)			Selection of Volumetric Unit at Normal Condition N: Normal S: Standard	(0)	D	L
C40	TIME UNIT	W	/s (0) /m (1) /h (2) /d (3)			Selection of Time Unit	(2)	D	L
C45	FLOW SPAN	W	0.00001 to 32000	FU+C40	0 to 5	Flow Span	10	D	L
C50	DAMPING	W	0 to 99	sec	0	Damping Time	4	D	L
C60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit  
(\*1) : Only for Option Code /MV

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**(4) Item D : Additional Setup**

These items are for Auxiliary Setup.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal point	Remark	Initial value	Disp.	U/D
D00	AUX. SETUP					Menu D (Additional Setup)			
D10	LOW CUT	W	* to 32000	FU+C40	0 to 5	Low Cut Flow rate		D	
D20	TEMP UNIT	W	deg C (0) deg F (1)			*Minimum Flow rate / 2 Selection of Temperature Unit	(0)	D	L
D21	TEMP f	W	-999.9 to 999.9	D20	1	Operating Temperature (Manual Setting Value)	15.0	D	L
D25	DENSITY UNIT	W	kg/m <sup>3</sup> (0) lb/cf (1) lb/USgal (2) lb/UKgal (3)			Selection of Density Unit	(0)	D	L
D26	DENSITY f	W	0.00001 to 32000	D25	0 to 5	Operating Density (Manual Setting Value)	1024	D	L
D30	OUT LIMIT (H)	W	100.0 to 110.0	%	1	Upper Limit Value	110.0	D	L
D35	BURN OUT	R	High (0) Low (1)			Output Direction at Burn Out	(0)	D	L
D40	SPECIAL UNIT		No (0) Yes (1)			Selection of change for Special Flow Unit	(0)	D	L
(Indication and set only for D40 : Yes)									
D41	BASE UNIT	R	m <sup>3</sup> (0) k m <sup>3</sup> (1) l (2) cf (3) m cf (4) k cf (5) USgal (6) kUSgal (7) UKgal (8) kUKgal (9) bbl (10) m bbl (11) k bbl (12) kg (13) t (14) lb (15) k lb (16) Nm <sup>3</sup> (17) k Nm <sup>3</sup> (18) M Nm <sup>3</sup> (19) NI (20) Sm <sup>3</sup> (21) k Sm <sup>3</sup> (22) M Sm <sup>3</sup> (23) SI (24) scf (25) k scf (26) M scf (27)			Basic unit for conversion to special unit N: Normal S: Standard		D	
D42	USER'S UNIT	W	8 characters			User's unit			L
D43	CONV FACTOR	W	0.00001 to 32000		0 to 5	Coefficient for conversion to special unit	1.0	D	
D60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			L

FU : Flow unit

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**(5) Item E : Detector Setup**

These items are for detector that has been already set before.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal point	Remark	Initial value	Disp.	U/D
E00	METER SETUP					Menu E (Detector setup)			
E10	NOMINAL SIZE	W	15mm (0) 25mm (1) 40mm (2) 50mm (3) 80mm (4) 100mm (5) 150mm (6) 200mm (7) 250mm (8) 300mm (9) — (10)			Selection of Nominal Size	(1)	D	L
E20	BODY TYPE	W	Standard (0) High Pressure (1) Low Flow Unit (1) (2) Low Flow Unit (2) (3) — (1)			Selection of Body Type	(0)	D	L
E30	SENSOR TYPE	W	Standard (0) High Temperature (1) Low Temperature (2)			Selection of Sensor Type	(0)	D	L
E40	K-FACT UNIT	W	P/l (0) P/Usgal (1) P/Ukgal (2)			Selection of K-factor Unit	(0)	D	L
E41	K-FACTOR	W	0.00001 to 32000	E40	0 to 5	K-factor value of 15 deg C	68.6	D	
E50	DETECTOR No.	W	16 characters			Detector number			
E60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

FU : Flow unit

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**(6) Item F: Thermometer (Only for Option Code /MV)**

These items is for thermometer setting when.

A Value in "( )" is the data corresponding to the indicator.

Item	Name	R / W	Data Range	Unit	Decimal Point	Remark	Initial Value	Disp	U/D*1
F00 F10	THERMOMETER Function	W	Monitor only (0) Saturated Steam (1) Superheat Steam (2) GAS: STD/Normal (3) LIQUID: Mass (4) Not use (5)			Menu F (Thermometer function) Select thermometer function. (Move to F40 when "Monitor only" is selected) (Move to F60 when "Not Use" is selected)	(0)	D	L
F12	(Indicate and set only for F10: Saturated Stem) MASS UNIT	W	kg (0) t (1) lb (2) k lb (3)			Selection of mass flow rate unit	(0)	D	L
F14	(Indicate and set only for F10: Superheat Steam) PRSS UNIT	W	MPa abs (0) kPa abs (1) bar abs (2) kg/cm2 a (3) psia (4)			Selection of pressure unit	(0)	D	L
F15 F16	PRESS f MASS UNIT	W W	0.00001 to 32000 (0) kg (0) t (1) lb (2) k lb (3)	F14	0 to 5	Absolute pressure at operating condition(Manual setting value) Selection of mass flow rate unit	0.1013 (0)	D	L
F18 F19 F20	(Indicate and set only for F10: GAS STD/Normal) TEMP UNIT TEMP b PRESS UNIT	W W W	deg C (0) deg F (1) -999.9 to 999.9 (0) MPa abs (0) kPa abs (1) bar abs (2) kg/cm2 a (3) psia (4)	F18	1	Selection of temperature unit Standard/Normal temperature Selection of temperture unit	(0) 15.0 (0)	D D	L L
F21 F22 F23 F24	PRESS f PRESS b DEVIATION STD/NOR UNIT	W W W W	0.00001 to 32000 (0) 0.00001 to 32000 (0) 0.001 to 10.000 (0) Nm3 (0) k Nm3 (1) M Nm3 (2) NI (3) Sm3 (4) k Sm3 (5) M Sm3 (6) Sl (7) scf (8) k scf (9) M scf (10)	F20 F20	0 to 5 0 to 5 3	Absolute pressure at operating condition(Manual setting value) Absolute pressure at Standard condition Deviation factor Selection of volumetric unit at normal condition N: Normal S: Standard	0.1013 0.1013 1.0 (0)	D D D D	L L L L
F26 F27 F28	(Indicate and set only for F10: Liquid: Mass) DENSITY UNIT DENSITY b TEMP UNIT	W W W	kg/m3 (0) lb/cf (1) lb/USgal (2) lb/UKgal (3) 0.00001 to 32000 (0) deg C (0) deg F (1)	F26	0 to 5	Selection of density unit Density of standard condition Selection of temperature unit	(0) 1024 (0)	D D	L L
F29 F30 F31 F32	TEMP b 1st coef 2nd coef MASS UNIT	W W W W	-999.9 to 999.9 (0) -32000 to 32000 (0) -32000 to 32000 (0) kg (0) t (1) lb (2) k lb (3)	F28 1/F28	1 0 to 5 0 to 5	Temperature of standard condition 1st temperature coefficient 2nd temperature coefficient Selection of mass flow rate unit	15.0 0 0 (0)	D D D D	L L L L
F35 F40 F45 F50 F52 F55	TIME UNIT FLOW SPAN DAMPING TEMP DAMPING CABLE LENGTH A/OUT SELECT	W W W W W W	/s (0) /m (1) /h (2) /d (3) 0.00001 to 32000 (0) 0 to 99 (0) 0 to 99 (0) 0 to 30 (0) FLOW (0) TEMP (1)	FU+35 sec sec m	0 to 5 0 0 0	Selection of time unit Flow span Damping Damping for temperture output Cable length for signal cable (0m in case of integral version) Selection of analog output	1 0.5 4 4 0 (0)	D D D D D D	L L L L L L
F56 F57 F58	(Indicate and set only for F55: TEMP) TEMP 0% TEMP 100% TEMP ERR OUT	W W W	-999.9 to 999.9 (0) -999.9 to 999.9 (0) 0% (0) OUT LIMIT(H) (1) TEMP f (2)	D20 D20	1 1	Temperature value at 0% Temperture value at 100% Selection of themometer error output when "F55: TEMP" is selected (A value of OUT LIMIT(H) depend on D30)	-40 260 1	D D D	L L L
F60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

(\*1) When "K50 : SOFTWARE REV" is "3.10", it can be available.

**(7) Item H : Adjust.**

These items are for setting of adjustment.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal Point	Remark	Initial value	Disp.	U/D
H00	ADJUST					Menu H (Adjust)			
H10	TRIM 4mA	W	-1.00 to 1.00	%	2	Trimming 4mA	0.0	D	
H11	TRIM 20mA	W	-1.00 to 1.00	%	2	Trimming 20mA	0.0	D	
H20	USER ADJUST	W	0.00001 to 32000		0 to 5	User Adjust	1.0	D	
H25	REYNOLDS ADJ	W	NOT ACTIVE (0) ACTIVE (1)			Reynolds Coefficient	(0)	D	
(Indicator and Set only H25 : Active)									
H26	DENSITY f	W	0.00001 to 32000	D25	0 to 5	Density at operating condition	1024	D	
H27	VISCOSITY	W	0.00001 to 32000	mPa-s	0 to 5	Viscosity factor	1.0	D	
H30	EXPANSION FA	W	NOT ACTIVE (0) ACTIVE (1)			Expansion correction for compressible Gas	(0)	D	
H40	FLOW ADJUST	W	NOT ACTIVE (0) ACTIVE (1)			Instrumental Error Adjust	(0)	D	
(Indicator and Set only H40 : Active)									
H41	FREQUENCY 1	W	0 to 32000	Hz	0 to 5	First break-point frequency (f1)	0.0	D	
H42	DATA 1	W	-50.00 to 50.00	%	2	First correcting value (d1)	0.0	D	
H43	FREQUENCY 2	W	0 to 32000	Hz	0 to 5	Second break-point frequency (f2)	0.0	D	
H44	DATA 2	W	-50.00 to 50.00	%	2	Second correcting value (d2)	0.0	D	
H45	FREQUENCY 3	W	0 to 32000	Hz	0 to 5	Third break-point frequency (f3)	0.0	D	
H46	DATA 3	W	-50.00 to 50.00	%	2	Third correcting value (d3)	0.0	D	
H47	FREQUENCY 4	W	0 to 32000	Hz	0 to 5	Fourth break-point frequency (f4)	0.0	D	
H48	DATA 4	W	-50.00 to 50.00	%	2	Fourth correcting value (d4)	0.0	D	
H49	FREQUENCY 5	W	0 to 32000	Hz	0 to 5	Fifth break-point frequency (f5)	0.0	D	
H50	DATA 5	W	-50.00 to 50.00	%	2	Fifth correcting value (d5)	0.0	D	
H60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

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**(8) Item J : Test**

These items are for test of output.

A value in "( )" is the data corresponding to the indicator.

Item	Name	R/W	Data Range	Unit	Decimal Point	Remark	Initial value	Disp.	U/D
J00	TEST					Menu J (Test)			
J10	OUT ANALOG	W	0.0 to 110.0	%	1	Current Output	0.0	D	
J20	OUT PULSE	W	0 to 10000	PPS	0	Pulse Output	0	D	
J30	OUT STATUS	W	OFF (0) ON (1)			Status Output	(0)	D	
J60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

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**(9) Item K : Maintenance**

These items are for maintenance.

Item	Name	R/W	Data Range	Unit	Decimal Point	Remark	Initial value	Disp.	U/D
K00	MAINTENANCE					Menu K (Maintenance)			
K10	TLA	W	0.1 to 20.0		1	Trigger Level Adjust	1.0	D	
K20	SIGNAL LEVEL	W	0.1 to 20.0		1	Signal Level	1.0	D	
K25	N.B. MODE	W	AUTO (0) MANUAL (1) TUNING AT ZERO (2)			Selection of Noise balance Mode	(0)	D	
K26	NOISE RATIO	R/W	0.00 to 2.00		2			D	
K28	SET VORTEX F	W	0 to 10000	Hz	0 to 5	Output test by setting simulated frequency.(*2)		D	
K30	VELOCITY	R		m/s	2	Velocity		D	
K32	SPAN V	R		m/s	2	Span velocity		D	
K34	VORTEX FREQ.	R		Hz	0 to 5	Vortex frequency		D	
K36	SPAN F	R		Hz	0 to 5	Span frequency		D	
(Indicate only for F10: "Saturated Steam" or "Super heat steam" or "Liquid mass)(*1)									
K38	DENSITY	R	0.00001 to 32000	D25	0 to 5	Density value (Calculated by Thermometer)		D	
K40	ERROR RECORD	R				Error Records			
K45	H VIBRATION	W	0% (0) NO ACTION (1)			Selection of Output Function when "High Vibration" error is indicated.	(0)		
K50	SOFTWARE REV	R	0.01 to 99.99			Software Revision Number			
K60	SELF CHECK	R	GOOD ERROR			Self-diagnostic message			

(\*1) Only for Option Code /MV

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(\*2) Available for 5.10 or greater version that can be checked in K50 SOFTWARE REV.

**(10) Item M : Memo**

These items are for Memorandum.

Item	Name	R/W	Data Range	Unit	Decimal Point	Remark	Initial value	Disp.	U/D
M00	MEMO					Menu M (Memo)			
M10	MEMO 1	W	16 characters	W		Memorandum 1 (16 characters)			
M20	MEMO 2	W	16 characters	W		Memorandum 2 (16 characters)			
M30	MEMO 3	W	16 characters	W		Memorandum 3 (16 characters)			
M60	SELF CHECK	R	GOOD ERROR	R		Self-diagnostic message			

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## 5.4 Parameter Description

### (1) Item A : Display

These items are for the indication of flowrate and total.

#### [A10:FLOW RATE(%)] Flow rate

Flowrate is displayed by “%” to span value.

#### [A20:FLOW RATE] Flow rate (Engineering unit)

Flowrate is displayed by engineering unit.

#### [A30:TOTAL] Total value

Total value of flowrate is displayed

**The following item should be done in case of which Option code /MV is selected and analog output is “Temperature”.**

#### [A40:TEMP(%)] Temperature value

The measured temperature value is displayed by “%” to span value of temperature.

**The following item should be done in case of which Option code /MV is selected.**

#### [A41:TEMPERATURE] Temperature value

The measured temperature value is displayed by engineering unit.

### (2) Item B : Easy Setting

These items are for the Principal items to operate digital YEW FLO.

A value in “( )” is the data corresponding to indicator.

#### [B10:FLOW SPAN] Flowrate span

Set the required span with a numerical.



#### NOTE

A span setting is available up to 1.5 times of the maximum flow velocity. However, range of measurable flow velocity is as described in Table 9.5.2.

#### [B15:DAMPING] Damping time constant

Set damping time constant values from 0s to 99sec.

#### [B20:CONTACT OUT] Contact output

Select contact output.

Item	Description
OFF (0)	—————
SCALED PULSE (1)	Scaled pulse output: Refer to “B21”
UNSCALED PULSE (2)	Unscaled pulse output: Refer to “B21”
FREQUENCY (3)	Frequency output: Refer to “B22”
ALARM (4)	Alarm output: The status goes from close to open (OFF) during alarming. Refer to 5.5 Error Code Lists.
FLOW SW (LOW:ON) (5)	Status output: Refer to “B23”
FLOW SW (LOW:OFF) (6)	Status output: Refer to “B23”

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#### [B21:PULSE RATE] Pulse output rate

Set output rate in a selection of SCALED PULSE or UNSCALED PULSE.

SCALED PULSE OUTPUT:

When SCALED PULSE is selected in B20, set flowrate per one pulse output. Rate unit is linking to the flow unit.

UNSCALED PULSE OUTPUT:

When UNSCALED PULSE is selected in B20, it output number of vortex (vortex frequency) as a pulse-number, which is detected from vortex shedder bar. (1.0 must be set for this.)

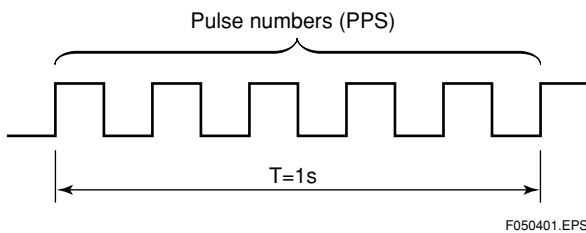
The formula for output pulse number is as follows.

Output pulse number per one second = vortex number per one second / PULSE RATE set number. Refer to 6.1.5 Unit of Pulse Output (Scaling).



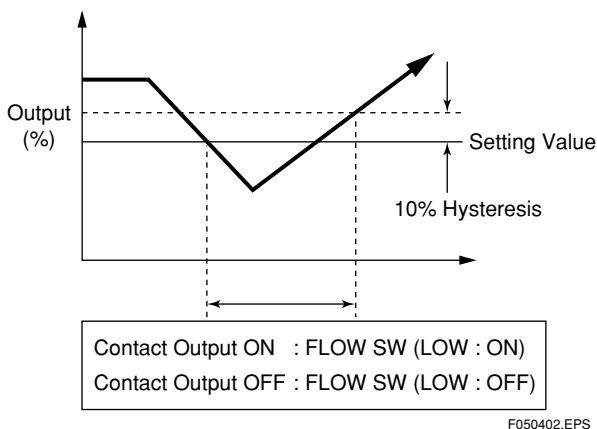
**[B22:100% FREQ] Pulse numbers of 100% at one second**

Set pulse number at 100% for one second when “FREQUENCY” in B20 is selected.



**[B23:SET LEVEL] Level of flow switch**

Set level of flow switch when “FLOW SW” in B20 is selected. The contact output is sent out when the flowrate is less than the set comparison level.



**[B30:UPPER DISP] Upper indicator display**

Select upper display, Flow rate (%) (0), Flowrate (1), TEMP(%) (2). “TEMP(%)” can be selected when Option Code /MV.

**[B31:LOWER DISP] Lower indicator display**

Select lower indicator display, “BLANK (0), TOTAL (1), TEMP(2). When “BLANK” in B31 is selected, indicator is blank. “TEMP” can be selected when Option Code /MV.

**[B40:TOTAL START]**

Select the START/STOP of totalizer from “STOP (0), START (1).”

**[B45:TOTAL RATE] Total rate of the totalizer**

Set the total rate of the totalizer.

**[B47:TOTAL RESET] Reset the totalizer**

When totalizer reset function is executed, the total display and communication parameter are reset.

**The following items should be done in case of which Option code “/MV” is selected.**

**[B50 A/OUT SELECT] Analog Output select**

Select the analog output select from flow rate or temperature.

When changing the analog output, UPPER DISPLAY can be changed shown as below automatically.

B50 : A/OUT SELECT	UPPER DISPLAY
“TEMP” TO “FLOW”	FLOW(%)
“FLOW” TO “TEMP”	TEMP(%)

(“B30 : UPPER DISPLAY” is “FLOW RATE”, it can not be changed.)

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**The following item should be done in case of which B50 is “TEMP”**

**[B51 TEMP 0%]**

Set temperature value of 0% output.

**[B52 TEMP 100%]**

Set temperature valve of 100% output.

**(3) Item C : BASIC SETUP**

These items are for the basic parameters with setting before shipment.

The parameters which are set in B are not necessary to set in C.

A value in “( )” is the data corresponding to indicator.

**The parameters, C20 to C50, are not indicated when option code “/MV” is selected and parameter item is selected in F10 except “Monitor only” or “Not Use”.**

**[C10: TAG NO] Tag. No**

Set Tag. No. (16 characters)

Available characters are as follows.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z a b c d e f g h i j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9 . SPACE / - , + * ) ( ' & % \$ # " !
--

**[C20:FLUID] Flowrate unit**

Set the flowrate unit below.

Item	Description
LIQUID : Volume (0)	Volumetric flow of liquid measuring
GAS/STEAM : Volume (1)	Volumetric flow of gas or steam measuring
LIQUID : Mass (2)	Mass flow of liquid measuring
GAS/STEAM : Mass (3)	Mass flow of gas or steam measuring
GAS : STD/Normal (4)	Volumetric flow at Standard condition

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**The following items should be done in case of which “C20” is “LIQUID : Volume” or “GAS/STEAM : Volume”.**

**[C22:VOLUME UNIT] Volumetric unit**

Select the unit of volumetric flow from m<sup>3</sup>(0), km<sup>3</sup>(1), l(2), cf(3), mcf(4), def(5), USgal(6), kUKgal(9), bbl(10), mdbl(11), kdbl(12).

**The following items should be done in case of which “C20” is “LIQUID: Mass” or “GAS/STEAM : Mass”**

**[C25:DENSITY UNIT] Density Unit of Flow measurement**

Select the unit of density from kg/m<sup>3</sup>(0), lb(1), lb/USgal(2), lb/UKgal(3).

**[C26:DENSITY f] Density at normal operation conditions**

Set the density value of the fluid at operating condition for mass flow unit.

**[C27:MASS UNIT] Mass flowrate unit**

Select the mass flowrate unit from kg(0), t(1), lb(2), k lb(3).

**The following item should be done in case of which “C20” is “GAS/STEAM : Volume”.**

**[C30:TEMP UNIT] Fluid temperature unit at operating conditions**

Select temperature unit at operating condition from

“degC (0), degF (1)”.

**[C31:TEMP f] Fluid temperature at operating conditions**

Set fluid temperature at operating condition.

Range is -196 to 450°C

**The following items should be done in case of which “C20” is “GAS/STD : Normal”.**

**[C32:TEMP b] Fluid temperature at standard/normal conditions**

Set the values of Fluid temperature at standard condition.

**[C33:PRESS UNIT] Pressure unit**

Select the unit of pressure from “MPa abs(0), kPa abs(1), kg/cm<sup>2</sup> abs(2), bar abs(3)”.

**[C34:PRESS f] Absolute pressure at operating conditions**

Set the absolute pressure at operating condition.

**[C35:PRESS b] Absolute pressure at standard/normal condition**

Set the absolute pressure at normal condition.

**[C36:DEVIATION] Deviation factor**

Set deviation factor.

**[C37:STD/NOR UNIT] Volumetric unit at normal conditions**

Select volumetric unit at normal condition from Nm<sup>3</sup>(0), kNm<sup>3</sup>(1), MNm<sup>3</sup>(2), NI(3), Sm<sup>3</sup>(4), Km<sup>3</sup>(5), Mm<sup>3</sup>(6), Sl(7), scf(8), kscf(9), Mscf(10).

N: Normal

S: Standard

**[C40:TIME UNIT] TIME UNIT**

Select time unit from “/s(0), /m(1), /h(2), d(3)”

**[C45:FLOW SPAN] Flowrate span**

Set the required span with a numerical value.

**[C50:DAMPING] Damping time constant**

Set damping time constant values from 0 to 99s.

**(4) Item D (AUX SETUP)**

These items are for Auxiliary setup.

A value in “( )” is the data corresponding to indicator.

**[D10:LOW CUT] Low-cut flowrate****NOTE**


---

For D10 setting, be sure to set “NOMINAL SIZE” in E10 firstly.

---

Set to noise elimination or zero flow in the low flowrate (or low frequency) range. The settable range for low cut flowrate is more than half-minimum flowrate.

**NOTE**


---

In case that D10: LOW CUT and item H (ADJUST) are necessary to set, change all appropriate parameters of item H before setting D10.

---

**[D20:TEMP UNIT] Fluid temperature unit at operating conditions**

Select temperature unit at operating condition from “degC (0), degF (1)”.

**[D21:TEMP f] Fluid temperature at operating conditions**

Set fluid temperature at operating condition.

Range is -196 to 450°C

**[D25:DENSITY UNIT] Density Unit of Flow measurement**

Select the unit of density from kg/m<sup>3</sup>(0), lb(1), lb/USgal(2), lb/UKgal(3).

**[D26:DENSITY f] Density at normal operation conditions**

Set the density value of the fluid at operating condition for mass flow unit

**[D30:OUT LIMIT] Limit value of output and indication**

Set limit value of output from 100.0% to 110.0%

**[D35:BURN OUT] Indication of the output direction at burn out**

This is indication of the output direction at burn out. Refer to “6.1.6 Burn out” when the output direction can be changed.

**[D40:SPECIAL UNIT] Change to special flowrate unit**

Select the availability of changing to special flowrate Unit from “No(0)” or “Yes(1)”

**[D41:BASE UNIT] Indication of the special flowrate unit**

Indication of the basic flowrate unit when item D40 is “Yes(1)”

**[D42:USER'S UNIT] Free unit for users**

Set in up to 8 alphanumeric characters when item D40 is “Yes(1)”

**(5) Item E (METER SETUP)**

These items are for detector set up that has already been set before shipment.

A value in “( )” is the data corresponding to indicator.

**[E10:NOMINAL SIZE] Nominal size of the detector**

Select the nominal size of the flowmeter, from “15mm(0), 25mm(1), 40mm(2), 50mm(3), 80mm(4), 100mm(5), 150mm(6), 200mm(7), 250mm(8), 300mm(9)”

**[E20:BODY TYPE] Body type for the detector**

Select body type for detector from standard or high pressure.

Standard (0) : Standard type  
 High Pressure (1) : High Pressure type (tokuchu)  
 Low Flow Unit (1) (2) : Reduced Bore type (option : /R1)  
 Low Flow Unit (2) (3) : Reduced Bore type (option : /R2)

**NOTE**

Parameter setting for the Reduced Bore type, Select Low Flow Unit (1) or (2) and set. Set nominal size of the model code to E10: NOMINAL SIZE.

**[E30:SENSOR TYPE] Sensor type for the detector**

Select sensor type for the detector.

Standard (0) : Standard type  
 High Temperature (1) : Option /HT  
 Low Temperature (2) : Option /LT

**[E40:K-FACTOR UNIT],**

Select this unit from p/l, p/Usgal, p/Ukgal.

**IMPORTANT**

K-FACTOR is the eigenvalue of each detector.  
 Please keep the factory preset value.  
 NEVER REWRITE IT.  
 (Unless the replacement of the remote type detector.)

**[E41:K-FACTOR]**

The flowmeter data plate includes a K-factor (KM) at 15°C for the combined detector.

**[E50:DETECTOR NO.] Detector number of flowmeter**

Set the serial number using 16 alphanumeric characters of the detector combined converter.

**(6) Item F (Thermometer)**

These items are for setting of thermometer and available when build in thermometer type (Option code: /MV).

**[F10: Function] Thermometer function**

Select the thermometer function.

Monitor only(0): Only temperature measurement.

Saturated Steam: Mass Flow rate is calculated from density values by temperature measurement using saturated steam table.

Superheat Steam: Mass Flow rate is calculated from density values by temperature measured by using steam table. In order to measure superheat steam. It is necessary to make constant pressure value.

GAS: STD/Normal: Volumetric flow rate at standard condition is calculated by using Pressure-Temperature correction. It is necessary to make constant pressure value.

Liquid: Mass: Mass flow rate is calculated by using the density change values depend on temperature values by which the secondary order function is used.

**The following item should be done in case of which F10 is Saturated steam****[F12 MASS UNIT] Mass flow unit**

Select mass rate unit from kg(0), t(1), lb(2), k lb(3).

**The following items should be done in case of which F10 is Superheat steam****[F14 PRESS UNIT] Pressure unit**

Select pressure unit from MPa abs(0), kPa abs(1), bar abs(2), kg/cm<sup>2</sup> a(3), psia(4).

**[F15 PRESS f] Pressure value**

Set absolute pressure values at operating condition.

**[F16 MASS UNIT] Mass flow unit**

Select mass flow unit from kg(0), t(1), lb(2), k lb(3).

The following items should be done in case of which F10 is GAS: STD/Normal

**[F18 TEMP UNIT] Temperature unit**

Select temperature unit from deg C(0), deg F (1).

**[F19 TEMP b] Temperature b**

Set temperature value at normal/standard condition.

**[F20 PRESS UNIT] Pressure unit**

Select pressure unit from MPa abs(0), kPa abs(1), bar abs(2), kg/cm<sup>2</sup> a(3), psia(4).

**[F21 PRESS f] Pressure value f**

Set absolute pressure values at operating condition.

**[F22 PRESS b] Pressure value b**

Set absolute pressure values at normal/standard Condition.

**[F23 DAVIATION] Daviation factor**

Set the daviation factor.

**[F24 STD/NOR UNIT] Standard/Normal unit**

Select Volumetric unit at standard/normal condition From Nm<sup>3</sup>(0), k Nm<sup>3</sup>(1), M Nm<sup>3</sup>(2), NI(3), Sm<sup>3</sup>(4)

k Sm<sup>3</sup>(5), M Sm<sup>3</sup>(6), SI(7), scf(8), k scf(9), M scf(10)

N: Normal

S: Standard

**The following item should be done in case of which F10 is LIQUID:MASS****[F26 DENSITY UNIT] Density unit**

Select density unit from kg/m<sup>3</sup>(0), lb/cf(1), lb/Usgal(2), lb/Ukgal(3).

**[F27 DENSITY b] Density b**

Set density value at standard condition.

**[F28 TEMP UNIT] Temperature unit**

Select temperature unit from deg C(0), deg F(1).

**[F29 TEMP b] Temperature b**

Set temperature value at standard condition

**[F30 1st coef] 1st coefficient**

Set 1st temperature coefficient using the density correction.

**[F31 2nd coef] 2nd coefficient**

Set 1st temperature coefficient using the density correction.

**[F32 MASS UNIT] Mass unit**

Select mass flow rate unit from kg(0), t(1), lb(2), k lb(3).

**[F35 TIME UNIT] Time unit**

Select time unit from /s(0), /m(1), /h(2), /d(3).

**[F40 FLOW SPAN] Flow span**

Set span flow rate, 0 to 32000.

**[F45 DAMPING] Flow damping**

Set flow damping, 0 to 99sec.

**[F50 TEMP DAMPING] Temperature damping**

Set temperature damping, 0 to 99sec.

**[F52 CABLE LENGTH] Cable length of signal cable(DYC)**

Set cable length(m) of signal cable for DYA.

When type of model is integral, cable length is set in 0m.

**IMPORTANT**

Be sure to set this parameter to correct temperature measurement error, occured by cable length.

**[F55 A/OUT SELECT] Analog out select**

Select the analog output from FLOW(0), TEMP(1).

**The following item should be done in case of which F55 is TEMP****[F56 TEMP 0%] Temperature at 0%**

Set temperature value at 0%.

**[F57 TEMP 100%] Temperature at 100%**

Set temperature value at 100%.

**[F58 TEMP ERR OUT] Output selection of thermometer error**

Select output function when thermometer error from 0%(0), OUTLIMIT(H)(1), TEMP f.

In case of OUT LIMIT(H), it is based on parameter "D30"

**(7) Item H (ADJUST)**

This item for setting of adjustment.

**NOTE**

In case that item H (ADJUST) and D10: LOW CUT are necessary to set, change all appropriate parameters of item H before setting D10.

**[H10, H11:TRIM 4mA, TRIM 20mA] Trimming of 4mA and 20mA**

Fine tuning adjustment of 4mA and 20mA output.

Fine tuning range is from -1.00% to 1.00%.

**[H20:USER ADJUST] Conversion factor for user setting.**

Set conversion factor by user.

This conversion factor is converted into measurement flowrate.

**[H25:REYNOLDS ADJ] Reynolds adjustment**

Select the Reynolds adjustment.

This adjustment should be done in case of their error compensation, because error of vortex flowmeter should be increased when it come to low reynolds numbers.

**The following item should be done in case of which "H25" is "ACTIVE".****[H26:DENSITY f]**

Set the density at operating condition.

**[H27:VISCOSITY]**

Set the value of density and viscosity at standard conditions.

These values should be used for Reynolds adjustment.

Reynolds number(Re) is calculated as shown in the formula below.

$$Re = 354 \times \frac{Q \cdot \rho f}{D \cdot \nu}$$

Q : Volumetric flow (m<sup>3</sup>/h)

D : Internal diameter (m)

$\rho f$  : Density at operating condition

$\nu$  : Viscosity (m Pa · s (cp))

Flowrate error of vortex flowmeter increases as Reynolds number decrease less than 20000.

By setting H25, H26, H27, it corrects the error.

**[H30:EXPANSION FA] Gas expansion correction.**

When measuring a compressibility gas by mass flow (Steam M, Gas M) and standard condition (Gas Qn), this expansion factor is useful to correct the deviation from the ideal gas law.

**[H40:FLOW ADJUST] Select a break point correction**

Select a break point correction for the instrumental error from "NOT ACTIVE(0) OR ACTIVE(1)".

**[H41, H45:FLOW ADJUST] Instrumental Error Correction**

■ Correct the instrumental error in flowmeter characteristics using 1 line-segment approximation (with five correction factors).

(1) Flow frequency input at line segments needs to be  $f_1 \leq f_2 \leq f_3 \leq f_4 \leq f_5$ .

When four correction factors are available, line segments need to be  $f_4=f_5$  and  $d_4=d_5$ .

When three correction factors are available, line segments need to be  $f_3=f_4=f_5$  and  $d_3=d_4=d_5$ .

(2) When a flow input of  $f_1$  or less is present, correct the instrumental error as the corrected value= $d_1$ .

(3) When a flow input of  $f_5$  or more is present, correct the instrumental error as the corrected value= $d_5$ .

(4) Abscissa ( $f_1$  to  $f_5$ ) : Set the break-point frequencies as parameters.

(5) Ordinate ( $d_1$  to  $d_5$ ) : Set the corrected value (%) at each break-point as parameters.

$$\text{Set value} = - \frac{Q_s - I}{I} \times 100$$

Where

$Q_s$  : Correct flowrate determined by a reference apparatus

I : Indication of vortex flowmeter

• Definition of error varies with the type of flowmeter. Be careful of the difference in signs in the error and corrected value.

$$Q_f = \frac{f(\text{Hz})}{K\text{-factor}} \times 100$$

holds and the error is included in the K-factor.

Therefore, for the region where the K-factor shift on the positive side, the corrected value is negative.

The corrected value when the calibration fluid of the flowmeter and the fluid to be measured are different must be set as a corrected value obtained by making both abscissas agree with respect to the Reynolds number.

**(8) Item J (TEST)**

These items are for test of output.

A value in “( )” is the data corresponding to indicator.

**[J10:OUT ANALOG] 4 to 20mA Current output.**

It tests 4 to 20mA Current output. Electric current of the set value (%) which designates 4 to 20mA as 0 to 100%.

When this test is executed, transistor contact output (Pulse, Alarm, Status) is fixed at ON or OFF (not determined).

Exiting this parameter item or stopping access after ten minutes, this function will be reset automatically.

**[J20:OUT PULSE] Pulse output**

It tests Pulse output.

The number of pulses which is set (unit: PPS) is output.

Exiting this parameter item or stopping access after ten minutes, this function will be reset automatically.

When this test is executed, current output is fixed at 0% (4mA).

**[J30:OUT STATUS] Status output test**

Status output test can be executed (OFF(0) or ON(1)).

When this test is executed, current output is fixed at 0% (4mA).

Exiting this parameter item or stopping access after ten minutes, this function will be reset automatically.

**(9) Item K (Maintenance)**

These items are for maintenance.

A value in “( )” is the data corresponding to indicator.

**[K10:TLA] TLA Adjustment**

Trigger level (TLA) is adjusted upon shipment. Therefore, TLA adjustment is nonnecessity. But set TLA adjustment below as

- The measurement of Low flow rate area is required.
- Mechanical vibration and impact are applied to digital YEW FLO and Zero point and low flow rate area is output.

Note: Refer to “6.2 Adjustment for Manual Mode”.

**[K20:SIGNAL LEVEL]**

Set the signal level.

**[K25:N. B. MODE]**

Set the Noise Balance Mode from “AUTO(0)” or “MANUAL(1)” or “TUNING AT ZERO(2)”

**[K26:N. B.RATIO] The ratio of Noise Balance.**

When “NOISE BALANCE MODE (N. B. MODE)” is “AUTO”, noise balance value is the indication only.

When N.B. mode is “MANUAL”, the noise balance can be adjusted entering the setting values.

Note: Refer to “6.2 Adjustment for Manual Mode”.

**[K28:SET VORTEX F] Output test by setting simulated frequency.**

Amplifier check is executed by simulated frequency input.

Output to be able to check are, analog output, pulse output/contact output.

Test status also can be seen on display board.

**NOTE**

- In case of multi-variable type (/MV), output value is calculated by setting density and temperature.
- Available for 5.10 or greater version that can be checked in K50 SOFTWARE REV.

**[K30:VELOCITY] Flow velocity**

Indication of flow velocity at the operating conditions.

**[K32:SPAN V] Flow span velocity**

Indication of flow span velocity.

When /MV is selected and “F10 : FUNCTION” is “Saturated Steam” or “Superheat Steam” and “GAS : STD/Normal” or “LIQUID : Mass”, the display of span velocity may differ from an actual value.

**[K34:VORTEX FREQ.] Vortex frequency.**

Indication of vortex frequency at operating conditions.

**[K36:SPAN F] Span vortex frequency.**

Indication of span vortex frequency.

When /MV is selected and “F10 : FUNCTION” is “Saturated Steam” or “Superheat Steam” and “GAS : STD/Normal” or “LIQUID : Mass”, the display of span frequency may differ from an actual value.

**[K40:ERROR RECORD] Error record**

The error record can be indicated.

- The error is recorded as history.
- The error history is not time-series data.
- The error history can be holded for 30 days.

In order to clear an error record, set the video inverse bar by “<>” and press “ENTER”key twice.

**[K50:SOFTWARE REV] Software revision**

The software revision can be indicated.

## 5.5 Error Code Lists

When an ERROR is displayed by SELF CHECK in item A60, B60, C60, D60, E60, or H60, J60, K60, M60, press function key F2 [DIAG] and the error contents are displayed.

The error contents are listed below:

Table 5.1 ERROR Code List

Indication	Diagnostic Message	Error Name	Problem Cause	Current Output		% Output		Pulse Output	Engineering Unit Output	Totalizing Output	Engineering Temp Output	Pulse / Status Output		How to recover	
				Select flow rate	Select temperature	Select flow rate	Select temperature					Pulse <sup>(*)</sup>	Status <sup>(*)</sup>		Alarm <sup>(*)</sup>
Err-01	OVER OUTPUT	Over range output signal	Output signal is 110% or more	Fixed at 110% <sup>(*)</sup>	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	Change parameters or over ranged flow input
Err-02	SPAN SET ERROR	Span Setting Error	Span setting parameter is more than 1.5 times of max flow velocity	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	Change parameters span factor is outside the acceptable limits
Err-06	PULSE OUT ERROR	Pulse output error	Pulse output frequency is more than 10kHz	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Fixed at 10KHZ	Normal Operation	Normal Operation	Normal Operation	Fixed at 10kHz	Normal Operation		Change parameters (ItemC.ItemE)
Err-07	PULSE SET ERROR	Pulse setting error	Pulse output frequency setting is more than 10kHz	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation		Change parameters (ItemC.ItemE)
CHECK Vibration	Transient noise	Error of Vibration	Transitional disturbance	Hold	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Hold	Normal Operation	Normal Operation	Hold	Normal Operation	OFF (H)	CHECK the vibration
CHECK High Vibration	High vibration	Error of Vibration	High vibration	Based on K45	Normal Operation	Normal Operation	Normal Operation	Stop Output	Based on K45	Stop the total	Normal Operation	Normal Operation	Normal Operation	OFF (H)	CHECK the vibration
CHECK Flow	Fluctuating	Error of Flow	Fluctuating	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	CHECK the clogging
CHECK Flow	Clogging	Error of Flow	Clogging	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	CHECK the clogging
Err-10	TEMP OVER OUTPUT	Over range Temp output signal	Temp output signal is 110% or more, and 0% below.	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	CHECK the temperature or temperature span
Err-11	OVER TEMP	Error of temperature	Temp value is -50°C below or 300°C over.	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	Remain in operation at Temp=50°C or Temp=300°C	OFF (H)	CHECK the temperature
Err-12	TEMP SENSOR FAULT	Error of thermometer	Disconnection or short of thermometer sensor	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	OFF (H)	Change thermometer sensor.
Err-13	TEMP CONV. FAULT	Error of temperature converter	Temperature converter is failed	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	Based on F58	Remain in operation at Manual setting condition	Remain in operation at Manual setting condition	OFF (H)	Change converter case build in temperature sensor.
Err-20	PRE-AMP ERROR	PRE-AMP is failed		Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	Replace the AMP. unit
Err-30	EE PROM ERROR	EEPROM is not functioning correctly		Over 110% or -2.5% below	Normal Operation	Fixed at 0%	Fixed at 0%	Fixed at 0%	Fixed at 0%	Fixed at 0%	Fixed at 0%	Fixed at 0%	Fixed at 0%	OFF (H)	Replace the AMP. unit
Err-40	FLOW SENSOR FAULT	Error of Flow sensor	Flow sensor is fault.	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	Normal Operation	OFF (H)	Change Flow sensor
	CPU FAULT	CPU is failed	All operations are Dead. Display and self diagnostic function is also dead.g	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Over 110% or -2.5% below	Halt	Replace the AMP. unit

Note. Normal Operation : Operation continues without relation to error occurrence.  
 Remain in Operation : Calculation continues with relation to error occurrence.  
 Status output : These conditions should be done in case of which B20 is "SCALED PULSE"; "UNSCALED PULSE"; "FREQUENCY".  
 Alarm output : These conditions should be done in case of which B20 is "Alarm".

(\*) "110%" is based on "D30 : OUT LIMIT (H)".  
 (1) "110%" is based on "D30 : OUT LIMIT (H)".  
 (2) Pulse output : These conditions should be done in case of which B20 is "SCALED PULSE"; "UNSCALED PULSE"; "FREQUENCY".  
 Status output : These conditions should be done in case of which B20 is "FLOW SW (LOW : ON)"; "FLOW SW (LOW : OFF)".  
 Alarm output : These conditions should be done in case of which B20 is "Alarm".



## 6. OPERATION

After you have installed the flowmeter into the process piping, wired the input/output terminals, set up the required parameters, the vortex flowmeter should output an accurate flow signal from its terminals as soon as the measured liquid begins to flow.

This section describes procedure of test method and adjustment method for the pre-operation.



### NOTE

The initial parameter setting has already been done at the factory according to the sizing data when ordering. Therefore it is not necessary to set parameters except measurement condition changes or some additions happen.

## 6.1 Adjustment

### 6.1.1 Zero Adjustment

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

Because of the effect of electrical noise and vibration noise, digitalYEWFO may provide an output even when the flowrate is zero. In that case, properly eliminate the source of the noise.

Refer to “6.2 : Adjustment for manual mode”.

### 6.1.2 Span Adjustment

In normal application, you need not confirm the span.

If you need to ensure the output of 4 to 20mA DC, refer to “6.1.3 Loop Test”.

### 6.1.3 Loop test

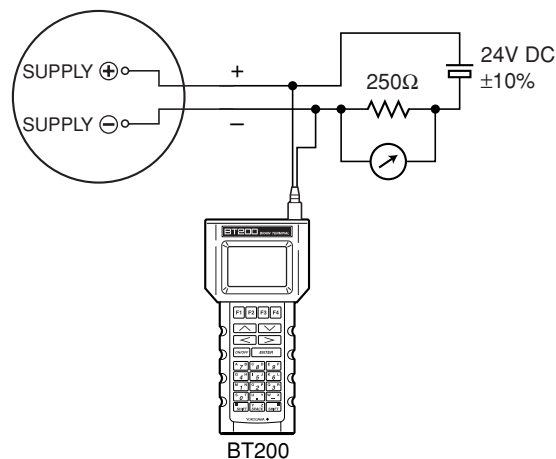
To ensure output of 4 to 20mA DC or pulse, their loop tests can be done using parameter “J10 (Analog out)” or “J20 (Pulse test)”.

If you are verifying the analog output, follow the procedure on the verification procedure.

<Check Procedure>

1. Connect the instruments referring to Figure 6.1, and warm up for three minutes more.
2. Set span frequency in Parameter J10:OUT ANALOG.
3. In case the load resistance is 250 ohm, digital multimeter indicates 5V. Otherwise if it is known load resistance value, it indicates  $R \times 0.02A$ .

4. Check output value after set 50% in Parameter J10.
5. Check output value after set 0% in Parameter J10.



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Figure 6.1 Connection of Maintenance Instruments



### IMPORTANT

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

### 6.1.4 Totalizer Function Start and Totalized Value Reset

When using the Totalizer Function, the start setup should be done.

- (1) Start operation using BT200  
Enter to B40(TOTAL START), and move the video bar to “EXECUTE”. Push “ENTER” key at 2 times.
- (2) Start operation using indicator  
Enter to “Setting mode”, move to B40 of parameter number, and enter to “01” of data number.  
Refer to “4.4: Setting mode”.

Totalized value can be reset using the indicator or BT200.

- (1) Reset operation using BT200  
Enter to B42 (TOTAL RESET), and move the video bar to “EXECUTE”. Push “ENTER” key at 2 times.
- (2) Reset operation using indicator  
Enter to “Setting mode”, move to B42 of parameter number, and enter to “01” of data Number.  
Refer to “4.4 : Setting mode”.

### 6.1.5 Unit of Pulse Output (Scaling)

Pulse output are constructed by two units, that are “Scaled pulse and Unscaled Pulse”.

#### (1) Scaled Pulse

When SCALED PULSE is selected in B20, set flowrate per one pulse output. Rate unit is linking to the flow unit.

#### (2) Unscaled Pulse

When UNSCALED PULSE is selected in B20, it output number of vortex (vortex frequency) as a pulse-number, which is detected from vortex shedder bar. (1.0 must be set for this.)

Refer to 7.6 (1) Flow calculation.

### ● Pulse Rate setting



Pulse rate setting is settable by “B21:PULSE RATE”.

### 6.1.6 Setting of Burnout Switch

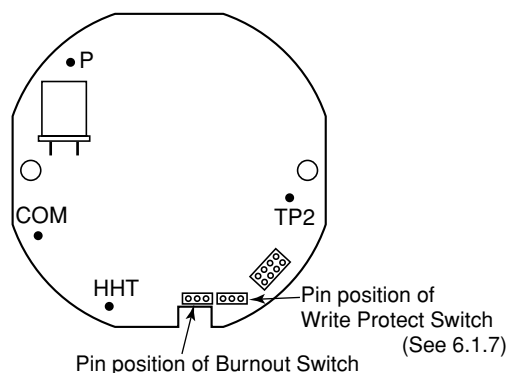
digitalYEWFO is equipped with a CPU error burnout function used to set the output direction upon CPU error, and a sensor burnout function that sets the direction of the output in the event of burnout of the temperature sensor. When factory-shipment under normal conditions, the output of both CPU error burnout and sensor burnout are set to HIGH, but if suffix code/C1 is specified, the CPU error burnout is set to LOW(-2.5% below) output, and sensor burnout is set to LOW(-2.5% below) output, respectively. The setting of the direction of output from burnout can be changed.

To change the direction of output arising from burnout, switch the setting pin on the CPU assembly (see Table 6.1).

**Table 6.1 Output Setting Pin for Burnout**

Pin position	CPU error burnout direction	CPU error burnout output	Remark
 H L	HIGH	110% or more (21.6mA DC)	Set to HIGH before shipment.
 H L	LOW	-2.5% or less (3.6mA DC)	Set to LOW for option specification code / C1.

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**Figure 6.2 Pin position of Burnout and Write Protect Switch**

### 6.1.7 Setting of Write Protect Switch

By setting the write protect function to “Protect”, it is possible to prevent the overwriting of parameters. Write protection can be carried out using either the hardware switch on the CPU board (i.e., Switch 2) or software parameter settings. If either of these items is set to “Protect”, the overwriting of parameters will be prohibited.





#### NOTE

If the hardware switch is set to “Protect”, it will not be possible to overwrite parameters; furthermore, this condition will be maintained until the switch is set to “Enable”.

For more details regarding usage of the write protect function and the software’s parameter switches, refer to 4.6.11 Write Protect.

**Table 6.3 Setting pin for Write Protect**

Pin position	CPU error burnout direction
 N Y	Enable
 N Y	Protect

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### 6.1.8 Power Failure

When a power failure occurs, the totalized value will be protected by EEPROM (Electrically Erasable Programmable ROM). But during a power failure, the vortex flowmeter stops and also the totalizing will stop.

After a power is recovered, the vortex flowmeter and the totalizing start to work automatically.

EEPROM doesn't need a battery for backup.

## 6.2 Adjustment for Manual Mode

digitalYEWFL0 does not need the initial adjustment because digitalYEWFL0 is always adjusted by itself automatically.

These adjustments should be done in case that indicator reads over zero at zero flow.

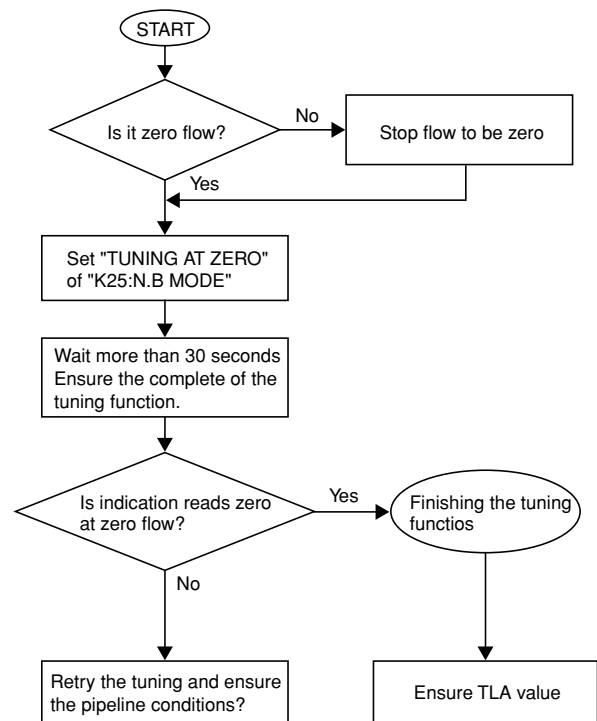
### 6.2.1 Low Cut Adjustment

Adjust to noise elimination or zero flow in the low flowrate (or low frequency) range.

The settable range for low cut flowrate is to half of minimum flowrate.

### 6.2.2 Tuning

This adjustment should be done according to a flow figure shown below.



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If this adjustment is executed, the following value is changed.

K25:N.B MODE = MANUAL

K26:NOISE RATIO=Constant value

Minimum flowrate is increased when TLA value is changed form initial value.

## 1. Tuning method

(1) Ensure the condition of flowrate

The necessary condition for tuning function is zero flow.

(2) Executing the tuning function.

Set “ TUNING AT ZERO” of “K25:N.B MODE”.

Wait more 30 second.

(3) Finishing the tuning functions

### Using the BT200

- (a) Press “DATA” key of BT200 function key.
- (b) Ensure the indication of “MANUAL” which is “K25:N.B MODE” (“NOW TUNING” is indicated during tuning operation.)

### Using the indicator

- (a) Press “SHIFT” and “SET” key simultaneously.
- (b) Press “SET” key and ensure “01” of Lower indication. (“02” is indicated during tuning operation. Execute (a), (b) once again.)

## 2. TLA value

TLA values is possible to change after executing “TUNING”. In this case, minimum flowrate is increased.

Minimum flowrate for TLA value is given by below equation.

$$\text{Minimum Flowrate after changing TLA Value} = \text{Specified Minimum Flowrate} \times \sqrt{\frac{\text{TLA Value after Tuning}}{\text{TLA initial value or default value}}}$$

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Ensure minimum flowrate for changing TLA value.

## 3. Output

After tuning, ensure that the indication reads is zero where no fluid is flowing.

If the indication reads over zero is done continuously, retry the tuning and ensure the below condition.

### Does high vibrations occur in pipeline?

In this case, refer to “2:INSTALLATION”, and keep the pipeline properly.

## 6.3 Other Maintenance

### 6.3.1 Cleaning Precautions

Care should be taken to prevent the build up of dirt, dust or other material on the display glass and data plate. In case of its maintenance, soft and dry cloth is used.

## 7. MAINTENANCE

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### CAUTION

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- Disassemble work should be done only for error occurrence.
  - Maintenance work must be carried out by expert engineer or skilled personnel and not by operators.
  - Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.
- 



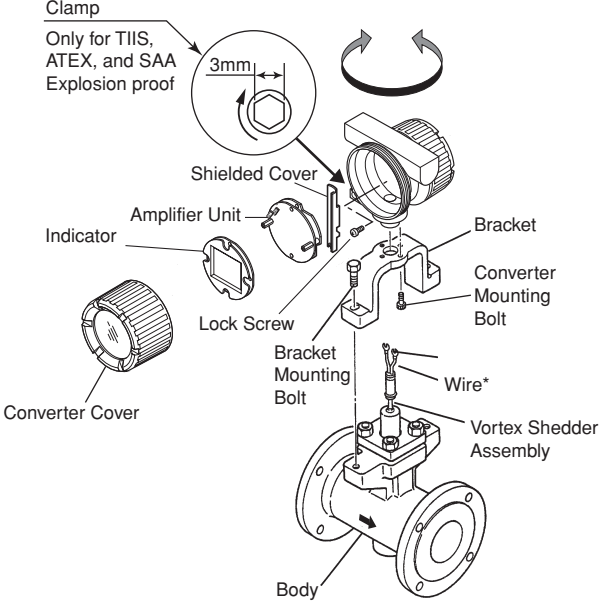
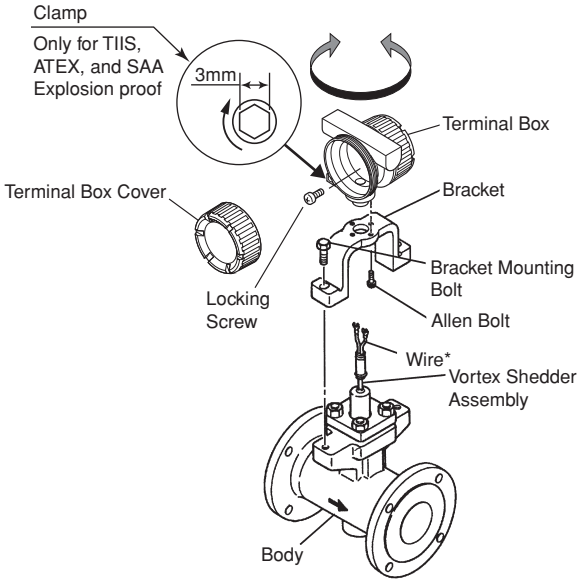
### CAUTION

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- It is prohibited by law for the user to modify flameproof instruments. It is not permitted to add or remove indicators. If modification is required, contact YOKOGAWA.
  - Explosion protected type must be, as a rule, removed to a non-hazardous area for maintenance and be disassembled and reassembled to the original state.
  - For TIIS, ATEX and SAA explosion proof, the display cover is locked by the clamp. In case of opening the display cover, use the hexagonal wrench attached.
  - Be sure to lock the cover by the clamp using the hexagonal wrench attached after installing the cover.
-

## 7.1 Changing the Terminal Box Orientation

The terminal box can be changed in four directions with respect to the flow direction.

Integral Type Vortex Flowmeter	Remote Converter Type Vortex Flowmeter
<p>&lt;1&gt; Remove the converter cover.</p> <p>&lt;2&gt; For amplifier unit removal, refer to paragraph 3.7.2.</p> <p>&lt;3&gt; Disconnect the vortex shedder assembly lead-wires from the converter.</p> <p>&lt;4&gt; Remove the bracket mounting bolts and remove the converter and bracket from the flowmeter body. The bracket applies to the 1 (25mm) to 4 (100mm) inch flowmeters.</p> <p>&lt;5&gt; Remove the four allen bolts securing the converter to the bracket.</p> <p>&lt;6&gt; Turn the converter to the desired orientation. When reassembling the converter, reverse the above procedure.</p> 	<p>&lt;1&gt; Remove the terminal box cover.</p> <p>&lt;2&gt; Loosen two screws to disconnect leadwires from shedder bar.</p> <p>&lt;3&gt; Remove the bracket mounting bolts and remove the terminal box and bracket from the flowmeter body. The bracket applies to the 1 (25mm) to 4 (100mm) inch flowmeters.</p> <p>&lt;4&gt; Remove the four allen bolts securing the terminal box to the bracket.</p> <p>&lt;5&gt; Turn the terminal box to the desired orientation. When reassembling the terminal box, reverse the above procedure.</p> 

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## 7.2 Indicator Removal and Rotation

- (1) Turn the power OFF.
- (2) Remove the cover.
  - \* In case of the Explosion protected type, remove the cover after unlock the clamp.
- (3) For the indicator, disconnect the cable connector from the amplifier unit.
- (4) Loosen the two indicator mounting screws using a Phillips screwdriver.
- (5) Pull out the indicator.
- (6) Reinstall the indicator in the reverse order to its removal (above) and secure the mounting screws.

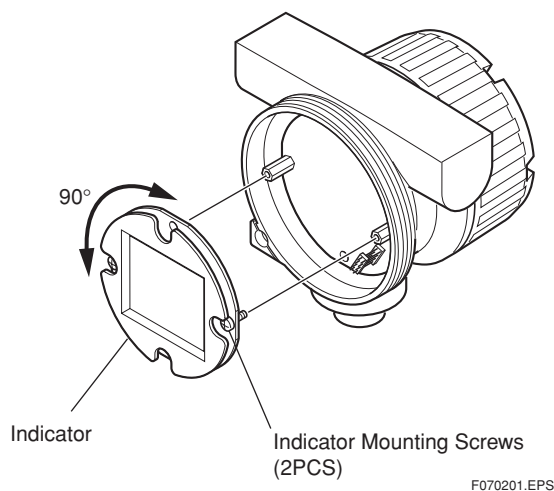


Figure 7.1 Removing and Reinstalling the Indicator

## 7.3 Amplifier Unit Removal



### IMPORTANT

Do not turn the amplifier unit for removal or assembling. The connector pins may be damaged.

- (1) Turn the power OFF.
- (2) Remove the converter cover.
  - \* In case of the Explosion protected type, remove the cover after unlock the clamp.
- (3) Remove the indicator according to the procedures described in paragraph 7.2.
- (4) Loosen the terminal screws and remove the amplifier unit.

## 7.4 Amplifier Unit Assembling



### IMPORTANT

The amplifier unit must be assembled keeping the procedure as follows. Amplifier may not operate normally when the procedure does not keep.

- (1) Put two-mounting pins① into mounting hole②.
- (2) Push the head of two mounting screws④ lightly.
- (3) Push head of two IC⑤ and mount the amplifier unit③.
- (4) Tighten two mounting screws④.

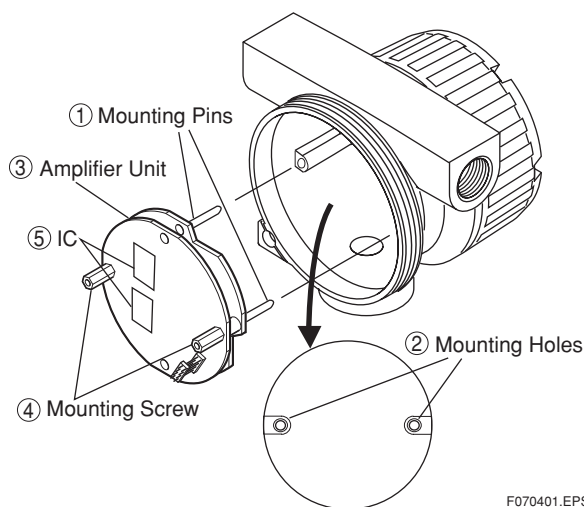


Figure 7.2 Removing and Reinstalling the Amplifier Unit

## 7.5 Vortex Shedder Removal



### CAUTION

- Disassemble work should be done only for error occurrence.
- Only expert engineer or skilled personnel are permitted to open the cover.
- When the vortex shedder is disassembled, and empty the flow tube before the gasket must be replaced with a new one.
- Output error may cause when the shedder bar is not restored correctly.
- For Explosion proof type, move vortex flowmeter to non-hazardous area firstly, then do the assemble work.

In case of High Temperature Version (Option code: HT), First time tighten Nuts with a torque wrench, applying the torque specified “A”.

Next time loosen Nuts completely, then again tighten Nuts with a torque wrench, applying the torque specified “B”.

- e. Insert the leadwires (vortex shedder) through the terminal box bottom hole and lower the terminal box slowly until the bracket touches the flowmeter shoulder. Be sure to keep the leadwires vertical while lowering the terminal box.
- f. After assembling, confirm that there is no leakage from the vortex flowmeter.



### IMPORTANT

Please tighten the screws/bolts uniformly and observing the torque value in Table 7.1.

- (1) Remove the converter cover.
- (2) For Integral Type, loosen the terminal screws and disconnect leadwires on the amplifier and loosen 4 screws to disassemble the Amplifier. And for Remote Type, remove the terminal box cover in the same way.
- (3) Loosen the bracket mounting bolts and remove the terminal box together with the bracket. Be careful not to damage the leadwires connected to the vortex shedder assembly when removing the terminal box.
- (4) Loosen the vortex shedder assembly mounting bolts or nuts and remove the vortex shedder assembly.
- (5) When reassembling the vortex shedder assembly, reverse above procedure. Confirm the following.
  - a. The gasket should be changed to new one.
  - b. The guide pin on the vortex shedder mounting block meets the guide pin hole. See Figure 7.3. The guide pin applies to the 1 to 4 inch flowmeters.
  - c. The vortex shedder assembly is installed as illustrated in Figure 7.3.
  - d. Tighten the sensor mounting bolts or nuts with a torque wrench, applying the torque specified below.

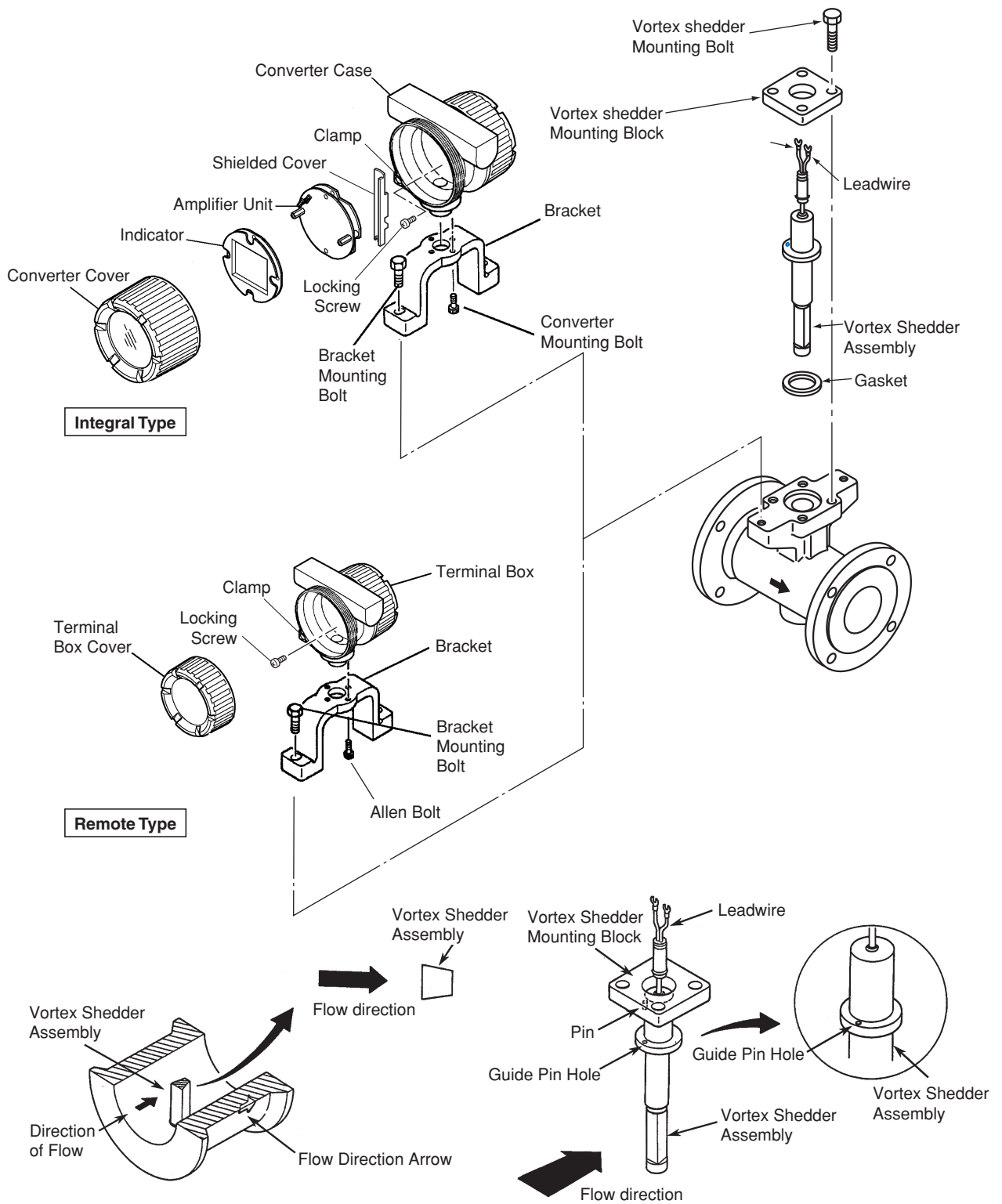
Table 7.1 Torque Value

UNIT: kg·m (lb·in)

Nominal Size mm (inch)	Standard	High Temperature (HT)	
		A	B
15 (1/2)	1.6 (140)		
25 (1)	1.2 (105)	1.75 (153)	1.2 (105)
40 (1-1/2)	1.2 (105)	1.75 (153)	1.2 (105)
50 (2)	2 (174)	5 (435)	2 (174)
80 (3)	3 (260)	10 (870)	4 (348)
100 (4)	4 (348)	10 (870)	5 (435)
150 (6)	5 (435)	7 (608)	5 (435)
200 (8)	7 (610)	10 (870)	7 (608)
250 (10)	16 (1390)		
300 (12)	16 (1390)		

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Figure 7.3 Disassembling and Reassembling the Vortex Shedder Assembly

## 7.6 Flow Calculation

### (1) Flow Calculation

The flowrate is calculated with the following equations based on the N number of generated vortices:

(a) Flowrate (in engineering units)

$$\text{RATE} = N \cdot \frac{1}{\Delta t} \cdot \epsilon_f \cdot \epsilon_c \cdot \epsilon_r \cdot \frac{1}{KT} \cdot U_k \cdot U_{TM} \quad \dots (7.1.1)$$

$$KT = KM \cdot U_{KT} \cdot \{1 - 4.81 \times (T_f - 15) \times 10^{-5}\} \dots \text{(Metric Units)} \quad \dots (7.1.2)$$

$$KT = KM \cdot \{1 - 2.627 \times (T_f - 59) \times 10^{-5}\} \dots \text{(English Units)} \quad \dots (7.1.3)$$

(b) Flowrate (%)

$$\text{RATE}(\%) = \text{RATE} \cdot \frac{1}{F_S} \quad \dots (7.2)$$

(c) Totalized value

$$\text{TOTAL} = \text{TOTAL} + \Delta \text{TOTAL}$$

$$\Delta \text{TOTAL} = \text{RATE} \cdot \Delta t \cdot \frac{1}{T_R} \cdot \frac{1}{U_{TM}} \quad \dots (7.3)$$

(d) Pulse output frequency

$$\text{PULSE FREQ} = \text{RATE} \cdot \frac{1}{P_R} \cdot \frac{1}{U_{TM}} \quad \dots (7.4.1)$$

$$\text{PULSE FREQ} = N \cdot \frac{1}{\Delta t} \cdot \frac{1}{P_R} \quad \dots \text{(Unscaled pulses)} \quad \dots (7.4.2)$$

(e) Velocity

$$V = N \cdot \frac{1}{\Delta t} \cdot \frac{1}{KT} \cdot U_{KT} \cdot \frac{4}{\pi D^2} \quad \dots (7.5)$$

(f) Reynolds number

$$\text{Red} = V \cdot D \cdot \rho_f \cdot \frac{1}{\mu} \times 1000 \quad \dots \text{(Metric Units)} \quad \dots (7.6.1)$$

$$\text{Red} = V \cdot D \cdot \rho_f \cdot \frac{1}{\mu} \times 124 \quad \dots \text{(English Units)} \quad \dots (7.6.2)$$

where N: Number of input pulses (pulse)  
 $\Delta t$ : Time corresponding to N (seconds)  
 $\epsilon_f$ : Instrumental error correction factor  
 $\epsilon_c$ : Expansion correction factor for compressive fluid  
 $\epsilon_r$ : Reynolds number correction factor  
 KT: K-factor at operating conditions (pulses/litre) (pulse/gal)  
 KM: K-factor at temperature 15°C (59°F)  
 $U_{KT}$ : Unit conversion factor for K-factor  
 $U_k$ : Flow unit conversion factor (Refer to item (2))  
 $U_k(\text{user})$ : Flow unit conversion factor for user's unit  
 $U_{TM}$ : Factor corresponding to flow unit time (ex./m (minute) is 60.)

$P_R$ : Pulse rate (ex. E+ 3 is  $10^3$ .)  
 $T_f$ : Temperature at operating conditions (°C) (°F)  
 $F_S$ : Flowrate span  
 $T_R$ : Total rate  
 D: Internal diameter (m) (inch)  
 $\mu$ : Viscosity (cP)  
 $\rho_f$ : Density at operating conditions ( $\text{kg/m}^3$ ) ( $\ell\text{b/ft}^3$ )

### (2) Flow Conversion Factor (Uk)

Flow conversion factor  $U_k$  is obtained by carrying out the following computation depending on the selection of the fluid to be measured and the flow unit.

(a) Steam

$$M \text{ (Mass flowrate): } U_k = \rho_f \cdot U_{\rho_f} \cdot U_k \text{ (kg)} \quad \dots (7.7.1)$$

$$U_k = \rho_f \cdot U_k \text{ (}\ell\text{b)} \quad \dots (7.7.2)$$

$$Q_f \text{ (Flowrate at operation): } U_k = U_k \text{ (m}^3\text{)} \quad \dots (7.7.3)$$

$$U_k = U_k \text{ (acf)} \quad \dots (7.7.4)$$

(b) Gas

$Q_n$ : (Flowrate at STP):

$$U_k = \frac{P_f}{P_n} \cdot \frac{T_n + 273.15}{T_f + 273.15} \cdot \frac{1}{K} \cdot U_{k(Nm^3)} \quad \dots (7.8)$$

$$U_k = \frac{P_f}{P_n} \cdot \frac{\frac{5}{9}(T_n - 32) + 273.15}{\frac{5}{9}(T_f - 32) + 273.15} \cdot \frac{1}{K} \cdot U_{k(scf)}$$

$$M: \text{ (Mass flowrate): } U_k = \rho_f \cdot U_{\rho_f} \cdot U_k \text{ (kg)} \quad \dots (7.9.1)$$

$$U_k = \rho_f \cdot U_{\rho_f} \cdot U_k \text{ (}\ell\text{b)} \quad \dots (7.9.2)$$

$$Q_f: \text{ (Flowrate): } U_k = U_k \text{ (m}^3\text{)} \quad \dots (7.10.1)$$

$$U_k = U_k \text{ (acf)} \quad \dots (7.10.2)$$

(c) Liquid

$$Q_f: \text{ (Flowrate): } U_k = U_k \text{ (m}^3\text{)} \quad \dots (7.11.1)$$

$$U_k = U_k \text{ (acf)} \quad \dots (7.11.2)$$

$$M \text{ (Mass flowrate): } U_k = \rho_f \cdot U \text{ (kg)} \quad \dots (7.12.1)$$

$$U_k = 7.481 \times \rho_f \cdot U \text{ (}\ell\text{b)} \quad \dots (7.12.2)$$

7.481 is a conversion factor of U.S

gal into acf

(d) User's unit

$$U_k = U_k \text{ (user)} \quad \dots (7.13)$$

$U_{\rho_f}$ : Unit conversion factors of density.

$U_{k(kg)}$ ,  $U_{k(Nm^3)}$ ,  $U_{k(m^3)}$

$U_{k(lb)}$ ,  $U_{k(Btu)}$ ,  $U_{k(scf)}$ ,  $U_{k(acf)}$ : Unit conversion factors

**(3) Mass Flow calculation**

## a) Steam

In case of saturated steam, mass flow rate is calculated from density values to temperature measured by using saturated steam table.

In case of superheat steam, mass flow rate is calculated from density values to temperature measured by using steam table. In order to measure superheat steam, it is necessary to make constant pressure value. A pressure values which is entered in parameter is used.

$$M = \rho_{ft} \cdot Q_f \dots\dots\dots (7.14.1)$$

## b) Gas

In case of gas, Volumetric flow rate at standard condition is calculated, so Pressure-Temperature correction is carried out. It is necessary to make constant pressure value. A Pressure values at operational condition, temperature and pressure value at standard condition which is entered in parameter is used.

$$Q_n = Q_f \cdot \frac{P_f}{P_n} \cdot \frac{T_n + 273.15}{T_{ft} + 273.15} \cdot \frac{1}{K} \dots\dots\dots (7.14.2)$$

## c) Liquid

In case of liquid, mass flow rate is calculated from which used to calculate the secondary function for the density value to the temperature. A density value which indicated by the order sheet is used.

$$M = Q_f \cdot \rho_n \cdot \{1 + a_1(T_{ft} - T_n) \cdot 10^{-2} + a_2(T_{ft} - T_n)^2 \cdot 10^{-6}\} \dots\dots\dots (7.14.3)$$

[Supplement]

$$M = Q_f \cdot \rho_f \\ = Q_f \cdot \rho_n \cdot \{1 + a_1(T_f - T_n) \times 10^{-2} + a_2(T_f - T_n)^2 \times 10^{-6}\}$$

Where,  $\Delta T_f = T_f - T_n$

Density compensation formula;

$$\rho_f = \rho_n \{1 + a_1 \cdot \Delta T_f \times 10^{-2} + a_2 \Delta T_f^2 \times 10^{-6}\}$$

$\rho_1$  : Density at  $T_1$

$\rho_2$  : Density at  $T_2$

$$k_1 = \rho_1 / \rho_n$$

$$k_2 = \rho_2 / \rho_n$$

$$\Delta T_1 = T_1 - T_n$$

$$\Delta T_2 = T_2 - T_n$$

Then  $a_1$  and  $a_2$  can be calculated from formulas below,

$$a_1 = \{(k_1 - 1) \cdot \Delta T_2^2 - (k_2 - 1) \cdot \Delta T_1^2\} / \\ \{(\Delta T_1 \cdot \Delta T_2^2 - \Delta T_2 \cdot \Delta T_1^2) \times 10^{-2}\}$$

$$a_2 = \{(k_1 - 1) \cdot \Delta T_2 - (k_2 - 1) \cdot \Delta T_1\} / \\ \{(\Delta T_1^2 \cdot \Delta T_2 - \Delta T_2^2 \cdot \Delta T_1) \cdot 10^{-6}\}$$

Where

$M$  : Mass flow

$Q_n$  : Volumetric flow rate at Standard condition

$Q_f$  : Volumetric flow rate at oprtating condition

$T_n$  : Temperature at operating condition (°C), (°F)

$T_f$  : Temperature at standard condition (°C), (°F)

$T_{ft}$  : Measured temperature value (°C), (°F)

$P_f$  : Pressure at operating condition (kPa abs), (psi)

$P_n$  : Pressure at standard condition (kpa abs), (psi)

$K$  : Deviation factor

$\rho_{ft}$  : Density calculated by temperature value

$\rho_n$  : Density at Standard condition (kg/m<sup>3</sup>), (lb/cf)

$\rho_f$  : Density at operating condition

$U_{\rho f}$  : Density unit conversion factor

$U_{k(kg)}, U_{k(Nm^3)}, U_{k(m^3)}$  : Flow unit conversion factor

$a_1$  : 1st temperature coefficient

$a_2$  : 2nd temperature coefficient

Example: conversion factor in kg.

kg :  $U_{kkg} = 1$

ton :  $U_{kkg} = 0.001$

## 8. TROUBLESHOOTING

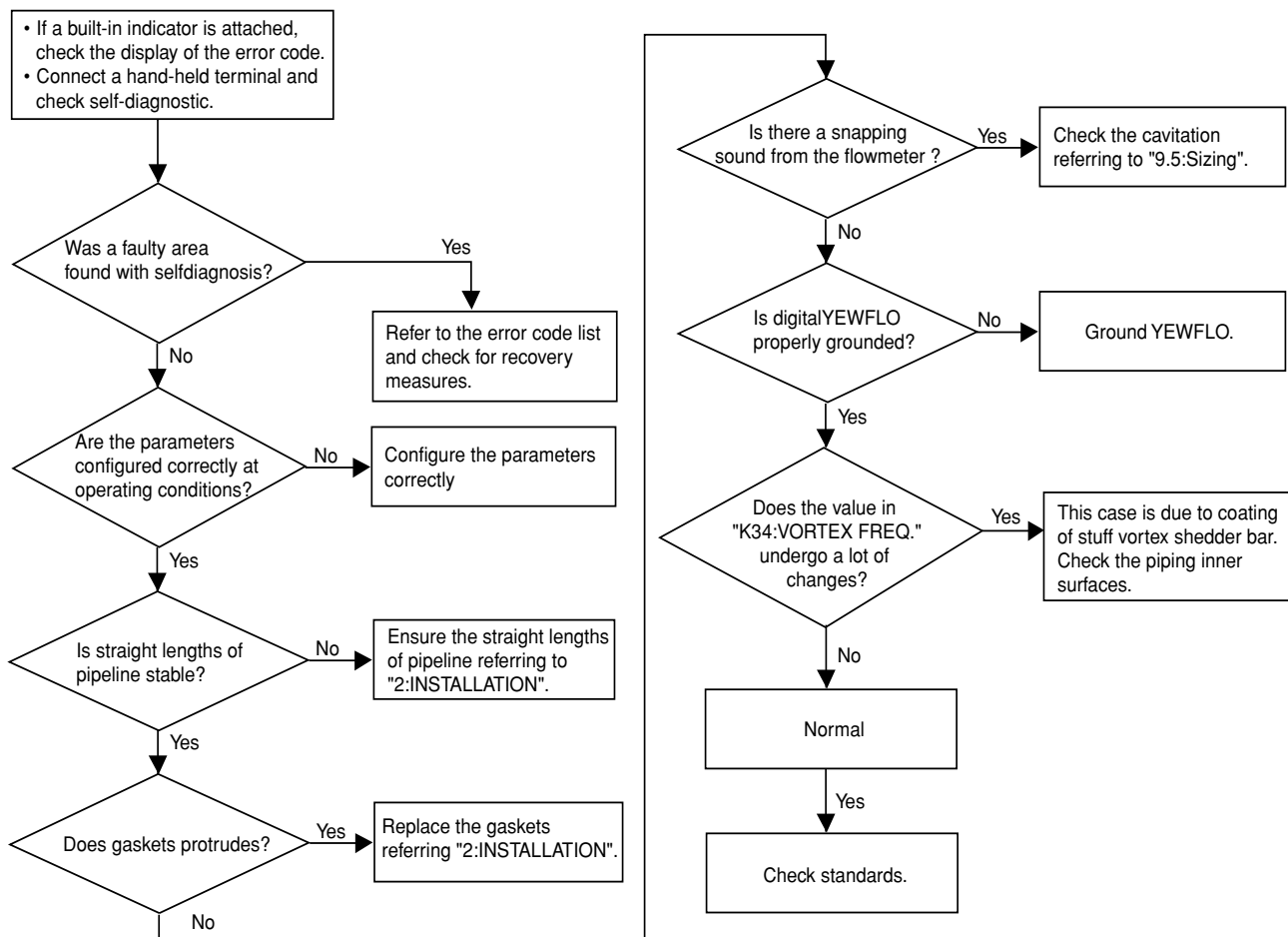


### CAUTION

Please avoid replacing the amplifier unit from the case, and the vortex shedder bar. When these procedures are needed, please contact the nearest Yokogawa office.

### 8.1 Flow

#### ● Large flowmeter errors and flowrate reading fluctuates.



**Note 1:** This is the temperature and pressure at digitalYEWFLO mounted place.

**Note 2:** Contact with our service in case this is not carried out into the right statement.

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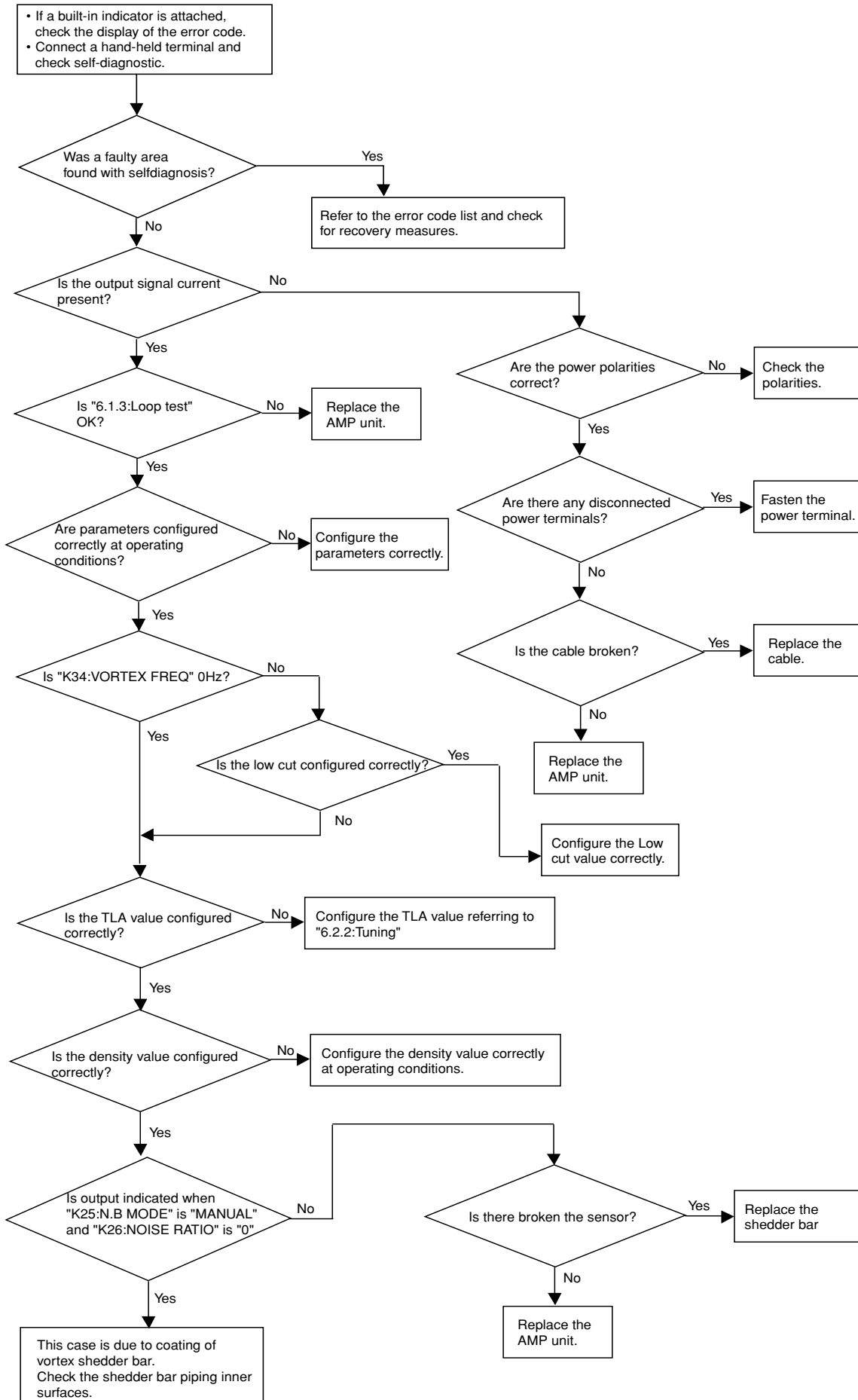
#### ● After the output showed correctly, the indication goes down to zero at certain time.

When this problem occurred, the cause is suspected of deterioration of sensor sensitivity and turbulent of fluid flow due to coating on the shedder bar and flowmeter inner tube.

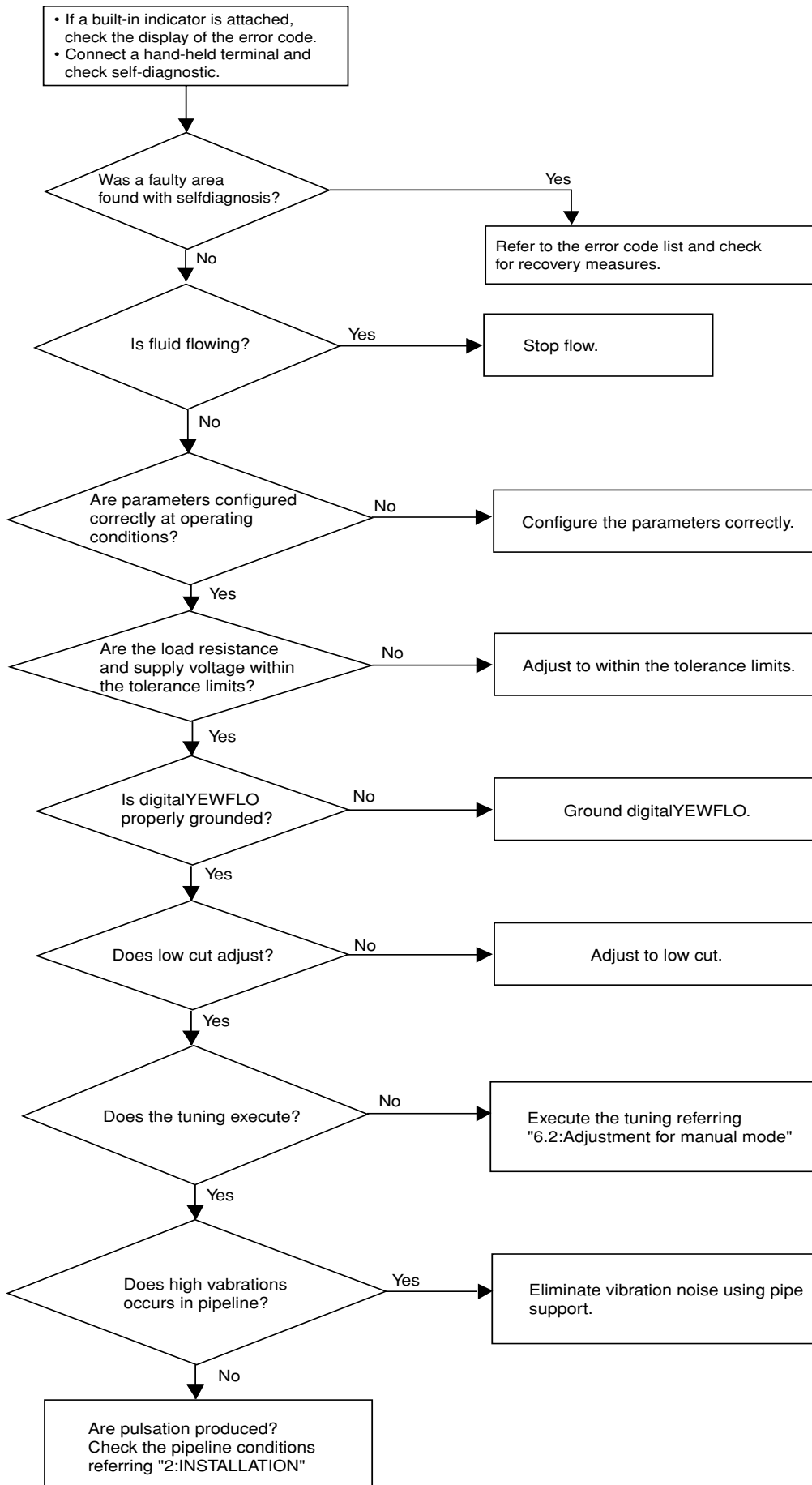
#### How to cope with this problem

- 1) Referring item 7.5 "Vortex Shedder Removal", take out the Vortex Shedder bar and clean it.
- 2) If there is the coating on inner tube of the flowmeter, remove the flowmeter body from adjacent pipes and clean it.

● No output is indicated when the fluid is flowing.

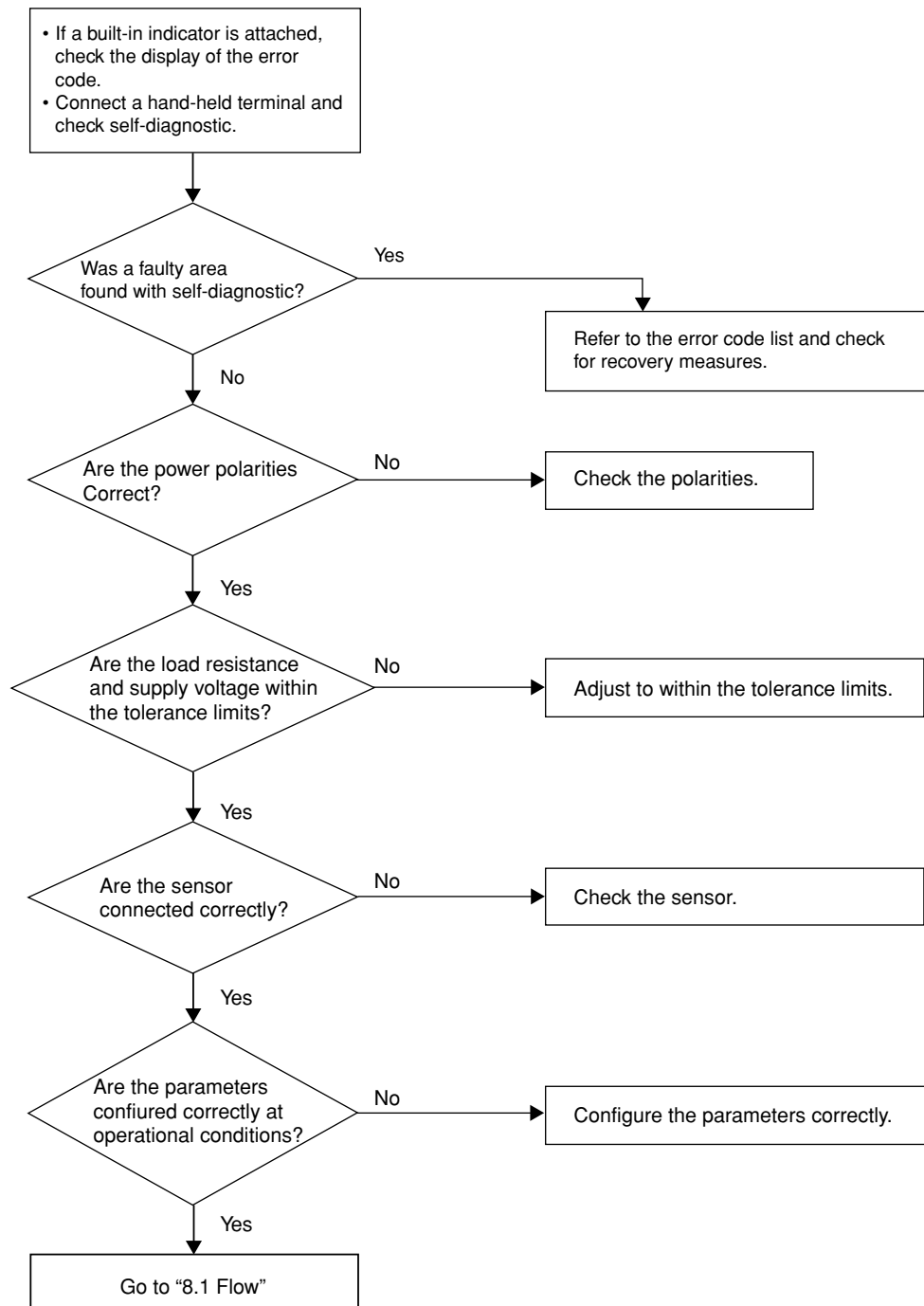


● Output is indicated at zero flow.



## 8.2 Flow (Only for /MV)

- Start with this flow in case of /MV.



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# 9. GENERAL DESCRIPTION

## 9.1 Outline

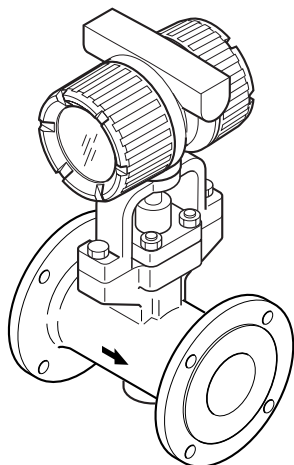
This vortex flowmeter measures liquid, gas and steam flow rates and converts them to a 4 to 20mA DC output or pulse, alarm, status output signal.

Since the converter is mounted independently from the flowmeter, it permits remote flow measurements of high temperature liquid, steam, etc.

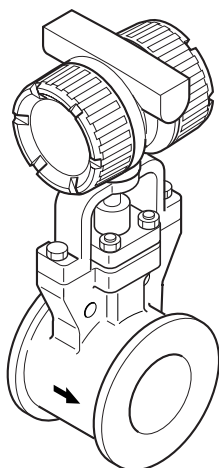
### ■ Integral Type

The Integral Type Vortex Flowmeter (DY-A) has the converter with the flowmeter, and measures liquid, gas and steam flow rates and converts them to a 4 to 20mA DC output or pulse, alarm, status output signal.

**Flange Type**  
(built-in indicator)



**Wafer Type**



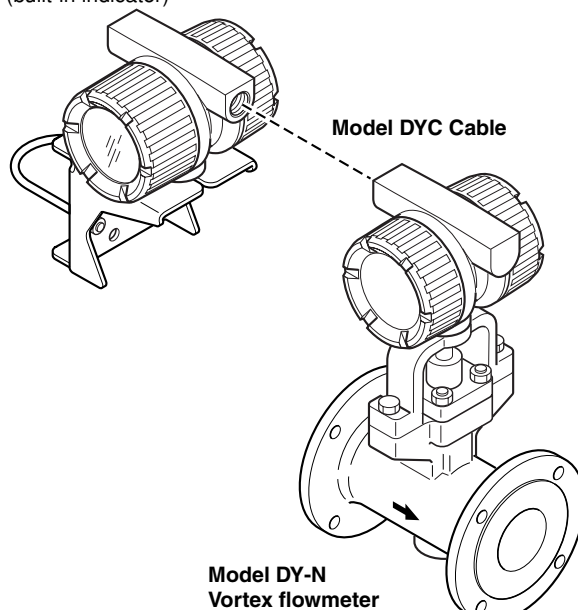
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Figure 9.1.1 External Views (Integral Type)

### ■ Remote Type

The Remote Converter Type Vortex Flowmeter (DY-N) is used with the Model DYA Vortex Flow Converter. A special cable (DYC) is used between these instruments.

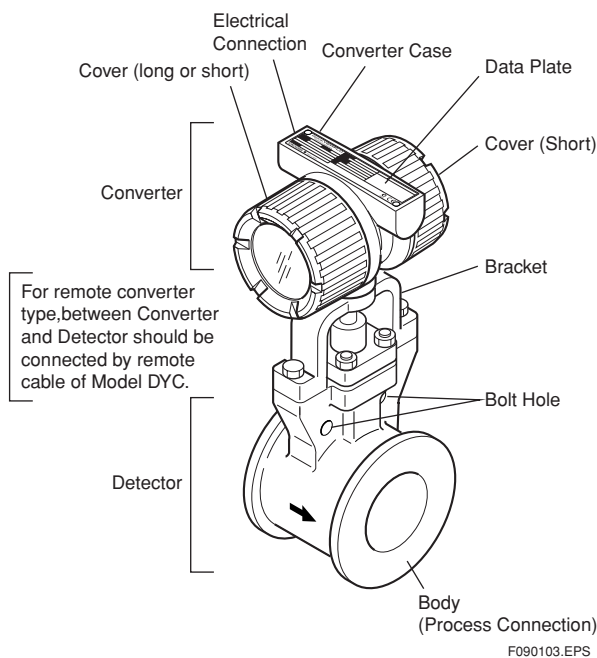
**Model DYA Vortex flow converter**  
(built-in indicator)



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Figure 9.1.2 External Views (Remote Type)

- Name of a portion of the flowmeter (Example of the Wafer Type)



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Figure 9.1.3 Example of Name of portion



## 9.2 Standard Specifications

Refer to GS 01F06F01-01E for Fieldbus communication type, marked with “◇”.

### Performance Specifications

#### Fluid to be Measured :

Liquid, Gas, Steam (Avoid Multiphase Flow and Sticky Fluids)

#### Measuring Flow Rates :

Refer to Table 9.5.2

#### Accuracy : ±0.75% of Reading (Liquid)

±1% of Reading (Gas, Steam)

Refer to P9-15

For the Multi-Variable Type, refer to 9.4.2 term.

#### Repeatability : ±0.2% of Reading

#### Calibration :

This flowmeter is factory-calibrated using a water flow.

Temperature and flow calibration by water flow when /MV is selected.

### Normal Operating Condition

#### Process Temperature Range :

–29 to 250 °C (general)

–196 to 100 °C (Cryogenic Version:option)

–29 to 450 °C (High Process Temperature Version:option)

For the Multi-Variable Type, refer to 9.4.2 term.

Refer to Figure 1 for integral converter type.

#### Process Pressure Limit :

–0.1MPa (–1 kg/cm<sup>2</sup>) to flange rating.

#### Ambient Temperature Range :

–29 to 85 °C (Remote type detector)

–40 to 85 °C (Remote type converter)

–29 to 85 °C (Integral type, refer to Figure 9.2.1)

–29 to 80 °C (Integral type with Indicator, refer to Figure 9.2.1)

–30 to 80 °C (Remote type converter with Indicator)

#### Ambient Humidity : 5 to 100% RH (at 40 °C)

(No Condensation)

#### Power Supply Voltage (◇) : 10.5 to 42 V DC

(Refer to Figure 9.2.2 ; Relationship Between Power Supply Voltage and Load Resistance)

### Mechanical Specifications

#### Material (General Type):

Refer to Table 9.3.1

#### Wetted Parts:

Body; Stainless steel JIS SCS14A,  
ASTM CF8M

Shedder Bar; Duplex stainless steel  
[equivalent to JIS SUS329J1]  
Size 15mm ASTM S31803  
Size 25mm to 300mm

DCS1\*1 or EN 1.4517

\*1 DCS1 is a registered trademark of Daido Castings Co., Ltd.

Gasket: JIS SUS316 stainless steel with Teflon®\* coating.

\*Teflon® is a registered trademark of E.I. Du Pont de Nemours & Co.

#### Non-Wetted Parts:

Housing (Case, Cover):

Aluminum alloy JIS ADC12

Name Plate: Stainless steel JIS SUS304

DYA Mounting Bracket for 2B pipe:

Cold-reduced carbon steel sheet JIS SPCC,  
JIS SECC

#### Coating Color:

Housing:

Polyurethane corrosion-resistant coating

Deep sea moss green (Munsell 0.6GY

3.1/2.0)

DYA Mounting Bracket for 2B pipe:

Polyurethane corrosion-resistant coating

Frosty white (Munsell 2.5Y 8.4/1.2)

#### Protection:

IP67 immersion proof and dust proof. (NEMA 4X).

#### Hazardous Area Classifications:

Refer to 9.4 Option Specifications.

#### Electrical Connection:

JIS G1/2 female, ANSI 1/2 NPT female,

ISO M20 × 1.5 female

#### Signal Cable:

Model DYC cable, used for remote detector and converter.

Max. length : 30 m.

Outer Sheath Material: Heat resisting polyethylene

Durable Temperature : –40 to 150 °C

#### Weight:

Refer to 9.6 External Dimension.

#### Mounting:

Integral type and Remote type detector :

Flange mounting or wafer mounting by flange adjacent to the pipeline.

Remote type converter : 2 inch pipe mounting.

### Electrical Specifications

Note\*: Pulse output, alarm output and status output use the common terminal, therefore these functions are not used simultaneously.

#### Output Signal (◇) : Dual Output (Both Analog and

Transistor contact output can be obtained simultaneously). In this case refer to “3: WIRING”.

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

#### Transistor Contact Output\* :

Open collector, 3-wire system.

Pulse, alarm, status output are selected by parameter setting.

Contact rating: 10.5 to 30 V DC, 120 mA DC

Low level: 0 to 2 V DC. (refer to Figure 9.2.3)

#### Communication Requirements :

##### Communication Signal :

BRAIN or HART communication signal (superimposed on a 4 to 20 mA DC signal)

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

##### Conditions of Communication Line :

##### Load Resistance :

250 to 600 Ω(including cable resistance).

Refer to Figure 9.2.2

##### Supply Voltage :

16.4 to 42 V DC for digital communications

BRAIN and HART protocols.(16.4 to 30 V DC for intrinsically safe type).

Refer to Figure 9.2.2

**BRAIN:**

**Space from other Power Line:** 15cm or more (Parallel wiring should be avoided.)  
**Communication Distance :**  
 Up to 2 km, when polyethylene insulated PVC-sheathed cables (CEV cables) are used. Communication distance varies depending on type of cable used.  
**Load Capacitance:** 0.22 µF or less  
**Load Inductance:** 3.3 mH or less  
**Input Impedance of Receiver Connected to the Receiving Resistance:**  
 10 kΩ or more at 2.4 kHz.

**Functions:**

**Damping Time Constant :**

0 to 99 Sec (63% response time)

Note: Delay time is 0.5 Sec.

Analog output circuit time constant is 0.3 Sec.

**Pulse Output Function\*:**

Pulse output is selected from scaled pulse, unscaled pulse, frequency (number of pulses output per second at 100% of output).

Pulse frequency : Max 10 kHz

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

**Self-diagnostics and Alarm Output\*:**

In case alarm (over range output signal, EEPROM error, vibration noise, abnormal flow such as clogging, bubble) occurs, an alarm signal is output and indicated.

The alarm signal output goes from close(ON) to open(OFF) during alarming.

**Status Output Function\*:**

**Flow Switch:**

In case flow rate decreases under the flow set value, a status signal is output.

Status signal output mode can reverse (ON/OFF) .

**Analog Output Function:**

Analog output is selected from flowrate temperature value when option code /MV is selected.

**Data Security During Power Failure:**

Data (parameter, totalizer value, etc) storage by EEPROM. No back-up battery required.

**Correction:**

**Instrument Error Correction:**

Vortex flowmeter instrument errors can be corrected by segment approximations.

**Reynolds Number Correction:**

Output error at Reynolds number 20000 or less is corrected by using five-break-point line-segment approximation.

**Gas Expansion Correction:**

When measuring a compressibility gas and steam, this expansion factor is useful to correct the error at high velocity of flow (35m/s or more).

**Down-scale or Up-scale burn out.**

In case a CPU or EEPROM failure occurs, flow meter output the signal of Up-scale (21.6 mA or more).

Up-scale or Down-scale (3.6 mA or less) is user-selectable through the fail mode alarm jumper.

**Indicator:**

Flow rate (% or engineering units) or temperature value and totalizer can be indicated simultaneously.

Short message for self diagnostics indicates. Local parameter setting can be operated by key switches.

In mounting direction, the right and left 90° is rotatable.

**EMC Conformity Standards:**

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

EN55011 Class A Group 1

Note1: This instrument is a Class A product, and it is designed for use in the industrial environment. Please use this instrument in the industrial environment only.

Note2: Use the metal conduit for the remote cable.

**Pressure Equipment Directive:**

Notified Body Identification Number 0038  
 Module H

MODEL	DN(mm)*	PS(Mpa)*	PS-DN (Mpa-mm)	CATEGORY**
DY015	15	42	630	Article 3***, Paragraph 3
DY025	25	42	1050	Article 3***, Paragraph 3
DY040	40	42	1680	II
DY050	50	42	2100	II
DY080	80	42	3360	II
DY100	100	42	4200	II
DY150	150	42	6300	III
DY200	200	42	8400	III
DY250	250	42	10500	III
DY300	300	42	12600	III

\* PS : Maximum allowable pressure for Flow tube, DN : Nominal size

\*\* Referred to Table 6 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC

\*\*\* DY015 and DY025 are outside the scope of CE marking of PED.

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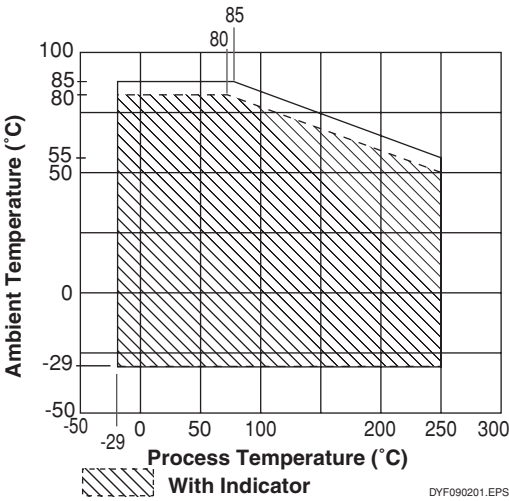


Figure 9.2.1 Ambient Temperature limit (Integral Type)

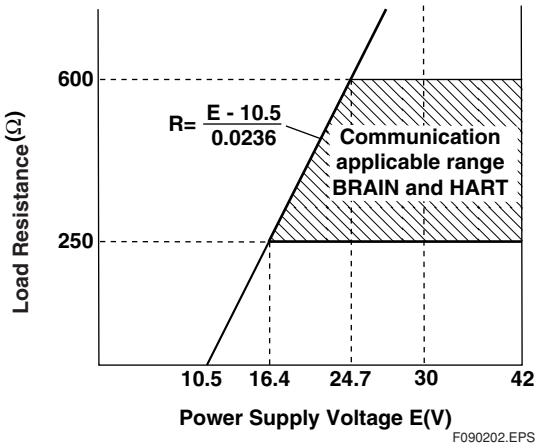


Figure 9.2.2 Relationship Between Power Supply and Load Resistance

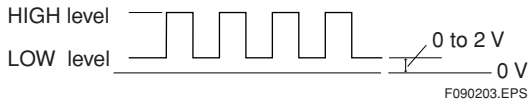


Figure 9.2.3 High and low level (Pulse output)

### 9.3 Model and Suffix Codes

#### DY Vortex Flowmeter (Integral Type, Remote type detector)

Model	Suffix Codes	Description
DY015	.....	Size 15 mm (1/2 inch)
DY025	.....	Size 25 mm (1 inch)
DY040	.....	Size 40 mm (1-1/2 inch)
DY050	.....	Size 50 mm (2 inch)
DY080	.....	Size 80 mm (3 inch)
DY100	.....	Size 100 mm (4 inch)
DY150	.....	Size 150 mm (6 inch)
DY200	.....	Size 200 mm (8 inch)
DY250	.....	Size 250 mm (10 inch)
DY300	.....	Size 300 mm (12 inch)
Output Signal /Communication *1, *12	-D .....	4 to 20 mA DC, Pulse, BRAIN Communication
	-E .....	4 to 20 mA DC, Pulse, HART Communication
	-F .....	Digital communication (FOUNDATION Fieldbus protocol)
	-N .....	Remote type detector
Body Material *2, *14	A .....	JIS SCS14 A *10
	B .....	ASTM, ASME CF8M *3
	X .....	Others
Shedder bar Material *4, *14	L .....	Duplex stainless steel
	E .....	Duplex stainless steel (for TIIS Approval)
	X .....	Others
Process Connection *5  RF : Raised Face SF : Smooth Finish RJ : Ring Joint	AJ1 .....	JIS 10 K Wafer
	AJ2 .....	JIS 20 K Wafer
	AJ4 .....	JIS 40 K Wafer
	AA1 .....	ANSI Class 150 Wafer
	AA2 .....	ANSI Class 300 Wafer
	AA4 .....	ANSI Class 600 Wafer
	AD1 .....	DIN PN10 Wafer
	AD2 .....	DIN PN16 Wafer
	AD3 .....	DIN PN25 Wafer
	AD4 .....	DIN PN40 Wafer
	BJ1 .....	JIS 10K Flange(RF)
	BJ2 .....	JIS 20K Flange(RF)
	BJ4 .....	JIS 40K Flange(RF)
	BA1 .....	ANSI Class 150 Flange(RF)
	BA2 .....	ANSI Class 300 Flange(RF)
	BA4 .....	ANSI Class 600 Flange(RF)
	BA5 .....	ANSI Class 900 Flange(RF)
	BS1 .....	ANSI Class 150 Flange(RF, SF)
	BS2 .....	ANSI Class 300 Flange(RF, SF)
	BS4 .....	ANSI Class 600 Flange(RF, SF)
BS5 .....	ANSI Class 900 Flange(RF, SF)	
BD1 .....	DIN PN10 Flange(RF)	
BD2 .....	DIN PN16 Flange(RF)	
BD3 .....	DIN PN25 Flange(RF)	
BD4 .....	DIN PN40 Flange(RF)	
CA4 .....	ANSI Class 600 Flange(RJ)	
CA5 .....	ANSI Class 900 Flange(RJ)	
Electrical Connection *11	-0.....	JIS G 1/2 Female
	-2.....	ANSI 1/2 NPT Female *6
	-4.....	ISO M20×1.5 Female
Indicator *7	D .....	With Indicator
	N .....	None Indicator, Remote type detector
Options	<input type="checkbox"/>	Refer to Option Specifications

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#### DYA Vortex Flowmeter Converter(Remote Type)

Model	Suffix Code	Description
DYA	.....	Vortex Flowmeter Converter (Remote Type)
Output Signal /Communication *1, *12	-D.....	4 to 20 mA DC, Pulse BRAIN Communication
	-E.....	4 to 20 mA DC, Pulse HART Communication
	-F.....	Digital communication (FOUNDATION Fieldbus protocol)
Electrical Connection	0.....	JIS G 1/2 Female
	2.....	ANSI 1/2 NPT Female *6
	4.....	ISO M20 ×1.5 Female
Indicator	D .....	With Indicator
	N .....	None Indicator
Options	<input type="checkbox"/> /MV.....	Refer to Option Specifications Multi-Variable Type *13

#### DYC Signal Cable

Model	Suffix Code	Description
DYC	.....	Signal Cable
Cable End	-0.....	Without End finish *8
	-1.....	With End finish
Cable Length *9	-05.....	5 m
	-10.....	10 m
	-15.....	15 m
	-20.....	20 m
	-25.....	25 m
	-30.....	30 m
	-35.....	35 m
	-40.....	40 m
	-45.....	45 m
	-50.....	50 m
	-55.....	55 m
	-60.....	60 m
	-65.....	65 m
	-70.....	70 m
	-75.....	75 m
-80.....	80 m	
-85.....	85 m	
-90.....	90 m	
-95.....	95 m	
Options	/C1 .....	Cable End Finish Parts 1 set
	/C2 .....	2 set
	/C3 .....	3 set
	/C4 .....	4 set
	/C5 .....	5 set
	/C6 .....	6 set
	/C7 .....	7 set
	/C8 .....	8 set
	/C9 .....	9 set
	/MV .....	Multi-variable Type

- \* 1 : Nominal size, Fluid(Liquid, Gas, Steam), Density, Viscosity, Pressure, Temperature, Flow range, Parameters are set at the factory before shipment.
- \* 2 : Refer to Table 9.3.1.  
In case of /NC or /HX or /HY or /HT or /LT, select X (others).
- \* 3 : In case of B (ASTM, ASME CF8M), the process connection is available for ANSI (AA1 to 4, BA1 to 5, CA4 to 5) and DIN (BD1 to 4).
- \* 4 : Refer to Table 9.3.1.  
In case of /NC or /HX or /HY or /HT or /LT, select X (others).
- \* 5 : Refer to Table 9.3.2.
- \* 6 : In case of /FF1 or /CF1, the screw length is deeper than ANSI standard for 0.5 to 3.5 threads.
- \* 7 : Indicator is not available for remote type detector.
- \* 8 : One set of end finish part is attached.
- \* 9 : DYC cable can be used up to 30m. When you divide the cable below 30m, select the Cable End code [-0].
- \*10: In case of A (JIS SCS14A), the process connection is available for JIS (AJ1, AJ2, AJ4, BJ1, BJ2, BJ4)
- \*11: In case of an explosion proof type, it depends for an electrical connection on the kind of an explosion protect type. Refer to 9.4.3 Option Specification (For Explosion Protected type).
- \*12: For FOUNDATION Fieldbus protocol, refer to GS 01F06F01-01E. For Fieldbus communication type, there are not setting keys on the display board.
- \*13: DY A-□□□ / MV and DY□□□□ -N\*\*\* / MV should be combined.
- \*14: Users must consider the characteristics of selected wetted parts material and the influence of process fluids. The use of inappropriate materials can result in the leakage of corrosive process fluids and cause injury to personnel and/or damage to plant facilities. It is also possible that the instrument itself can be damaged and that fragments from the instrument can contaminate the user's process fluids.  
Be very careful with highly corrosive process fluids such as hydrochloric acid, sulfuric acid, hydrogen sulfide, sodium hypochlorite, and high-temperature steam (150°C [302°F] or above). Contact Yokogawa for detailed information of the wetted parts material.

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Table 9.3.1 Body, Shedder bar, Gasket Material

Body Material		Upper: Material Code Lower: Material Name		Standard (Note 1)	Anti-corrosion version II (/HY) (Note 2)	High process temperature version (/HT) (Note 2)	Cryogenic version (/LT) (Note 2) (Note 3)	Compliance with NACE (/NC)
Wafer	Flange							
DY015	DY015	DY025/R1	DY040/R2	A JIS SCS14A  B ASTM CF8M	X (Note 2) JIS SCS14A ASTM CF8M	X (Note 2) JIS SCS14A ASTM CF8M	X (Note 2) DIN1.4308 (JIS SACS13)	B ASTM CF8M
DY025	DY025	DY040/R1	DY050/R2					
DY040	DY040	DY050/R1	DY080/R2					
DY050	DY050	DY080/R1	DY100/R2					
DY080	DY080	DY100/R1	DY150/R2					
DY100	DY100	DY150/R1	DY200/R2					
	DY150	DY200/R1	—					
	DY200	—	—					
	DY250	—	—					
	DY300	—	—					

(Note 1) In case of the suffix code of the body material is A, the code of the process connection is for one of AJ□, AJ□, BJ□, AP□ or BP□.

In case of the code B, process connection code is for one of AA□, BA□, BS□, CA□, AD□ or BD□.

(Note 2) In case of optional specifications code "/HY", "/HT", "/LT" and "/NC", select "X" for both body material code and shedder bar material code.

(Note 3) The combination of "/LT" and "R□" is not available.

Shedder bar material		Upper: Material Code Lower: Material Name		Standard TIIS Flame proof approval (/JF3)	Anti-corrosion version II (/HY) (Note 1)	High process temperature version (/HT) (Note 1)	Cryogenic version (/LT) (Note 1) (Note 3)	Compliance with NACE (/NC) (Note 1)
Wafer	Flange							
DY015	DY015	DY025/R1	DY040/R2	L ASTM S31803	X ASTM N10276	—	X ASTM N10276	X ASTM N10276
DY025	DY025	DY040/R1	DY050/R2	L DCS1 or EN1.4517	E EN1.4517 (Note 2)	X ASTM CW-12MW	X ASTM CW-12MW	X ASTM CW-12MW
DY040	DY040	DY050/R1	DY080/R2					
DY050	DY050	DY080/R1	DY100/R2					
DY080	DY080	DY100/R1	DY150/R2					
DY100	DY100	DY150/R1	DY200/R2					
	DY150	DY200/R1	—	L DCS1	—	—	—	—
	DY200	—	—		—	—	—	—
	DY250	—	—		—	—	—	—
	DY300	—	—		—	—	—	—

(Note 1) Select body code [X] and shedder bar code [X] for /HY, /HT, /LT and /NC.

(Note 2) Select shedder bar code [E] in case of TIIS Flame proof type (/JF3) and general specification for DY025 to DY100.

Select [L] for other normal sizes.

The combination of /JF3 and /HY, /HT, /LT and NC, select [X] according to Note 1.

(Note 3) The combination of "/LT" and "R□" is not available.

Gasket material		Upper: Material Code Lower: Material Name		Standard	Anti-corrosion version II (/HY)	High process temperature version (/HT)	Cryogenic version (/LT) (Note 1)	Compliance with NACE (/NC)
Wafer	Flange							
DY015	DY015	DY025/R1	DY040/R2	JIS SUS316 stainless steel with polytetra- fluoroethylene (Teflon) coating	JIS SUS316 stainless steel with polytetra- fluoroethylene (Teflon) coating	JIS SUS316 stainless steel plated with silver	JIS SUS316 stainless steel with polytetra- fluoroethylene (Teflon) coating	JIS SUS316 stainless steel with polytetra- fluoroethylene (Teflon) coating
DY025	DY025	DY040/R1	DY050/R2					
DY040	DY040	DY050/R1	DY080/R2					
DY050	DY050	DY080/R1	DY100/R2					
DY080	DY080	DY100/R1	DY150/R2					
DY100	DY100	DY150/R1	DY200/R2					
	DY150	DY200/R1	—					
	DY200	—	—					
	DY250	—	—					
	DY300	—	—					

(Note 1) The combination of "/LT" and "R□" is not available.

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Table 9.3.2 Flowmeter Selection Guide

Process Connection	Wafer		Flange(Raised Face)			Flange(Ring Joint)		Flange(Raised Face, Smooth Finish)				
	Suffix Code	Model Code	Suffix Code	Model Code		Suffix Code	Model Code	Suffix Code	Model Code			
JIS 10 K	AJ1	DY015 up to DY100	BJ1	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	—	—	—	—		
JIS 20 K	AJ2	DY015 up to DY100	BJ2	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	—	—	—	—		
JIS 40 K	AJ4	DY015 up to DY100	BJ4	DY015 up to DY150		—	—	—	—			
ANSI Class 150	AA1	DY015 up to DY100	BA1	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	—	—	BS1	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2
ANSI Class 300	AA2	DY015 up to DY100	BA2	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	—	—	BS2	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2
ANSI Class 600	AA4	DY015 up to DY100	BA4	DY015 up to DY200		CA4	DY015 up to DY200	BS4	DY015 up to DY200			
ANSI Class 900	—	—	BA5	DY015 up to DY200		CA5	DY015 up to DY200	BS5	DY015 up to DY200			
DIN PIN 10	AD1	DY015 up to DY100	BD1	DY015 up to DY200		—	—	—	—			
DIN PIN 16	AD2	DY015 up to DY100	BD2	DY015 up to DY200		—	—	—	—			
DIN PIN 25	AD3	DY015 up to DY100	BD3	DY015 up to DY200		—	—	—	—			
DIN PIN 40	AD4	DY015 up to DY100	BD4	DY015 up to DY200		—	—	—	—			

(Note)

- ANSI standardized types are worked by serration finishing except the Smooth Finish type.
- Refer to "OPTION REDUCED BORE TYPE (/R1, /R2)" (P.11), when you select reduced bore type (/R1, /R2).

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## 9.4 Option Specifications

### 9.4.1 Option Specifications

Item	Specification	Applicable Model	Code
Multi-Variable Type (Note 5)	Build in Temperature sensor (Pt 1000 ) in vortex shedder bar.	DY / DYA	MV
Reduced bore type (Note 8) See 9.4.3	Integrated and welded construction with concentric reduced bore piping. R1 : Detector size is one meter body size down of digitalYEWFL0 to flange pipe size.	DY	R1
	R2 : Detector size is two meter body size down of digitalYEWFL0 to flange pipe size.		R2
Stainless Steel Tag Plate (Note 1)	JIS SUS304 tag plate, hung on the case.	DY / DYA	SCT
Stainless Steel Bolt & Nut Assembly	JIS SUS304 bolt/nut assembly. Used when a wafer type is installed.	DY Wafer Type	BL
Paint Color Change	Only for the covers: See refer to Table 9.4.1	DY / DYA	See Table8
Hydrostatic / Pneumatic Test Certificate	Test pressure value is in accordance with Table 9.4.2. Test time: 10 minutes. Available for the general type. Test medium: Air, Nitrogen or Water.	DY	T01
Hydrostatic Test Certificate	Test pressure value is in accordance with Table 9.4.2. Test time: 10 minutes. Available for the general type. Test medium: Water.	DY	T02
Degrease Treatment (Note 2)	Degrease cleansing treatment.	DY	K1
Epoxy Coating	Epoxy coating for case and cover.	DY / DYA	X1
Pilling up coating to keep off corrosion	Epoxy and Polyurethane coating for the purpose of corrosion - proof improvement; salt damage, alkali, climate and acidity	DY, DYA	X2
High Process Temperature Version (Note 7)	For Liquid and Steam (NOT for Gas) This specification temperature is from -29 to +450 °C Refer to Table 9.3.1 , Figure 9.4.1. Refer to Table 9.5.1 for minimum velocity. In case of another size, please contact to YOKOGAWA sales person.	DY***-N	HT
Cryogenic Version	This specification temperature is from -196 to +100 °C Refer to Table 9.3.1 , Figure 9.4.2. In case of another size, please contact to YOKOGAWA sales person.	DY***-N	LT
Stainless Steel Bracket for Remote Converter (DYA)	The bracket material for remote converter type (DYA) is JIS SUS304.	DYA	SB
Lightning Protector	There is an arrester inside converter for power supply line. Maximum power supply voltage : 30VDC	DY***-D,E / DYA	A
Compliance with NACE	Compliance with NACE. Refer to Table 9.3.1.	DY	NC
Compliance with NAMUR (Note 6)	Compliance with NAMUR43. Current signal for measurement is 4mA up to 20.5mA. Set output 3.6mA or less when burn-out occurred.	DY / DYA	NM
Anti-corrosion Version II	Anti-corrosion Version II. Refer to Table 9.3.1.	DY	HY
Converter Installing Direction 180 Change (Note4)	Converter installing direction 180° change inversely when shipped.	DY	GRC
Down-scale burn-out in CPU or EEPROM failure (Note 3)	Set output 3.6mA or less when burn-out occurred.	DY***-D,E / DYA	C1
Stainless steel housing (Note 9)	Converter housing, case and cover material: JIS SCS14A or ASTM CF8M stainless steel castings. (equivalent to JIS SUS316)	DY***-N / DYA	E1
Flameproof Packing Adapter	Power source connection port and signal cable (remote type) connection port. JIS G1/2 female thread. Other cable shape: ø 8 to ø 12. G11 : One piece, G12 : Two pieces.	DY / DYA, / JF3	G11
			G12
Calibration Certificate	Level 2 Declaration and Calibration Equipment List	DY / DYA	L2
	Level 3 Declaration and Primary Standard List	DY / DYA	L3
	Level 4 Declaration and YOKOGAWA Measuring	DY / DYA	L4

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## 9. GENERAL DESCRIPTION

Item	Specification	Applicable Model	Code
Material certificates: Mill sheets	Each certificate to be attached produced by the vendors.	DY	
	Item to be specified		M01
	1. Meterbody		M02
	1. Meterbody, 2. Shedder bar		M03
Material certificates: EN10204 3.1	Each certificate to be attached produced by the vendors.	DY	
	Item to be specified		E01
	1. Meterbody		E02
	1. Meterbody, 2. Shedder bar		E03
PAMI test certificate	Positive Material Identification certificate to be attached for the main 3 chemical components of specified materials. Each certificate to be attached.	DY	PM1
	Item to be specified		PM2
ASME welding documents submission	1. Welder/Welding Operator Performance Qualification (or Welder Qualification Record) 2. Welding Procedure Specification (WPS) 3. Procedure Qualification Record (PQR) Each certificate to be submitted. The customer's name and job name to be specified when ordered.	DY	WP
	Item to be specified		
Liquid Penetrant test certificate	Dye Penetrant test certificate for the welded portion to be attached. Each certificate to be attached.	DY	PT
	Item to be specified	1. Welded portion for the bottom plug 2. Welded portion for the flange in case of the welding construction	

- (Note 1) The specified Tag Number is engraved on the data plate and stainless tag plate. The limitation of characters for Tag Number is, for BRAIN Terminal or name plate, stainless steel tag plate: 16 characters, and for HART Configuration Tool: 8 characters.
- (Note 2) There is a case that calibration water should stay in the meter tube. So this is not degrease treatment in the strict sense.
- (Note 3) The output is set 3.6mA or less (General type is set 21.6mA or more at shipping).
- (Note 4) The electrical connection turn to a downstream side.
- (Note 5) Refer to "OPTION MULTI-VARIABLE (BUILD IN TEMPERATURE SENSOR) TYPE (/MV)" (see 9.4.2)  
In case of Remote type detector (DY\*\*\*-N), select "/MV" both DY and DYA.
- (Note 6) /NM can not combine with Remote type (DY\*\*\*-N).
- (Note 7) SAA Flame proof Approval (/SF1) can not combine with High Process Temperature Version (/HT).
- (Note 8)
- Cryogenic version (/LT) is not available.
  - High process temperature version (/HT) and Multi-variable type (/MV) for DY025/R1 and DY040/R2 are not available.
  - Explosion protected type SAA (/SF1, /SS1) is not available.
  - Flange type only and available process connections are JIS10k, 20k (BJ1, BJ2) and ANSI150, 300 (BA1, BA2, BS1, BS2).
  - Model Code size means "DY\*\*\*" nominal size.
- (Note 9)
- Applicable for option code /FF1, /FS1, /KF1, /KS1 and /KN1.
  - Not applicable for option code: /P1, /P2, /P7, /X1, /X2, /HT, /LT, /SB, /JF3, /CF1, /CS1, /CF11, /CS11, /SF1, /SS1.
  - The materials of exterior parts, name plate, screw, bolts on the stainless steel housing and bracket, u-bolt, nuts for DYA/E1 and tag plate for /E1/SCT are JIS SUS316 or SUS316L.

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**Table 9.4.1 Paint Color and Codes**

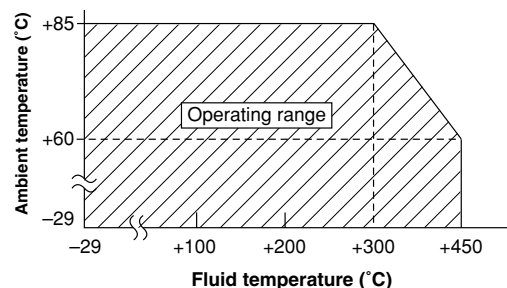
Codes	Munsell Renotation Code	Color
P1	N1.5	Black
P2	7.5BG4/1.5	Jade green
P7	—	Metallic silver

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**Table 9.4.2 Test Pressure Value**

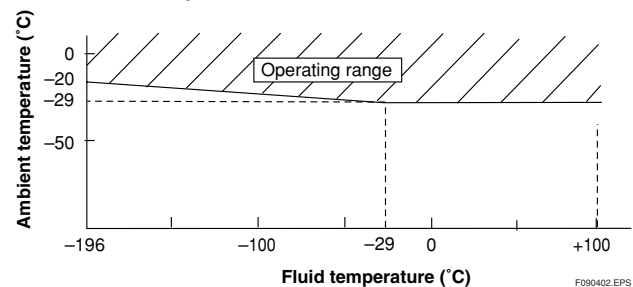
Flange Rating	Pressure
JIS 10 K	2.1 MPa
JIS 20 K	5.0 MPa
JIS 40 K	10.0 MPa
ANSI Class 150	2.9 MPa
ANSI Class 300	7.5 MPa
ANSI Class 600	14.9 MPa
ANSI Class 900	22.4 MPa
DIN PN 10	1.5 MPa
DIN PN 16	2.4 MPa
DIN PN 25	3.8 MPa
DIN PN 40	5.9 MPa

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**Figure 9.4.1 Fluid temperature range of high process temperature version**



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**Figure 9.4.2 Fluid temperature range of cryogenic version**



### 9.4.2 Option Multi-Variable (Build in Temperature Sensor) Type (/MV)(\*1)

This option is the same as standard specification except the following items.

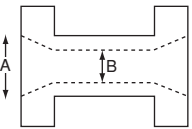
		Multi-variable Type					Standard Type
Size	Wafer Type	25mm to 100mm					15mm to 100mm
	Flange Type	25mm to 200mm					15mm to 300mm
Function	Only for indication and output	Mass Flow calculation. (Volumetric flowrate at Standard condition for GAS)					
Fluid	Liquid, Gas Saturated Steam Superheat Steam	Saturated Steam	Superheat Steam	Gas	Liquid	Liquid, Gas Saturated Steam Superheat Steam	
Temperature Range	-29 to 250°C	100 to 250°C	100 to 250°C	-29 to 250°C	-29 to 250°C	-29 to 250°C	
Accuracy (*2)	Mass Flow	Refer to "Detailed Accuracy" (See P.9-15)					
	Temperature	±0.5% OF RATE	±1% OF RATE	±1°C (Less than 100°C) ±1% OF RATE (100°C or more)	±0.5°C (Less than 100°C) ±0.5% OF RATE (100°C or more)		
Temperature Response (50% response)	60sec (Churning Underwater)						
Mass Flow Calculation Method		Density Calculation (*3)	Density Calculation (Constant pressure is assumed) (*4)	Temp.-Pressure Correction (Constant pressure is assumed) (*5)	Density change Calculation (*6)		
Output	Analog Output	Select from Flow rate or temperature (*7)					Only for Flow Rate
	Pulse Output	Only for Flow rate					Only for Flow Rate
	Alarm Output	Standard Alarm+Error of thermometer etc.					Only for Standard
	StatusOutput	Only for Flow Switch					Flow Switch
Display	Upper	Select from Flow rate (% Engineering Unit) or Temperature (%) (*8)					Only for Flow Rate
	Lower	Select from Total Rate or temperature ( C, F) (*9)					Only for Total Rate
Remote Type	Flow Converter : Select DYA-□□□/MV Signal Cable : Select DYC-□□□/MV (*10)						

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- (\*1) When /MV is chosen, /HT, /LT is not available.
- (\*2) Measurement temperature is changed by the heat-insulation method of piping and piping method. Refer to 2.2 Piping, about heat-insulation (P.2-3). In case of the Mass Flow measurement of saturated steam and superheat steam, it is necessary to make a heat-insulation.
- (\*3) Mass Flow rate is calculated from density values by temperature measurement using saturated steam table.
- (\*4) Mass Flow rate is calculated from density values to temperature measured by using steam table. In order to measure superheated steam, it is necessary to make constant pressure value. A pressure values which is indicated by order sheet is used.
- (\*5) In order to measure gas, Pressure-Temperature correction is carried out. It is necessary to make constant pressure value. A pressure values at operational condition, temperature and pressure value at standard condition which is indicated by order sheet is used.
- (\*6) In order to measure mass flowrate of liquid application, the density at normal condition is used, and if fluid temperature deviates from normal temperature density values is calculated by 2 dimensional equation. In this case, temperature coefficient should be prepared by user's side.
- (\*7) Default setting is Flow rate. It is necessary to change the parameter of output in case of setting temperature output.
- (\*8) In case of indicating the temperature %, the display indicate not only "%" but also "t". ("t" is the means of temperature)
- (\*9) Default setting is "temperature" but "Total" is setup when ordering the Total Rate.
- (\*10) For the Remote Type (DY\*\*\*-N/MV), be sure to set the parameter of cable length for DYA, Remote Type converter.

9.4.3 OPTION REDUCED BORE TYPE (/R1) (\*1)

This option is the same as standard specification except the following items.

Reduced bore type (Option Code: /R1, /R2)				
Model Code (Note 2) 	Flange piping size (A)	R1 Detector size (inner dia.) (B)	R2 Detector size (inner dia.) (B)	[Pressure Loss] R1: about 15% increases to standard type. R2: about 28% increases to standard type. see P.9-18
	DY025	15 (14.6) (mm) (Note 3)		
	DY040	25 (25.7) (mm)	15 (14.6) (mm) (Note 3)	
	DY050	40 (39.7) (mm)	25 (25.7) (mm)	
	DY080	50 (51.1) (mm)	40 (39.7) (mm)	
	DY100	80 (71) (mm)	50 (51.1) (mm)	
	DY150	100 (93.8) (mm)	80 (71) (mm)	
	DY200	150 (138.8) (mm)	100 (93.8) (mm)	
Measurable minimum flow velocity	Refer to table 9.5.1.			
Range of measurable flow velocity	Refer to table 9.5.2.			

(Note 1) For detailed accuracy, see "SIZING". Not available for /LT.  
 Not available for /SF1, /SS1

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(Note 2) Flange type only: JIS10K,20K (BJ1,BJ2) and ANSI150,300 (BA1,BA2,BS1,BS2)  
 MS Code [\*] of "DY\*\*\*-" means flange piping size.

(Note 3) High process temperature version (/HT) and Multi-variable type (/MV) for DY025/R1 and DY040/R2 are not available.

## 9.4.4 Option Specifications (For Explosion Protected Type)

Item	Specification	Code
TIIS Certification	<p>TIIS Flame proof Approval (Note 1)            Flame proof Ex d IIC T6 Certified by TIIS.            (TIIS is the abbreviation of Technology Institution of Industrial Safety.)            Amb. Temp: -20 to 60°C            Electrical connection: JIS G1/2 female</p>	JF3
Factory Mutual (FM)	<p>FM Explosion proof Approval            Applicable Standard: FM3600 1998, FM3611 1999, FM3615 2006, FM3810 1989,            Including Supplement 1 1995, ANSI/NEMA 250 1991            Type of Protection : Explosion proof for Class I, Division 1, Groups A, B, C and D;            Dust-ignitionproof for Class II/III, Division 1, Groups E, F, and G.            "SEAL ALL CONDUITS WITHIN 18 INCHES." "WHEN INSTALLED IN DIV.2,            SEALS NOT REQUIRED."            Enclosure Rating : NEMA Type 4X            Temperature Code : T6            Ambient Temperature : -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)            -40 to +60°C (Remote Type Converter)            Maximum Working Pressure : 16MPa (DY015 to DY200)            5MPa (DY250 and DY300)            Electrical Connection : ANSI 1/2NPT female</p>	FF1
	<p>FM Intrinsically safe Approval (Note 2)            Applicable Standard: FM3600 1998, FM3610 1999, FM3611 2004, FM3810 2005,            Including Supplement 1 1995, ANSI/NEMA 250 1991, ISA-S12.0.01 1998            Type of Protection : Intrinsically Safe for Class I, II, III, DIV.1, Groups A, B, C, D, E, F and G, T4,            and Class I, Zone 0, AEx ia IIC T4            Nonincendive for Class I, II, Div.2, Groups A, B, C, D, F and G, Class III, DIV.1, T4,            and Class I, Zone 2, Groups IIC, T4            Ambient Temperature : -29 to +60°C (Integral Type Flowmeter)            -29 to +80°C (Remote Type Flowmeter)            -40 to +60°C (Remote Type Converter)            Maximum Working Pressure : 16MPa (DY015 to DY200)            5MPa (DY250 and DY300)            Indoors and Outdoors : NEMA Type 4X            Electrical Parameter : Vmax=30Vdc, Imax=165mAdc, Pi=0.9W, Ci=12nF, Li=0.15mH            Electrical Connection : ANSI 1/2NPT female</p>	FS1
GENELEC ATEX (KEMA)	<p>GENELEC ATEX(KEMA) Explosion proof Approval            Applicable Standard : EN50014: 1997, EN50018: 2000, EN61010-1: 1993            Type of protection : EExd IIC T6...T1(Integral Type Flowmeter and Remote Type Flowmeter)            EExd IIC T6 (Remote Type Converter)            Group : II            Category : 2G            Process temp.: T6; 85°C, T5;100°C, T4;135°C, T3;200°C, T2 (*);300°C, T1 (*);450°C            (*: Use /HT version above 250°C)            Degree of Protection of Enclosure : IP67            Tamb: -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)            -40 to +60°C (Remote Type Converter)            -30 to +60°C (Remote Type Converter with indicator)            Maximum working Pressure : 16MPa (DY015 to DY200)            5MPa (DY250 to DY300)            Electrical Connection : ANSI 1/2 NPT female, ISO M20 × 1.5 female.</p>	KF1
	<p>GENELEC ATEX(KEMA) Intrinsically safe Approval (Note 2)            Applicable Standard : EN50014: 1997+A1, A2, EN50020: 2002            EN50284: 1999            Type of protection : EEx ia IIC T4...T1(Integral Type Flowmeter and Remote Type Flowmeter)            EEx ia IIC T4(Remote Type Converter)            Group : II            Category : 1G            Degree of Protection of Enclosure : IP67            Maximum Working Pressure : 16MPa (DY015 to DY200)            5MPa (DY250 and DY300)            Tamb. : -29 to +60°C (Integral Type Flowmeter)            -29 to +80°C (Remote Type Flowmeter)            -40 to +60°C (Remote Type Converter)            Process temp.: T4;135°C, T3;200°C, T2 (*);300°C, T1(*); 450°C            (*: Use /HT version above 250°C)            Electrical data:            Supply and Output Circuit (SUPPLY + and -, PULSE + and -);            Maximum Input Voltage Ui: 30 V            Maximum Input Current Ii: 165 mA            Maximum Input Power Pi: 0.9 W            Internal Capacitance Ci: 6nF            Internal Inductance Li: 0.15mH            For connection of DYA and DY-N            Maximum capacitance of cable: 160nF            Electrical connection : ANSI 1/2NPT female, ISO M20 × 1.5 female.</p>	KS1

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9. GENERAL DESCRIPTION

Item	Specification	Code
CENELEC ATEX (KEMA)	<p>CENELEC ATEX (KEMA) Type n Approval                      Applicable Standard: EN60079-15: 2005, IEC60079-0: 2004, IEC60079-11: 1999, EN60529: 1991                      Type of Protection : EEx nL IIC T4...T1 (Integral Type Flowmeter and Remote Type Flowmeter)                      EEx nL IIC T4 (Remote Type Converter)</p> <p>Group : II                      Category : 3G                      Degree of Protection of Enclosure: IP67                      Maximum Working Pressure : 16MPa (DY015 to DY200)                      5MPa (DY250 and DY300)                      Ambient Temperature: -29 to +60°C (Integral Type Flowmeter)                      : -29 to +80°C (Remote Type Flowmeter)                      : -40 to +60°C (Remote Type Converter)                      Process Temp.: T4; 135°C, T3; 200°C, T2(*); 300°C, T1(*); 450°C                      (*: Use /HT version above 250°C)</p> <p>Electrical data:                      Supply and Output Circuit (SUPPLY + and -, PULSE + and -);                      Maximum Input Voltage Ui: 30 V                      Internal Capacitance Ci: 6nF                      Internal Inductance Li: 0.15mH                      Maximum Capacitance of Cable :160nF</p> <p>Electrical Connection : ANSI 1/2 NPT female, ISO M20 X 1.5 female.</p>	KN1
Canadian Standards Association (CSA)	<p>CSA Explosion proof Approval                      Applicable Standard: C22.1-98, C22.2 No.0-M1991, C22.2 No.0.4-04, C22.2 No. 0.5-1982,                      C22.2 No. 25-1966, C22.2 No. 30-M1986, C22.2 No. 94-M1991,                      C22.2 No. 142-M1987, C22.2 No. 61010-1-04, ANSI/ISA-12.27.01-2003</p> <p>Type of Protection : Explosionproof for Class I, Groups B, C and D;                      Class II, Groups E, F, and G; Class III.                      For Class I, Division 2 location:                      "FACTORY SEALED, CONDUIT SEAL NOT REQUIRED"</p> <p>Enclosure : Type 4X                      Temperature Code : T6...T1 (Integral Type Flowmeter and Remote Type Flowmeter)                      T6 (Remote Type Converter)                      Amb.Temp. : -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)                      -40 to +60°C (Remote Type Converter)                      Process temp. : T6;85°C, T5;100°C, T4;135°C, T3;200°C, T2;300°C, T1; 450°C                      Maximum working Pressure : 16MPa (DY015 to DY200)                      5MPa (DY250 and DY300)</p> <p>Electrical Connection: ANSI 1/2 female (Special)</p>	CF1
	<p>CSA Explosion proof Approval                      • The approval specification is the same with /CF1.                      • Process Sealing Certification                      Dual Seal Certified by CSA to the requirement of ANSI/ISA 12.27.01                      No additional sealing required</p>	CF11
	<p>CSA Intrinsically safe Approval (Note 2)                      Applicable Standard: C22.2 No. 0.4-2004, C22.2 No. 157-M1987, C22.2 No. 213-M1987, C22.2 No. 1010.1-92,                      CAN/CSA-E60079-0:02, CAN/CSA-E60079-11:02, CAN/CSA-E60079-15:02 ANSI/ISA-12.27.01-2003</p> <p>Type of Protection : Ex ia IIC T4...T1 and Ex nC IIC T4...T1(Integral Type Flowmeter and Remote Type Flowmeter)                      Ex ia IIC T4 and Ex nC IIC T4(Remote Type Converter)</p> <p>Temperature Class.: T4;135°C, T3;200°C, T2;300°C, T1;450°C (Integral Type Flowmeter and Remote Type Flowmeter)                      -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)                      -40 to +60°C (Remote Type Converter)                      Amb. Hum. : 0 to 100%RH (No condensation)                      Degree of Protection of Enclosure:IP67                      Electrical Parameters:Ui=30Vdc, li=165mAdc, Pi=0.9W, Ci=12nF, Li=0.15mH.</p> <p>Intrinsically Safe for Class I, II, III, DIV.1, Groups A, B, C, D, E, F and G                      Non-incendive for Class I, II, DIV.2, Groups A, B, C, D, E, F and G, ClassIII, DIV.1.                      Temperature Code : T4;135°C, T3; 200°C, T2; 300°C, T1; 450°C (Integral Type Flowmeter and Remote Type Flowmeter)                      T4;135°C (Remote Type converter)</p> <p>Enclosure : Type 4X                      Electrical Parameter:Vmax =30Vdc, Imax =165mAdc, Pmax = 0.9W, Ci =12nF, Li = 0.15mH.                      Maximum working Pressure : 16MPa (DY015 to DY200)                      5MPa (DY250 and DY300)</p> <p>Electrical Connection: ANSI 1/2 NPT female</p>	CS1
	<p>CSA Intrinsically safe Approval                      • The approval specification is the same with /CS1.                      • Process Sealing Certification                      Dual Seal Certified by CSA to the requirement of ANSI/ISA 12.27.01                      No additional sealing required</p>	CS11

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9. GENERAL DESCRIPTION

Item	Specification	Code
Standards Association of Australia (SAA) (Note3)	SAA Flame proof Approval Applicable Standard: AS 2380.1-1989, AS2380.2-1991, AS1939-1990 Type of protection: Ex d IIC T6...T1, IP67, Class 1, Zone 1 Amb.Temp.: -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter) : -40 to +60°C (Remote Type Converter) Max. process temp. : T6; 85°C, T5; 100°C, T4; 135°C, T3; 200°C, T2; 300°C, T1;450°C  Electrical connection: ANSI 1/2 NPT female, ISO M20 X 1.5 female	SF1
Standards Association of Australia (SAA)	SAA intrinsically Safe Approval (Note 2) SAA Type n Approval Applicable Standard: AS 2380.1-1989, AS2380.7-1987, AS2380.9-1991, AS1939-1990 Type of Protection: Ex ia IIC T4 IP67 (Integral Type Flowmeter, Remote Type Flowmeter and Remote Type Converter) Maximum Input Voltage (Ui)=30Vdc Maximum Input Current (Ii)=165mAdc Maximum Input Power (Pi)=0.9W Internal Capacitance (Ci)=37nF Internal Inductance (Li)=0mH Ambient Temperature: -20 to +60°C  Type of Protection: Ex n IIC T4 IP67 (Integral Type Flowmeter, Remote Type Flowmeter and Remote Type Converter) Hazardous Area: Class I, Zone 2 Maximum Input Voltage (Ui)=30Vdc Ambient Temperature: -20 to +80°C  Electrical connection: ANSI 1/2 NPT female, ISO M20 × 1.5 female	SS1

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- (Note 1) The flameproof packing adapter (/G11,G12) is necessary except the electrical conduit work. In case the ambient temperature exceeds 50deg.C, use heat resistant cables with maximum allowable temperature of 70deg.C or above.
- (Note 2) For intrinsically safe approval, use the barrier certified by the testing laboratories (BARD-400 is not applicable).
- (Note 3) SAA Flame proof Approval (/SF1) can not combine with High Process Temperature Version (/HT).

## 9.5 Sizing

The following items are the basic specifications.  
In case of the definite sizing, it is necessary to check by the sizing software.

### ■ Measurable minimum flow velocity

**Table 9.5.1 Relationship between Minimum Velocity and Density (In case of “Gas, Steam”, Use the Large of the Two Values)**

Model Code			Liquid		Gas, Steam	Steam
			General Type, Cryogenic Type (unit: m/s) (Note)	High Process Temperature Version (unit: m/s)	General Type, Cryogenic Type (unit: m/s) (Note)	High Process Temperature version (unit: m/s)
DY015	DY025-/R1	DY040-/R2	$\sqrt{250/\rho}$	—	$\sqrt{80/\rho}$ or 3	—
DY025	DY040-/R1	DY050-/R2	$\sqrt{122.5/\rho}$	$\sqrt{490/\rho}$	$\sqrt{45/\rho}$ or 2	$\sqrt{125/\rho}$ or 2
DY040	DY050-/R1	DY080-/R2	$\sqrt{90/\rho}$	$\sqrt{302.5/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{90.3/\rho}$ or 2
DY050	DY080-/R1	DY100-/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY080	DY100-/R1	DY150-/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY100	DY150-/R1	DY200-/R2	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 2	$\sqrt{61.3/\rho}$ or 2
DY150	DY200-/R1	—	$\sqrt{90/\rho}$	$\sqrt{160/\rho}$	$\sqrt{31.3/\rho}$ or 3	$\sqrt{61.3/\rho}$ or 3
DY200	—	—	$\sqrt{122.5/\rho}$	$\sqrt{202.5/\rho}$	$\sqrt{45/\rho}$ or 3	$\sqrt{80/\rho}$ or 3
DY250	—	—	$\sqrt{160/\rho}$	—	$\sqrt{61.3/\rho}$ or 3	—
DY300	—	—	$\sqrt{160/\rho}$	—	$\sqrt{61.3/\rho}$ or 3	—

$\rho$  : Density at operating conditions (kg/m<sup>3</sup>)  
Liquid density is 400 up to 2000kg/m<sup>3</sup>

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(Note) Reduced bore type (/R1 and /R2) are not available to combine for Cryogenic type (/LT.)

### ■ Range of measurable flow velocity

**Table 9.5.2 Range of measurable flow velocity**

Fluid	Model Code			Minimum flow velocity	Maximum flow velocity (Note)
Liquid	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 5000”, whichever is greater. For liquid Reynolds number of 5000 : See P.9-16 “Calculation formula”.	10 m/s
Gas, Steam	DY015 up to DY300	DY025-/R1 up to DY200-/R1	DY040-/R2 up to DY200-/R2	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 5000”, whichever is greater. For Gas and steam Reynolds number of 5000 : See P.9-16 “Calculation formula”.	80 m/s

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When the flow velocity is lower than minimum, both the analog output and the pulse output is displayed as zero “0”.

### ■ Range of fixed accuracy flow velocity

**Table 9.5.3 Range of fixed accuracy flow velocity**

Fluid	Model Code			Minimum flow velocity	Maximum flow velocity (Note)
Liquid	DY015 up to DY100	DY025-/R1 up to DY150-/R1	DY040-/R2 up to DY200-/R2	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 20000”, whichever is greater. For liquid Reynolds number of 20000 : The value is four times velocity value in P.9-16 “Calculation formula”.	10 m/s
	DY150 up to DY300	DY200-/R1	—	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 40000”, whichever is greater. For liquid Reynolds number of 40000 : The value is eight times velocity value in P.9-16 “Calculation formula”.	
Gas, Steam	DY015 up to DY100	DY025-/R1 up to DY150-/R1	DY040-/R2 up to DY200-/R2	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 20000”, whichever is greater. For gas and steam Reynolds number of 20000 : See P.9-16 “Calculation formula”.	80 m/s
	DY150 up to DY300	DY200-/R1	—	“flow velocity obtained from Table 9.5.1” or “flow velocity at Reynolds number of 40000”, whichever is greater. For gas and steam Reynolds number of 40000 : See P.9-16 “Calculation formula”.	

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■ Detailed Accuracy (for Table 9.5.3 Range of Fixed Accuracy Flow Velocity.)

Volumetric flow rate at operation condition

\*Accuracy: of Reading

	Model Code	General Type	Multi-Variable Type (/MV)	Reduced Bore Type (/R1)	Reduced Bore Type (/R2)
Liquid	DY015	± 1.0% (20000 ≤ Re < 2000*D) ± 0.75% (2000*D ≤ Re)			
	DY025	± 1.0% (20000 ≤ Re < 1500*D) ± 0.75% (1500*D ≤ Re)	± 1.0% (20000 ≤ Re < 1500*D) ± 0.75% (1500*D ≤ Re)		
	DY040	± 1.0%	± 1.0%	± 1.0% (20000 ≤ Re)	± 1.0% (20000 ≤ Re)
	DY050	(20000 ≤ Re < 1000*D)	(20000 ≤ Re < 1000*D)		
	DY080	± 0.75%	± 0.75%		
	DY100	(1000*D ≤ Re)	(1000*D ≤ Re)		
	DY150	± 1.0%	± 1.0%		
	DY200	(40000 ≤ Re < 1000*D) ± 0.75%	(40000 ≤ Re < 1000*D) ± 0.75%	± 1.0% (40000 ≤ Re)	
	DY250	(1000*D ≤ Re)			
DY300					
Gas, Steam	DY015				
	DY025				
	DY040				
	DY050	± 1.0%	± 1.0%	± 1.0%	± 1.0% (Velocity 35m/s or less) ± 1.5% (Velocity 35m/s up to 80m/s )
	DY080	(Velocity 35m/s or less)	(Velocity 35m/s or less)	(Velocity 35m/s or less)	
	DY100	± 1.5%	± 1.5%	± 1.5%	
	DY150	(Velocity 35m/s up to 80m/s )	(Velocity 35m/s up to 80m/s )	(Velocity 35m/s up to 80m/s )	
	DY200				
	DY250				
DY300					

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D : Inner diameter of digitalYEWFLOW detector (mm)

Re: Reynolds number (non unit)

Note: This table shows the accuracy of pulse output. In case of analog output, add up ± 0.1% of full scale to the values mentioned above.

Guarantee conditions of liquid volumetric flow rate: the accuracy of a product before shipment in our water actual test facility. Totalized value of 2000 pulse or greater, straight pipe length: upper 10D or greater, lower 5D or greater, Fluid temp. 20 ± 10degC

Gas, Steam : The accuracy which is add up from liquid measurement accuracy. The accuracy is confirmed by actual measured value of typical nominal size.

Mass flow or Volumetric flow rate at Normal/Standard condition:

for Multi-Variable Type and combination of Multi-Variable Type and Reduced Bore

\*Accuracy: of Reading

	Model Code	Multi-Variable Type (/MV)	Multi-Variable Type (/MV)/ Reduced Bore Type (/R1)	Multi-Variable Type (/MV)/ Reduced Bore Type (/R1)
Liquid	DY025	± 2.0% (20000 ≤ Re < 1500*D) ± 1.5% (1500*D ≤ Re)		
	DY040			
	DY050	± 2.0% (20000 ≤ Re < 1000*D)	± 2.0% (20000 ≤ Re)	± 2.0% (20000 ≤ Re)
	DY080	± 1.5% (1000*D ≤ Re)		
	DY100			
	DY150	± 2.0% (40000 ≤ Re < 1000*D)		
DY200	± 1.5% (1000*D ≤ Re)	± 2.0% (40000 ≤ Re)		
Gas, Steam	DY015			
	DY025			
	DY040			
	DY050	± 2.0%	± 2.0%	± 2.0% (Velocity 35m/s or less) ± 2.5% (Velocity 35m/s up to 80m/s )
	DY080	(Velocity 35m/s or less)	(Velocity 35m/s or less)	
	DY100	± 2.5%	± 2.5%	
	DY150	(Velocity 35m/s up to 80m/s )	(Velocity 35m/s up to 80m/s )	
	DY200			

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D : Inner diameter of digitalYEWFLOW detector (mm)

Re: Reynolds number (non unit)

Note: This table shows the accuracy of pulse output. In case of analog output, add up ± 0.1% of full scale to the values mentioned above.

### ■ Calculation formula

■ How to calculate volume flow rate at operating conditions.

$$\bullet Q_f = 3600 \times v \times S \quad \text{or} \quad Q_f = \frac{v \times D^2}{354}$$

■ How to calculate the velocity of a Reynolds number.

- $v = 5 \times \nu / D$  (Reynolds number of 5000)
- $v = 20 \times \nu / D$  (Reynolds number of 20000)
- $v = 40 \times \nu / D$  (Reynolds number of 40000)

however

$$\bullet Re = \frac{354 \times 10^3 \times Q_f}{v \times D} \quad \dots\dots\dots (1)$$

$$\bullet \nu = \frac{\mu}{\rho f} \times 10^3 \quad \dots\dots\dots (2)$$

- Qf : Volume flow rate at operating conditions (m<sup>3</sup>/h)
- D : Inner diameter of YEWFL0 (mm)
- S : Sectional area of YEWFL0(m<sup>2</sup>)
- v : Flow velocity (m/s)
- Re : Reynolds number (non unit)
- ρf : Density at operating conditions (kg/m<sup>3</sup>)
- μ : Viscosity at operating conditions (mPa·s (cP))
- ν : Kinematic viscosity at operating conditions (10<sup>-6</sup>m<sup>2</sup>/s(cSt))

### ■ Typical fluid example

**Table 9.5.4 Range of Measurable Water Flow Rate**  
(At standard condition of 15°C, ρ = 1000 kg/m<sup>3</sup>)

Model Code			Measurable Flow Rate in m <sup>3</sup> /h	Range of Fixed Accuracy Flow Rate in m <sup>3</sup> /h
DY015	DY025-/R1	DY040-/R2	0.30 up to 6	0.94 up to 6
DY025	DY040-/R1	DY050-/R2	0.65 up to 18	1.7 up to 18
DY040	DY050-/R1	DY080-/R2	1.3 up to 44	2.6 up to 44
DY050	DY080-/R1	DY100-/R2	2.2 up to 73	3.3 up to 73
DY080	DY100-/R1	DY150-/R2	4.3 up to 142	4.6 up to 142
DY100	DY150-/R1	DY200-/R2	7.5 up to 248	7.5 up to 248
DY150	DY200-/R1	—	17 up to 544	18 up to 544
DY200	—	—	34 up to 973	34 up to 973
DY250	—	—	60 up to 1506	60 up to 1506
DY300	—	—	86 up to 2156	86 up to 2156

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**Table 9.5.5 Range of Measurable Air Flow Rate at Selected Process Pressures**

Model Code			Flow Rate Limits	Minimum and Maximum Measurable Flow Rate in Nm <sup>3</sup> /h									
				0 MPa	0.1 MPa	0.2 MPa	0.4 MPa	0.6 MPa	0.8 MPa	1 MPa	1.5 MPa	2 MPa	2.5 MPa
DY015	DY025 -R1	DY040 -R2	min.	4.8(11.1)	6.7(11.1)	8.2(11.1)	10.5(11.1)	12.5	16.1	19.7	28.6	37.5	46.4
			max.	48.2	95.8	143	239	334	429	524	762	1000	1238
DY025	DY040 -R1	DY050 -R2	min.	11.0(19.5)	15.5(19.5)	19.0(19.5)	24.5	29.0	33.3	40.6	59.0	77.5	95.9
			max.	149	297	444	739	1034	1329	1624	2361	3098	3836
DY040	DY050 -R1	DY080 -R2	min.	21.8(30.0)	30.8	37.8	48.7	61.6	79.2	97	149	184	229
			max.	356	708	1060	1764	2468	3171	3875	5634	7394	9153
DY050	DY080 -R1	DY100 -R2	min.	36.2(38.7)	51	62.4	80.5	102	131	161	233	306	379
			max.	591	1174	1757	2922	4088	5254	6420	9335	12249	15164
DY080	DY100 -R1	DY150 -R2	min.	70.1	98.4	120	155	197	254	310	451	591	732
			max.	1140	2266	3391	5642	7892	10143	12394	18021	23648	29274
DY100	DY150 -R1	DY200 -R2	min.	122	172	211	272	334	442	540	786	1031	1277
			max.	1990	3954	5919	9847	13775	17703	21632	31453	41274	51095
DY150	DY200 -R1	—	min.	268	377	485	808	1131	1453	1776	2583	3389	4196
			max.	4358	8659	12960	21559	30163	38765	47365	68867	90373	111875
DY200	—	—	min.	575	809	990	1445	2202	2599	3175	4617	6059	7501
			max.	7792	15482	23172	38549	53933	69313	84693	123138	161591	200046
DY250	—	—	min.	1037	1461	1788	2306	3127	4019	4911	7140	9370	11600
			max.	12049	23939	35833	59611	83400	107181	130968	190418	249881	309334
DY300	—	—	min.	1485	2093	2561	3303	4479	5756	7033	10226	13419	16612
			max.	17256	34286	51317	85370	119441	153499	187556	272699	357856	443017

- (1) At standard conditions STP (0°C, 1atm).  
 (2) Pressure listed is at process temperature of 0°C.  
 (3) Maximum flow rate is the lower of 80 m/s.  
 (4) Minimum values are determined from Table 12. The values in parenthesis show the minimum linear flow rates (Re = 20,000 or 40,000) when they are higher than the minimum measurable flow rate.

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**Table 9.5.6 Range of Measurable Saturated Steam Flow Rate at Selected Process Pressures**

Model Code			Flow Rate Limits	Minimum and Maximum Measurable Flow Rate in kg/h									
				0.1 MPa	0.2 MPa	0.4 MPa	0.6 MPa	0.8 MPa	1 MPa	1.5 MPa	2 MPa	2.5 MPa	3 MPa
DY015	DY025 -R1	DY040 -R2	min.	5.8(10.7)	7.0(11.1)	8.8(11.6)	10.4(12.1)	11.6(12.3)	12.8	15.3	19.1	23.6	28.1
			max.	55.8	80	129	177	225	272	390	508	628	748
DY025	DY040 -R1	DY050 -R2	min.	13.4(18.9)	16.2(20.0)	20.5	24.1	27.1	30	36	41	49	58
			max.	169.7	247.7	400	548	696	843	1209	1575	1945	2318
DY040	DY050 -R1	DY080 -R2	min.	26.5(29.2)	32	40.6	47.7	53.8	59	72	93	116	138
			max.	405	591	954	1310	1662	2012	2884	3759	4640	5532
DY050	DY080 -R1	DY100 -R2	min.	44.0	53	67.3	79	89	98	119	156	192	229
			max.	671	979	1580	2170	2753	3333	4778	6228	7688	9166
DY080	DY100 -R1	DY150 -R2	min.	84.9	103	130	152	171	189	231	300	371	442
			max.	1295	1891	3050	4188	5314	6435	9224	12024	14842	17694
DY100	DY150 -R1	DY200 -R2	min.	148	179	227	267	300	330	402	524	647	772
			max.	2261	3300	5326	7310	9276	11232	16102	20986	25907	30883
DY150	DY200 -R1	—	min.	324	392	498	600	761	922	1322	1723	2127	2536
			max.	4950	7226	11661	16010	20315	24595	35258	45953	56729	67624
DY200	—	—	min.	697	841	1068	1252	1410	1649	2364	3081	3803	4534
			max.	8851	12918	20850	28627	36325	43976	63043	82165	101433	120913
DY250	—	—	min.	1256	1518	1929	2260	2546	2801	3655	4764	5882	7011
			max.	13687	19977	32243	44268	56172	68005	97489	127058	156854	186978
DY300	—	—	min.	1799	2174	2762	3236	3646	4012	5235	6823	8423	10041
			max.	19602	28609	46175	63397	80445	97390	139614	181960	224633	267772

- (1) Maximum flow rate is the lower of 80 m/s.  
 (3) Minimum values are determined from Table 12. The values in parenthesis show the minimum linear flow rates (Re = 20,000 or 40,000) when they are higher than the minimum measurable flow rate.

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## Reference

Table 9.5.7 Inner Diameter and Nominal value

Model Code	Inner Diameter mm	Nominal K-Factor Pulse/L	Nominal Pulse Rate		
			Hz/m/s	Hz/m <sup>3</sup> /h	
DY015	DY025-/R1	14.6	376	62.7	104
DY025	DY040-/R1	25.7	65.6	35.5	19.1
DY040	DY050-/R1	39.7	18.7	23.1	5.19
DY050	DY080-/R1	51.1	8.95	18.3	2.49
DY080	DY100-/R1	71.0	3.33	13.2	0.925
DY100	DY150-/R1	93.8	1.43	9.88	0.397
DY150	DY200-/R1	138.8	0.441	6.67	0.123
DY200	—	185.6	0.185	5.00	0.0514
DY250	—	230.8	0.0966	4.04	0.0268
DY300	—	276.2	0.0563	3.37	0.0156

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## Pressure Loss

### Calculation of pressure loss for general type

obtained from the following equations.

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

or

$$\Delta P = 135 \times \rho_f \cdot \frac{Q_f^2}{D^4} \dots\dots\dots (2)$$

where,

$\Delta P$  : Pressure loss (kPa)

$\rho_f$  : Density at operating condition (kg/m<sup>3</sup>)

$v$  : Flow velocity (m/s)

$Q_f$  : Actual flow rate (m<sup>3</sup>/h)

$D$  : Internal Diameter of detector (mm)

### (Example)

DY050, hot water: 80°C, flowrate: 30 m<sup>3</sup>/h

1. Since the density of water at 80°C is 972 kg/m<sup>3</sup>, substitute this value in equation (2):

$$\Delta P = 135 \times 972 \times 30^2 / 51.1^4 = 17.3 \text{ kPa}$$

2. Obtain the pressure loss using equation (1). The flow velocity when the flow rate is 30 m<sup>3</sup>/h is given by:

$$v = 354 \times Q_f / D^2 = \frac{354 \times 30}{51.1^2} = 4.07 \text{ m/s}$$

Therefore, substitute this value in equation (1):

$$\Delta P = 108 \times 10^{-5} \times 972 \times 4.07^2 = 17.3 \text{ kPa}$$

### Calculation of pressure loss for reduced bore type (Option code: /R1)

obtained from the following equations.

$$\Delta P = 124 \times 10^{-5} \times \rho_f \times v^2 \dots\dots\dots (3)$$

or

$$\Delta P = 155 \times \rho_f \times Q_f^2 / D^4 \dots\dots\dots (4)$$

### (Example)

DY040-/R1, hot water: 50 deg C flowrate: 10 m<sup>3</sup>/h

1. Since the density of water at 50 deg C is 992 kg/cm<sup>3</sup>, substitute this value in equation (4):

$$\Delta P = 155 \times 992 \times 10^2 / 25.7^4 = 35.3 \text{ kPa}$$

2. Obtain by using equation (3). The flow velocity when the flow rate is 10 m<sup>3</sup>/h is given by:

$$v = 354 \times Q_f / D^2 = 354 \times 10 / 25.7^2 = 5.4 \text{ m/s}$$

Therefore, substitute this value in equation (3):

$$\Delta P = 124 \times 10^{-5} \times 992 \times 5.4^2 = 35.3 \text{ kPa}$$

### Calculation of pressure loss for reduced bore type (Option code: /R2)

obtained from the following equations.

$$\Delta P = 138 \times 10^{-5} \cdot \rho_f \cdot v^2 \dots\dots\dots (5)$$

or

$$\Delta P = 173 \times \rho_f \cdot \frac{Q_f^2}{D^4} \dots\dots\dots (6)$$

### (Example)

DY050-/R2, hot water: 50 deg C, flowrate: 15 m<sup>3</sup>/h

1. Since the density of water at 50 deg C is 992 kg/cm<sup>3</sup>, substitute this value in equation (6):

$$\Delta P = 173 \times 992 \times 15^2 / 25.7^4 = 88.5 \text{ kPa}$$

2. Obtain by using equation (5). The flow velocity when the flow rate is 20m<sup>3</sup>/h is given by:

$$v = 354 \times Q_f / D^2 = \frac{354 \times 15}{25.7^2} = 8.0 \text{ m/s}$$

Therefore, substitute this value in equation (5):

$$\Delta P = 138 \times 10^{-5} \times 992 \times 8.0^2 = 88.5 \text{ kPa}$$

## Cavitation

### (Minimum Back Pressure, Liquid service only):

Cavitation occurs when the flow line pressure is low and flow velocity is high during fluid measurement, preventing correct measurement of flow rate. The optimum line pressure can be obtained from the following equation.

$$P = 2.7 \cdot \Delta P + 1.3 \cdot P_o \dots\dots\dots (5)$$

Where,

$P$  : Line pressure, 2 to 7 times as large as internal diameter on downstream of flowmeter body surface. (kPa absolute).

$\Delta P$  : Pressure loss (kPa).

Refer to the item above.

$P_o$  : Saturation liquid vapor pressure at operating temperature (kPa absolute).

### (Example) Confirmation of presence of cavitation

Suppose that the line pressure is 120 kPa abs and the flow rate scale is 0 to 30 m<sup>3</sup>/h. It is only necessary to confirm the pressure at the maximum flow rate ; therefore, the saturated steam pressure of water at 80°C is as follows from the table of saturated steam pressures:

$$P_o = 47.4 \text{ kPa abs}$$

Therefore, substitute this value in equation (5):

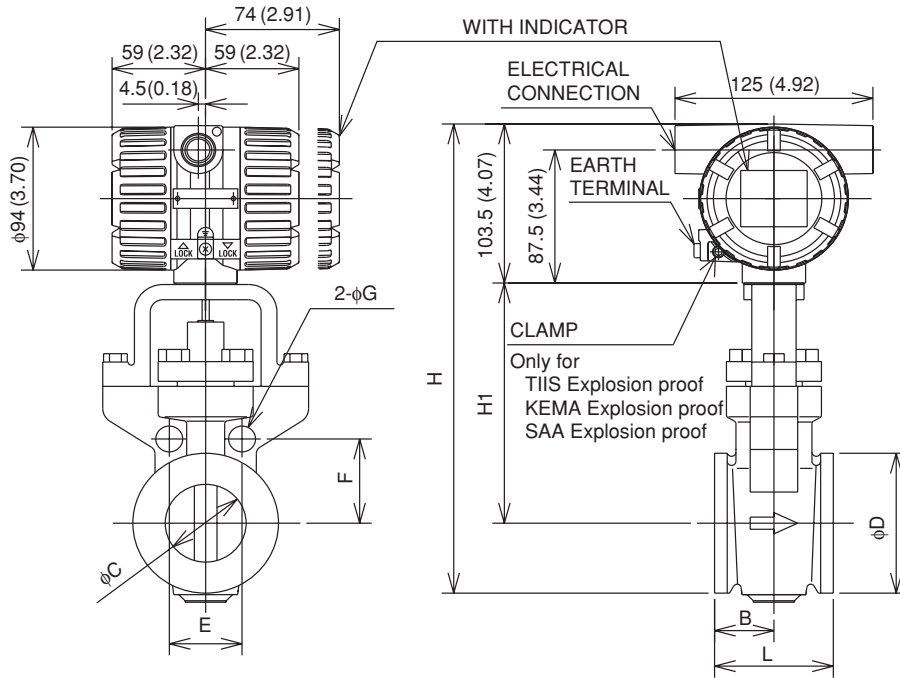
$$P = 2.7 \times 17.3 + 1.3 \times 47.4 = 108.3 \text{ kPa abs}$$

Since the operating pressure of 120 kPa abs is higher than 108.3 kPa abs, no cavitation occurs.

# 9.6 External Dimensions

■ Wafer type (DY015 up to DY100)

Unit: mm  
(approx. inch)



TYPE CODE	INTEGRAL/REMOTE													
	DY015 (15mm, 1/2in)							DY025 (25mm, 1in)						
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4
L	70 (2.76)							70 (2.76)						
B	35 (1.38)							35 (1.38)						
C	14.6 (0.57)							25.7 (1.01)						
D	35.1 (1.38)							50.8 (2.00)						
H	248 (9.76)							258 (10.16)						
H1	127 (5.00)							129 (5.08)						
E	49.5 (1.95)	49.5 (1.95)	56.6 (2.23)	42.7 (1.68)	47.1 (1.85)	47.1 (1.85)	46 (1.81)	63.6 (2.50)	63.6 (2.50)	67.2 (2.65)	56 (2.21)	62.9 (2.48)	62.9 (2.48)	60.1 (2.37)
F	24.7 (0.97)	24.7 (0.97)	28.3 (1.11)	21.4 (0.84)	23.5 (0.93)	23.5 (0.93)	23 (0.91)	31.8 (1.25)	31.8 (1.25)	33.6 (1.32)	28 (1.10)	31.4 (1.24)	31.4 (1.24)	30.1 (1.19)
G	13 (0.51)	13 (0.51)	17 (0.67)	14 (0.55)	14 (0.55)	14 (0.55)	13 (0.51)	17 (0.67)	17 (0.67)	17 (0.67)	14 (0.55)	17 (0.67)	17 (0.67)	13 (0.51)
WEIGHT kg	2.8 (6.17lb)							3.7 (8.16lb)						

TYPE CODE	INTEGRAL/REMOTE													
	DY040 (40mm, 1 1/2in)							DY050 (50mm, 2in)						
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4
L	70 (2.76)							75 (2.95)						
B	35 (1.38)							37.5 (1.48)						
C	39.7 (1.56)							51.1 (2.01)						
D	73 (2.87)							92 (3.62)						
H	276 (10.87)							307.5 (12.11)						
H1	136 (5.35)							158 (6.22)						
E	74.2 (2.92)	74.2 (2.92)	84.9 (3.34)	69.7 (2.74)	80.8 (3.18)	80.8 (3.18)	77.8 (3.06)	(Note 3)	45.9 (1.81)	49.8 (1.96)	(Note 3)	48.6 (1.91)	48.6 (1.91)	(Note 3)
F	37.1 (1.46)	37.1 (1.46)	42.4 (1.67)	34.9 (1.37)	40.4 (1.59)	40.4 (1.59)	38.9 (1.53)	(Note 3)	55.4 (2.18)	60.1 (2.36)	(Note 3)	58.7 (2.31)	58.7 (2.31)	(Note 3)
G	17 (0.67)	17 (0.67)	21 (0.83)	14 (0.55)	20 (0.79)	20 (0.79)	17 (0.67)	(Note 3)	17 (0.67)	17 (0.67)	(Note 3)	17 (0.67)	17 (0.67)	(Note 3)
WEIGHT kg	4.3 (9.48lb)							6.0 (13.23lb)						

TYPE CODE	INTEGRAL/REMOTE															
	DY080 (80mm, 3in)							DY100 (100mm, 4in)								
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD2	AD3 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD2	AD3 - AD4
L	100 (3.94)							120 (4.72)								
B	40 (1.57)							50 (1.97)								
C	71 (2.80)							93.8 (3.69)								
D	127 (5.00)							157.2 (6.19)								
H	342 (13.47)							372 (14.65)								
H1	175 (6.89)							190 (7.48)								
E	57.4 (2.26)	61.2 (2.41)	65.1 (2.56)	(Note 3)	84.4 (3.32)	84.4 (3.32)	61.2 (2.41)	61.2 (2.41)	67 (2.64)	70.8 (2.79)	78.5 (3.09)	79.9 (3.15)	76.8 (3.02)	82.6 (3.25)	68.9 (2.71)	72.7 (2.86)
F	69.3 (2.73)	73.9 (2.91)	78.5 (3.09)	(Note 3)	77.7 (3.06)	77.7 (3.06)	73.9 (2.91)	73.9 (2.91)	80.8 (3.18)	85.5 (3.37)	94.7 (3.73)	88 (3.46)	92.5 (3.64)	99.7 (3.93)	83.1 (3.27)	87.8 (3.46)
G	17 (0.67)	21 (0.83)	21 (0.83)	(Note 3)	20 (0.79)	20 (0.79)	17 (0.67)	17 (0.67)	17 (0.67)	21 (0.83)	23 (0.91)	17 (0.67)	20 (0.79)	23 (0.91)	17 (0.67)	21 (0.83)
WEIGHT kg	9.4 (20.73lb)							12.8 (28.22lb)								

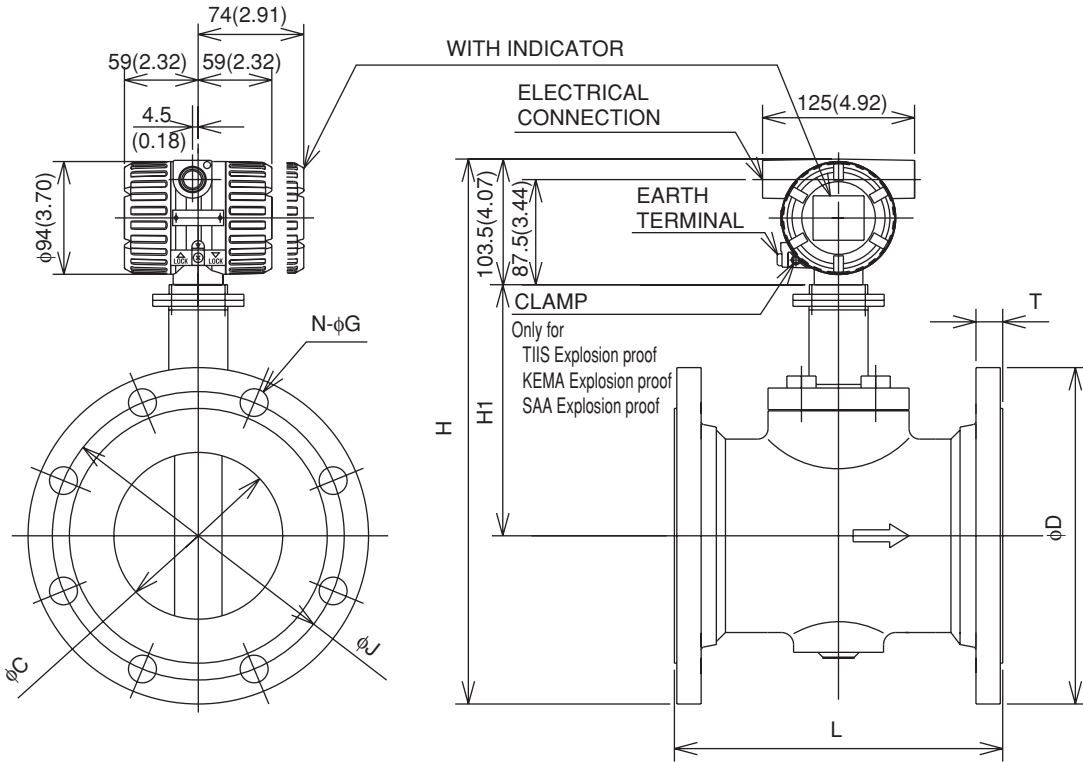
(Note 1) Integral weight is the same as Remote.  
 (Note 2) In case of with Indicator, add 0.2kg.  
 (Note 3) The hole is not provided.  
 (Note 4) The flow direction is opposite (right to left when facing onto indicator) in case of code / CRC.



9. GENERAL DESCRIPTION

■ Flange type (DY150 up to DY300)

Unit: mm  
(approx. inch)



TYPE	INTEGRAL/REMOTE																							
CODE	DY150 (150mm, 6in)										DY200 (200mm, 8in)													
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 - BD2	BD3 - BD4	CA4	CA5	BJ1	BJ2	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1	BD2	BD3	BD4	CA4	CA5	
L	(10.63)										(12.20)													
C	138.8 (5.46)										185.6 (7.31)													
D	280 (11.02)	305 (12.01)	355 (13.98)	279.4 (11.00)	317.5 (12.50)	356 (14.02)	381 (15.00)	285 (11.22)	300 (11.81)	356 (14.02)	381 (15.00)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)	419.1 (16.50)	469.9 (18.50)	340 (13.39)	340 (13.39)	360 (14.17)	375 (14.76)	419.1 (16.50)	469.9 (18.50)	
H	453 (17.83)	465 (18.31)	490 (19.29)	452 (17.80)	471 (18.54)	491 (19.33)	503 (19.80)	455 (17.91)	463 (18.23)	491 (19.33)	503 (19.80)	510 (20.08)	520 (20.47)	516 (20.31)	535 (21.06)	554 (21.81)	579 (22.80)	515 (20.28)	515 (20.28)	525 (20.67)	532 (20.94)	554 (21.81)	579 (22.80)	
H1	209 (8.23)										241 (9.49)													
T	22 (0.87)	28 (1.10)	44 (1.73)	25.4 (1.00)	36.6 (1.44)	54.4 (2.14)	62 (2.44)	22 (0.87)	28 (1.10)	55.7 (2.19)	63.6 (2.50)	22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)	62 (2.44)	69.9 (2.75)	24 (0.95)	24 (0.95)	30 (1.18)	34 (1.34)	63.6 (2.50)	71.4 (2.81)	
J	240 (9.45)	260 (10.24)	295 (11.61)	241.3 (9.50)	269.7 (10.62)	292 (11.50)	317.5 (12.50)	240 (9.45)	250 (9.84)	292 (11.50)	317.5 (12.50)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)	349.3 (13.75)	393.7 (15.50)	295 (11.61)	295 (11.61)	310 (12.20)	320 (12.60)	349.3 (13.75)	393.7 (15.50)	
N	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	
G	23 (0.91)	25 (0.98)	33 (1.30)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	26 (1.02)	28.4 (1.12)	31.8 (1.25)	23 (0.91)	25 (0.98)	25 (0.98)	22.4 (0.88)	31.8 (1.25)	38.1 (1.50)	22 (0.87)	22 (0.87)	26 (1.02)	30 (1.18)	31.8 (1.25)	38.1 (1.50)	
WEIGHT	kg	33.4	43.4	76.4	36.4	54.4	84.4	106	33.4	42.9	90	107	45.4	52.4	55.4	80.4	136	182	46.3	46.3	53.6	55.9	139	183
	lb	73.65	95.70	168.46	80.26	119.95	186.10	233.73	73.65	94.59	198.45	235.94	100.11	115.54	122.16	177.28	299.88	401.31	102.09	102.09	118.19	123.26	306.52	403.52

TYPE	INTEGRAL/REMOTE								
CODE	DY250 (250mm, 10in)				DY300 (300mm, 12in)				
PROCESS CONNECTION	BJ1	BJ2	BA1 BS1	BA2 BS2	BJ1	BJ2	BA1 BS1	BA2 BS2	
L	370 (14.57)				400 (15.75)				
C	230.8 (9.09)				276.2 (10.87)				
D	400 (15.75)	430 (16.93)	406.4 (16.00)	444.5 (17.50)	445 (17.52)	480 (18.90)	482.6 (19.00)	520.7 (20.50)	
H	581 (22.87)	596 (23.46)	584 (22.99)	603 (23.74)	633 (24.92)	651 (25.63)	652 (25.67)	671 (26.42)	
H1	277 (10.91)				307 (12.09)				
T	25 (0.98)	35 (1.38)	31.2 (1.23)	48.8 (1.92)	25 (0.98)	37 (1.46)	32.8 (1.29)	51.8 (2.04)	
J	355 (13.98)	380 (14.96)	362 (14.25)	387.4 (15.25)	400 (15.75)	430 (16.93)	431.8 (17.00)	450.9 (17.75)	
N	12 (0.47)	12 (0.47)	12 (0.47)	16 (0.63)	16 (0.63)	16 (0.63)	12 (0.47)	16 (0.63)	
G	25 (0.98)	27 (1.06)	25.4 (1.00)	28.5 (1.12)	25 (0.98)	27 (1.06)	25.4 (1.00)	31.8 (1.25)	
WEIGHT	kg	78	100	90	125	100	128	140	178
	lb	171.99	220.50	198.45	275.63	220.50	282.24	308.70	392.49

(Note 1) Integral weight is the same as Remote

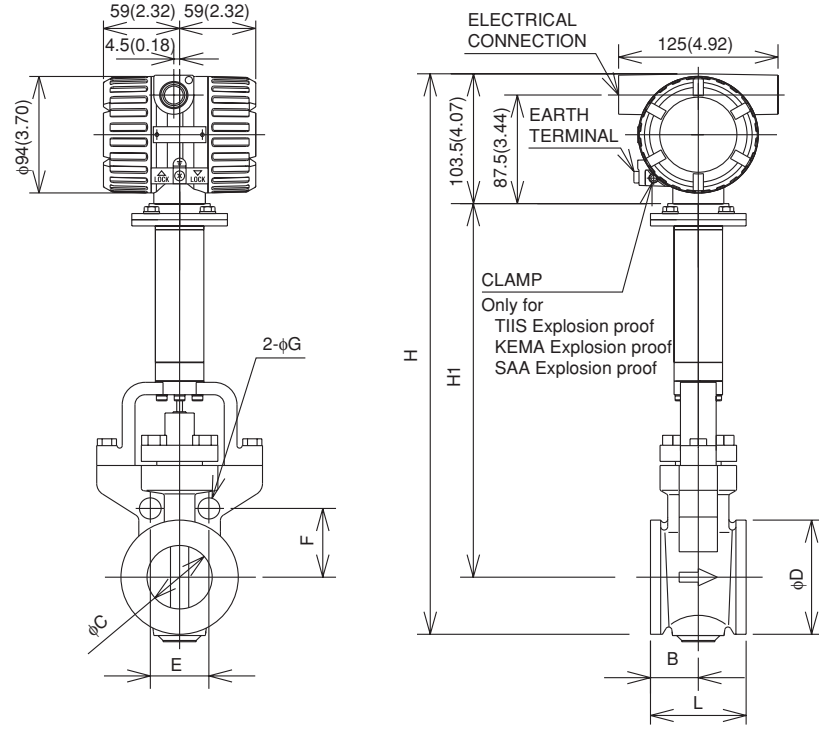
(Note 2) In case of with indicator, add 0.2kg

(Note 3) The flow direction is opposite (right to left when facing onto indicator) in case of code / CRC.

9. GENERAL DESCRIPTION

- High Process Temperature Version (/HT): DY025-/HT up to DY100-/HT
- Cryogenic Version (/LT): DY015-/LT up to DY100-/LT
- Wafer type

Unit: mm  
(approx. inch)



TYPE	Only for REMOTE						
CODE	DY015 (15mm, 1/2in) Only for /LT						
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4
L	70 (2.76)						
B	35 (1.38)						
C	14.6 (0.57)						
D	35.1 (1.38)						
H	391 (15.39)						
H1	270 (10.63)						
E	49.5 (1.95)	46.5 (1.85)	56.6 (2.23)	42.7 (1.68)	47.1 (1.85)	47.1 (1.85)	46 (1.81)
F	24.7 (0.97)	24.7 (0.97)	28.3 (1.11)	21.4 (0.84)	23.5 (0.93)	23.5 (0.93)	23 (0.91)
G	13 (0.51)	13 (0.51)	17 (0.67)	14 (0.55)	14 (0.55)	14 (0.55)	13 (0.51)
WEIGHT kg	3.2 (7.06lb)						

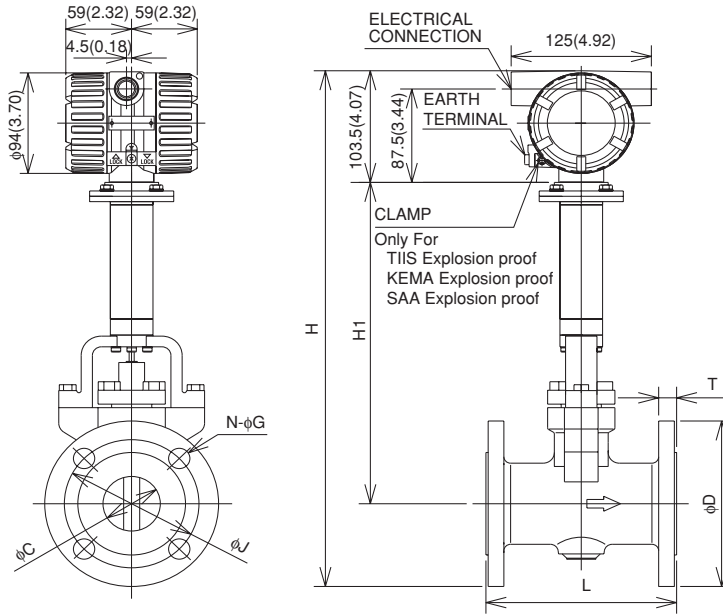
TYPE	Only for REMOTE																				
CODE	DY025 (25mm, 1in) /LT, /HT							DY040 (40mm, 1 1/2in) /LT, /HT							DY050 (50mm, 2in) /LT, /HT						
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD4
L	70 (2.76)							70 (2.76)							75 (2.95)						
B	35 (1.38)							35 (1.38)							37.5 (1.48)						
C	25.7 (1.01)							39.7 (1.56)							51.1 (2.01)						
D	50.8 (2.00)							73 (2.87)							92 (3.62)						
H	401 (15.79)							419 (16.50)							450.5 (17.74)						
H1	272 (10.71)							279 (10.98)							301 (11.85)						
E	63.6 (2.50)	63.6 (2.50)	67.2 (2.65)	56 (2.20)	62.9 (2.48)	62.9 (2.48)	60.1 (2.37)	74.2 (2.92)	74.2 (2.92)	84.9 (3.34)	69.7 (2.74)	80.8 (3.18)	80.8 (3.18)	77.8 (3.06)	(Note 1)	45.9 (1.81)	49.8 (1.96)	(Note 1)	46.6 (1.91)	46.6 (1.91)	(Note 1)
F	31.8 (1.25)	31.8 (1.25)	33.6 (1.32)	28 (1.10)	31.4 (1.24)	31.4 (1.24)	30.1 (1.19)	37.1 (1.46)	37.1 (1.46)	42.4 (1.67)	34.8 (1.37)	40.4 (1.59)	40.4 (1.59)	38.9 (1.53)	(Note 1)	55.4 (2.18)	60.1 (2.37)	(Note 1)	58.7 (2.31)	58.7 (2.31)	(Note 1)
G	17 (0.67)	17 (0.67)	17 (0.67)	14 (0.55)	17 (0.67)	17 (0.67)	13 (0.51)	17 (0.67)	17 (0.67)	21 (0.83)	14 (0.55)	20 (0.79)	20 (0.79)	17 (0.67)	(Note 1)	17 (0.67)	17 (0.67)	(Note 1)	17 (0.67)	17 (0.67)	(Note 1)
WEIGHT kg	4.1 (9.04lb)							4.7 (10.36lb)							6.4 (14.11lb)						

TYPE	Only for REMOTE															
CODE	DY080 (80mm, 3in) /LT, /HT							DY100 (100mm, 4in) /LT, /HT								
PROCESS CONNECTION	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD2	AD3 - AD4	AJ1	AJ2	AJ4	AA1	AA2	AA4	AD1 - AD2	AD3 - AD4
L	100 (3.94)							120 (4.72)								
B	40 (1.57)							50 (1.97)								
C	71 (2.80)							93.8 (3.69)								
D	127 (5.00)							157.2 (6.19)								
H	485 (19.09)							515 (20.28)								
H1	318 (12.52)							333 (13.11)								
E	57.4 (2.26)	61.2 (2.41)	65.1 (2.56)	(Note 1)	64.4 (2.54)	64.4 (2.54)	61.2 (2.41)	61.2 (2.41)	67 (2.64)	70.8 (2.79)	78.5 (3.09)	72.9 (2.87)	76.6 (3.02)	82.6 (3.25)	68.9 (2.71)	72.7 (2.86)
F	69.3 (2.73)	73.9 (2.91)	78.5 (3.09)	(Note 1)	77.7 (3.06)	77.7 (3.06)	73.9 (2.91)	73.9 (2.91)	80.8 (3.18)	85.5 (3.37)	94.7 (3.73)	88 (3.46)	92.5 (3.64)	99.7 (3.93)	83.1 (3.27)	87.8 (3.46)
G	17 (0.67)	21 (0.83)	21 (0.83)	(Note 1)	20 (0.79)	20 (0.79)	17 (0.67)	17 (0.67)	17 (0.67)	21 (0.83)	23 (0.91)	17 (0.67)	20 (0.79)	23 (0.91)	17 (0.67)	21 (0.83)
WEIGHT kg	9.8 (21.61lb)							13.2 (29.11lb)								

(Note 1) The hole is not provided.  
(Note 2) The flow direction is opposite (right to left when facing onto indicator) in case of code / CRC.

- High Process Temperature Version (/HT): DY025-/HT up to DY100-/HT
- Cryogenic Version (/LT): DY015-/LT up to DY100-/LT
- Flange type

Unit: mm  
(approx. inch)



TYPE	Only for REMOTE																			
CODE	DY015 (15mm, 1/2in) Only for LT									DY025 (25mm, 2in) /LT, /HT										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	CA4	CA5
L	130 (5.12)									150 (5.91)										
C	14.6 (0.57)									25.7 (1.01)										
D	95 (3.74)	95 (3.74)	115 (4.53)	88.9 (3.50)	95.3 (3.75)	95.3 (3.75)	120.7 (4.75)	95 (3.74)	95.3 (3.75)	120.7 (4.75)	125 (4.92)	125 (4.92)	130 (5.12)	108 (4.25)	124 (4.88)	124 (4.88)	149.4 (5.88)	115 (4.53)	124 (4.88)	149.4 (5.88)
H	421 (16.57)	421 (16.57)	431 (16.97)	418 (16.46)	421 (16.57)	421 (16.57)	434 (17.09)	421 (16.57)	421 (16.57)	434 (17.09)	438 (17.24)	438 (17.24)	441 (17.36)	430 (16.93)	438 (17.24)	438 (17.24)	450 (17.72)	433 (17.05)	433 (17.05)	450 (17.72)
H1	270 (10.63)									272 (10.71)										
T	12 (0.47)	14 (0.55)	20 (0.79)	11.2 (0.44)	14.2 (0.56)	21 (0.83)	28.8 (1.13)	16 (0.63)	19.9 (0.78)	28.8 (1.13)	14 (0.55)	16 (0.63)	22 (0.87)	14.2 (0.56)	17.5 (0.69)	24 (0.94)	34.9 (1.37)	18 (0.71)	24 (0.94)	34.9 (1.37)
J	70 (2.76)	70 (2.76)	80 (3.15)	60.5 (2.38)	66.5 (2.62)	66.5 (2.62)	82.6 (3.25)	65 (2.56)	66.5 (2.62)	82.6 (3.25)	90 (3.54)	90 (3.54)	95 (3.74)	79.2 (3.12)	89 (3.50)	89 (3.50)	101.6 (4.00)	85 (3.35)	89 (3.50)	101.6 (4.00)
N	4 (0.16)									4 (0.16)										
G	15 (0.59)	15 (0.59)	19 (0.75)	15.7 (0.62)	15.7 (0.62)	22.4 (0.88)	14 (0.55)	15.7 (0.62)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	25.4 (1.00)	14 (0.55)	19 (0.75)	25.4 (1.00)	
WEIGHT kg	4.6	4.7	6.3	4.5	4.7	5.0	7.1	4.6	4.9	7.2	7.3	7.5	9.0	7.0	7.6	8.1	11.5	7.3	8.3	11.8
lb	10.14	10.36	13.89	9.92	10.36	11.03	15.66	10.14	10.80	15.88	16.10	16.54	19.85	15.44	16.76	17.86	25.36	16.10	18.30	26.02

TYPE	Only for REMOTE																			
CODE	DY040 (40mm, 1 1/2in) /LT, /HT									DY050 (50mm, 2in) /LT, /HT										
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	CA4	CA5
L	150 (5.91)									170 (6.69)										
C	39.7 (1.56)									51.1 (2.01)										
D	140 (5.51)	140 (5.51)	160 (6.30)	127 (5.00)	155.4 (6.12)	155.4 (6.12)	177.8 (7.00)	150 (5.91)	155.4 (6.12)	177.8 (7.00)	155 (6.10)	155 (6.10)	165 (6.50)	152.4 (6.00)	165.1 (6.50)	165.1 (6.50)	215.9 (8.50)	165 (6.50)	165.1 (6.50)	215.9 (8.50)
H	453 (17.83)	453 (17.83)	463 (18.23)	446 (17.56)	460 (18.11)	460 (18.11)	472 (18.58)	458 (18.03)	460 (18.11)	472 (18.58)	482 (18.98)	482 (18.98)	487 (19.17)	482 (18.94)	487 (19.17)	487 (19.17)	513 (20.20)	487 (19.17)	487 (19.17)	513 (20.20)
H1	279 (10.98)									301 (11.85)										
T	16 (0.63)	18 (0.71)	26 (1.02)	17.5 (0.69)	20.6 (0.81)	28.8 (1.13)	38.2 (1.50)	18 (0.71)	28.8 (1.13)	38.2 (1.50)	16 (0.63)	18 (0.71)	26 (1.02)	19.1 (0.75)	22.4 (0.88)	31.8 (1.25)	44.5 (1.75)	20 (0.79)	33.3 (1.31)	46 (1.81)
J	105 (4.15)	105 (4.15)	120 (4.72)	98.6 (3.88)	114.3 (4.50)	114.3 (4.50)	124 (4.88)	110 (4.33)	114.3 (4.50)	124 (4.88)	120 (4.72)	120 (4.72)	130 (5.12)	120 (4.72)	127 (5.00)	127 (5.00)	165.1 (6.50)	125 (4.92)	127 (5.00)	165.1 (6.50)
N	4 (0.16)									4 (0.16)										
G	19 (0.75)	19 (0.75)	23 (0.91)	15.7 (0.62)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	18 (0.71)	22.4 (0.88)	28.4 (1.12)	19 (0.75)	19 (0.75)	19 (0.75)	15.7 (0.62)	19 (0.75)	19 (0.75)	25.4 (1.00)	18 (0.71)	19 (0.75)	25.4 (1.00)
WEIGHT kg	8.6	8.8	12.3	8.5	9.7	11.7	16.6	9.2	12.1	16.7	11.5	12.0	14.7	12.1	13.6	15.2	26.9	11.7	16.2	27.3
lb	18.96	19.40	27.12	18.74	21.39	25.80	36.60	20.29	26.68	36.82	25.36	26.46	32.42	26.68	29.99	33.52	59.32	25.80	35.72	60.20

TYPE	Only for REMOTE																					
CODE	DY080 (80mm, 3in) /LT, /HT										DY100 (100mm, 4in) /LT, /HT											
PROCESS CONNECTION	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	BD3	CA4	CA5	BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 -BD4	BD3	CA4	CA5
L	200 (7.87)										220 (8.66)											
C	71 (2.80)										93.8 (3.69)											
D	185 (7.28)	200 (7.87)	210 (8.27)	190.5 (7.50)	209.6 (8.25)	209.6 (8.25)	241.3 (9.50)	200 (7.87)	200 (7.87)	209.6 (8.25)	241.3 (9.50)	210 (8.27)	225 (8.86)	250 (9.84)	228.6 (9.00)	254 (10.00)	273 (10.75)	292.1 (11.50)	220 (8.66)	220 (8.66)	273 (10.75)	292.1 (11.50)
H	514 (20.24)	522 (20.55)	527 (20.75)	517 (20.35)	527 (20.75)	527 (20.75)	542 (21.34)	522 (20.55)	522 (20.55)	527 (20.75)	542 (21.34)	542 (21.34)	549 (21.61)	562 (22.13)	542 (21.34)	562 (22.13)	564 (22.20)	573 (22.56)	564 (22.20)	573 (22.56)	547 (21.54)	554 (21.81)
H1	318 (12.52)										333 (13.11)											
T	18 (0.71)	22 (0.87)	32 (1.26)	23.9 (0.94)	28.4 (1.12)	38.2 (1.50)	44.5 (1.75)	20 (0.79)	24 (0.94)	39.7 (1.56)	46 (1.81)	18 (0.71)	24 (0.94)	36 (1.42)	23.9 (0.94)	31.8 (1.25)	44.5 (1.75)	50.9 (2.00)	20 (0.79)	24 (0.94)	46 (1.81)	52.4 (2.06)
J	150 (5.91)	160 (6.30)	170 (6.69)	152.4 (6.00)	168.2 (6.61)	168 (6.61)	190.5 (7.50)	160 (6.30)	160 (6.30)	170 (6.69)	180 (7.09)	175 (6.89)	185 (7.28)	205 (8.07)	190.5 (7.50)	200.2 (7.88)	216 (8.50)	235 (9.25)	180 (7.09)	190 (7.48)	216 (8.50)	235 (9.25)
N	4 (0.16)																					
G	19 (0.75)	23 (0.91)	23 (0.91)	19 (0.75)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	18 (0.71)	18 (0.71)	22.4 (0.88)	25.4 (1.00)	19 (0.75)	23 (0.91)	25 (0.98)	19 (0.75)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	18 (0.71)	22 (0.87)	25.4 (1.00)	31.8 (1.25)
WEIGHT kg	17.8	20.4	25.8	20.4	24.2	25.8	36.1	19.8	20.4	27.5	36.7	23.2	27.2	38.5	27.7	36.3	51.2	56.3	23.6	27.8	53.2	57.0
lb	39.25	44.98	56.89	44.98	53.36	56.89	79.60	43.66	44.98	60.64	80.92	51.16	59.98	84.89	61.30	80.04	112.90	124.14	52.04	61.30	117.31	125.69

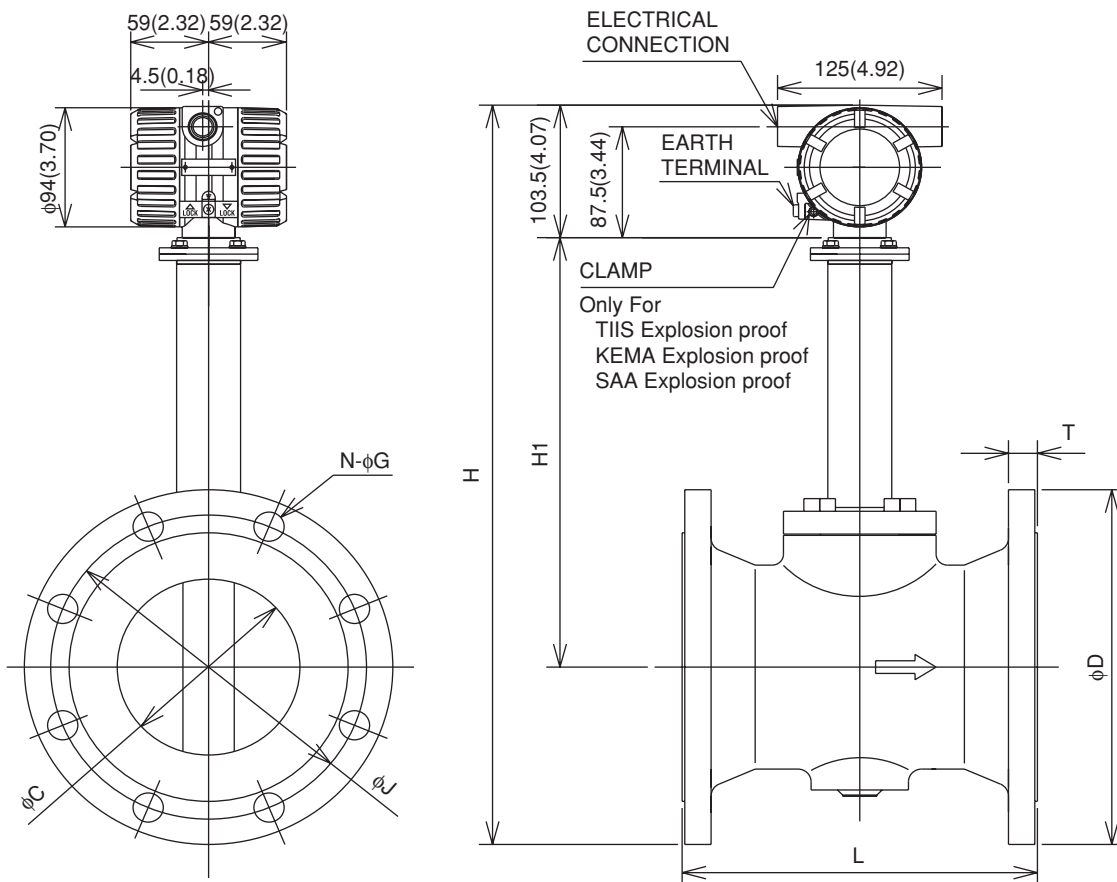
(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code / CRC.



■ High Process Temperature Version (/HT): DY150-/HT up to DY200-/HT

■ Flange type

Unit: mm  
(approx. inch)



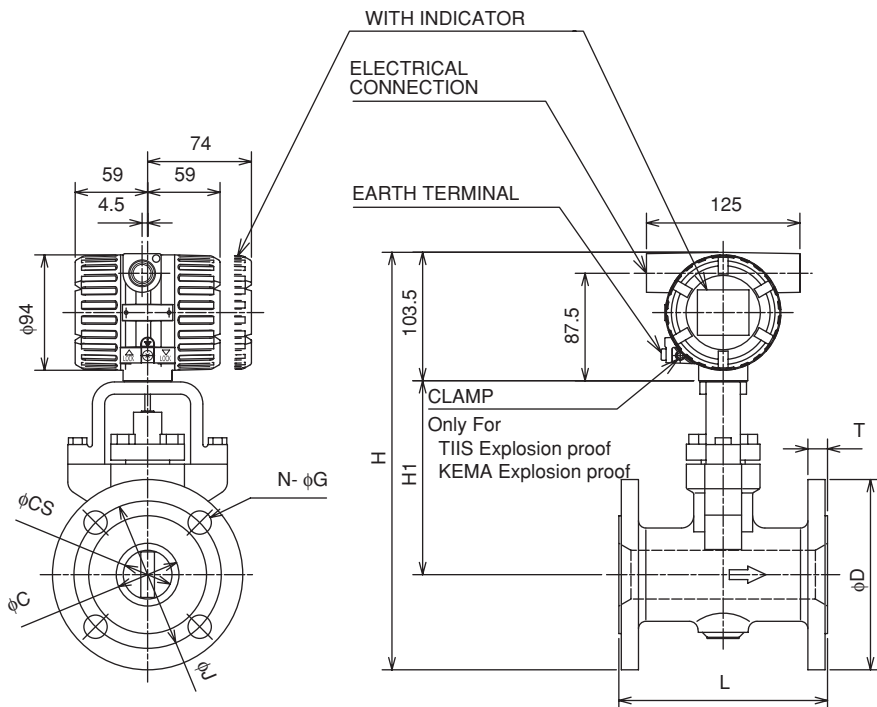
TYPE		Only for REMOTE																						
CODE		DY150 (150mm,6in) / HT										DY200 (200mm,8in) / HT												
PROCESS CONNECTION		BJ1	BJ2	BJ4	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1 - BD2	BD3 - BD4	CA4	CA5	BJ1	BJ2	BA1 BS1	BA2 BS2	BA4 BS4	BA5 BS5	BD1	BD2	BD3	BD4	CA4	CA5
L		270 (10.63)										310 (12.20)												
C		138.8 (5.46)										185.6 (7.31)												
D		280 (11.02)	305 (12.01)	355 (13.98)	279.4 (11.00)	317.5 (12.50)	356 (14.02)	381 (15.00)	285 (11.22)	300 (11.81)	356 (14.02)	381 (15.00)	330 (12.99)	350 (13.78)	342.9 (13.50)	381 (15.00)	419.1 (16.50)	469.9 (18.50)	340 (13.39)	340 (13.39)	360 (14.17)	375 (14.76)	419.1 (16.50)	469.9 (18.50)
H		583 (22.95)	595 (23.43)	620 (24.41)	582 (22.91)	601 (23.66)	621 (24.45)	633 (24.92)	585 (23.03)	593 (23.35)	621 (24.45)	633 (24.92)	640 (25.20)	650 (25.59)	646 (25.43)	665 (26.18)	684 (26.93)	709 (27.91)	645 (25.39)	645 (25.39)	655 (25.79)	662 (26.06)	684 (26.93)	709 (27.91)
H1		339 (13.35)										371 (14.61)												
T		22 (0.87)	28 (1.10)	44 (1.73)	25.4 (1.00)	36.6 (1.44)	54.4 (2.14)	62 (2.44)	22 (0.87)	28 (1.10)	55.7 (2.19)	63.6 (2.50)	22 (0.87)	30 (1.18)	28.4 (1.12)	41.1 (1.62)	62 (2.44)	69.9 (2.75)	24 (0.95)	24 (0.95)	30 (1.18)	34 (1.34)	63.6 (2.50)	71.4 (2.81)
J		240 (9.45)	260 (10.24)	295 (11.61)	241.3 (9.50)	269.7 (10.62)	292 (11.50)	317.5 (12.50)	240 (9.45)	250 (9.84)	292 (11.50)	317.5 (12.50)	290 (11.42)	305 (12.01)	298.5 (11.75)	330.2 (13.00)	349.3 (13.75)	393.7 (15.50)	295 (11.61)	295 (11.61)	310 (12.20)	320 (12.60)	349.3 (13.75)	393.7 (15.50)
N		8 (0.31)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	12 (0.47)	8 (0.31)	8 (0.31)	12 (0.47)	12 (0.47)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	12 (0.47)	8 (0.31)	12 (0.47)	12 (0.47)	12 (0.47)	12 (0.47)	12 (0.47)
G		23 (0.91)	25 (0.98)	33 (1.30)	22.4 (0.88)	22.4 (0.88)	28.4 (1.12)	31.8 (1.25)	22 (0.87)	26 (1.02)	28.4 (1.12)	31.8 (1.25)	23 (0.91)	25 (0.98)	22.4 (0.88)	25.4 (1.00)	31.8 (1.25)	38.1 (1.50)	22 (0.87)	22 (0.87)	26 (1.02)	30 (1.18)	31.8 (1.25)	38.1 (1.50)
WEIGHT	kg	33.4	43.4	76.4	36.4	54.4	84.4	106	33.4	42.9	90	107	45.4	52.4	55.4	80.4	136	182	46.3	46.3	53.6	55.9	139	183
	lb	73.65	95.70	168.46	80.26	119.95	186.10	233.73	73.65	94.59	198.45	235.94	100.11	115.54	122.16	177.28	299.88	401.31	102.09	102.09	118.19	123.26	306.50	403.52

(Note 1) The flow direction is opposite (right to left when facing onto indicator) in case of code / CRC.



■ Reduced Bore Type (/R1):DY025-/R1 up to DY150-/R1

■ Flange type



Model Code	DY025 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	25.7			
CS	14.6			
D	125	125	108	124
H	293	293	284.5	292.5
H1	127			
T	14	16	14.2	17.5
J	90	90	79.2	89
N	4			
G	19	19	15.7	19
Weight kg	6.1	6.5	5.5	7.0

Model Code	DY040 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	39.7			
CS	25.7			
D	140	140	127	155.4
H	302.5	302.5	296	310
H1	129			
T	16	18	17.5	20.6
J	105	105	98.6	114.3
N	4			
G	19	19	15.7	22.4
Weight kg	9.5	10.1	9.4	12.6

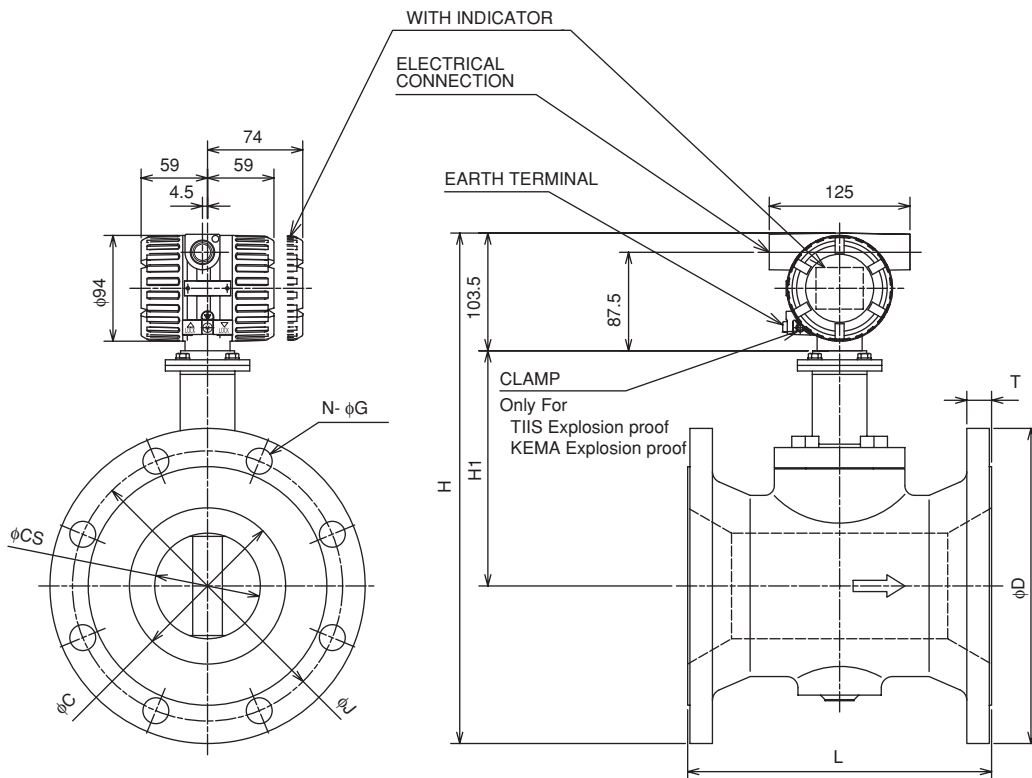
Model Code	DY050 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	170			
C	51.1			
CS	39.7			
D	155	155	152.4	165.1
H	317	317	315.5	322
H1	136			
T	16	18	19.1	22.4
J	120	120	120.7	127
N	4	8	4	8
G	19	19	19	19
Weight kg	10.5	11.1	11.4	13.6

Model Code	DY080 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	200			
C	71			
CS	51.1			
D	185	200	190.5	209.6
H	354	361.5	357	366.5
H1	158			
T	18	22	23.9	28.4
J	150	160	152.4	168.2
N	8	8	4	8
G	19	23	19	22.4
Weight kg	18.6	21.7	21.9	26.9

Model Code	DY100 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	220			
C	93.8			
CS	71			
D	210	225	228.6	254
H	383.5	391	393	405.5
H1	175			
T	18	24	23.9	31.8
J	175	185	190.5	200.2
N	8			
G	19	23	19	22.4
Weight kg	25	30	30.6	41.0

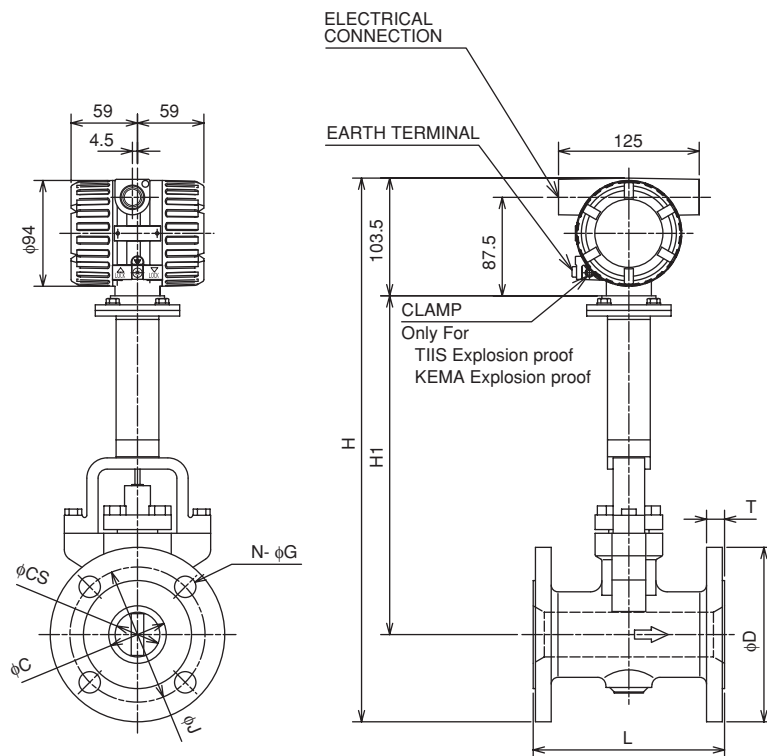
Model Code	DY150 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	270			
C	138.8			
CS	93.8			
D	280	305	279.4	317.5
H	433.5	446	433	452
H1	190			
T	22	28	25.4	36.6
J	240	260	241.3	269.7
N	8	12	8	12
G	23	25	22.4	22.4
Weight kg	45.9	56.3	49.4	71.7

- Reduced Bore Type (/R1):DY200-/R1
- Flange type



Model Code	DY200 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	310			
C	185.6			
CS	138.8			
D	330	350	342.9	381
H	477.5	487.5	484	503
H1	209			
T	22	30	28.4	41.1
J	290	305	298.5	330.2
N	12	12	8	12
G	23	25	22.4	25.4
Weight kg	58.7	74.1	70.7	102.9

- High Process Temperature Version Reduced Bore Type (/R1/HT): DY040-/HT/R1 up to DY150-/R1/HT
- Flange type



Model Code	DY040 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	39.7			
CS	25.7			
D	140	140	127	155.4
H	445.5	445.5	439	453
H1	272			
T	16	18	17.5	20.6
J	105	105	98.6	114.3
N	4			
G	19	19	15.7	22.4
Weight kg	10	10.5	9.8	13.0

Model Code	DY050 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	170			
C	51.1			
CS	39.7			
D	155	155	152.4	165.1
H	460	460	458.5	465
H1	279			
T	16	18	19.1	22.4
J	120	120	120.7	127
N	4	8	4	8
G	19	19	19	19
Weight kg	10.9	11.5	11.8	14.0

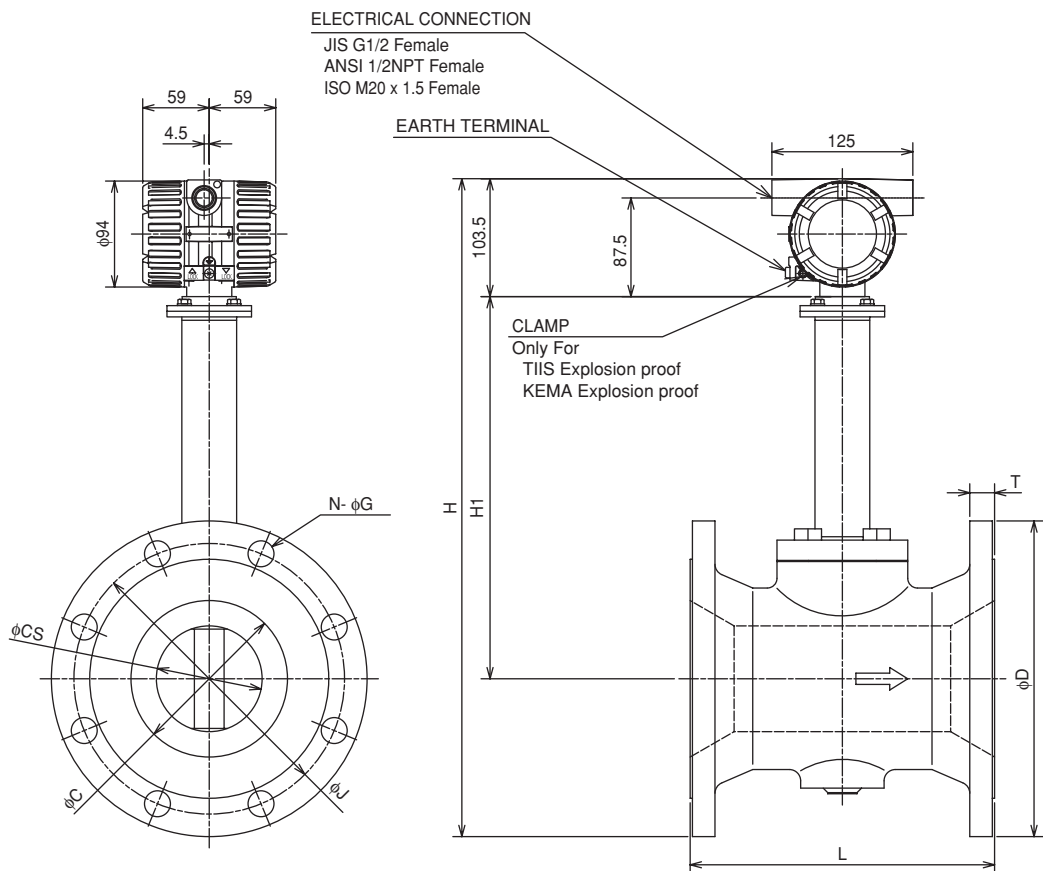
Model Code	DY080 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	200			
C	71			
CS	51.1			
D	185	200	190.5	209.6
H	497	504.5	500	509.5
H1	301			
T	18	22	23.9	28.4
J	150	160	152.4	168.2
N	8	8	4	8
G	19	23	19	22.4
Weight kg	19	22.1	22.3	27.3

Model Code	DY100 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	220			
C	93.8			
CS	71			
D	210	225	228.6	254
H	526.5	534	536	548.5
H1	318			
T	18	24	23.9	31.8
J	175	185	190.5	200.2
N	8			
G	19	23	19	22.4
Weight kg	25.4	30.4	31.0	41.4

Model Code	DY150 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	270			
C	138.8			
CS	93.8			
D	280	305	279.4	317.5
H	576.5	589	576	595.5
H1	333			
T	22	28	25.4	36.6
J	240	260	241.3	269.7
N	8	12	8	12
G	23	25	22.4	22.4
Weight kg	45.9	56.3	49.4	71.7

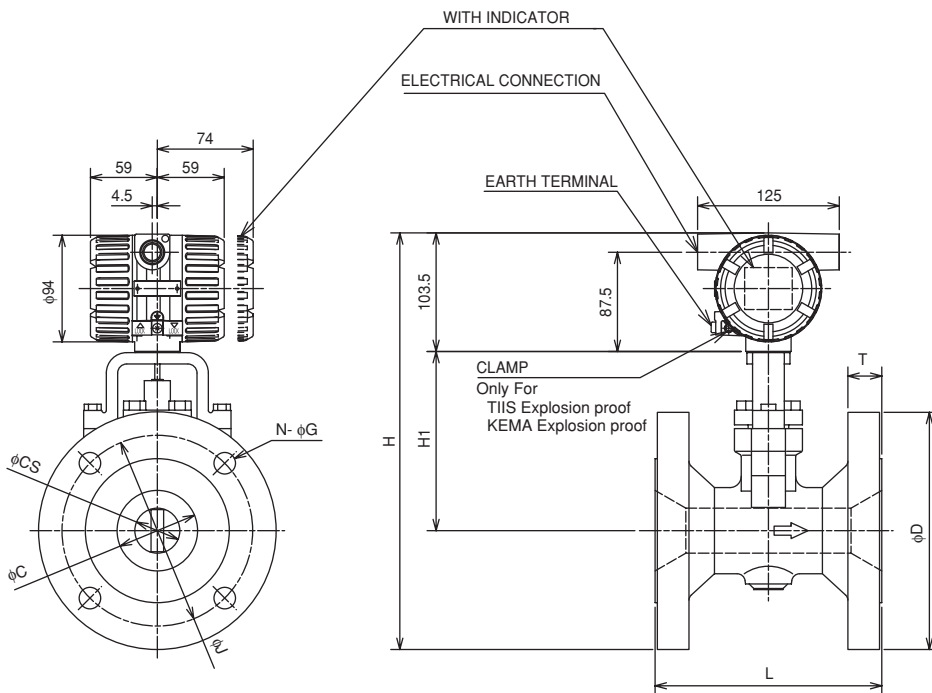
■ High Process Temperature Version Reduced Bore Type (/R1/HT): DY200-/R1/HT

■ Flange type



Model Code	DY200 /R1/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L			310	
C			185.6	
CS			138.8	
D	330	350	342.9	381
H	607.5	617.5	614	633
H1			339	
T	22	30	28.4	41.1
J	290	305	298.5	330.2
N	12	12	8	12
G	23	25	22.4	25.4
Weight kg	58.7	74.1	70.7	102.9

- Reduced Bore Type (/R2): DY040-/R2 up to DY200-/R2
- Flange type



Model Code		DY040 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	150				
C	39.7				
CS	14.6				
D	140	140	127	155.4	
H	300.5	300.5	294.0	308.2	
H1	127				
T	16	18	17.5	20.6	
J	105	105	98.6	114.3	
N	4				
G	19	19	15.7	22.4	
Weight kg	7.7	7.9	7.6	8.8	

Model Code		DY050 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	170				
C	51.1				
CS	25.7				
D	155	155	152.4	165.1	
H	310	310	308.7	315.1	
H1	129				
T	16	18	19.1	22.4	
J	120	120	120.7	127	
N	4	8	4	8	
G	19				
Weight kg	10	10.5	10.6	12.1	

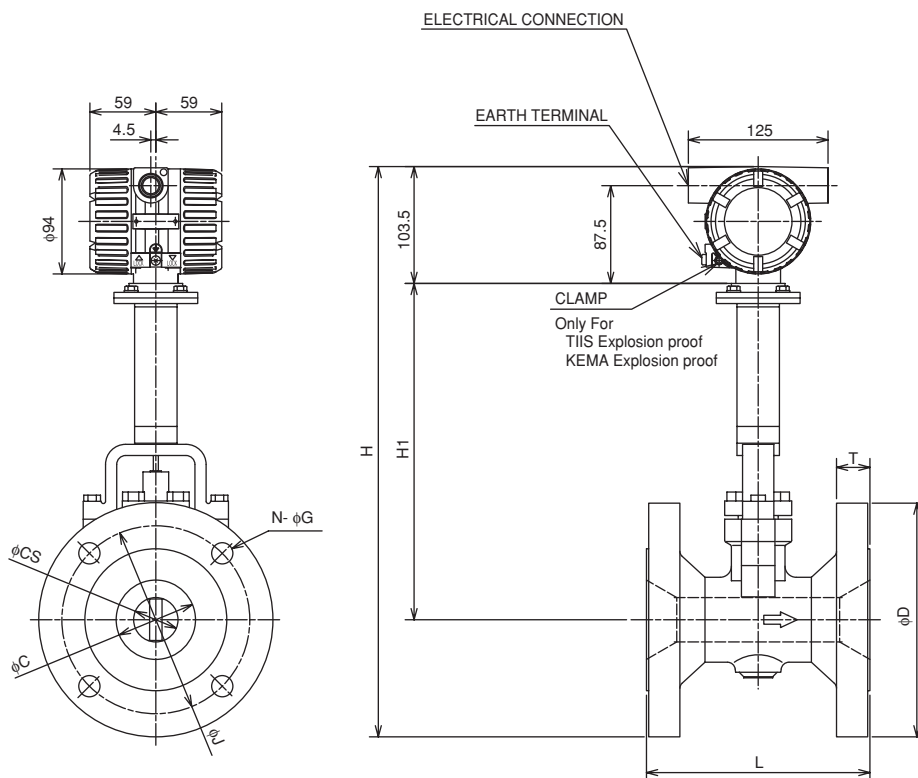
Model Code		DY080 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	200				
C	71				
CS	39.7				
D	185	200	190.5	209.6	
H	332	339.5	334.8	344.3	
H1	136				
T	18	22	23.9	28.4	
J	150	160	152.4	168.2	
N	8	8	4	8	
G	19	23	19	22.4	
Weight kg	13.6	16.2	16.2	20	

Model Code		DY100 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	220				
C	93.8				
CS	51.1				
D	210	225	228.6	254	
H	366.5	374	375.8	388.5	
H1	158				
T	18	24	23.9	31.8	
J	175	185	190.5	200.2	
N	8				
G	19	23	19	22.4	
Weight kg	20.9	24.9	25.5	34	

Model Code		DY150 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	270				
C	138.8				
CS	71				
D	280	305	279.4	317.5	
H	418.5	431	418.2	437.3	
H1	175				
T	22	28	25.4	36.6	
J	240	260	241.3	269.7	
N	8	12	8	12	
G	23	25	22.4	22.4	
Weight kg	40.3	50.3	43.3	61.3	

Model Code		DY200 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2	
L	310				
C	185.6				
CS	93.8				
D	330	350	342.9	381	
H	458.5	468.5	465.0	484	
H1	190				
T	22	30	28.4	41.1	
J	290	305	298.5	330.2	
N	12	12	8	12	
G	23	25	22.4	25.4	
Weight kg	61.9	68.9	71.9	96.9	

■ High Process Temperature Version Reduced Bore Type (/R2/HT): DY050-/R2/HT up to DY200-/R2/HT



Model Code	DY050 /R2/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	170			
C	51.1			
CS	25.7			
D	155	155	152.4	165.1
H	453	453	451.7	458.1
H1	272			
T	16	18	19.1	22.4
J	120	120	120.7	127
N	4	8	4	8
G	19			
Weight kg	10.4	10.9	11	12.5

Model Code	DY080 /R2/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	200			
C	71			
CS	39.7			
D	185	200	190.5	209.6
H	475	482.5	477.8	487.3
H1	279			
T	18	22	23.9	28.4
J	150	160	152.4	168.2
N	8	8	4	8
G	19	23	19	22.4
Weight kg	14	16.6	16.6	20.4

Model Code	DY100 /R2/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	220			
C	93.8			
CS	51.1			
D	210	225	228.6	254
H	509.5	517	518.8	531.5
H1	301			
T	18	24	23.9	31.8
J	175	185	190.5	200.2
N	8			
G	19	23	19	22.4
Weight kg	21.3	25.3	25.9	34.4

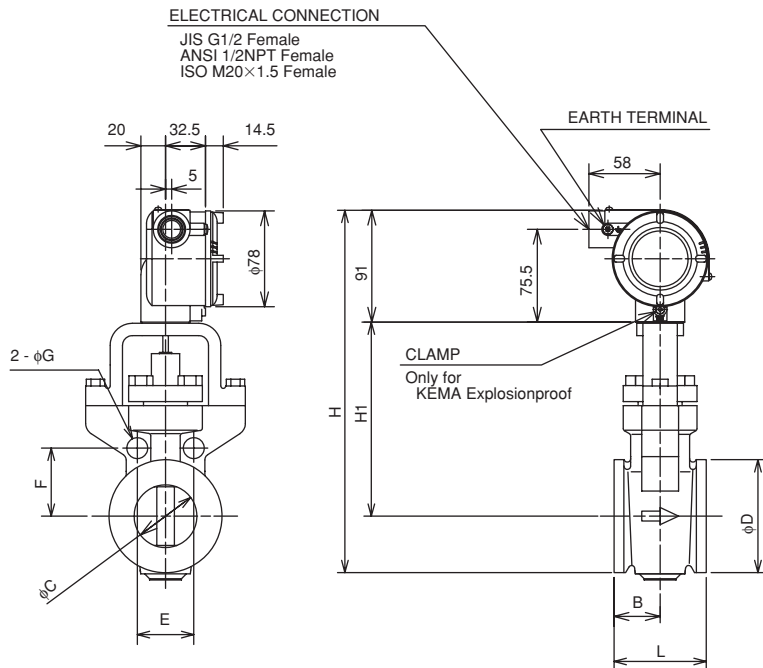
Model Code	DY150 /R2/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	270			
C	138.8			
CS	71			
D	280	305	279.4	317.5
H	561.5	574	561.2	580.3
H1	318			
T	22	28	25.4	36.6
J	240	260	241.3	269.7
N	8	12	8	12
G	23	25	22.4	22.4
Weight kg	40.3	50.3	43.3	61.3

Model Code	DY200 /R2/HT			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	310			
C	185.6			
CS	93.8			
D	330	350	342.9	381
H	601.5	611.5	608	627
H1	333			
T	22	30	28.4	41.1
J	290	305	298.5	330.2
N	12	12	8	12
G	23	25	22.4	25.4
Weight kg	61.9	68.9	71.9	96.9

■ Stainless Steel Housing: DY015-/E1 up to DY100-/E1

■ Wafer Type

Unit: mm  
(approx. inch)



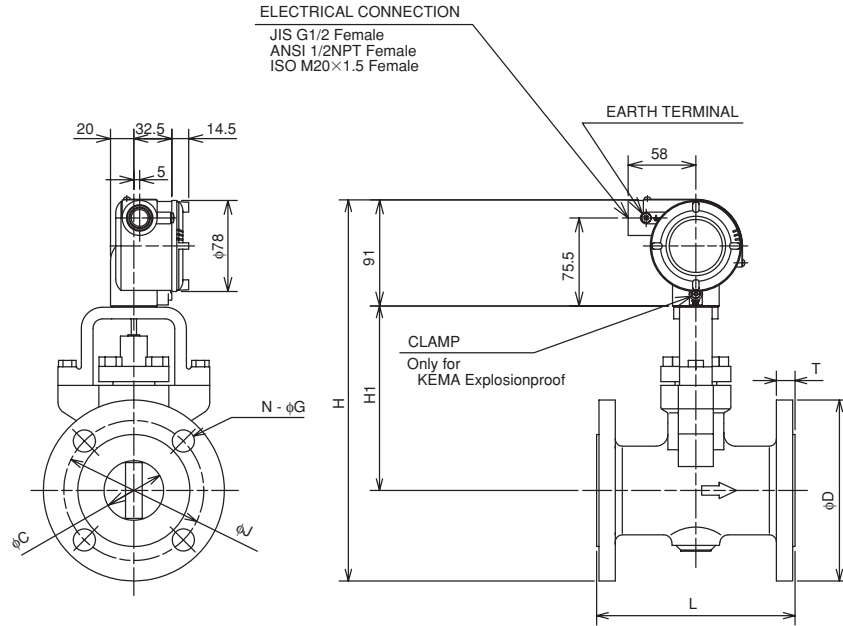
Model Code	DY015 (15A) /E1							DY025 (25A) /E1							DY040 (40A) /E1						
	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD4	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD4	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD4
L	70							70							70						
B	35							35							35						
C	14.6							25.7							39.7						
D	35.1							50.8							73						
H	235.5							245.4							263.5						
H1	127							129							136						
E	49.5	49.5	56.6	42.7	47.1	47.1	46	63.6	63.6	67.2	56	62.9	62.9	60.1	74.2	74.2	84.9	69.7	80.8	80.8	77.8
F	24.7	24.7	28.3	21.4	23.5	23.5	23	31.8	31.8	33.6	28	31.4	31.4	30.1	37.1	37.1	42.4	34.8	40.4	40.4	38.9
G	13	13	17	14	14	14	13	17	17	17	14	17	17	13	17	17	21	14	20	20	17
Weight kg	2.9							3.8							4.4						

Model Code	DY050 (50A) /E1							DY080 (80A) /E1							DY100 (100A) /E1								
	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD4	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD2	AD3 to AD4	AJ1	AJ2	AJ4	AP1 AA1	AP2 AA2	AP4 AA4	AD1 to AD2	AD3 to AD4
L	75							100							120								
B	37.5							40							50								
C	51.1							71							93.8								
D	92							127							157.2								
H	295							329.5							359.6								
H1	158							175							190								
E	45.9	49.8	56.6	48.6	48.6	48.6	46	57.4	61.2	65.1	56	64.4	64.4	61.2	61.2	67	70.8	78.5	72.9	76.6	82.6	68.9	72.7
F	55.4	60.1	66.8	58.7	58.7	58.7	56	69.3	73.9	78.5	56	77.7	77.7	73.9	73.9	80.8	85.5	94.7	88	92.5	99.7	83.1	87.8
G	17	17	21	17	17	17	16	17	21	21	17	20	20	17	17	17	21	23	17	20	23	17	21
Weight kg	6.1							9.5							12.9								

■ Stainless Steel Housing: DY015-/E1 up to DY100-/E1

■ Flange type

Unit: mm  
(approx. inch)



Model Code	DY015 (15A) /E1										
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD4	BD5 to BD6	CA4	CA5
L	130						160	130	140	160	
C	14.6										
D	95	95	115	88.9	95.3	95.3	120.7	95	105	95.3	120.7
H	265.5	265.5	275.5	262.5	265.5	265.5	278.5	265.5	270.5	265.5	278.5
H1	127										
T	12	14	20	11.2	14.2	21	28.8	16	20	19.9	28.8
J	70	70	80	60.5	66.5	66.5	82.6	65	75	66.5	82.6
N	4										
G	15	15	19	15.7	15.7	15.7	22.4	14	14	15.7	22.4
Weight kg	4.3	4.4	6	4.2	4.4	4.7	6.8	4.3	5.5	4.6	6.9

Model Code	DY025 (25A) /E1										
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD4	BD5 to BD6	CA4	CA5
L	150						190	150	170	190	
C	25.7										
D	125	125	130	108	124	124	149.4	115	140	124	149.4
H	282.5	282.5	285	274	282	282	294.7	277.5	290	282	294.7
H1	129										
T	14	16	22	14.2	17.5	24	34.9	18	24	24	34.9
J	90	90	95	79.2	89	89	101.6	85	100	89	101.6
N	4										
G	19	19	19	15.7	19	19	25.4	14	18	19	25.4
Weight kg	7	7.2	8.7	6.7	7.3	7.8	11.2	7	9.7	8	11.5

Model Code	DY040 (40A) /E1										
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD4	BD5 to BD6	CA4	CA5
L	150						200	150	185	200	
C	39.7										
D	140	140	160	127	155.4	155.4	177.8	150	170	155.4	177.8
H	297	297	307	290.5	304.7	304.7	315.9	302	312	304.7	315.9
H1	136										
T	16	18	26	17.5	20.6	28.8	38.2	18	26	28.8	38.2
J	105	105	120	98.6	114.3	114.3	124	110	125	114.3	124
N	4										
G	19	19	23	15.7	22.4	22.4	28.4	18	22	22.4	28.4
Weight kg	8.3	8.5	12	8.2	9.4	11.4	16.3	8.9	12.8	11.8	16.4

Model Code	DY050 (50A) /E1										
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD4	BD5 to BD6	CA4	CA5
L	170						230	170	205	230	
C	51.1										
D	155	155	165	152.4	165.1	165.1	215.9	165	180	195	215.9
H	326.5	326.5	331.5	325.2	331.5	331.5	357	331.5	339	346.5	331.5
H1	158										
T	16	18	26	19.1	22.4	31.8	44.5	20	26	28	33.3
J	120	120	130	120.7	127	127	165.1	125	135	145	127
N	4	8	8	4	8	8	4	4	4	4	8
G	19	19	19	19	19	19	25.4	18	22	26	19
Weight kg	11.2	11.7	14.4	11.8	13.3	14.9	26.6	11.4	14.4	15.3	15.9

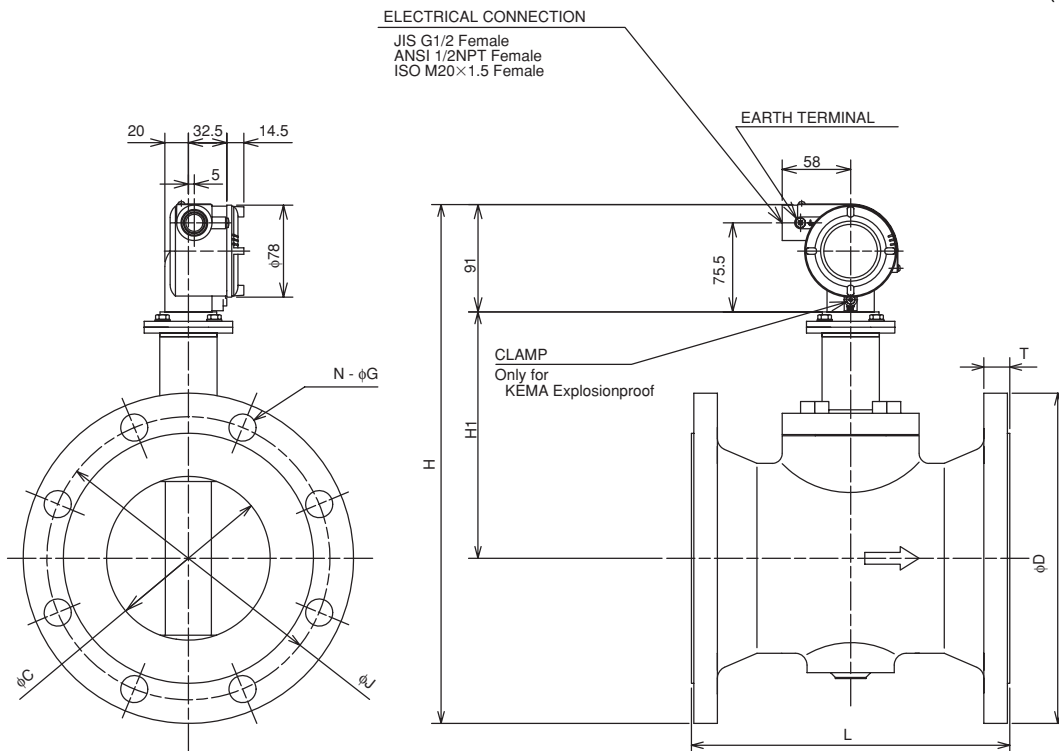
Model Code	DY080 (80A) /E1												
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD2	BD3 to BD4	BD5	BD6	CA4	CA5
L	200						245	200		235	250		
C	71												
D	185	200	210	190.5	209.6	209.6	241.3	200	200	215	230	209.6	241.3
H	358.5	366	371	361.5	370.8	370.8	386.5	366	366	373.5	381	370.8	386.5
H1	175												
T	18	22	32	23.9	28.4	38.2	44.5	20	24	28	32	39.7	46
J	150	160	170	152.4	168.2	168	190.5	160	160	170	180	168	190.5
N	8	8	8	4	8	8	8	8	8	8	8	8	8
G	19	23	23	19	22.4	22.4	25.4	18	18	22	26	22.4	25.4
Weight kg	17.5	20.1	25.5	20.1	23.9	25.5	35.8	19.5	20.1	24.2	27.1	27.2	36.4

Model Code	DY100 (100A) /E1												
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BS5 BA5	BD1 to BD2	BD3 to BD4	BD5	BD6	CA4	CA5
L	220						240	280	220		270	285	
C	93.8												
D	210	225	250	228.6	254	273	292.1	220	235	250	265	273	292.1
H	386	393.5	406	395.3	408	417.5	427	391	398.5	406	413.5	417.5	427
H1	190												
T	18	24	36	23.9	31.8	44.5	50.9	20	24	30	36	46	52.4
J	175	185	205	190.5	200.2	216	235	180	190	200	210	216	235
N	8												
G	19	23	25	19	22.4	25.4	31.8	18	22	26	30	25.4	31.8
Weight kg	22.9	26.9	38.2	27.5	36	50.9	56	23.3	27.5	33.1	39.8	52.9	56.7



- Stainless Steel Housing: DY150-/E1 up to DY300-/E1
- Flange type

Unit: mm  
(approx. inch)



Model Code	DY150 (150A) /E1												
Process Connection	BJ1	BJ2	BJ4	BP1 BS1 BA1	BP2 BS2 BA2	BP4 BS4 BA4	BSS BA5	BD1 to BD2	BD3 to BD4	BD5	BD6	CA4	CA5
L	270			310		336		270			325		340
C	138.8												
D	280	305	355	279.4	317.5	356	381	285	300	345	355	356	381
H	440	452.4	477.5	439.7	458.5	478	490.5	442.5	450	472.5	477.5	478	490.5
H1	209												
T	22	28	44	25.4	36.6	54.4	62	22	28	36	44	55.7	63.6
J	240	260	295	241.3	269.7	292	317.5	240	250	280	290	292	317.5
N	8	12	12	8	12	12	12	8	8	8	12	12	12
G	23	25	33	22.4	22.4	28.4	31.8	22	26	33	33	28.4	31.8
Weight kg	33.5	43.5	76.5	36.5	54.5	84.5	106.1	33.5	43	58.2	76.5	90.1	107.1

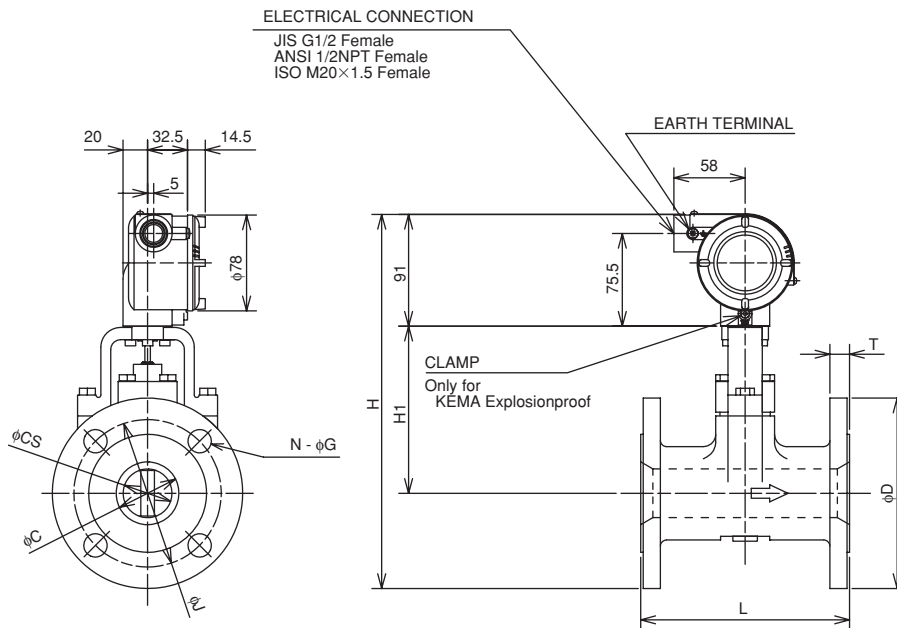
Model Code	DY200 (200A) /E1												
Process Connection	BJ1	BJ2	BP1 BS1 BA1	BP2 BS2 BA2	BS4 BA4	BS5 BA5	BD1	BD2	BD3	BD4	CA4	CA5	
L	310			370		386		310			375		390
C	185.6												
D	330	350	342.9	381	419.1	469.9	340	340	360	375	419.1	469.9	
H	497	507	503.5	522.5	541.5	567	502	502	512	519.5	541.5	567	
H1	241												
T	22	30	28.4	41.1	62	69.9	24	24	30	34	63.6	71.4	
J	290	305	298.5	330.2	349.3	393.7	295	295	310	320	349.3	393.7	
N	12	12	8	12	12	12	8	12	12	12	12	12	
G	23	25	22.4	25.4	31.8	38.1	22	22	26	30	31.8	38.1	
Weight kg	45.5	52.5	55.5	80.5	136.1	182.1	46.4	46.4	53.7	56	139.1	183.1	

Model Code	DY250 (250A) /E1				DY300 (300A) /E1			
Process Connection	BJ1	BJ2	BP1 BS1 BA1	BP2 BS2 BA2	BJ1	BJ2	BP1 BS1 BA1	BP2 BS2 BA2
L	370				400			
C	230.8				276.2			
D	400	430	406.4	444.5	445	480	482.6	520.7
H	568	583	571.2	590.5	620.5	638	639.3	658.5
H1	277				307			
T	24	34	30.2	47.8	24	36	31.8	50.8
J	355	380	362	387.4	400	430	431.8	450.9
N	12	12	12	16	16	16	12	16
G	25	27	25.4	28.5	25	27	25.4	31.8
Weight kg	78.1	100.1	90.1	125.1	100.1	128.1	140.1	178.1

■ Stainless Steel Housing Reduced Bore Type (/E1/R1): DY025-/E1/R1 up to DY150-/E1/R1

■ Flange type

Unit: mm  
(approx. inch)



Model Code	DY025 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	25.7			
CS	14.6			
D	125	125	108	124
H	280.5	280.5	272	280
H1	127			
T	14	16	14.2	17.5
J	90	90	79.2	89
N	4			
G	19	19	15.7	19
Weight kg	6.2	6.6	5.6	7.1

Model Code	DY040 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	39.7			
CS	25.7			
D	140	140	127	155.4
H	290	290	283.5	297.7
H1	129			
T	16	18	17.5	20.6
J	105	105	98.6	114.3
N	4			
G	19	19	15.7	22.4
Weight kg	9.7	10.2	9.5	12.7

Model Code	DY050 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	170			
C	51.1			
CS	39.7			
D	155	155	152.4	165.1
H	304.5	304.5	303.2	309.5
H1	136			
T	16	18	19.1	22.4
J	120	120	120.7	127
N	4	8	4	8
G	19	19	19	19
Weight kg	10.6	11.2	11.5	13.7

Model Code	DY080 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	200			
C	71			
CS	51.1			
D	185	200	190.5	209.6
H	341.5	349	344.5	353.8
H1	158			
T	18	22	23.9	28.4
J	150	160	152.4	168.2
N	8	8	4	8
G	19	23	19	22.4
Weight kg	18.7	21.8	22	27

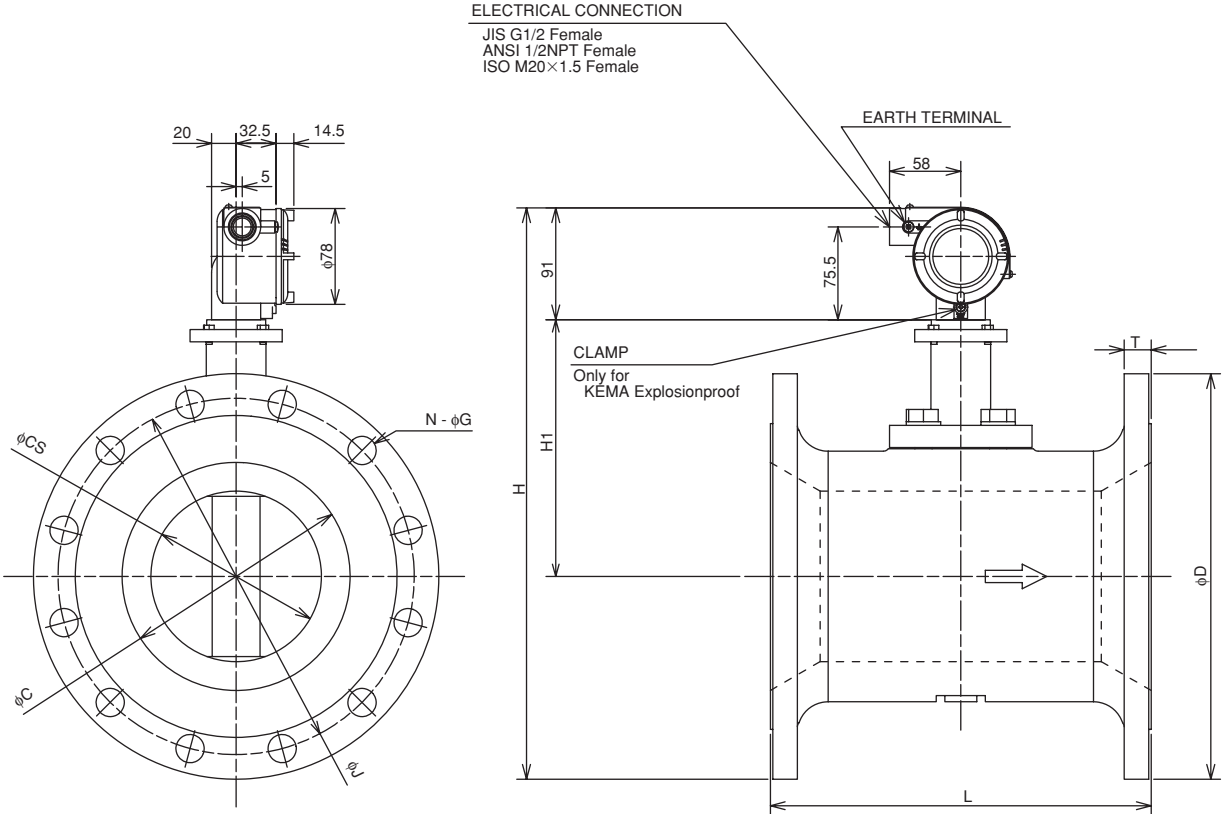
Model Code	DY100 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	220			
C	93.8			
CS	71			
D	210	225	228.6	254
H	371	378.5	380.3	393
H1	175			
T	18	24	23.9	31.8
J	175	185	190.5	200.2
N	8			
G	19	23	19	22.4
Weight kg	25.1	30.1	30.7	41.4

Model Code	DY150 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	270			
C	138.8			
CS	93.8			
D	280	305	279.4	317.5
H	421	433.5	420.7	439.5
H1	190			
T	22	28	25.4	36.6
J	240	260	241.3	269.7
N	8	12	8	12
G	23	25	22.4	22.4
Weight kg	46	56.4	49.5	71.8

■ Stainless Steel Housing Reduced Bore Type (/E1/R1): DY200-/E1/R1

■ Flange type

Unit: mm  
(approx. inch)

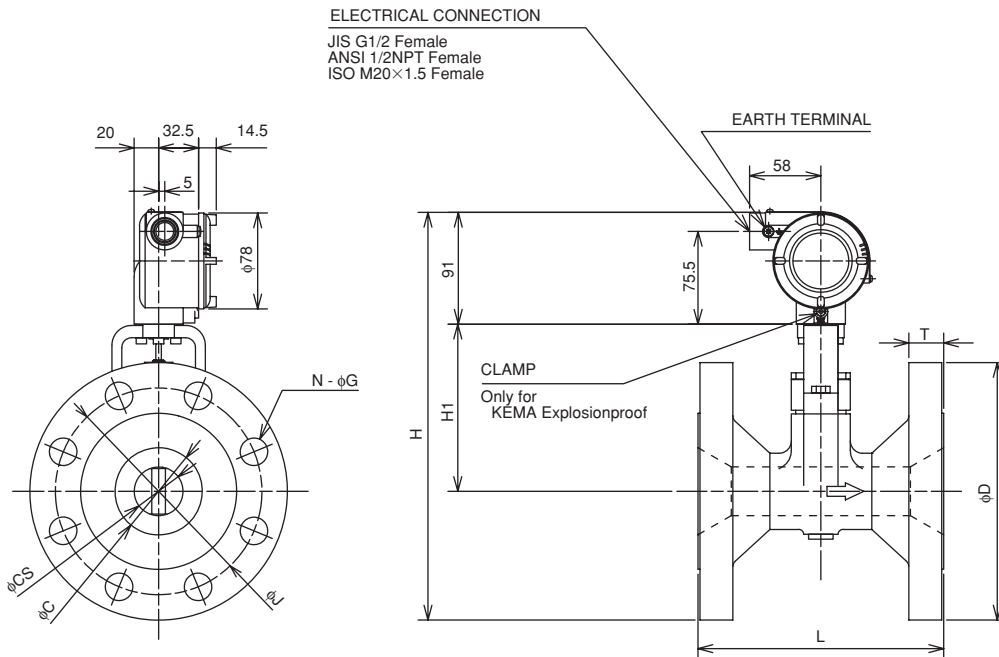


Model Code	DY200 /E1 /R1			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	310			
C	185.6			
CS	138.8			
D	330	350	342.9	381
H	465	475	471.5	490.5
H1	209			
T	22	30	28.4	41.1
J	290	305	298.5	330.2
N	12	12	8	12
G	23	25	22.4	25.4
Weight kg	58.8	74.2	70.8	103

■ Stainless Steel Housing Reduced Bore Type (/E1/R2): DY040-/E1/R1 up to DY200-/E1/R2

■ Flange type

Unit: mm  
(approx. inch)



Model Code	DY040 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	150			
C	39.7			
CS	14.6			
D	140	140	127	155.4
H	288	288	281.5	295.7
H1	127			
T	16	18	17.5	20.6
J	105	105	98.6	114.3
N	4			
G	19	19	15.7	22.4
Weight kg	7.8	8	7.7	8.9

Model Code	DY050 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	170			
C	51.1			
CS	25.7			
D	155	155	152.4	165.1
H	297.5	297.5	296.2	302.5
H1	129			
T	16	18	19.1	22.4
J	120	120	120.7	127
N	4	8	4	8
G	19			
Weight kg	10.1	10.6	10.7	12.2

Model Code	DY080 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	200			
C	71			
CS	39.7			
D	185	200	190.5	209.6
H	319.5	327	322.5	331.8
H1	136			
T	18	22	23.9	28.4
J	150	160	152.4	168.2
N	8	8	4	8
G	19	23	19	22.4
Weight kg	13.7	16.3	16.3	20.1

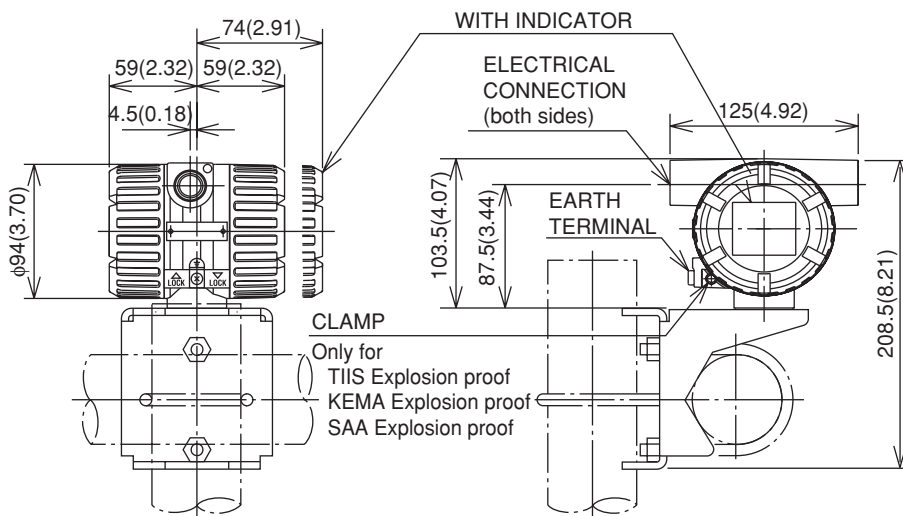
Model Code	DY100 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	220			
C	93.8			
CS	51.1			
D	210	225	228.6	254
H	354	361.5	363.3	376
H1	158			
T	18	24	23.9	31.8
J	175	185	190.5	200.2
N	8			
G	19	23	19	22.4
Weight kg	21	25	25.6	34.1

Model Code	DY150 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	270			
C	138.8			
CS	71			
D	280	305	279.4	317.5
H	406	418.5	405.7	424.5
H1	175			
T	22	28	25.4	36.6
J	240	260	241.3	269.7
N	8	12	8	12
G	23	25	22.4	22.4
Weight kg	40.4	50.4	43.4	61.4

Model Code	DY200 /E1 /R2			
Process Connection	BJ1	BJ2	BA1 BS1 BP1	BA2 BS2 BP2
L	310			
C	185.6			
CS	93.8			
D	330	350	342.9	381
H	446	456	452.5	471.5
H1	190			
T	22	30	28.4	41.1
J	290	305	298.5	330.2
N	12	12	8	12
G	23	25	22.4	25.4
Weight kg	62	69	72	97

■ Remote Type Converter (DYA)

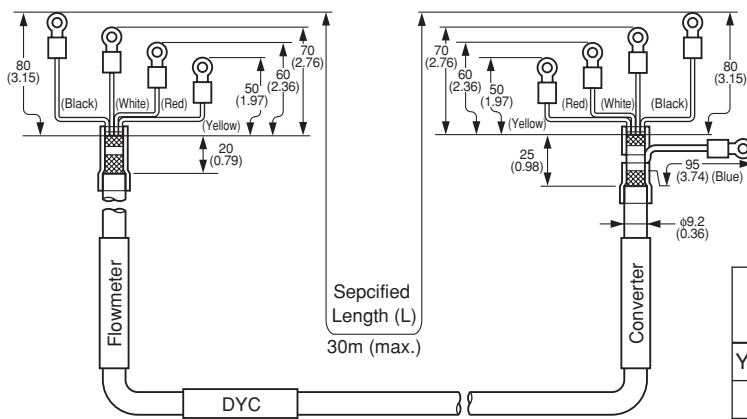
Unit: mm  
(approx. inch)



Weight: 1.9 kg (4.19lb), 4.1 kg (9.04lb) for /E1.  
Note: For flowmeters with indicator, add 0.2 kg (0.44lb), 0.3 kg (0.66lb) for /E1.

■ Signal Cable for Remote Type (DYC)

Unit: mm  
(approx. inch)

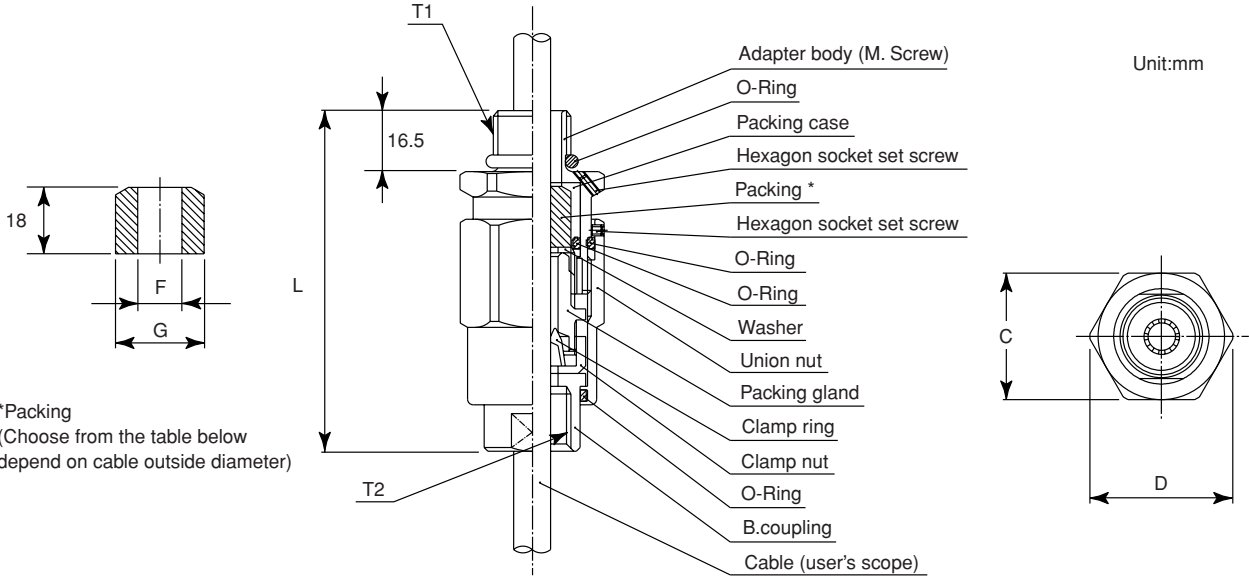


Cable Color and Terminal

Color	Terminal	
	Flow meter	Converter
Yellow <sup>(*)</sup>	T	T
Red	A	A
White	B	B
Black	$\perp$	C
Blue		$\perp$

(\*) Only for /MV

■ Flameproof Packing Adapter (Option code /G11,/G12)



Size					Cable outer diameter	Packing dimensions		Identification mark	Weight (kg)
T1	T2	C	D	L		F	G		
G 1/2	G 1/2	35	39	94.5	φ8 to φ10	φ10.0	φ20.0	16 8-10	0.26
					φ10 to φ12	φ12.0		16 10-12	

Fig50

# 10. EXPLOSION PROTECTED TYPE INSTRUMENT

In this section, further requirements and differences for explosion proof type instrument are described except JIS Flame proof. For explosion proof type instrument, the description in this chapter is prior to other description in this Instruction Manual.



## WARNING

- Only trained persons use this instrument in industrial locations.

## 10.1 CENELEC ATEX (KEMA)



## WARNING

Only trained persons use this instrument in industrial locations.

### 10.1.1 Technical Data

#### • Explosion proof

Applicable Standard : EN50014: 1997, EN50018: 2000

Certificate : KEMA 01ATEX2072

Type of protection: EEx d IIC T6...T1 (Integral Type Flowmeter and Remote Type Flowmeter)  
EEx d IIC T6 (Remote Type Converter)

Group: II

Category: 2G

Temperature Class: (Integral Type Flowmeter and Remote Type Flowmeter)

Temperature Class	Ambient Temperature	Process Temperature
T6	60°C	≦85°C
T5	60°C	≦100°C
T4	60°C	≦135°C
T3	60°C	≦200°C
T2 *1	60°C	≦300°C
T1 *1	60°C	≦450°C

T100101-1.eps

\*1 Note: Use /HT version above 250°C

Temperature Class: T6 (Remote Type Converter)

Enclosure: IP67

Tamb: -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)

-40 to +60°C (Remote Type Converter)

-30 to +60°C (Remote Type Converter with indicator)

Power Supply: 10.5 to 42Vdc max.

Output Signal: Current Output; 4 to 20mA

Pulse output; On=2Vdc, 200mA

Off=42Vdc, 4mA

Maximum Working Pressure: 16MPa(DY015 to DY200)  
5MPa(DY200 and DY300)

Electrical Connection: ANSI 1/2 NPT female,  
ISO M20 X 1.5 female

#### • Intrinsically Safe

Applicable Standard: EN50014: 1997, EN50020: 2002  
EN50284: 1999, EN60529: 1991

Certificate: KEMA 03ATEX1136X

Type of Protection: EEx ia IIB/IIC T4...T1 (Integral Type Flowmeter and Remote Type Flowmeter)  
EEx ia IIB/IIC T4 (Remote Type Converter)

Group: II

Category: 1G

Maximum Working Pressure: 16MPa (DY015 to DY200)  
5MPa (DY250 and DY300)

Tamb: -29 to +60°C (Integral Type Flowmeter)

-29 to +80°C (Remote Type Flowmeter)

-40 to +60°C (Remote Type Converter)

(Integral Type Flowmeter)

Temperature Class	Ambient Temperature	Process Temperature
T4	60°C	≦135°C
T3	60°C	≦200°C
T2*	60°C	≦300°C
T1*	60°C	≦450°C

T100101-2.eps

\*: Use /HT version above 250°C

(Remote Type Flowmeter)

Temperature Class	Ambient Temperature	Process Temperature
T4	80°C	≦135°C
T3	80°C	≦200°C
T2*	80°C	≦300°C
T1*	80°C	≦450°C

T100101-3.eps

\*: Use /HT version above 250°C

Electrical data:

Supply and Output Circuit (SUPPLY + and -, PULSE + and -);

Maximum Input Voltage  $U_i = 30$  V

Maximum Input Current  $I_i = 165$  mA

Maximum Input Power  $P_i = 0.9$  W

Internal Capacitance  $C_i = 6$  nF

Internal Inductance  $L_i = 0.15$  mH

For the connection of DYA to DY-N :

Maximum cable capacitance: 160nF

Electrical Connection: ANSI 1/2 NPT female, ISO M20 X 1.5 female

**Special conditions for safe use**

1. For process temperatures above 250°C the flow meters of the DY/HT or DY-N/HT series must be used.
2. Because the enclosures of the flow meters and the flow converter are made of aluminium alloy, when used in a potentially explosive atmosphere requiring apparatus of equipment category 1 G, they must be installed so, that even in the event of rare incidents, an ignition source due to impact of friction between the enclosure and iron/steel is excluded.

**• Type of Protection “n”**

Applicable Standard: EN60079-15: 2005, IEC60079-0: 2004, IEC60079-11: 1999, EN60529: 1991

Type of protection: Ex nL IIC T4...T1 (Integral Type Flowmeter and Remote Type Flowmeter)  
EEx nL IIC T4 (Remote Type Converter)

Group: II

Category: 3G

Maximum Working Pressure: 16MPa (DY015 to DY200)  
5MPa (DY250 and DY300)

Degree of protection of enclosure: IP67

Tamb. : -29 to +60°C (Integral Type Flowmeter)

-29 to +80°C (Remote Type Flowmeter)

-40 to +60°C (Remote Type Converter)

(Integral Type Flowmeter)

Temperature Class	Ambient Temperature	Process Temperature
T4	60°C	≦135°C
T3	60°C	≦200°C
T2*	60°C	≦300°C
T1*	60°C	≦450°C

T100101-4.eps

\*: Use /HT version above 250°C

(Remote Type Flowmeter)

Temperature Class	Ambient Temperature	Process Temperature
T4	80°C	≦135°C
T3	80°C	≦200°C
T2*	80°C	≦300°C
T1*	80°C	≦450°C

T100101-5.eps

\*: Use /HT version above 250°C

**Electrical data**

Signal/Supply and Pulse circuit

Ui= 32Vdc (30Vdc for the remote converter),

Ci= 1.76nF, Li= 0mH

For connection of DY-N series

Maximum capacitance of cable: 160nF

Connect to DYA series only

Electrical Connection: ANSI 1/2 NPT female, ISO M20 X 1.5 female

**10.1.2 Installation****WARNING**

- All wiring shall comply with local installation requirements and local electrical code.
- Use the suitable heat-resisting cables (over 90°C) for the digital YEW FLO Model DY Series Vortex 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 flame proof enclosure “d” and suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with certified blanking elements in type of protection flame proof enclosure “d”.

**10.1.3 Operation****WARNING**

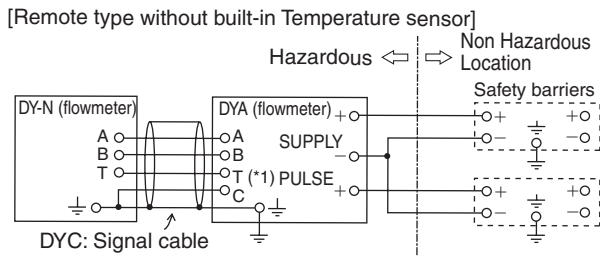
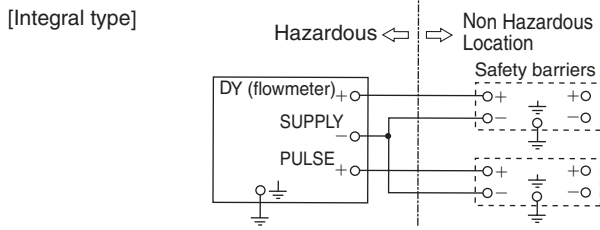
- Wait 10 min. after power is turned off, before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

**10.1.4 Maintenance and Repair****WARNING**

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



### 10.1.5 Installation Diagram of Intrinsically safe (and Note)

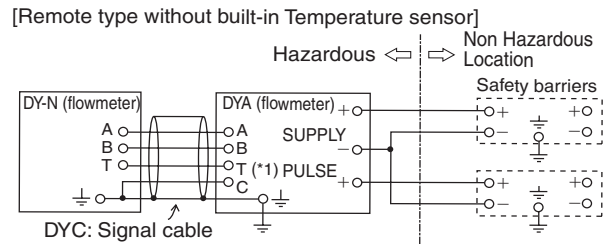
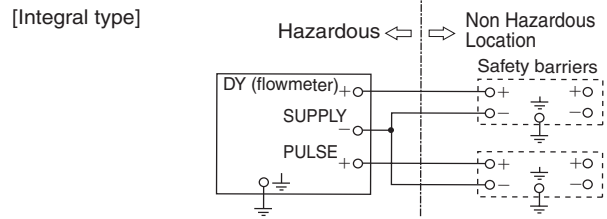


Note: In any safety barrier used output current must be limited by a resistor 'R' such that  $I_o=U_o/R$

Electric data:  
 Supply and Output Circuit (SUPPLY + and -, PULSE+ and -)  
 Maximum Input Voltage  $U_i$ : 30V  
 Maximum Input Current  $I_i$ : 165mA  
 Maximum Input Power  $P_i$ : 0.9W  
 Internal Capacitance  $C_i$ : 6nF  
 Internal Inductance  $L_i$ : 0.15mH

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### 10.1.6 Installation Diagram of Type of Protection "n"



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

Electric data:  
 Supply and Output Circuit (SUPPLY + and -, PULSE+ and -)  
 Maximum Input Voltage  $U_i$ : 30V  
 Maximum Input Current  $I_i$ : 165mA  
 Maximum Input Power  $P_i$ : 0.9W  
 Internal Capacitance  $C_i$ : 6nF  
 Internal Inductance  $L_i$ : 0.15mH

F100101.EPS



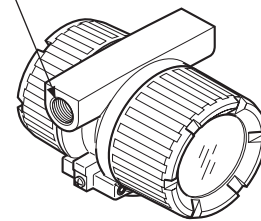
#### IMPORTANT

- In hazardous location, BT200 BRAIN Terminal can not be connected to the digital YEWFLOW which is approved by CENELEC (KEMA) Intrinsically Safe. (See the IM 1C0A11-01E).

### 10.1.7 Screw Marking

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

SCREW SIZE	MARKING
M20 X 1.5	⚠ M
1/2-14NPT	⚠ A



F100103.EPS

10.1.8 Name Plate

[Integral type, Flameproof]

digital YEW FLO VORTEX FLOWMETER		OUTPUT	TAG NO.
MODEL	STYLE	MWP	
SUFFIX	K-FACTOR	MPa at 38°C	
	RANGE		
	NO.		
SUPPLY		V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Remote type detector, Flameproof]

digital YEW FLO VORTEX FLOWMETER		MWP	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	MPa at 38°C	
	NO.		
SUPPLY		V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Remote type converter, Flameproof]

digital YEW FLO VORTEX FLOW CONVERTER		OUTPUT	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	MPa at 38°C	
	NO.		
SUPPLY		V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Integral type, Intrinsically safe]

digital YEW FLO VORTEX FLOWMETER		OUTPUT	TAG NO.
MODEL	STYLE	MWP	
SUFFIX	K-FACTOR	4 to 20mA DC / PULSE	
	RANGE	MPa at 38°C	
	NO.		
SUPPLY		10.5 to 30V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Integral type detector, Intrinsically safe]

digital YEW FLO VORTEX FLOWMETER		MWP	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	MPa at 38°C	
	NO.		
SUPPLY		V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Integral type converter, Flameproof]

digital YEW FLO VORTEX FLOW CONVERTER		OUTPUT	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	---	
	NO.		
SUPPLY		9~17.5(24)V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

REFER TO USER'S MANUAL.

[Integral type, Type n protection]

digital YEW FLO VORTEX FLOWMETER		OUTPUT	TAG NO.
MODEL	STYLE	MWP	
SUFFIX	K-FACTOR	4 to 20mA DC / PULSE	
	RANGE	MPa at 38°C	
	NO.		
SUPPLY		10.5 to 30V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Remote type detector, Type n protection]

digital YEW FLO VORTEX FLOWMETER		MWP	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	MPa at 38°C	
	NO.		
SUPPLY		V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

WARNING: THE PROCESS TEMP. ≥ 200°C. USE THE HEAT-RESISTING CABLE OF HIGHER THAN 90°C AFTER DE-ENERGIZING, DELAY 3 MINUTES BEFORE OPENING. THE ENCLOSURE IS HOT AT HIGH PROCESS TEMP.

[Remote type converter, Type n protection]

digital YEW FLO VORTEX FLOW CONVERTER		OUTPUT	TAG NO.
MODEL	STYLE	K-FACTOR	
SUFFIX	RANGE	---	
	NO.		
SUPPLY		9~32V DC	
YOKOGAWA		Made in China TOKYO 180-8750 JAPAN	

MODEL: Specified model code

SUFFIX : Specified suffix code

STYLE: Style code

SUPPLY : Supply voltage

OUTPUT : Output signal

MWP : Maximum working pressure

K-FACTOR : Device-specific factor

RANGE: Specified range

NO.: Manufacturing serial number \*1

\*1) The first digit in the final three numbers of the serial number appearing after “NO.” on the nameplate indicates the year of production. The following is an example of a serial number for a product that was produced in 2011:

NO. S5K965926 135

↑Produced in 2011

TAG NO. : Specified TAG No.

CE: CE marking

0344: The identification number of the notified body.

II2G: Group II Category 2 Gas atmosphere

II1G: Group II Category 1 Gas atmosphere

II3G: Group II Category 3 Gas atmosphere

## 10.2 FM

### 10.2.1 Technical Data

#### • Explosion Proof

Applicable Standard: FM3660 1998, FM3611 1999,  
FM3615 1989, FM3810 1989,  
Including Supplement 1 1995,  
ANSI/NEMA 250 1991

Type of Protection: Explosionproof for Class I, Division 1,  
Groups A,B, C and D;  
Dust-ignition proof for Class II/III,  
Division 1, Groups E, F, and G.

"SEAL ALL CONDUITS 18 INCHES." " WHEN  
INSTALLED IN DIV.2, SEALS NOT REQUIRED"

Enclosure Rating: NEMA Type 4X

Temperature Code: T6

Ambient Temperature: -29 to 60°C (Integral Type Flowmeter  
and Remote Type Flowmeter)  
-40 to 60°C (Remote Type Converter)

Power Supply: 42Vdc max. (Integral Type Flowmeter and  
Remote Type Converter)

Output Signal (Integral Type Flowmeter):

Current Output; 4 to 20mA

Pulse Output; On=2Vdc, 200mA  
Off=42Vdc, 4mA

Output Signal (Remote Type Flowmeter):

Output Signal to Converter; 30Vp-p, 100µAp-p

Input/Output Signal (Remote Type Converter):

Current Output; 4 to 20mA

Pulse Output; On=2Vdc, 200mA  
Off=42Vdc, 4mA

Input Signal from Flowmeter; 30Vp-p, 100µAp-p

Maximum Working Pressure: 16MPa (DY015 to DY200)

5MPa (DY250 and DY300)

Electrical connection : ANSI 1/2 NPT female (Special)

#### • Intrinsically Safe

Applicable Standard: FM3600 1998, FM3610 1999,  
FM3611 2004, FM3810 2005,  
Including Supplement 1 1995  
ANSI/NEMA 250 1991,  
ISA-S12.0.01 1998

Type of Protection: Intrinsically safe for Class I, II, III,  
Div.1, Groups A, B, C, D, E, F and G, T4  
and Class I, Zone 0, AEx ia IIC T4  
Nonincendive for Class I, II, Div. 2,  
Groups A, B, C, D, F and G, Class III,  
Div.1, T4, and Class I, Zone 2, Group  
IIC, T4

Ambient Temperature: -29 to +60°C

(Integral Type Flowmeter)

-29 to +80°C

(Remote Type Flowmeter)

-40 to +60°C

(Remote Type Converter)

Maximum Working Pressure: 16MPa (DY015 to DY200)

5MPa (DY250 and DY300)

Indoors and Outdoors: NEMA Type 4X

Electrical Parameters: Vmax=30Vdc, Imax=165mA,dc,

Pi=0.9W, Ci=12nF, Li=0.15mH

Electrical connection : ANSI 1/2 NPT female

### 10.2.2 Wiring

#### • Explosion proof



#### WARNING

- All wiring shall comply with National Electrical Code ANSI/NFPA 70 and Local Electrical Code.
- "SEAL ALL CONDUITS 18 INCHES" " WHEN INSTALLED DIV.2, SEALS NOT REQUIRED".

#### • Intrinsically Safe



#### NOTE

- The FM Approved Hand Held Communicator may be connected at any point in the loop between the digital YEW FLO and the Control Equipment.

### 10.2.3 Operation

#### • Explosion proof



#### WARNING

- Note a warning label worded as follows.  
Warning: OPEN CIRCUIT BEFORE REMOVING COVER.  
INSTALL IN ACCORDANCE WITH THE INSTRUCTION MANUAL (IM) IF6A1-01E.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

### 10.2.4 Maintenance and Repair

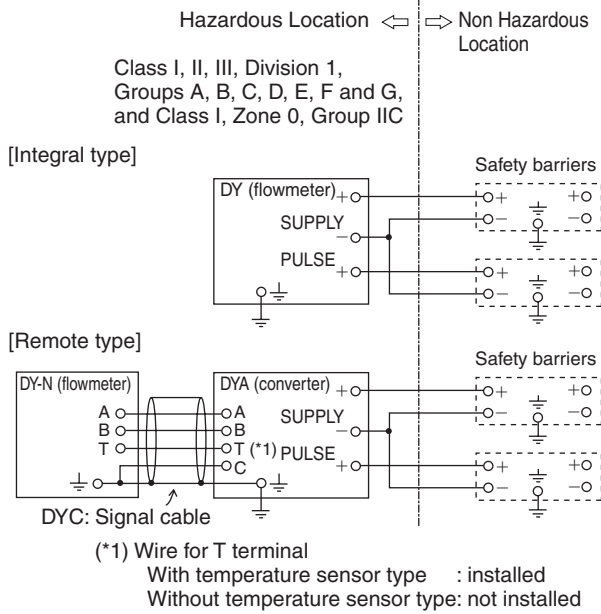


#### WARNING

- The instrument modification or part replacements by other than authorized representative of Yokogawa Electric Corporation is prohibited and will void the approval of FM Approvals.

### 10.2.5 Installation Diagram

#### Intrinsically Safe (and WARNING)



Electrical parameters of vortex flowmeter (DY) and vortex flow converter (DYA).

$V_{max}=30V$	$I_{max}=165mA$	$P_i=0.9W$
$C_i=12nF$	$L_i=0.15mH$	

Installation requirement between flowmeter, converter and Safety Barrier

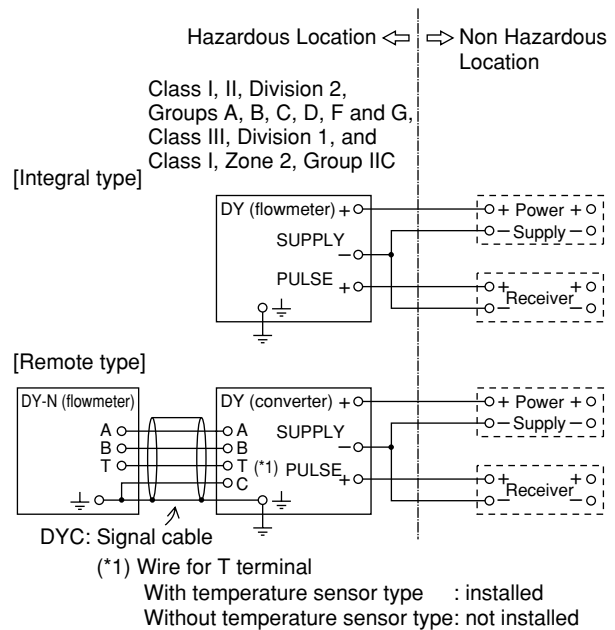
$V_t$  or  $V_{oc} \leq V_{max}$     $I_t$  or  $I_{sc} \leq I_{max}$     $P_o \leq P_i$   
 $C_a \geq C_i + C_{cable}$   
 $L_a \geq L_i + L_{cable}$   
 $V_t, V_{oc}, I_t, I_{sc}, P_o, C_a$  and  $L_a$  are parameters of barrier.

F100201\_1.EPS

#### WARNING

- In any safety barrier used output current must be limited by a resistor 'R' such that  $I_{sc}=V_{oc}/R$ .
- Any Single FM Approved Barrier of multiple barriers FM Approved for this configuration who's parameters meet the above installation requirements.
- Input voltage of the safety barrier must be less than  $250V_{rms}/V_{dc}$ .
- Installation should be in accordance with National Electrical Code, ANSI /NFPA70.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from FM.

#### Nonincendive (and WARNING)



Non-incendive field wire parameters of vortex flowmeter (DY) and vortex flow converter (DYA).

$V_{max}=30V$	$I_{max}=165mA$	$P_i=0.9W$
$C_i=12nF$	$L_i=0.15mH$	

Installation requirement between flowmeter, converter and general purpose equipment.

$V_t$  or  $V_{oc} \leq V_{max}$     $I_t$  or  $I_{sc} \leq I_{max}$     $P_o \leq P_i$   
 $C_a \geq C_i + C_{cable}$     $L_a \geq L_i + L_{cable}$   
 $V_t, V_{oc}, I_t, I_{sc}, P_o, C_a$  and  $L_a$  are nonincendive field wire parameters of general purpose equipment.

F100201\_2.EPS

#### WARNING

- The general purpose equipment must be FM approved with Nonincendive field wiring parameter which meet the above installation requirements.
- Installation should be in accordance with National Electric Code, ANSI/NFPA70.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from FM.

## 10.3 SAA



### WARNING

Only trained persons use this instrument in industrial locations.

### 10.3.1 Technical Data

#### • Flameproof

Applicable Standard: AS 2380.1-1989, AS2380.2-1991,  
AS1939-1990

Certificate : AUS Ex 3808X

Type of Protection : Exd IIC T6...T1, IP67

Ambient Temperature : -29 to +60°C  
(Integral type flowmeter and  
Remote type flowmeter)  
-40 to +60°C

(Remote type converter)  
Max. Process Temp. : T6; 85°C, T5; 100°C,  
T4: 135°C, T3; 200°C,  
T2 (\*); 300°C, T1 (\*); 450°C  
(\*: Use /HT version above  
260°C)

Electrical Connection : ANSI 1/2 NPT female,  
ISO M20 X 1.5 female

#### • Intrinsically Safe Type n

Applicable Standard: AS 2380.1-1989, AS2380.7-1987,  
AS2380.9-1991

Certificate : AUS Ex 2611X

Type of Protection: Ex ia IIC T4 IP67 (Integral Type  
Flowmeter, Remote Type Flowmeter and  
Remote Type Converter)

Hazardous Area: Class I, Zone 0

Maximum Input Voltage (Ui)=30Vdc

Maximum Input Current (Ii)=165mAdc

Maximum Input Power (Pi)=0.9W

Internal Capacitance (Ci)=37nF

Internal Inductance (Li)=0mH

Ambient Temperature: -20 to +60°C

Type of Protection: Ex n IIC T4 IP67 (Integral Type  
Flowmeter, Remote Type Flowmeter and  
Remote Type Converter)

Hazardous Area: Class I, Zone 2

Maximum Input Voltage (Ui)=30Vdc

Ambient Temperature: -20°C to +80°C

Electrical Connection : ANSI 1/2 NPT female, ISO M20X1.5  
female.

### 10.3.2 Installation



### WARNING

- All wiring shall comply with local installation requirements and local electrical code.
- Use the suitable heat-resisting cables for the digital YEW FLO Series Vortex Flowmeter when the process temperature exceeds +200°C.
- In hazardous locations, the cable entry devices shall be certified flame proof type, suitable for the conditions of use and correctly installed.
- Unused apertures shall be closed with suitable flameproof certified blanking elements.

### 10.3.3 Operation



### WARNING

- Open circuit before opening the covers.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

### 10.3.4 Maintenance and Repair



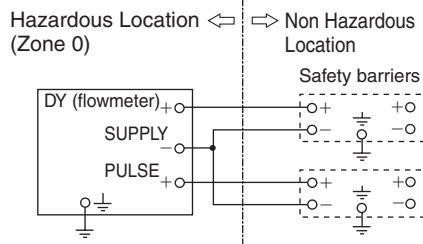
### WARNING

- The instrument modification or parts replacements by other than authorized representative of Yokogawa Electric Corporation are prohibited and will void the certification.

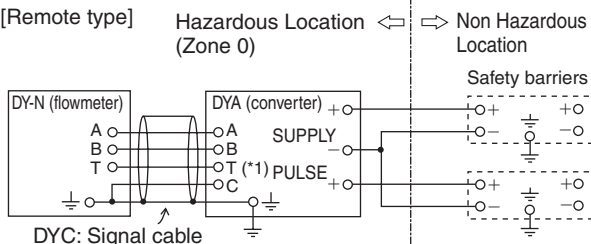
### 10.3.5 Installation Diagram

#### Intrinsically Safe

[Integral type]



[Remote type]



(\*) Wire for T terminal  
 With temperature sensor type : installed  
 Without temperature sensor type: not installed

Electrical parameters:

$U_i=30V$        $I_i=165mA$        $P_i=0.9W$   
 $C_i=37nF$        $L_i=0mH$

Installation Requirements between Flowmeter, Converter and Safety Barriers:

$U_o \leq U_i$     $I_o \leq I_i$     $P_o \leq P_i$     $C_o \geq C_i + C_{cable}$   
 $L_o \geq L_i + L_{cable}$

$U_o$ ,  $I_o$ ,  $C_o$ , and  $L_o$  are parameters of safety barrier.  
 $C_{cable}$  and  $L_{cable}$  are the maximum allowable cable parameters.

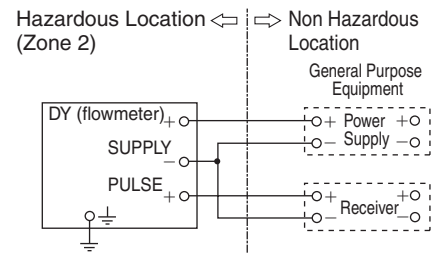
F100301\_1.EPS

#### ! WARNING

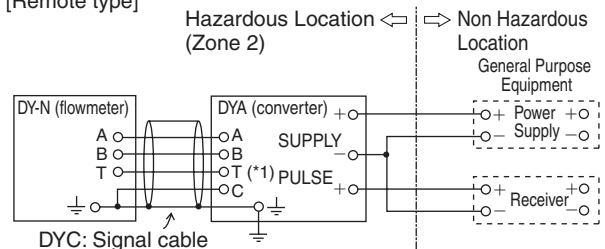
- The safety barrier must be SAA certified.
- Input voltage of the safety barrier must be less than 250Vrms/Vdc.
- In any safety barriers used the output current must be limited by a resistor 'R' such that  $I_o=U_o/R$ .

#### Type "n"

[Integral type]



[Remote type]



(\*) Wire for T terminal  
 With temperature sensor type : installed  
 Without temperature sensor type: not installed

F100301\_2.EPS

#### ! WARNING

Output voltage of power supply must not exceed 30Vdc and will void the certification.

### 10.3.6 Data Plate

#### Intrinsically safe and Type "n"

#### ! WARNING

- The specifications of Intrinsically safe type and Type n are described (engraved) on these data plates. For use of SAA, select a specification either Intrinsically safe type (Ex ia) or Type n (Ex n), then **erase unnecessary specification at the customer side**. Once a specification has been selected, never it can be changed again. (ex. Never use the flowmeter as Type n if it has selected Intrinsically safe type firstly.)

## 10.4 CSA

### 10.4.1 Technical Data

**• Explosion Proof**

Applicable Standard: C22.1-98, C22.2 No.0-M1991, C22.2 No.4-04, C22.2 No.0.5-1982, C22.2 No. 25-1966, C22.2 No. 30-M1986, C22.2 No. 94-M1991, C22.2 No. 142-M1987, C22.2 No. 61010-1-04, ANSI/ISA-12.27.01-2003

Certificate : 1166201

Type of Protection: Explosionproof for Class I, B, C and D; Class II, Groups E, F and G; Class III.

For Class I, Division 2 location:

“FACTORY SEALED, CONDUIT SEAL NOT REQUIRED.”

Enclosure : Type 4X

(Integral Type Flowmeter and Remote Type Flowmeter)

Temperature Code	Ambient Temperature	Process Temperature
T6	60°C	≅85°C
T5	60°C	≅100°C
T4	60°C	≅135°C
T3	60°C	≅200°C
T2	60°C	≅300°C
T1	60°C	≅450°C

T100401\_1.EPS

Temperature Code: T6 (Remote Type Converter)

Ambient Temperature: -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)  
-40 to +60°C (Remote Type Converter)

Power Supply: 42Vdc max. (Integral Type Flowmeter and Remote Type Converter)

Output Supply (Integral Type Flowmeter):

Current Output; 4 to 20mAdc  
Pulse Output; on=2Vdc, 200mA  
Off=42Vdc, 4mA

Output Signal (Remote Type Flowmeter):

Output Signal; 30Vp-p, 100μAp-p

Input/Output signal (Remote Type Converter):

CURRENT Output; 4 to 20mAdc  
Pulse; On=2Vdc, 20mA  
Off=42Vdc, 4mA

Input Signal; 30Vp-p, 100μAp-p

Maximum Working Pressure: 16MPa (DY015 to DY200)  
5MPa (DY200 and DY300)

Electrical Connection: ANSI 1/2 female(Special)

**• Intrinsically Safe**

Applicable Standard: C22.2 No. 0.4-2004, C22.2 No. 157-M1987, C22.2 No. 213-M1987, C22.2 No. 1010.1-92, CAN/CSA-E60079-0:02, CAN/CSA-E60079-11:02, CAN/CSA-E60079-15:02, ANSI/ISA-12.27.01-2003

Certificate : 1198227

Type of Protection: Ex ia IIC T4...T1 and Ex nC IIC T4...T1 (Integral Type Flowmeter and Remote Type Flowmeter)  
Ex ia IIC T4 and Ex nC IIC T4 (Remote Type Converter)

(Integral Type Flowmeter and Remote Type Flowmeter)

Temperature Code	Ambient Temperature	Process Temperature
T4	60°C	≅135°C
T3	60°C	≅200°C
T2	60°C	≅300°C
T1	60°C	≅450°C

T100401\_2.EPS

Ambient Temperature: -29 to +60°C (Integral Type Flowmeter and Remote Type Flowmeter)  
-40 to +60°C (Remote Type Converter)

Degree of Protection of Enclosure: IP67

Electrical Parameters: Ui=30Vdc, Ii=165mAdc, Pi=0.9W  
Ci=12nF, Li=0.15mH

Electrical Connection: ANSI 1/2 NPT female

Type of Protection: Intrinsically Safe for Class I,II,III, Div.1, Groups A,B,C,D,E,F and G, Non- incendive for Class I,II, DIV.2, Groups A,B,C,D,E,F and G, Class III, Div.1

(Integral Type Flowmeter and Remote Type Flowmeter)

Temperature Code	Ambient Temperature	Process Temperature
T4	60°C	≅135°C
T3	60°C	≅200°C
T2	60°C	≅300°C
T1	60°C	≅450°C

T100402.EPS

Temperature Code: T4 (Remote Type Converter)

Ambient Temperature: -40 to 60°C

Enclosure: Type 4X

Electrical Parameters: Vmax=30Vdc, Imax=165mAdc, Pmax=0.9W, Ci=12nF, Li=0.15mH



10.4.2 Wiring

- Explosion proof



**WARNING**

- All wiring shall comply with Canadian Electrical Code Part I and Local Electrical Codes.
- In Hazardous locations, wiring shall be in conduit as shown in the figure.
- A SEAL SHALL BE INSTALLED WITHIN 50cm OF THE ENCLOSURE.
- When the equipment is installed in Division 2, "FACTORY SEALED, CONDUIT SEAL NOT REQUIRED".

10.4.3 Operation

- Explosion proof



**WARNING**

- Note a warning label worded as follows.  
Warning: OPEN CIRCUIT BEFORE REMOVING COVER.
- Take care not to generate mechanical spark when access to the instrument and peripheral devices in hazardous locations.

10.4.4 Maintenance and Repair

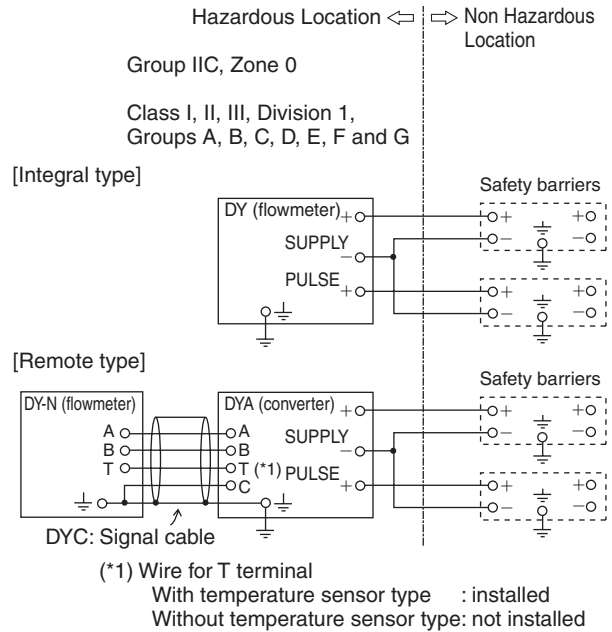


**WARNING**

- The instrument modification or part replacements by other than authorized representatives of Yokogawa Electric Corporation are prohibited and will void CSA Certification.

10.4.5 Installation Diagram Intrinsically Safe (and Note)

Intrinsically safe



Electrical parameters of vortex flowmeter (DY) and vortex flow converter (DYA).

$U_i (V_{max})=30\text{ V}$     $I_i (I_{max})=165\text{ mA}$     $P_i (P_{max})=0.9\text{ W}$   
 $C_i=12\text{ nF}$     $L_i=0.15\text{ mH}$

Installation requirements between flowmeter, converter and Safety Barrier

$U_o \leq U_i$     $I_o \leq I_i$     $P_o \leq P_i$     $C_o \geq C_i + C_{cable}$   
 $L_o \geq L_i + L_{cable}$   
 $V_{oc} \leq V_{max}$     $I_{sc} \geq I_{max}$     $C_a \geq C_i + C_{cable}$   
 $L_a \geq L_i + L_{cable}$

$U_o, I_o, P_o, C_o, L_o, V_{oc}, I_{sc}, C_a$  and  $L_a$  are parameters of barrier.

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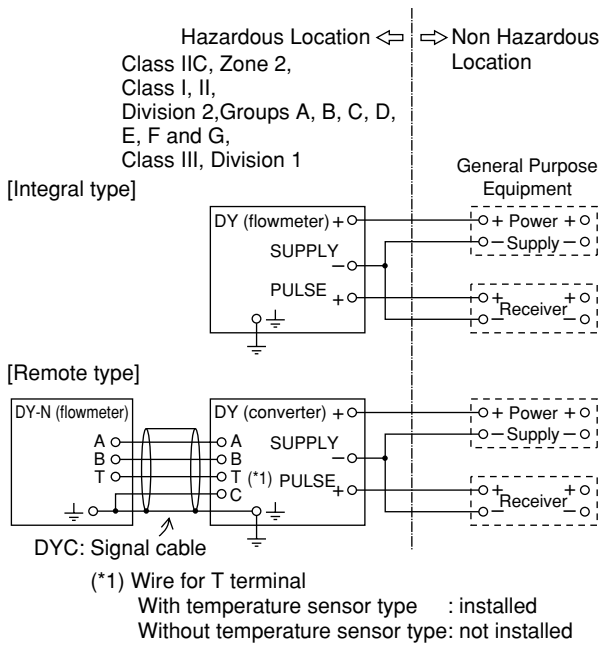


**WARNING**

- In any safety barrier used output current must be limited by a resistor 'R' such that  $I_o = U_o/R$  or  $I_{sc} = V_{oc}/R$ .
- The safety barrier must be CSA certified.
- Input voltage of the safety barrier must be less than 250Vrms/Vdc.
- Installation should be in accordance with Canadian Electrical Code Part I.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from CSA.



Type “n” and Non-incendive



Non-incendive field wire parameters of vortex flowmeter (DY) and vortex flow converter (DYA).  
 $U_i (V_{max})=30$      $I_i (I_{max})=165mA$      $P_i (P_{max})=0.9W$   
 $C_i=12nF$      $L_i=0.15mH$

Installation requirement between flowmeter, converter and general purpose equipment.  
 $U_o \leq U_i$      $I_o \leq I_i$      $P_o \leq P_i$      $C_o \geq C_i + C_{cable}$   
 $L_o \geq L_i + L_{cable}$   
 $V_{oc} \leq V_{max}$      $I_{sc} \leq I_{max}$      $C_a \geq C_i + C_{cable}$   
 $L_a \geq L_i + L_{cable}$

$U_o, I_o, P_o, C_o, V_{oc}, I_{sc}, C_a$  and  $L_a$  are nonincendive field wire parameters of general purpose equipment.  
F100401\_2.EPS

**WARNING**

- The general purpose equipment must be CSA certified as the equipment which have type n or non-incendive field wire parameters.
- Installation should be in accordance with Canadian Electrical Code Part I.
- Dust-tight conduit seal must be used when installed in class II and III environments.
- Do not alter drawing without authorization from CSA.

10.4.6 Dual Seal (Option: /CF11, /CS11)

Dual Seal:  
 Certified by CSA to the requirement of ANSI/ISA 12.27.01  
 No additional sealing required.  
 Primary seal failure annunciation: at the O-ring seal portion between shedder bar and amplifier housing.

### 10.5 TIIS

Certificate:

Model	Shedder bar Material	Integral Type Flowmeter		Remote Type Detector	Shedder bar Material	Integral Type Flowmeter		Remote Type Detector
		N (None Indicator)	D (With Indicator)	N (None Indicator)		N (None Indicator)	D (With Indicator)	N (None Indicator)
DY015 DY025/R1 DY040/R2	L	TC14901	TC14912	TC14923	-	-	-	-
	X	TC18903	TC18914	TC18925	-	-	-	-
DY025 DY040/R1 DY050/R2	L	TC14902	TC14913	TC14924	E	TC19504	TC19513	TC19522
	X	TC18904	TC18915	TC18926	-	-	-	-
DY040 DY050/R1 DY080/R2	L	TC14903	TC14914	TC14925	E	TC19505	TC19514	TC19523
	X	TC18905	TC18916	TC18927	-	-	-	-
DY050 DY080/R1 DY100/R2	L	TC14904	TC14915	TC14926	E	TC19506	TC19515	TC19524
	X	TC18906	TC18917	TC18928	-	-	-	-
DY080 DY100/R1 DY150/R2	L	TC14905	TC14916	TC14927	E	TC19507	TC19516	TC19525
	X	TC18907	TC18918	TC18929	-	-	-	-
DY100 DY150/R1 DY200/R2	L	TC14906	TC14917	TC14928	E	TC19508	TC19517	TC19526
	X	TC18908	TC18919	TC18930	-	-	-	-
DY150 DY200/R1	L	TC14907	TC14918	TC14929				
	X	TC18909	TC18920	TC18931				
DY200	L	TC14908	TC14919	TC14930				
	X	TC18910	TC18921	TC18932				
DY250	L	TC14909	TC14920	TC14931				
DY300	L	TC14910	TC14921	TC14932				
Model	Shedder bar Material	Remote Type Converter						
		N (None Indicator)	D (With Indicator)					
DYA		TC14934	TC14935					

T100403.EPS

	Integral Type Flowmeter		Remote Type Flowmeter	
	None Indicator	With Indicator	Detector	Converter
<b>Construction</b>	Ex d IIC T6	←	←	←
	Flame Proof Approval	←	←	←
<b>Amb.Temp</b>	-20°C up to -60°C	←	←	←
<b>Rating</b>	Maximum power supply vortage: DC42V Current Signal: DC4-20mA Pulse Signal: ON : 2V 200mA OFF : 42V 4mA		Output Voltage: 30Vp-p Output Current: 100µ Ap-p	Maximum power supply vortage: DC42V Current Signal: DC4-20mA Pulse Signal: ON : 2V 200mA OFF : 42V 4mA Input Signal: 30V p-p,100µ A p-p Resistance Temp, Sensor Input: Pt1000Ω at 0°C Specified Current: less than 1mA

T100404.EPS

\* In case that ambient temperature exceeds 50 degC, use heat-resistant cables with maximum allowable temperature of 70 degC or above.

# 11. PRESSURE EQUIPMENT DIRECTIVE

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This chapter is described further requirements and notices concerning the PED (Pressure Equipment Directive). The description in this chapter is prior to other description in this User's Manual.

## (1) Technical Data

Type of Equipment: Piping

Type of Fluid: Liquid and Gas

Group of Fluid: 1 and 2

Model	DN(mm)*	PS(MPa)*	PS-DN(MPa-mm)	CATEGORY**
DY015	15	42	630	Article 3,*** Paragraph 3
DY025	25	42	1050	Article 3,*** Paragraph 3
DY040	40	42	1680	II
DY050	50	42	2100	II
DY080	80	42	3360	II
DY100	100	42	4200	II
DY150	150	42	6300	II
DY200	200	42	8400	III
DY250	250	42	10500	III
DY300	300	42	12600	III
DY400	400****	25	10000	III

T110001.EPS

- \* PS: Maximum allowable pressure for Flow Tube  
DN: Nominal size
- \*\* Referred to Table 6 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC
- \*\*\* DY015 and DY025 are not attached CE mark of PED because they do not under CE mark of PED.
- \*\*\*\* Special-order product

## (2) Installation



### WARNING

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- Please tighten the bolts for piping-joint according to the prescribed torque values.
  - Please take measure to protect the flowmeters from forces caused by vibration through piping.
- 

## (3) Operation



### WARNING

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- The temperature and pressure of fluid should be applied under the normal operating condition.
- The ambient temperature should be applied under the normal operating condition.

- Please pay attention to prevent the excessive pressure like water hammer, etc. When water hammer is to be occurred, please take measures to prevent the pressure from exceeding PS(maximum allowable pressure) by setting the safety valve, etc. at the system and the like.
  - When external fire is to be occurred, please take safety measures at the device or system not to influence the flowmeters.
  - Please pay attention not to be abrade the metal pipe, when the fluid to abrade the lining such as slurry and sand are contained.
-

# INSTALLATION AND OPERATING PRECAUTIONS FOR TIIS 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 construc-

tion is of completely enclosed type and its enclosure shall endure explosive pressures in cases where explosive gases or vapours entering the enclosure cause explosion. In addition, the enclosure construction shall be such that flame caused by explosion does not ignite gases or vapours outside the enclosure.

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

### 3. Terminology

#### (1) Enclosure

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

#### (2) Shroud

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

#### (3) Enclosure internal volume

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

#### (4) Path length of joint surface

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

#### (5) Gaps between joint surfaces

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

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

## 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  $-20^{\circ}\text{C}$  to  $+40^{\circ}\text{C}$  (for products certified under Technical Criteria). However, some field-mounted instruments may be certified at an ambient temperature up to  $+60^{\circ}\text{C}$  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 for their electrical connections. For cable wiring, cable glands (cable entry devices for flameproof type) to wiring connections shall be attached. All non-live metal parts such as the enclosure shall be securely grounded. For details, see the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

### (1) Cable Wiring

- For cable wiring, cable glands (cable entry devices for flameproof type) specified or supplied with the apparatus shall be directly attached to the wiring connections to complete sealing of the apparatus.
- Screws that connect cable glands to the apparatus are those for G-type parallel pipe threads (JIS B 0202) with no sealing property. To protect the apparatus from corrosive gases or moisture, apply nonhardening sealant such as liquid gaskets to those threads for waterproofing.
- Specific cables shall be used as recommended by the "USER'S GUIDELINES for Electrical Installations for Explosive Gas Atmospheres in General Industry," published in 1994.

- In necessary, appropriate protective pipes (conduit or flexible pipes), ducts or trays shall be used for preventing the cable run (outside the cable glands) from damage.
- To prevent explosive atmosphere from being propagated 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 is 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.

## 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 Safet

# REVISION RECORD

Title : Model DY Vortex Flowmeter  
 Model DYA Vortex Flow Converter  
 Manual No. : IM 01F06A00-01E

Edition	Date	Page	Revised Item
3rd	Jun. 2002	1-1	1.1 Change Figure 1.1(b).
		2-2	2.2 Change the process temperature range and ambient temperature.
		2-3	2.2 Add Pressure Equipment Directive, Change Figure 2.2.1.
		2-5	2.3 Change Table 2.3.1 "Body" of Cryogenic Version.
		2-6, 2-7	2.4 Change the process temperature range and ambient temperature.
		2-9	2.4 Change the process temperature range.
		2-10	2.4 Change Figure 2.4.1 , 2.4.2.
		4-2	4.2 Add the description of Table 4.1.
		6-1	6.3 Change the contents of parameter lists.
		6-6	6.3 Change a table of parameter list.
		6-10	6.4 Add the description of "B50 A/OUT SELECT".
		7-3	7.2.2 Change a tuning method.
		9-1	9.1.1 Change the process temperature and ambient temperature.
		9-3	9.1.6 Change Data Plate.
		9-4	9.2.1 Change the process temperature and ambient temperature.
		9-5	9.2.5 Correct "WARNING" and Installation Diagram of Non incensive.
		9-6	9.2.6 Change Data Plate.
9-8	9.4.1 Change the process temperature and ambient temperature.		
9-10	9.4.5 Correct the Installation Diagram of Non incensive.		
9-11	9.4.6 Change Data Plate.		
10-1	10 Change the technical data.		
4th	Sep. 2003	2-4	2.3 Add BS1 to 5.
		2-5	Table 2.3.2 Add BS1 to 5.
		2-8, 2-9	2.4 Add Hydrostatic Pressure Test, etc.
		2-11	2.5 Table 2.5.1 Change the value for size 40 mm.
		3-10	3.7.3 Add the description.
		4-1	4.2 Figure 4.2 Add the description.
		4-3	4.4 Figure 4.5 Add the description.
		5-9	5.5 Figure 5.5 Add the description.
5th	Apr. 2004	i	CONTENTS Reconfiguration.
		iv	Add symbol mark, revision.
		vi	Revision.
		1-1	Revision.
		2-1/22	Revision of Specification, Move to Chapter 9.
		3-1/10	Revision, Move to Chapter 2.
		3-9	Revision, Move to Chapter 7.
		3-10	Add IMPORTANT, Revision, Move to Chapter 7.
		4-1/6	Move to Chapter 3.
		4-4/5	Revision, Move to Chapter 3.
		5-1/24	Revision, Move to Chapter 4.
		6-1/17	Revision, Move to Chapter 5.
		7-1/4	Change Chapter name MAINTENANCE to OPERATION.
		9-1/11	Revision, Move to Chapter 10.
		10-1	Move to Chapter 11.
8-5/6	8.3 moves to Chapter 7.		
8-7/8	8.4 moves to Chapter 7.		

REVISION RECORD

Edition	Date	Page	Revised Item
6th	Jan. 2005	5-6 5-8 5-16 9-5 9-8 9-13 9-18/25 10-7 10-8 10-9	Correction. Added a parameter. Added a parameter explanation and corrections. Revision (MS code). Revision (Option Specification). Revision. Revision. Revision. Revision.
7th	July 2005	2-5 7-8 9-3 9-6 10-1/13	Added a "CAUTION" about heat insulating material installation. Revised the formula 7.14.3. Changed the EMC Conformity Standards No.. Deleted DIN64 and DIN100 (Suffix Code: BD5 and BD6). Added Applicable Standard No.and Certificate No. to each Approval body.
8th	Nov. 2005	2-7 3-5 4-21-25 4-24 5-15 5-16 8-2 9-5 9-6 9-7 9-8 9-10 9-11 9-12 9-14 9-19 9-20 9-22 9-23 9-24	Revision: Vertical Installation. Revision: 7. Revision. Revision <K36>. H27: Revision. J10, J20: Revision. Revision. Revision of specification. Revision of specification. Revision of specification. Revision of specification. Table 9.4.3: Revision. Revision of specification. Revision of specification. Table 9.5.1: Revision. Tables: Revision. Tables: Revision. Tables: Revision. Tables: Revision. Revision.
9th	May. 2006	2-2 2-3 3-4 4-9 5-1 5-5 5-13 5-14 7-2 7-3 7-5 Chap.9	Revision. Add a note to "Valve position (T-type pipe exist)" and "Heat - Insulation". Revision: Figure 3.6. Revision: Figure 4.5. Add a "IMPORTANT" to 5.2. Add Data Range to <E20>. Add descriptions to <E20>. Add a "IMPORTANT" to <F52>. Revision figures. Revision figures. Revision figures. Revision, Added optional items, etc.



REVISION RECORD

Edition	Date	Page	Revised Item
10th	Nov. 2006	2-2 4-14 5-13 7-1 7-4 9-5 9-6 9-7 9-8 9-9 9-10 9-11 9-14 9-15 9-16 9-17 9-18 9-27 9-28 9-29/30 10-4 10-13	Add descriptions of /R2. Delete 4.6.2. Delete a note. Add to CAUTION. Add to CAUTION. Revisions. Add /R2. Add /R2. Revisions. Revision. Add /R2. Revisions. Add /R2. Add /R2. Add /R2. Add /R2. Add /R2. Add /R2. Revisions. Revisions. Add /R2. Revision. Revisions.
11th	Aug. 2008	3-3 4-1 4-21 5-2 to 8 5-11 5-13 5-14 6-1 7-4 7-5 7-7, 8 9-11 to 13 9-14, 15 9-16 10-1 to 12	Additions. Additions. Additions. Additions. Additions. Additions. Additions. Revisions of Figure 6.1. Additions of Table 7.1. Revisions of Figure 7.3. Corrections. Additions. Revisions. Corrections. Chap.10 Revisions.

REVISION RECORD

Edition	Date	Page	Revised Item
12th	Mar. 2010	1-1	Figure 1 Revision.
		2-5	2.4 Revision.
		2-7	Table 2.3 Revision.
		3-2	Figure 3.2 Revision.
		3-3	Table 3.1 Revision.
		3-4	Figure 3.5 Revision.
		4-9	Figure 4.4 Revision.
		4-13 to 21	4.6 Revision.
		5-4	D10 Revision.
		5-8	K45 Revision.
		5-12	NOTE Revision.
		5-15	NOTE Revision.
		6-1	NOTE Revision.
		6-3	6.2.1 Revision.
		9-2	9.2 Revision.
		9-5 to 9-6	9.3 Revision.
		9-7 to 9-8	9.4.1 Revision and add an option specification.
		9-9	9.4.2 Revision.
		9-16	Revision.
		9-6 to 9-37	Revision and add /E1 drawings.
		10-11	10.5 Revision.