User's Manual

RXF
Magnetic Flowmeter
Integral Flowmeter
Remote Flowtube
[Hardware Edition]

RXF™ Magnetic Flowmeter

IM 01R21D01-01E-E

vigilantplant.™

YOKOGAWA

IM 01R21D01-01E-E
1st Edition

Contents

1. INTRODUCTION

This instrument has been adjusted at the factory before shipment.

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

NOTE

This manual describes the hardware configuration of integral flowmeter and remote flowtube of the RXF magnetic flowmeters.

For details of the “basic operating procedures”, “parameter description”, “operation via BRAIN terminal (BT200)”, “operation via HART communicator”, and “actual operation” for the RXF integral flowmeter, see the user’s manual of the RXFA14 Remote Converter [Hardware Edition / Software Edition] (IM 01R21C02-01E-E).

Regarding This User’s Manual

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

NOTE

For details of the RXFA11G magnetic flowmeter converter, see the IM 01R21C01-01E-E instruction manual. For details on the RXFA14G magnetic flowmeter converter, see the IM01R21C02-01E-E instruction manual.

Safety and Modification Precautions

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

WARNING

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

CAUTION

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

IMPORTANT

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

NOTE

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

⏚ Protective grounding terminal

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

~ Alternating current

⎓ Direct current

1.1 Using the Magnetic Flowmeter Safely

WARNING

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

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

(3) Operation
- Do not open the cover until the power has been off for at least 10 min. Only expert engineers or skilled personnel are permitted to open the cover.

(4) Maintenance
- Maintenance on the magnetic flowmeter should be performed by expert engineers 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 get dirty, wipe them clean with a soft dry cloth.

(5) European Pressure Equipment Directive (PED)
- When using the instrument as a PED-compliant product, be sure to read Chapter 7 before use.

1.2 Warranty

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

The guarantee will not apply in the following cases:

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

1.3 Combination Remote Converters

IMPORTANT

- The RXF remote flowtube size 15 (0.5 in.) to 1000 mm (40 in.) should be used in combination with one of the following converters:
  - RXFA11 remote converter
  - RXFA14 remote converter up to 400 mm (16 in)

  Contact Yokogawa before using it in combination with converters other than those listed above.
- If the converter combined with the RXF magnetic flowmeter's remote flowtube is changed from the RXFA11 to RXFA14 or vice versa, the meter factor of the remote flowtube must be readjusted according to its flow calibration.

2. HANDLING PRECAUTIONS

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

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

2.1 Checking Model and Specifications

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

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

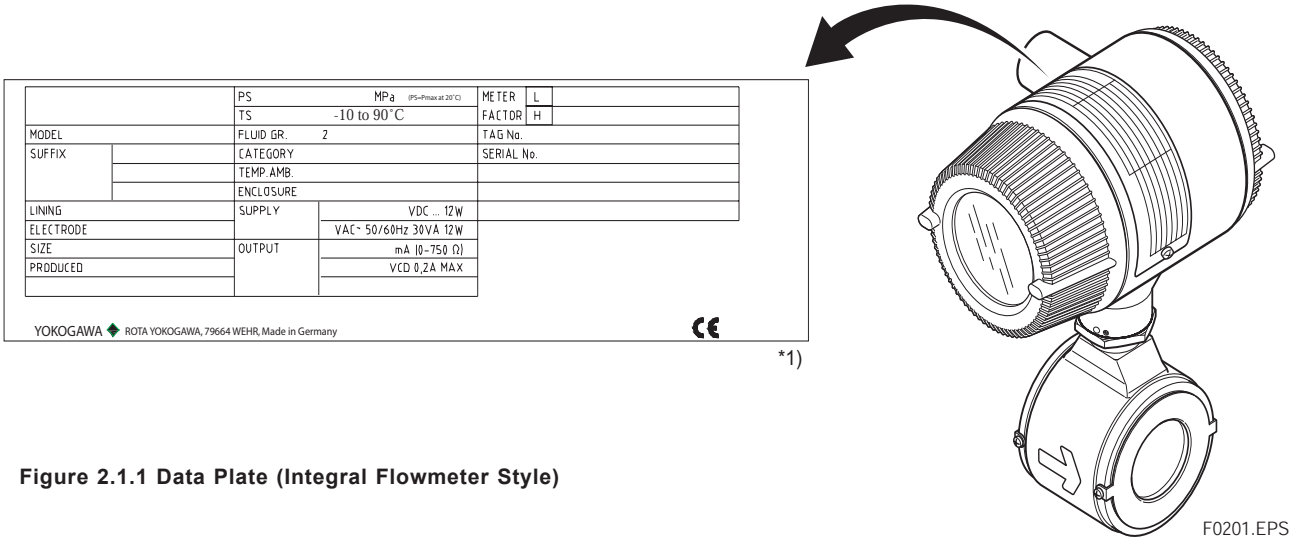

Figure 2.1.1 Data Plate (Integral Flowmeter Style)

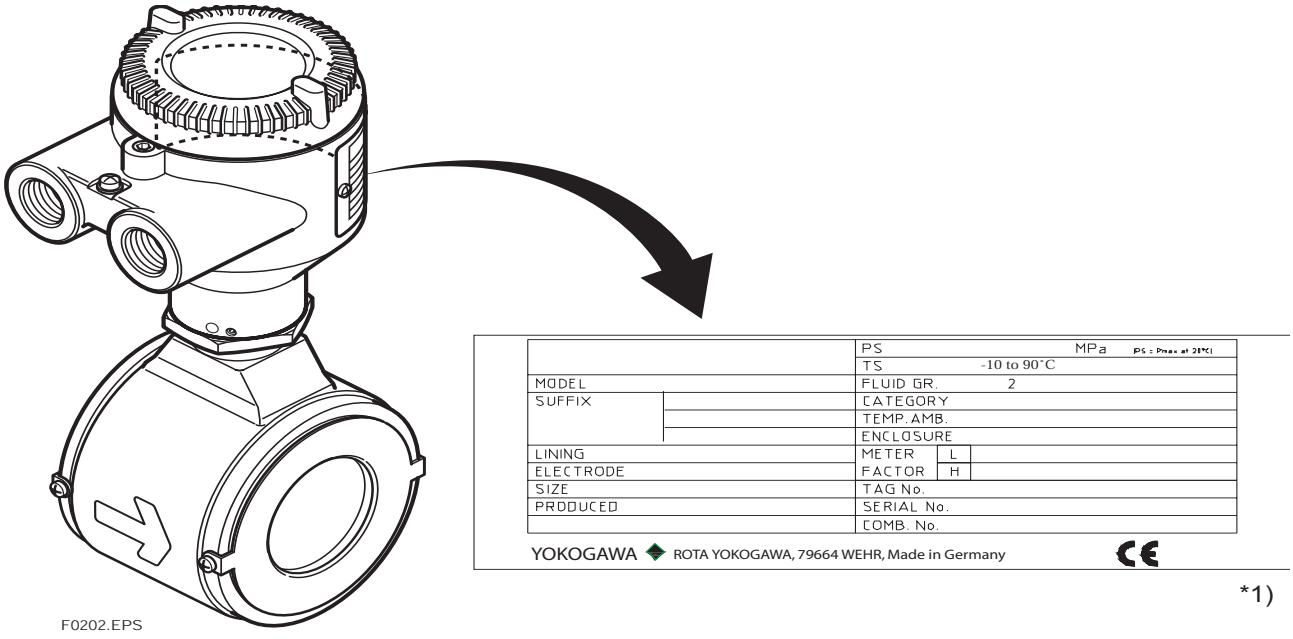

Figure 2.1.2 Data Plate (Remote Flowtube Style)

*1) In case of "special pressure rating" (/Z) or for use in fluid group 1 (/Z) 0038 may be described on the data plate.

In case of sizes 15 to 25 mm (0.5 to 1 in.) 0038 is not described on the data plate.

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2.2 Accessories

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

- Remote Flowtube size 15 to 1000 mm (0.5 to 40 in):
  Hexagonal wrench: 2 piece (one each of 1.5 mm and 3 mm nominal sizes)
- Integral Flowmeter
  Spare fuse (T2.0A, 250 V, T: time-lag fuse): 1pc. Use this spare fuse for this product only.)
  Hexagonal wrench: 2 piece (one each of 1.5 mm and 3 mm nominal sizes)

2.3 Storage Precautions

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

- The instrument should be stored in its original packing condition in the storage location.
- Select a storage location that fulfills the following conditions:
  - A place where it will not be exposed to rain, water and UV radiation also caused by sun light.
  - A place subject to minimal vibrations or shocks
  - Temperature and humidity levels should be as follows:
    Temperature: 0 to 70 °C
    Humidity: 5 to 80 % RH (no condensation)
    The preferred ambient temperature and humidity levels are 25 °C and approximately 65 % RH.
- If the RXF magnetic flowmeter is transferred to the installation site and stored without being installed, its performance may be impaired due to the infiltration of rainwater and so forth. Be sure to install and wire the RXF magnetic flowmeter as soon as possible after transferring it to the installation location.

2.4 Installation Location Precautions

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

- **Ambient Temperature:**
  Avoid installing the instrument in locations with constantly fluctuating temperatures. If the location is subject to radiant heat from the plant, provide heat insulation or improve ventilation.
- **Atmospheric Condition:**
  Avoid installing the instrument in a corrosive atmosphere. In situations where this is unavoidable, consider ways to improve ventilation and to prevent rainwater from entering and being retained in the conduit pipes.
- **Vibrations or Shocks:**
  Avoid installing the instrument in a place subject to shocks or vibrations.

3. INSTALLATION

3.1 Piping Design Precautions

WARNING

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

IMPORTANT

Design piping correctly, referring to the following information to prevent damage to flowtubes and to assure accurate measuring.

NOTE

This chapter describes the remote flowtube as an example. The same attention must be paid to the integral flowmeter.

(1) Location

IMPORTANT

Install the flowmeter in a location where it is not exposed to direct sunlight, and where the ambient temperature is between –40° to 60°C (–40° to 140°F). The minimum ambient temperature is limited by the minimum fluid temperature of the flowtube (the lining). For more information, refer to Chapter 6 “OUTLINE”. The flowmeter may be used in an ambient humidity where the relative humidity ranges from 0 to 100 %. However, avoid long-term continuous operation at relative humidity above 95 %.

(2) Noise Avoidance

IMPORTANT

The flowmeter should be installed apart from electrical motors, transformers, and other power sources in order to avoid interference with the measurement.

(3) Required Lengths of Straight Runs

To maintain accurate measurement, see EN 29104 (ISO 9104) “Measurement of fluid flow in closed conduits” which explains the requirements for upstream piping conditions of magnetic flowmeters.

The piping conditions we recommend to our customers as shown in Figure 3.1.1 are based on JIS B7554 and on our piping condition test data.

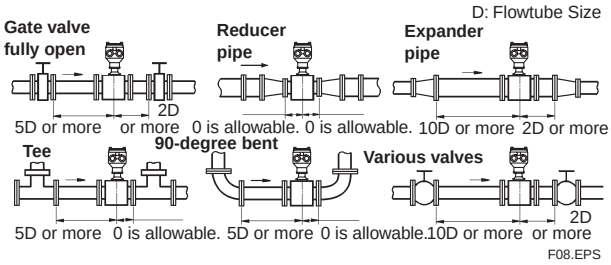

Figure 3.1.1 Required Lengths of Straight Runs

*1: Do not install anything in the vicinity that may interfere with the magnetic field, induced signal voltages, or flow velocity distributions of the flowmeter.

*2: A straight run may not be required on the downstream side of the flowmeter. However, if a downstream valve or other fitting causes irregularity or deviation in flows, provide a straight run of 2D to 3D on the downstream side.

*3: It is highly recommended to mount valves on the downstream side so that deviated flows do not occur in the flowtube and to avoid startup from an empty condition.

IMPORTANT

Do not install the flowmeter where fluid conductivity tends to become unstable. If chemicals are fed near the upstream side of a magnetic flowmeter, they may affect the flow-rate’s indications. To avoid this situation, it is recommended that the chemical feed ports are located on the downstream side of the flowmeter. If it is unavoidable that chemicals must be fed on the upstream side, provide a sufficient length of straight run (approximately 50D) to ensure the proper mixture of fluids.

(4) Maintaining Stable Fluid Conductivity

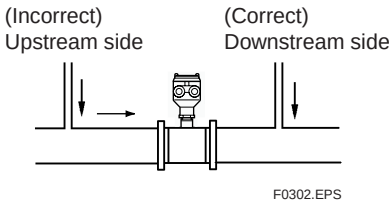

Figure 3.1.2 Chemical Injection

(5) Precautions for Use of Liquid Sealing Compounds

IMPORTANT

Take care in using liquid sealing compounds on the piping, as it may have a negative influence on the flow indications by flowing out and covering the surfaces of an electrode or grounding ring. In particular, take care if a liquid sealing compound is used in the case of vertical piping.

(6) Service Area

Select locations where there is adequate space to service installing, wiring, overhauling, etc.

(7) Bypass Line

It is recommended to install a bypass line to facilitate maintenance and zero adjustment.

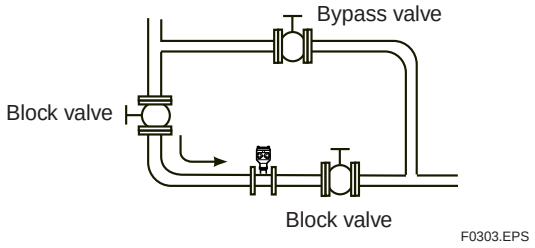

Figure 3.1.3 Bypass Line

(8) Supporting the Flowmeter

CAUTION

Do not secure the flowmeter separately to prevent the vibrations, shocks, and expansion and contraction forces of the piping from affecting it. Fix the pipes first, then support the flowmeter with the pipes.

(9) Mounting Positions

• Pipes must be fully filled with liquids

IMPORTANT

It is essential that pipes remain fully filled at all times, otherwise flow rate indications may be affected and measurement errors may be caused.

Piping shall be designed so as to maintain the interior of the flowtube filled with fluids.

Vertical mounting is effective in such cases as when fluids tend to separate or solid matter may be precipitated. When choosing vertical mounting, direct the fluids from the bottom to the top to ensure that the pipes remain fully filled.

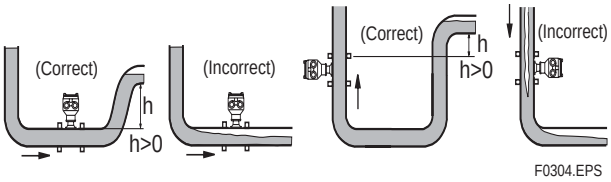

Figure 3.1.4 Mounting Positions

• Avoid air bubbles

IMPORTANT

If air bubbles enter a measurement pipe, flow rate indications may be affected and measurement errors may be caused.

In cases where fluids contain air bubbles, piping must be designed to prevent them from accumulating in the measurement pipe of a flowtube.

If a valve exists near the flowmeter, try to mount the flowmeter on the valve's upstream side in order to prevent a possible reduction of pressure inside the pipe, thereby avoiding the possibility of air bubbles.

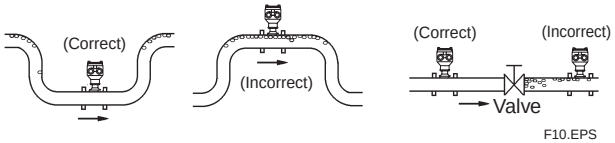

Figure 3.1.5 Avoiding Air Bubbles

• **Mounting orientation**

IMPORTANT

If electrodes are perpendicular to the ground, air bubbles near the top or precipitates at the bottom may cause measurement errors. Ensure that the terminal box of a remote flowtube and converter of an integral flowmeter are mounted above the piping to prevent water from seeping into them.

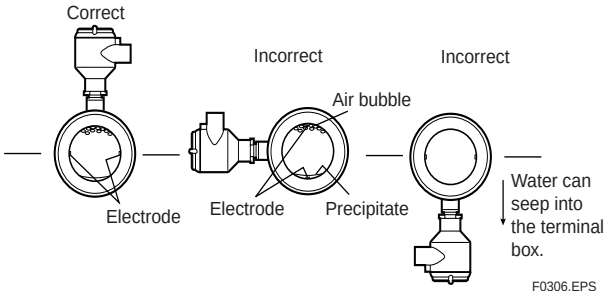

Figure 3.1.6 Mounting Orientation

3.2 Handling Precautions

WARNING

The magnetic flowmeter is a heavy instrument. Be careful that no damage is caused to personnel through accidentally dropping it, or by exerting excessive force on the magnetic flowmeter. When moving the magnetic flowmeter, always use a trolley and have at least two people carry it.

NOTE

This chapter describes the remote flowtube as an example. The same attention must be paid to the integral flowmeter.

3.2.1 General Precautions

(1) Precaution during Transportation

The magnetic flowmeter is packed tightly. When it is unpacked, pay attention to prevent damaging the flowmeter. To prevent accidents while it is transported to the installing location, transport it to the site in its original packing.

CAUTION

In order to lift a magnetic flowmeter that is fitted with eyebolts, proceed as in Figure 3.2.1. Never lift it using a bar passed through the flowtube as this damages the liner severely.

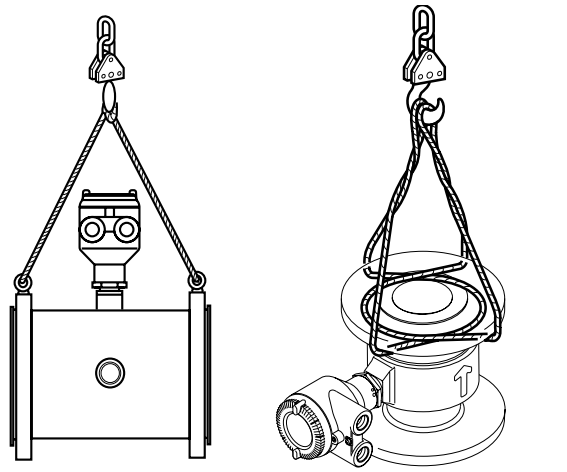

Figure 3.2.1 Lifting Flowmeter

(2) Avoiding Shocks from Impact

CAUTION

Take care not to drop the flowmeter or expose it to excessive shock. In particular, be careful not to subject the flange surface to shock. This may lead to liner damage which will result in inaccurate readings.

(3) Flange Protection Covers

IMPORTANT

Keep the protective covering (i.e. the corrugated cardboard or other cushioning material) in place over the flange except when mounting the flowmeter to the pipe.

(4) Terminal Box Cover

IMPORTANT

As it is possible that the insulation will deteriorate, do not open the terminal box cover until it is time to wire it.

(5) Long-term Non-use

IMPORTANT

It is not recommended to leave the flowmeter unused for a long term after installation. If this situation is unavoidable, take care of the flowmeter by observing the following.

• Confirmation of sealing conditions for the flowmeter

Confirm that the terminal box screw and wiring ports are well sealed. Equip the conduit piping with drain plugs or waterproof glands to prevent moisture or water from penetrating into the flowmeter through the conduit.

• Regular inspections

Inspect the sealing conditions as mentioned above, and the inside of the terminal box at least once a year. Also, due to rain, etc. when it is suspected that water may have penetrated into the inside flowmeter perform supplementary inspections.

3.2.2 Flowmeter Piping

CAUTION

Misaligned or slanted piping can lead to leakage and damage to the flanges.

(1) Correct any misaligned or slanted piping, and any gaps that may exist between mounting flanges before installing the flowmeter (refer to Figure 3.2.2).

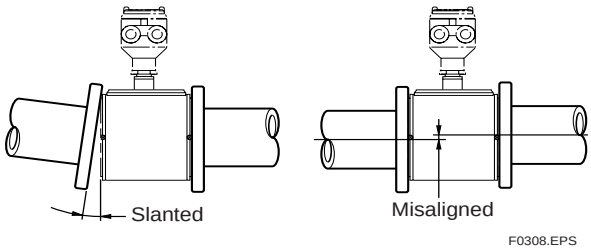

Figure 3.2.2 Slanted and Misaligned Flowmeter Piping

(2) Inside a newly installed pipeline, there may be some unusual substances such as residue from welding or wood chips. Remove them by flushing the piping before mounting the flowmeter. This prevents the lining from being damaged, as well as the occurrence of erroneous measured signals resulting from foreign substances passing through the flowtube during measurement.

3.3 Mounting Procedures

NOTE

The tightening torque value to which gaskets must be tightened varies depending on the type and external dimensions of the lining and the gasket. In this section, the tables indicating tightening torque values include the corresponding gasket types.

IMPORTANT

Use bolts and nuts in compliance with the flange ratings. Be sure to choose a gasket with an inner diameter that does not protrude inside the piping. If the inner diameter of the gasket is too large, however, fluid leakage may result.

(1) Mounting Direction

Mount the flowmeter so that the flow direction of the fluid to be measured is in line with the direction of the arrow mark on the flowmeter.

IMPORTANT

If it is impossible to match the direction of the arrow mark, the direction of the electrical connection can be changed. Refer to Section 5.1 to do this properly.
In case the fluid being measured flows against the arrow direction, refer to the parameter **J20: Flow Direction** in the user's manual of the RXFA11 Magnetic Flowmeter Remote Converter (IM 01R21C01-01E-E) or the RXFA14 Magnetic Flowmeter Remote Converter/RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

(2) Tightening Nuts

Tighten the bolts according to the torque values for the metal piping in Table 3.3.2. For PVC piping, use rubber gaskets and tighten the nuts to the torque values for the PVC piping in Table 3.3.1.

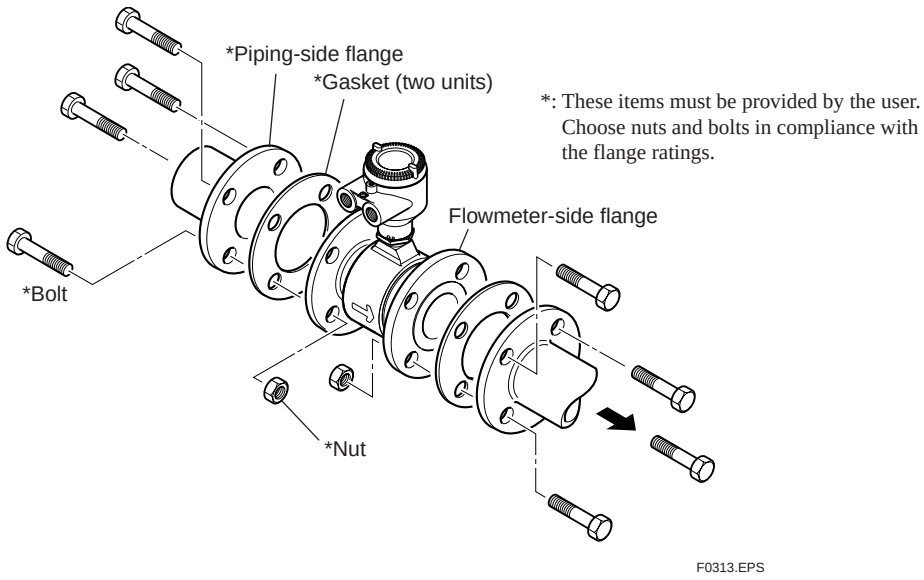

Figure 3.3.1 Mounting Procedure for Flange Style (size: 15 mm (0.5 in.) to 1000 mm (40 in.))

Table 3.3.1 Flange Style Tightening Torque Values for PVC Piping

Tightening torque values for Hard rubber lining type (N m / {kgf cm} / [in lbf])			
Gasket types for user's flange	Fluororubber gasket, chloroprene rubber gasket, or the equivalent in hardness		
Flange ratings / Size mm (in.)	DIN PN10 and ANSI Class 150,	DIN PN16 and ANSI Class 300,	DIN PN40
15 (0.5)	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]	0.9 to 1.6 / {9.177 to 16.32} / [7.966 to 14.16]
25 (1.0)	2.7 to 4.5 / {27.53 to 45.89} / [23.9 to 39.83]	2.7 to 4.5 / {27.53 to 45.89} / [23.9 to 39.83]	2.3 to 3.9 / {23.45 to 39.77} / [20.36 to 34.52]
32 (1.25)	3.0 to 4.9 / {30.59 to 49.97} / [26.55 to 43.37]	3.0 to 5.0 / {30.59 to 50.99} / [26.55 to 44.25]	2.9 to 4.9 / {29.57 to 49.97} / [25.67 to 43.37]
40 (1.5)	4.5 to 7.6 / {45.89 to 77.5} / [39.83 to 67.26]	4.7 to 7.8 / {47.93 to 79.54} / [41.6 to 69.03]	4.4 to 7.4 / {44.87 to 75.46} / [38.94 to 65.49]
50 (2.0)	5.9 to 9.8 / {60.16 to 99.93} / [52.22 to 86.74]	2.9 to 4.8 / {29.57 to 48.95 } / [25.67 to 42.48]	5.5 to 9.2 / {56.08 to 93.81 } / [48.68 to 81.43]
65 (2.5)	9.0 to 15.0 / {91.77 to 153.0} / [79.66 to 132.8]	4.4 to 7.3 / {44.87 to 74.44} / [38.94 to 64.61]	—
80 (3.0)	4.9 to 8.1 / {49.97 to 82.6} / [43.37 to 71.69]	5.5 to 9.1 / {56.08 to 92.79} / [48.68 to 80.54]	—
100 (4.0)	6.7 to 11.2 / {68.32 to 114.2} / [59.3 to 99.13]	7.5 to 12.6 / {76.48 to 128.5} / [66.38 to 111.5]	—
125 (5.0)	9.9 to 16.5 / {101.0 to 168.3} / [87.62 to 146.0]	10.7 to 17.8 / {109.1 to 181.5} / [94.7 to 157.5]	—
150 (6.0)	14.4 to 24.0 / {146.8 to 244.7} / [127.4 to 212.4]	9.8 to 16.3 / {99.93 to 166.2} / [86.74 to 144.3]	—
200 (8.0)	13.4 to 22.3 / {136.6 to 227.4} / [118.6 to 197.4]	14.6 to 24.3 / {148.9 to 247.8} / [129.2 to 215.1]	—

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Table 3.3.2 Flange Style Tightening Torque Values for Metal Piping and Permeable Fluids

Tightening torque values for Hard rubber lining type (N m / {kgf cm} / [in lbf])			
Gasket types for user's flange	Non-asbestos gasket, PTFE-sheathed non-asbestos gasket, or the equivalent in hardness		
Flange ratings / Size mm (in.)	DIN PN10 and ANSI Class 150,	DIN PN16 and ANSI Class 300,	DIN PN40
15 (0.5)	6.9 to 7.9 / {70.36 to 80.56} / [61.07 to 69.92]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]	7.0 to 8.1 / {71.38 to 82.6} / [61.95 to 71.69]
25 (1.0)	19.6 to 22.5 / {199.9 to 229.4} / [173.5 to 199.1]	19.7 to 22.7 / {200.9 to 231.5} / [174.4 to 200.9]	17.5 to 20.1 / {178.5 to 205.0} / [154.9 to 177.9]
32 (1.25)	21.5 to 24.7 / {219.2 to 251.9} / [190.3 to 218.6]	21.6 to 24.8 / {220.3 to 252.9} / [191.2 to 219.5]	22.1 to 25.4 / {225.4 to 259.0} / [195.6 to 224.8]
40 (1.5)	32.5 to 37.4 / {331.4 to 381.4} / [287.6 to 331.0]	32.8 to 37.7 / {334.5 to 384.4} / [290.3 to 333.7]	33.8 to 38.9 / {344.7 to 396.7} / [229.2 to 344.3]
50 (2.0)	41.3 to 47.5 / {421.1 to 484.4} / [365.5 to 420.4]	20.6 to 23.7 / {210.1 to 241.7} / [182.3 to 209.8]	42.2 to 48.5 / {430.3 to 494.6} / [373.5 to 429.3]
65 (2.5)	61.2 to 70.4 / {624.1 to 717.9} / [541.7 to 623.1]	30.5 to 35.1 / {311.0 to 357.9} / [269.9 to 310.7]	—
80 (3.0)	34.2 to 39.3 / {348.7 to 400.7} / [302.7 to 347.8]	38.5 to 44.3 / {392.6 to 451.7} / [340.7 to 392.1]	—
100 (4.0)	45.2 to 52.0 / {460.9 to 530.3} / [400.0 to 460.2]	51.0 to 58.7 / {520.1 to 598.6} / [451.4 to 519.5]	—
125 (5.0)	66.8 to 76.8 / {681.2 to 783.1} / [591.2 to 679.7]	70.8 to 81.4 / {722.0 to 830.0} / [626.6 to 720.4]	—
150 (6.0)	93.9 to 108.8 / {957.5 to 1109} / [831.1 to 962.9]	65.4 to 75.2 / {666.9 to 766.8} / [578.8 to 665.6]	—
200 (8.0)	85.8 to 98.7 / {874.9 to 1006} / [759.4 to 873.6]	91.5 to 105.2 / {933.0 to 1073} / [809.8 to 931.1]	—
250 (10)	207.8 to 239.0 / {2119 to 2437} / [1839 to 2115]	222.9 to 256.3 / {2273 to 2614} / [1973 to 2268]	—
300 (12)	171.0 to 196.7 / {1744 to 2006} / [1513 to 1741]	184.1 to 211.7 / {1877 to 2159} / [1629 to 1874]	—
350 (14)	234.7 to 269.9 / {2393 to 2752} / [2077 to 2389]	261.3 to 300.5 / {2665 to 3064} / [2313 to 2660]	—
400 (16)	320.0 to 368.0 / {3263 to 3753} / [2832 to 3257]	343.2 to 394.7 / {3500 to 4025} / [3038 to 3493]	—

T0316.EPS

4. WIRING

4.1 Wiring the Integral Flowmeter

This section describes the wiring of the integral flowmeter.

WARNING

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

CAUTION

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

4.1.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

CAUTION

- In cases where the ambient temperature exceeds 50 °C (122 °F), use external heat-resistant wiring with a maximum allowable temperature of 70 °C (158 °F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation, e.g. inside the terminal box of the flowmeter.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables may be routed in separate steel conduit tubes or flexible conduit tubes.
- If possible route the power and output signal cables in separate steel conduit tubes, except when the power supply voltage is 24 V and four-core cables are used for wiring. Keep conduits or flexible tubes watertight using sealing tape.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- In case of 24 V power supply version, it comes with a plug. Use this plug to cover the unused wiring port when wiring the instrument with only one, four-core cable.
- Be sure to turn the power off before opening the terminal box cover.
- Before turning the power on, tighten the terminal box cover securely.
- The terminal box cover is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw refer to fig. 4.1.5.
- Be sure to lock the cover by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw refer to fig. 4.1.5.

4.1.2 Power Cable / Output Cable

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

Outer Diameter: 6.5 to 12 mm (0.26 to 0.47 in.),
Nominal Cross Section (Single wire): 0.5 to 2.5mm^2
Nominal Cross Section (Stranded wire):
0.5 to 1.5 mm^2

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

NOTE

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

4.1.3 Wiring Ports

This instrument is of watertight construction as stipulated in JIS C0920-1982. (Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment.)

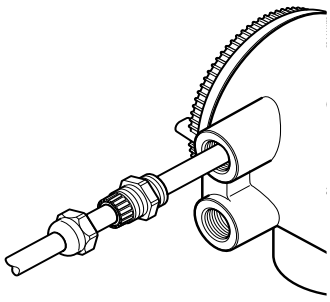
(1) When there are no particular optional specifications

The wiring port is sealed with a plastic gland IP67. Please remove sealing plug from gland entry before wiring. At this time, handle the wiring port in accordance with the JIS C0920-1982 mentioned above.

(2) Wiring using waterproof glands

IMPORTANT

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



F0403.EPS

Figure 4.1.1 Plastic Gland

(3) Conduit Wiring

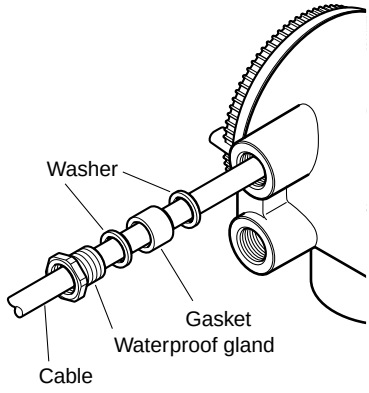


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Figure 4.1.2 Waterproof Gland

For working on the electric wire tubes or the flexible tubes (PF1/2), use the waterproof gland and attach them directly to the wiring port. When mounting the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.1.3. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

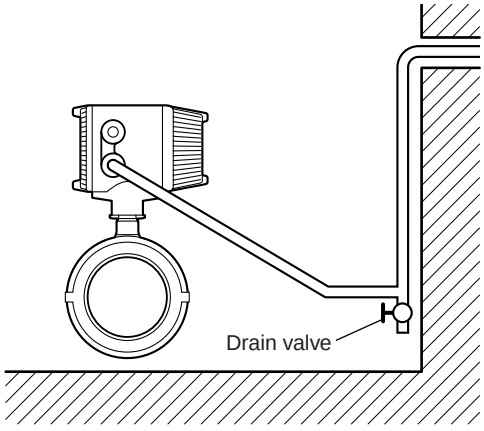

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Figure 4.1.3 Conduit Wiring

4.1.4 Wiring Connections

(1) Removing Cover

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

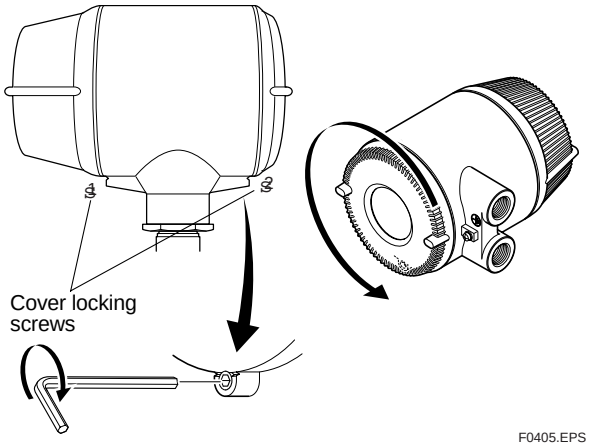

Figure 4.1.4 Removing the Terminal Box Cover

(2) Terminal Configuration

When the cover is removed, the connection terminals will be visible.

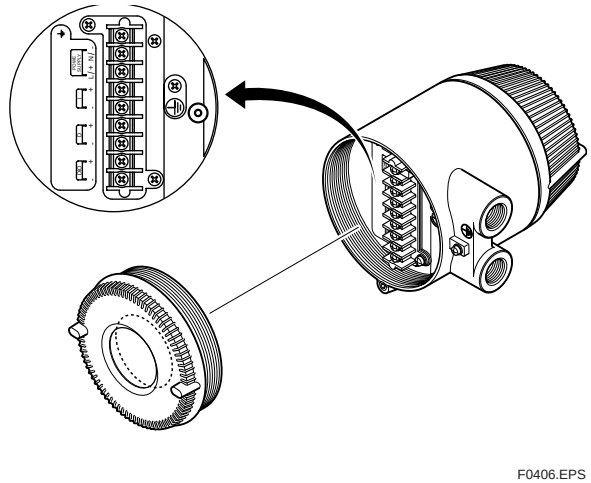

Figure 4.1.5 Terminal Configuration

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

Table 4.1.1 Terminal Symbols

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

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(3) Precautions for Wiring of Power Supply Cables

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

⚠ WARNING

- Ensure that the power supply is OFF in order to prevent electric shocks.
- Ensure the protective grounding terminal is grounded with a grounding resistance of 100 V or less before turning the power on.
- Use insulating sleeve crimp terminals (for 4-mm screws) for the power supply wiring and protective grounding wiring.
- Install an external switch or circuit breaker as a means to turn the powe off (capacitance; 15A, conforming to IEC947-1 and IEC947-3). Locate this switch either near the instrument or in other places facilitating easy operation. Affix a “Power Off Equipment” label to this external switch or circuit breaker.

Wiring Procedure

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

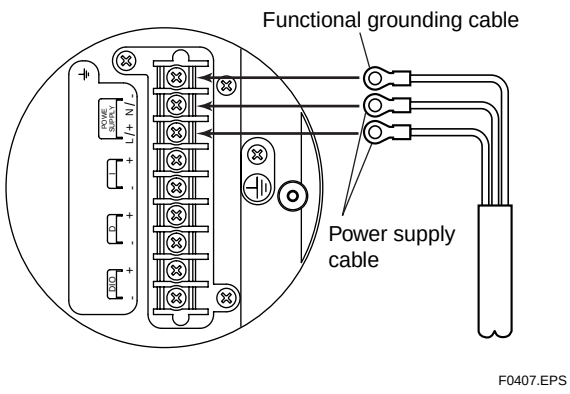


Figure 4.1.6 Electric Cable Wiring

(4) DC Power Connection

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

1) Connecting Power Supply

IMPORTANT

Do not connect power supply with reversed polarities.

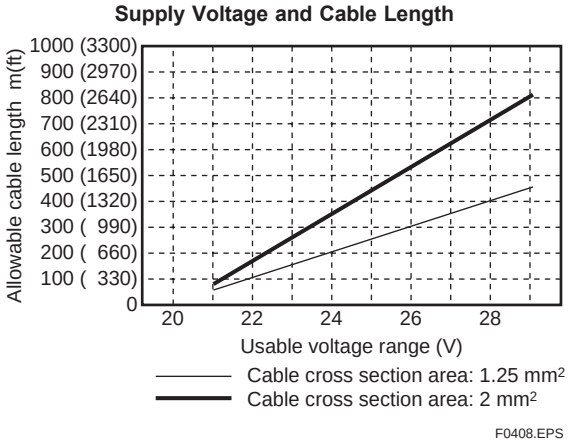
L/+ terminal: connect +

N/– terminal: connect –

2) Required Power Supply Voltages

IMPORTANT

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



3) Setting Power Supply Frequency

IMPORTANT

Set the local power frequency in order to eliminate the effect of induction noise from the power supply.

Refer to “Chapter 6: Parameter Description” in the user’s manual of the RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

Parameter No.: **J30** and **J31**

(5) Grounding

CAUTION

Be sure to connect the protective grounding of the RXF integral flowmeter with a cable of 2mm^2 or larger cross section in order to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.

Connect the grounding wire to the ⏚ mark. The grounding should satisfy Class D requirements (ground resistance, 100 Ω or less).

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

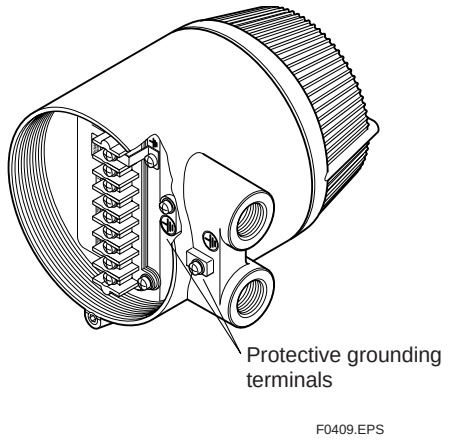


Figure 4.1.7 Protective Grounding Terminal Location

IMPORTANT

Improper grounding can have an adverse effect on the flow measurement. Ensure that the instrument is properly grounded.

IMPORTANT

In situations where a DC power supply is used for converters, set the local commercial power frequency in area where the converter is installed. Set “No” for **J30: Power Synch** and the local commercial power frequency for **J31: Power Frequency**.

The electromotive force of the magnetic flowmeter is very small and it is easily affected by noise, and the reference electric potential is the same as that of the measuring fluid. Therefore, the reference electric potential (terminal potential) of the flowtube and converter also need to be the same as that of the measuring fluid. Moreover, the potential must be the same as the ground. The magnetic flowmeter comes standard without grounding electrodes [RXF□□□□-□□□□1N...], but grounding electrode models are available [RXF□□□□-□□□□1L(H).. Please check your model code].

In case you have no grounding electrode you must provide a connection with the charge of the measured fluid to the protective grounding terminal shown in figure 4.2.12. Without this connection proper function can not be guaranteed.

Additionally be sure to ground also according to Figure 4.1.8.

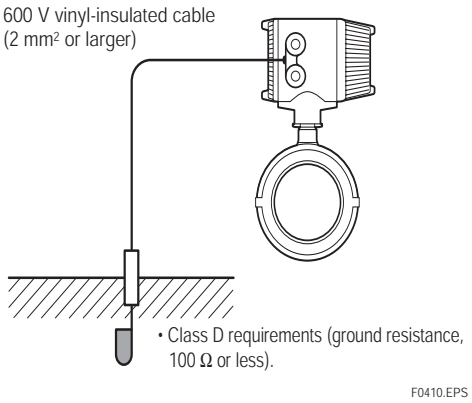


Figure 4.1.8 Grounding

(6) Connecting to External Instruments

WARNING

Before wiring with external instruments, be sure to turn off the magnetic flowmeter and any external instruments.

Connect the RXF integral flowmeter terminal to external instruments, giving attention to the following points.

▪ 4-20 mA DC Output

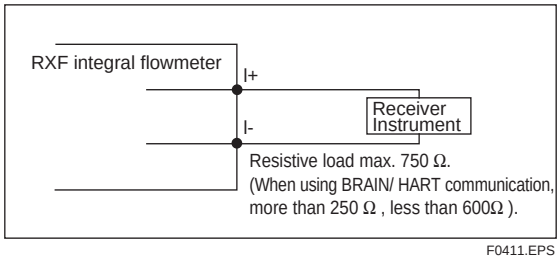


Figure 4.1.9 4-20 mA DC Output Connection

▪ Pulse Output

IMPORTANT

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

NOTE

For pulse output from the DO terminals, parameters B32, B33 and F20 must be set. Refer to “Parameter Description” in the user’s manual of the RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

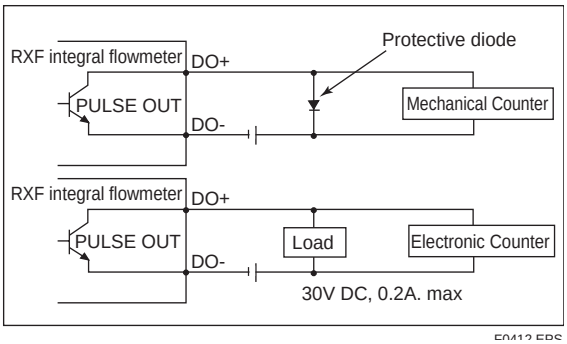


Figure 4.1.10 Pulse Output Connection

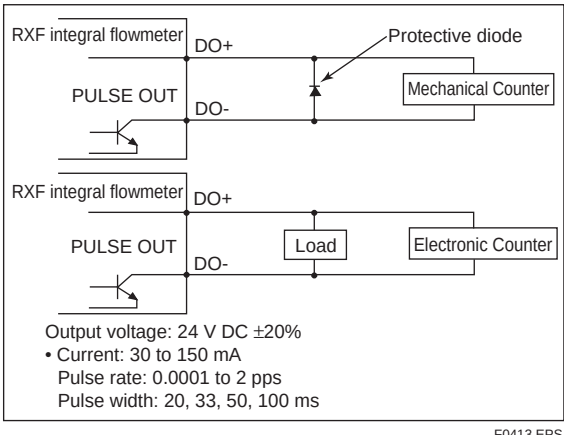


Figure 4.1.11 Active Pulse Output (/EM)

· Status Input

IMPORTANT

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

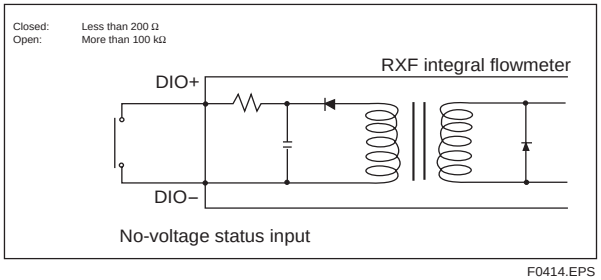


Figure 4.1.12 Status Input Connection

NOTE

For status input to the DIO terminals, parameter F21 must be set. Refer to “Parameter Description” in the user’s manual of the RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

· Status Output/ Alarm Output

IMPORTANT

Since this is an insulated transistor output, be careful of voltage and polarity when wiring. Do not apply a voltage larger than 30 V DC or a current larger than 0.2 A in order to prevent damage to the instrument.
This output cannot switch an AC load. To switch an AC load, an intermediate relay must be inserted as shown in Figure 4.1.13.
*The alarm output operates from open (normal) to closed (alarm occurrence) in the default value (as setup upon plant shipment). Changes can be made via the parameter settings.

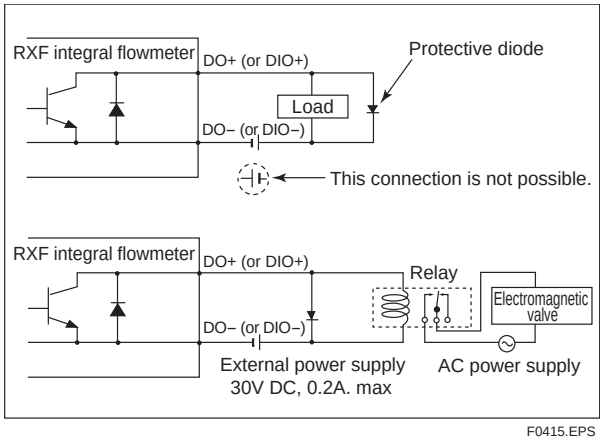


Figure 4.1.13 Status Output/Alarm Output Connection

NOTE

For status and alarm outputs from the DO or DIO terminals, parameters F20 or F21 must be set. Refer to “Parameter Description” in the user’s manual of the RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

(7) Installing the Cover

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

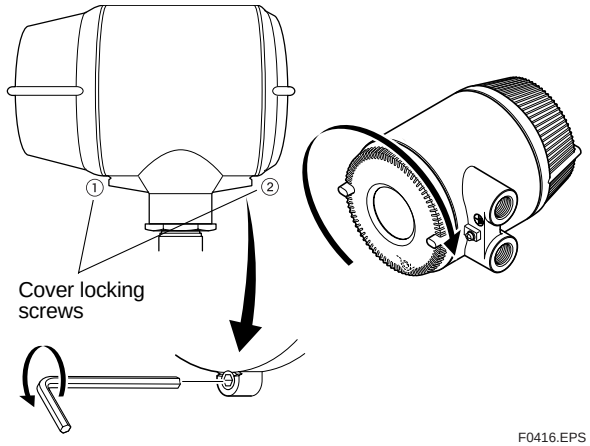


Figure 4.1.14 Installing the Terminal Box Cover

4.2 Wiring the Remote Flowtube

This section describes the wiring of the remote flowtube only. For information relating to the wiring of the converter, refer to the user's manual of the RXFA11 Magnetic Flowmeter Remote Converter (IM 01R21C01-01E-E) or the RXFA14 Magnetic Flowmeter Remote Converter (IM 01R21C02-01E-E).

WARNING

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

CAUTION

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

4.2.1 Wiring Precautions

Be sure to observe the following precautions when wiring:

CAUTION

- In cases where the ambient temperature exceeds 50 °C (122 °F), use external heat-resistant wiring with a maximum allowable temperature of 70 °C (158 °F) or above.
- Do not connect cables outdoors in wet weather in order to prevent damage from condensation and to protect the insulation, e.g. inside the terminal box of the flowtube.
- Do not splice the cable between the flowtube terminal and the converter if it is too short. Replace the short cable with a cable that is the appropriate length.
- All the cable ends must be provided with round crimp-on terminals and be securely wired.
- The signal cables may be routed in separate steel conduit tubes or flexible conduit tubes.
- Keep conduits or flexible tubes watertight using sealing tape.
- Ground the remote flowtube and the converter separately (with grounding resistance of 100Ω or less)
- Cover each shield of the signal cable with vinyl tube or vinyl tape to avoid contact between two shields or between a shield and a case.
- When waterproof glands or union equipped waterproof glands are used, avoid tightening the glands with an excessive torque.
- Be sure to turn the power off before opening the terminal box cover.
- Before turning the power on, tighten the terminal box cover securely.
- The terminal box cover of size 15 mm to 1000 mm is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached. For handling the locking screw, refer to Figure 4.2.8.
- Be sure to lock the cover of size 15 mm to 1000 mm by the special screw using the hexagonal wrench attached after installing the cover. For handling the locking screw, refer to Figure 4.2.20.
- When submersible type or optional code DHC is selected, waterproof glands, signal and excitation cables are attached and potted. In order to preserve the effectiveness of waterproof features, the terminal box cover and waterproof glands must not be detached from flowmeter.

4.2.2 Cables

(1) Dedicated Signal Cable (RXFC)

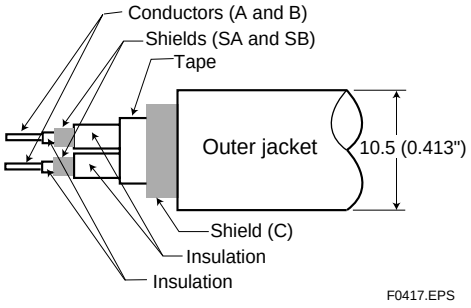


Figure 4.2.1 Dedicated Signal Cable RXFC

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

Finished diameter: 10.5 mm (0.413")
Maximum length:
Combination with the RXFA11 converter: 200 m (660 ft)
Combination with the RXFA14 converter: 100 m (330 ft)
Maximum temperature: 80 °C (176 °F)

NOTE

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

IMPORTANT

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

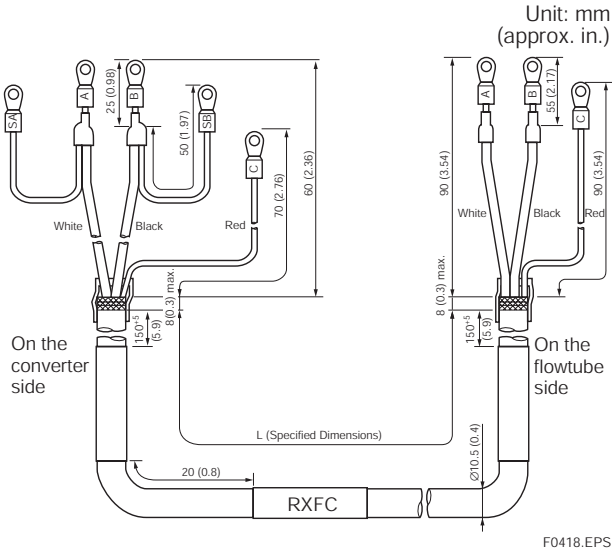


Figure 4.2.2 Treatment of Dedicated Signal Cables

CAUTION

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

(2) Excitation Cable

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

Outer Diameter: 6.5 mm to 12 mm (0.26 to 0.47 in),
Nominal Cross Section (Single wire): 0.5 to 2.5mm^2
Nominal Cross Section (Stranded wire): 0.5 to 1.5 mm^2

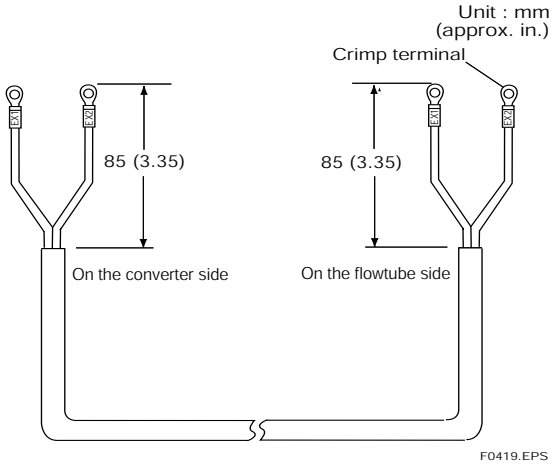


Figure 4.2.3 End Treatment of Excitation Cable

NOTE

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

4.2.3 Wiring Ports

This instrument is of watertight construction as described in JIS C0920-1982. (Tests to prove protection against ingress of water and degrees of protection against ingress of solid objects for electrical equipment.)

(1) When there are no particular optional specifications

The wiring port is sealed with a plastic gland IP67. Please remove sealing plug from gland entry before wiring. At this time, handle the wiring port in accordance with the JIS C0920-1982 mentioned above.

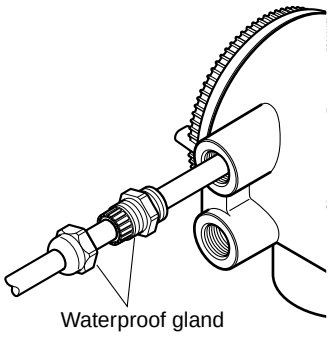


Figure 4.2.4 Plastic Gland

(2) Wiring using waterproof glands

IMPORTANT

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

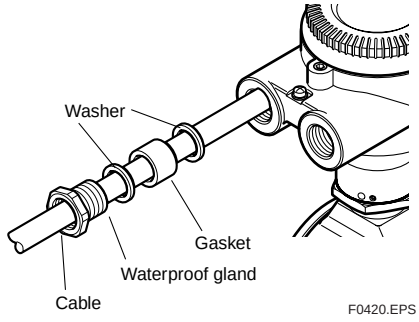


Figure 4.2.5 Waterproof Gland

(3) Conduit Wiring

For working on the electric wire tubes or the flexible tubes (PF1/2), remove the waterproof gland and attach them directly to the wiring port. When mounting the conduits, pass the conduit through the wiring connection port, and utilize the waterproof gland to prevent water from flowing in. Place the conduit pipe on an angle as shown in Figure 4.2.6. Install a drain valve at the low end of the vertical pipe, and open the valve regularly.

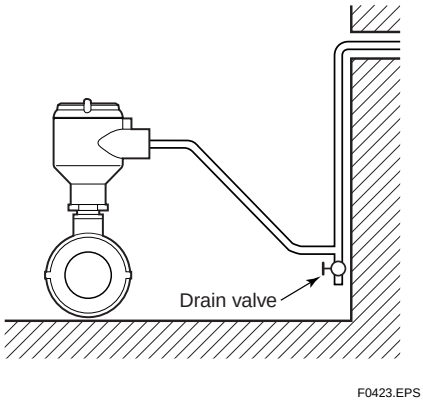


Figure 4.2.6 Conduit Wiring

4.2.4 Wiring Connections

(1) Removing Cover

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

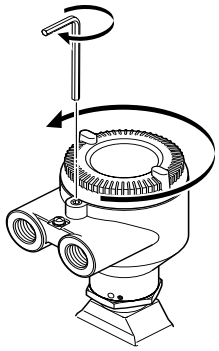


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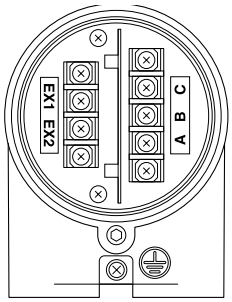
Figure 4.2.7 Removing the Terminal Box Cover (Remote Flowtube)

(2) Terminal Configuration remote flowtube

When the cover is removed, the connection terminals will be visible.

General style :



Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Protective grounding (Outside of the terminal)

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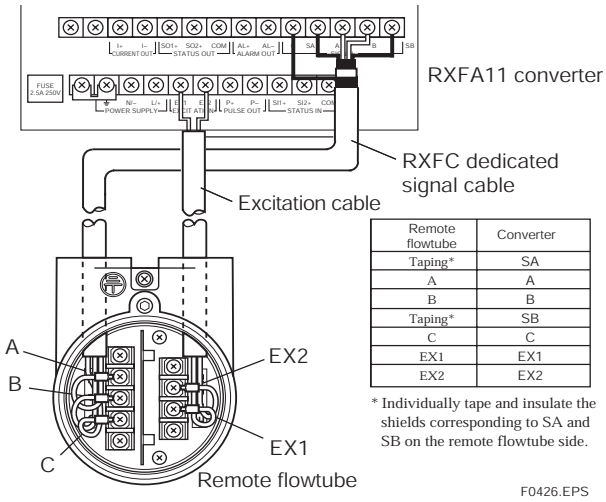
Figure 4.2.9 Terminal Configuration

(3) Wiring the Remote Flowtube (General Purpose Use, Submersible Style) with Converters

1) Connection with the RXFA11 converter

Connect wiring as shown in the figure below.



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

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

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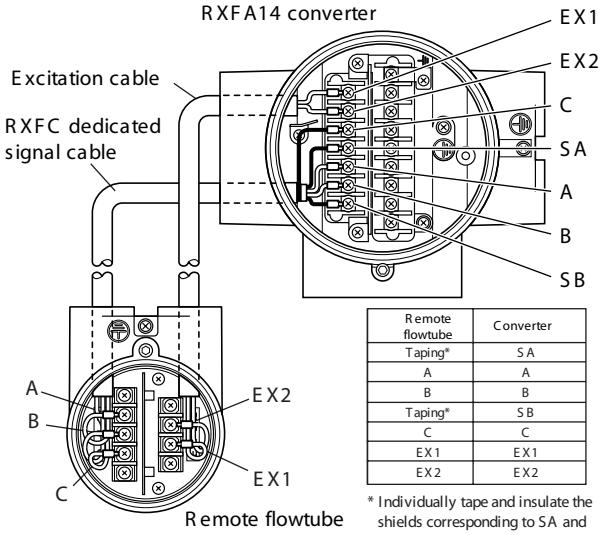
Figure 4.2.8 Wiring Diagram

2) Connection with the RXFA14 converter

Connect wiring as shown in the figure below.



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

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

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Figure 4.2.11 Wiring Diagram

⚠ CAUTION

Before wiring, be sure that the RXFA11 or RXFA14 converter has been turned off to prevent an electrical shock.

(4) Grounding

CAUTION

Be sure to connect the protective grounding of the RXF remote flowtube with a cable of 2mm² or larger cross section in order to avoid electrical shock to the operators and maintenance engineers and to prevent the influence of external noise.
Connect the grounding wire to the ⏚ mark.
The grounding should satisfy Class D require ments (ground resistance, 100 Ω or less).

IMPORTANT

Improper grounding can have an adverse affect on the flow measurement. Ensure that the instrument is properly grounded.

The electromotive force of the magnetic flowmeter is minute and it is easy to be affected by noise. And also that reference electric potential is the same as the measuring fluid potential. Therefore, the reference electric potential (terminal potential) of the flowtube and the converter also need to be the same as the measuring fluid. Moreover, that the potential must be the same with ground. The magnetic flowmeter comes standard without grounding electrodes [RXF□□□□-□□□□1N...], but grounding electrode models are available [RXF□□□□-□□□□1L(H).. Please check your model code].

In case you have no grounding electrode you must provide a connection with the charge of the measured fluid to the protective grounding terminal shown in figure 4.2.12. Without this connection proper function can not be guaranteed.

Additionally be sure to ground also according to Figure 4.2.12.

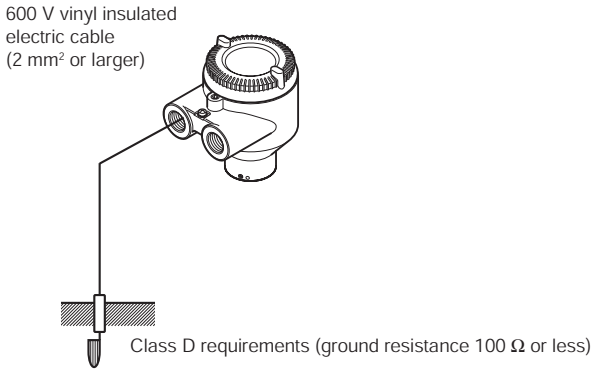


Figure 4.2.12 Protective Grounding Terminal Location

(5) Installing the Cover

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

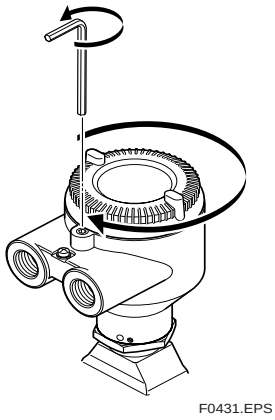


Figure 4.2.13 Installing the Terminal Box Cover (Remote Flowtube)

5. MAINTENANCE

WARNING

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

CAUTION

- The terminal box cover is locked by the special screw. In case of opening the terminal box cover, use the hexagonal wrench attached.
- Be sur to lock the cover by the special screw using the hexagonal wrench attached after installing the cover.

5.1 Changing Direction of Electrical Connection

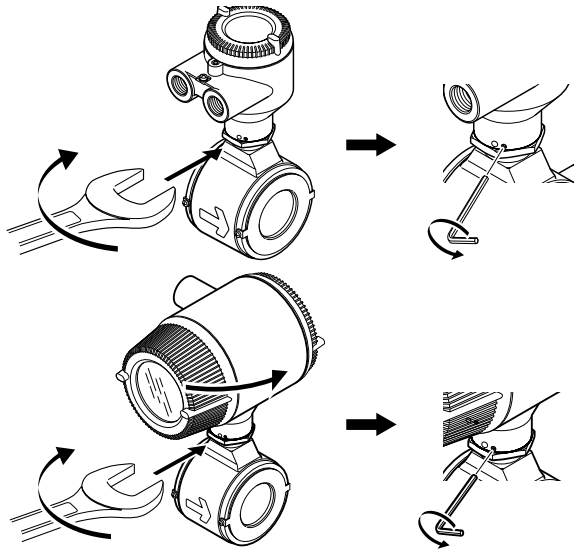
IMPORTANT

The following types can not be changed direction of electrical connection after delivery.
- Submersible Type (RXF□□□W-...)
- Optional code /DHC (for condensation-proof).

(1) The following tools are required to change the direction of the parts for the electrical connection:
   - Hexagonal wrench (nominal size 1.5): Comes with the instrument.
   - Wrench (size 46mm)

(2) Turn off the power to the flowmeter.

(3) Using the wrench, loosen thel nut at the neck of the instrument.



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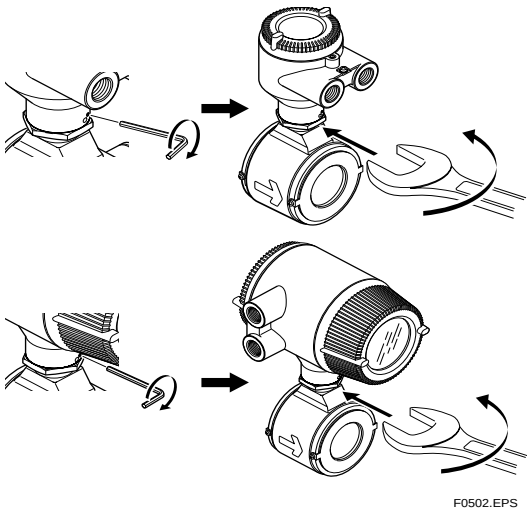
(4) Using the hexagonal wrench, loosen the screw in the neck.

(5) Turn the converter or the terminal box in the desired direction.

NOTE

The converter and the terminal box can be turned –140° to +180° from the arrow mark indicating the flow direction. Do not exceed these angle.

(6) Using the hexagonal wrench, retighten the neck screw.



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(7) Using the wrench, retighten the nut at the neck. After that, check that the converter or terminal box is fixed.

5.2 Components Replacement (Integral Flowmeter Only)

WARNING

- Component replacement and the associated operations must be carried out by expert engineer or skilled personnel and not by operators.
- Before opening the cover, it is important to ensure that at least 10 minutes have passed since the power was turned off. Furthermore, opening of the cover must also be carried out by expert engineer or skilled personnel.

IMPORTANT

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

5.2.1 Fuse Replacement

CAUTION

Be sure to turn off the power before performing fuse replacement. Also be sure to use the spare fuse that was supplied with the product, or ones supplied by Yokogawa's sales or service offices.
Fuse type : T 2.5A, 250V, T, time-lag fuse

The fuse holder is located on the farthest circuit board from the front.

(1) Remove the amplifier assembly by following the procedures shown in Section 5.2.3 "Amplifier Replacement."

(2) The fuse can be seen after step (1). Remove the fuse from the fuse holder.

(3) Push a new fuse into the holder until it clicks.

(4) Reinstall the amplifier assembly by following the procedures shown in Section 5.2.3.

Spare fuses are shipped with the instrument.

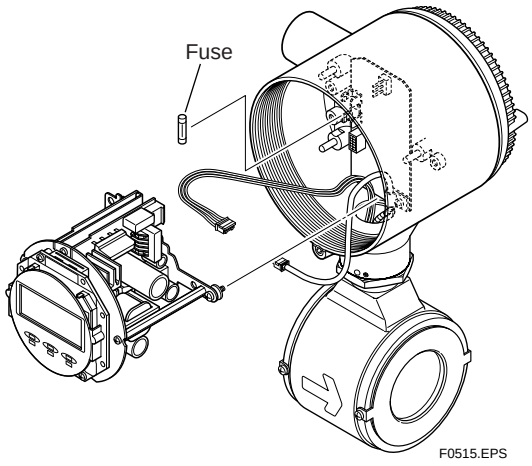

Figure 5.2.1 Fuse Replacement

5.2.2 Display Unit Replacement

5.2.2.1 Removing the Display Unit

(1) Turn off the power.

(2) Loosen cover locking screw 1 clockwise using a hexagonal wrench (nominal size 3) to unlock the cover. (Upon shipment from the manufacturing plant, the cover is locked.) Hold the flowmeter with your hand and remove the cover by turning it in the direction of the arrow as shown below.

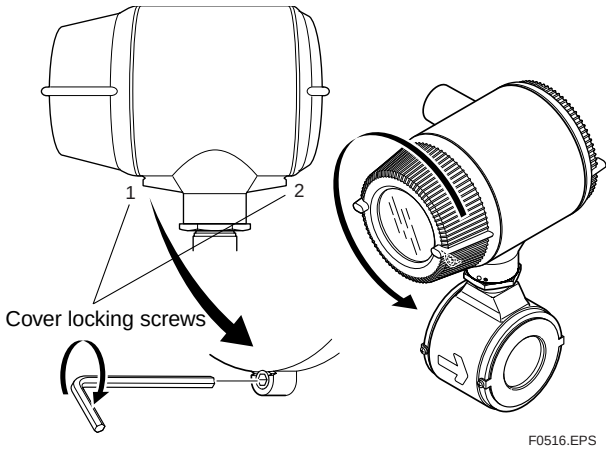

Figure 5.2.2 Removing the Display Cover

(3) Hold the display unit with your hand and remove the two mounting screws. Remove the connector of the display unit by pulling it to the left, taking care not to damage it (refer to Figure 5.2.3).

5.2.2.2 Assembling the Display Unit

(1) Reconnect the keyed display connector according to figure 5.2.3.

(2) Secure the display unit using its two mounting screws.

(3) Replace the cover by following the procedures used to remove it in the reverse order.

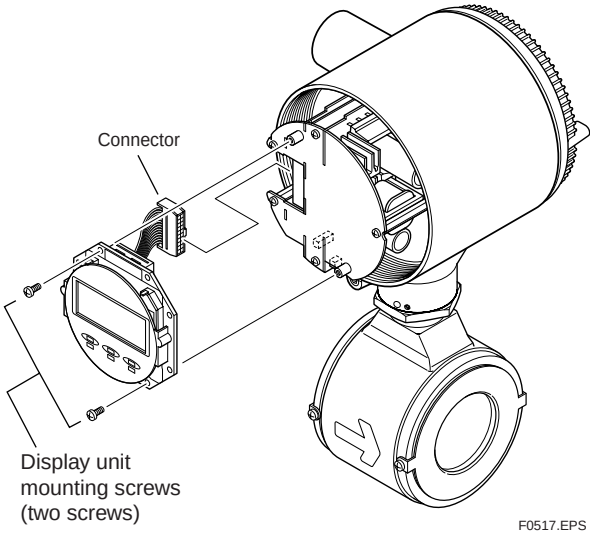

Figure 5.2.3 Removing and Assembling the Display Unit

5.2.2.3 Changing the Display Unit Orientation 90°

(1) Hold the display unit with your hand and remove the two mounting screws.

(2) Turn the display unit 90° clockwise and confirm the assembling position, taking care of the connector and wire of the display unit.

(3) Secure the display unit using its two mounting screws.

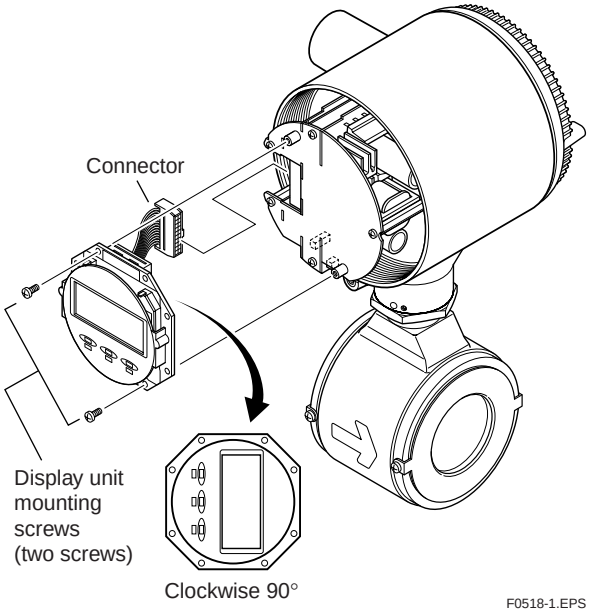

Figure 5.2.4 Assembling the Display Unit

5.2.2.4 Installing the Cover

(1) Install the cover to the flowmeter by turning it in the direction of the arrow as shown below. Tighten cover locking screw 1 counterclockwise using a hexagonal wrench (nominal size 3) to lock the cover.

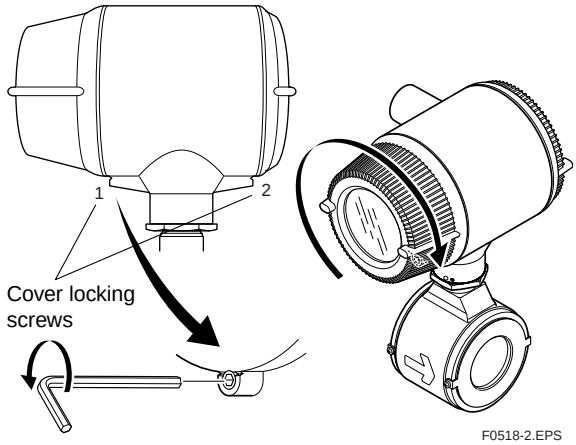

Figure 5.2.5 Installing the Display Cover

5.2.3 Amplifier Replacement

IMPORTANT

In case of amplifier replacement, it is necessary to perform the parameter resetting.
For parameters, refer to Chapter 6: Parameter Description of IM 01R21C02-01E.

5.4.3.1 Removing the Amplifier Assembly

(1) Turn off the power.

(2) Remove the cover.

(3) Remove wiring connectors 1 and 2 (refer to Figure 5.2.6) from the amplifier assembly. Remove them carefully, without applying excessive force.

(4) Loosen the three mounting screws while holding the assembly with your hand.

(5) Pull the assembly straight out.

5.4.3.2 Assembling the Amplifier Assembly

(1) To replace the amplifier assembly, follow the procedures used to remove it in the reverse order.

(2) Replace the assembly by pushing it in, taking care not to damage the amplifier mounting connectors on the circuit board.

(3) Carefully connect wiring connectors 1 and 2 to the amplifier assembly, making sure that the connectors' directions are correct. Let wiring connector 2 pass along the amplifier side of the rod.

(4) Tighten the three mounting screws while holding the assembly with your hand.

(5) Replace the cover, taking care not to entangle the cables of the wiring connectors.

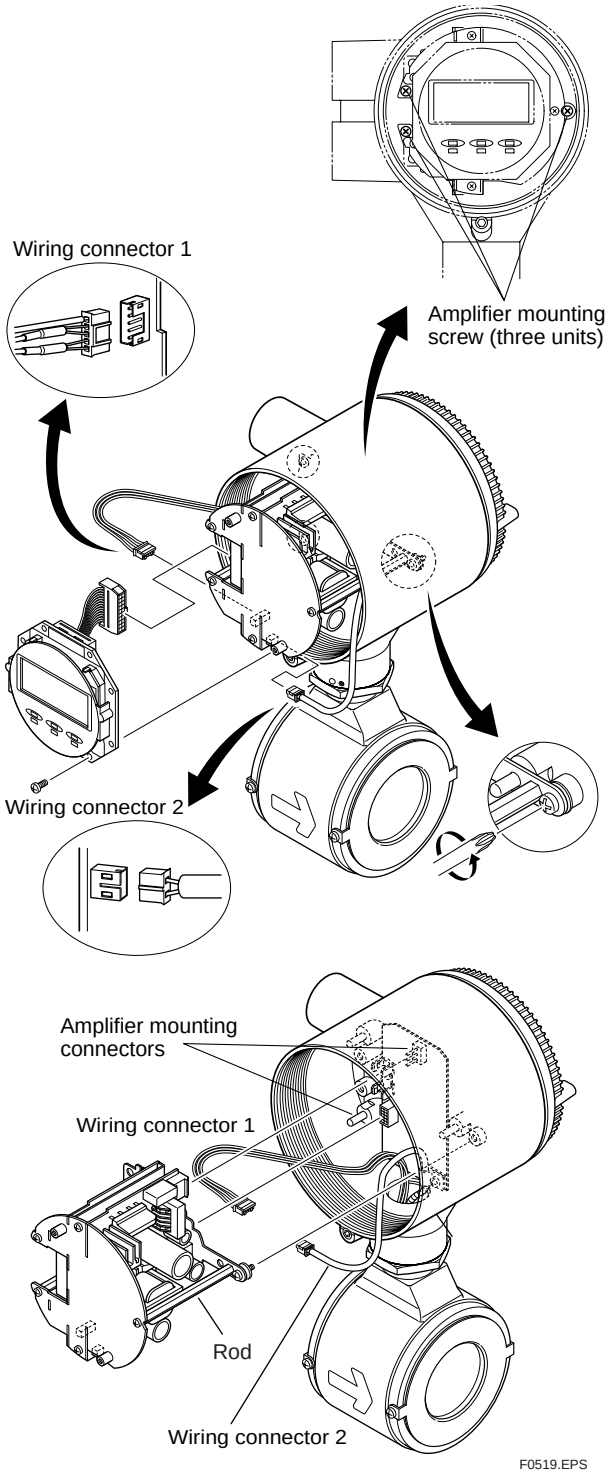

Figure 5.2.6 Assembling the Amplifier

5.3 Setting of Switches (Integral Flowmeter Only)

5.3.1 Setting of Burnout Switch

The burnout function sets the direction of current output in situations where the CPU has become damaged. Upon shipment from the manufacturing plant, the burnout direction is set to High (i.e.25 mA); the output direction can also be set to Low (i.e. 0 mA).

Modification of the burnout direction must be carried out using the setting switch from the amplifier's CPU board (i.e., Switch 1) (See Figure 5.3.1).

Table 5.3.1 Output Setting Pins for Burnout

Position of Pin	Burnout Direction	Burnout Output	Remarks
Low High	High	25 mA	Set to High before shipment
Low High	Low	0 mA	Set to Low

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NOTE

On the amplifier's CPU board, the burnout setting switch (i.e., Switch 1) and the write protect switch (i.e., Switch 2) are located adjacent to each other. Accordingly, special care should be taken when making switch settings.

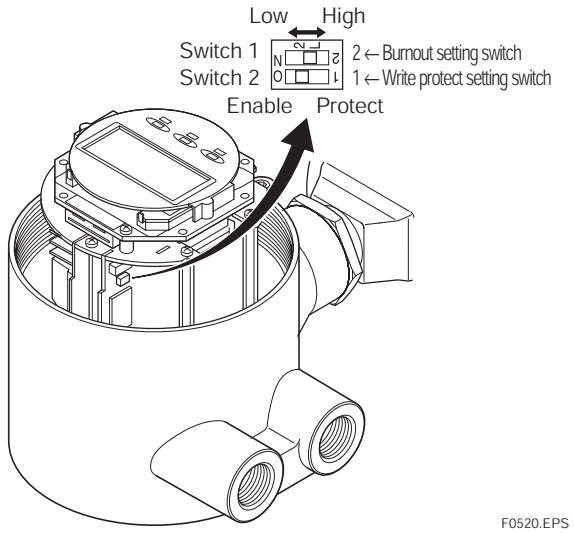

Figure 5.3.1 Switch Configuration

5.3.2 Setting of Write Protect Switch

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

NOTE

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

For more details regarding usage of the write protect function and the software’s parameter switches, refer to “Chapter 6: Parameter Description” in the user’s manual of the RXF Integral Flowmeter [Software Edition] (IM 01R21C02-01E-E).

5.4 Regular Inspection Items

(1) Inspection of moisture-proofing inside the terminal box: Once/year

(2) Retightening of piping joint screws: About twice/year

(3) Inspection of electrodes and lining (in case of adhesive and/or abrasive fluids, etc.)
Determine the period of regular inspection as necessary.

5.5 Excitation Coil and Insulation Resistance Check (Remote Flowtube Only)

CAUTION

- Before checking of the excitation coil and the insulation resistance, be sure that the power supply for RXFA11 or the RXFA14 converter has been turned off.
- Before checking, be sure to disconnect the cables from the terminals of the remote flowtube.

(1) Excitation Coil Check (Remote Flowtube Only)

Check that there is continuity between terminals EX1 and EX2 in the terminal box. If there is no continuity, the coils may be broken and replacement or repair of the flowtube is necessary. The coil resistance is designed to be 150 Ω or less. If it is not, this may be an abnormal condition. Consult Yokogawa’s sales or service offices.

(2) Insulation Resistance Check (Remote Flowtube Only)

Check the insulation resistances in the terminal box in accordance with the tables below. If any of them falls below the values listed in the tables, consult Yokogawa’s sales or service offices for investigation. If the insulation resistance cannot be restored, replacement or repair of the flowtube is needed. In case of submersible type flowmeters, undo the wiring connection on the converter side and measure resistance at the cable terminals. This check is also recommended for general purpose use remote flowtube if you like to include the wiring in the integrity check of the flowtube.

Coil Circuit

Checking is possible even if the pipe is filled with fluid.

Test Terminals	Test Voltage	Specification
Between terminals EX1 and C	500 V DC (Use an insulation tester or the equivalent.)	1 MΩ or more

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Signal Circuit

Before testing, be sure to empty and dry the interior of the pipe, checking that there is no adhesive material. Also undo the wiring connection on the converter side before testing.

Test Terminals	Test Voltage	Specification
Between terminals A and C Between terminals B and C	500 V DC (Use an insulation tester or the equivalent.)	100 MΩ or more for each

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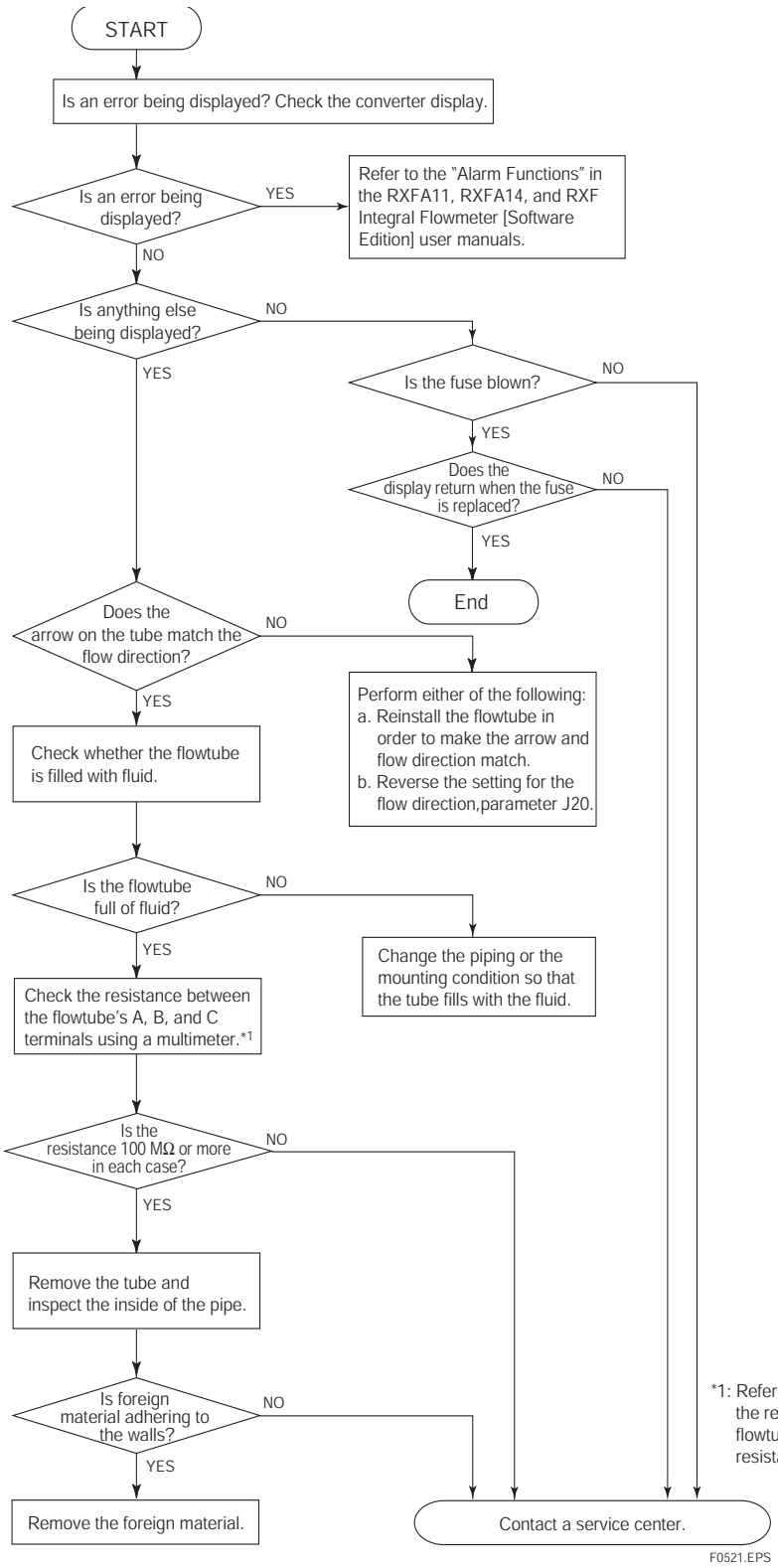
5.6 Troubleshooting

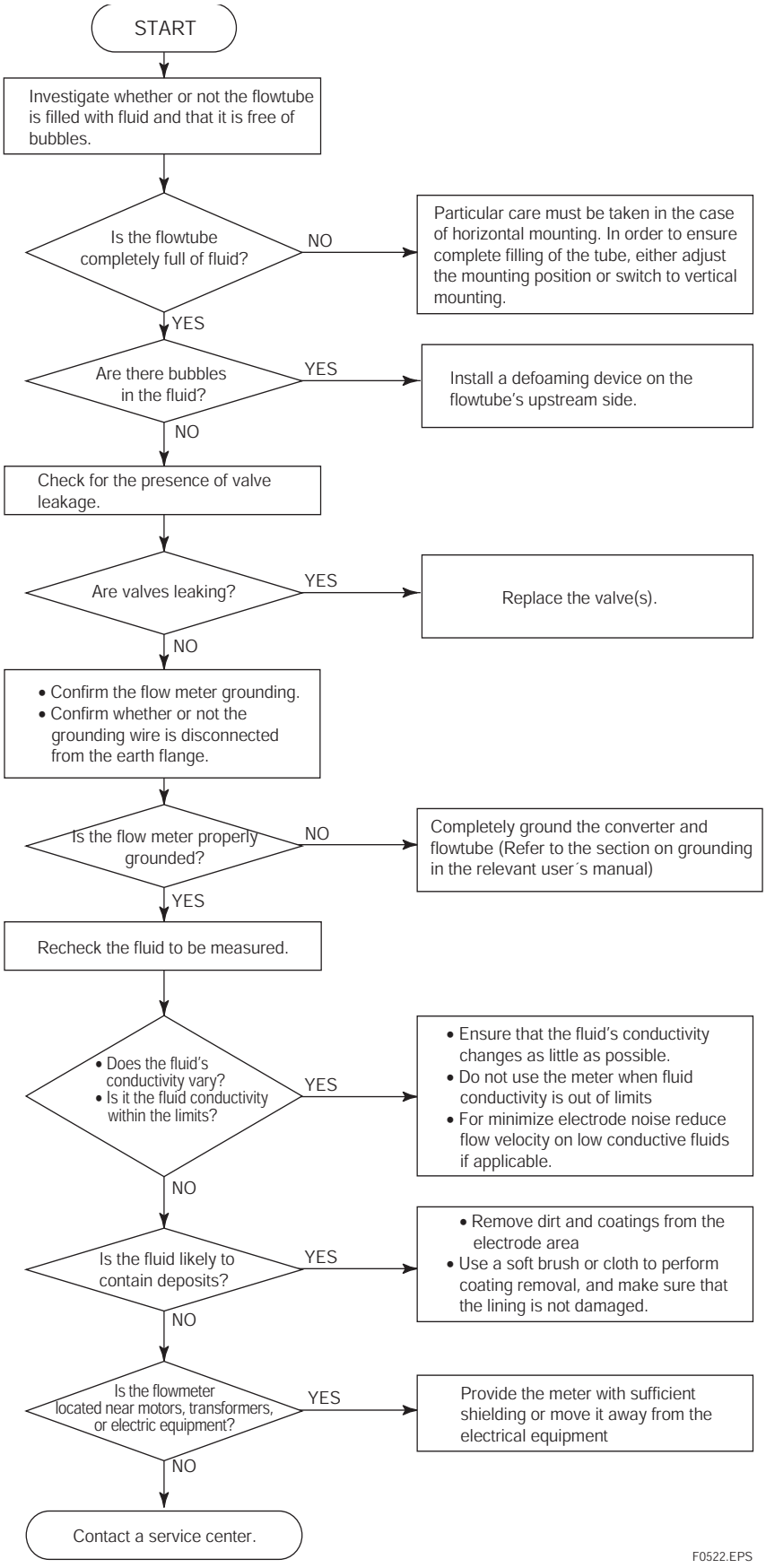
Although magnetic flowmeters rarely require maintenance, failures may occur when the instrument is not operated correctly. This section describes troubleshooting procedures where the cause of the breakdown is identified through receiver indication.

5.6.1 No Indication

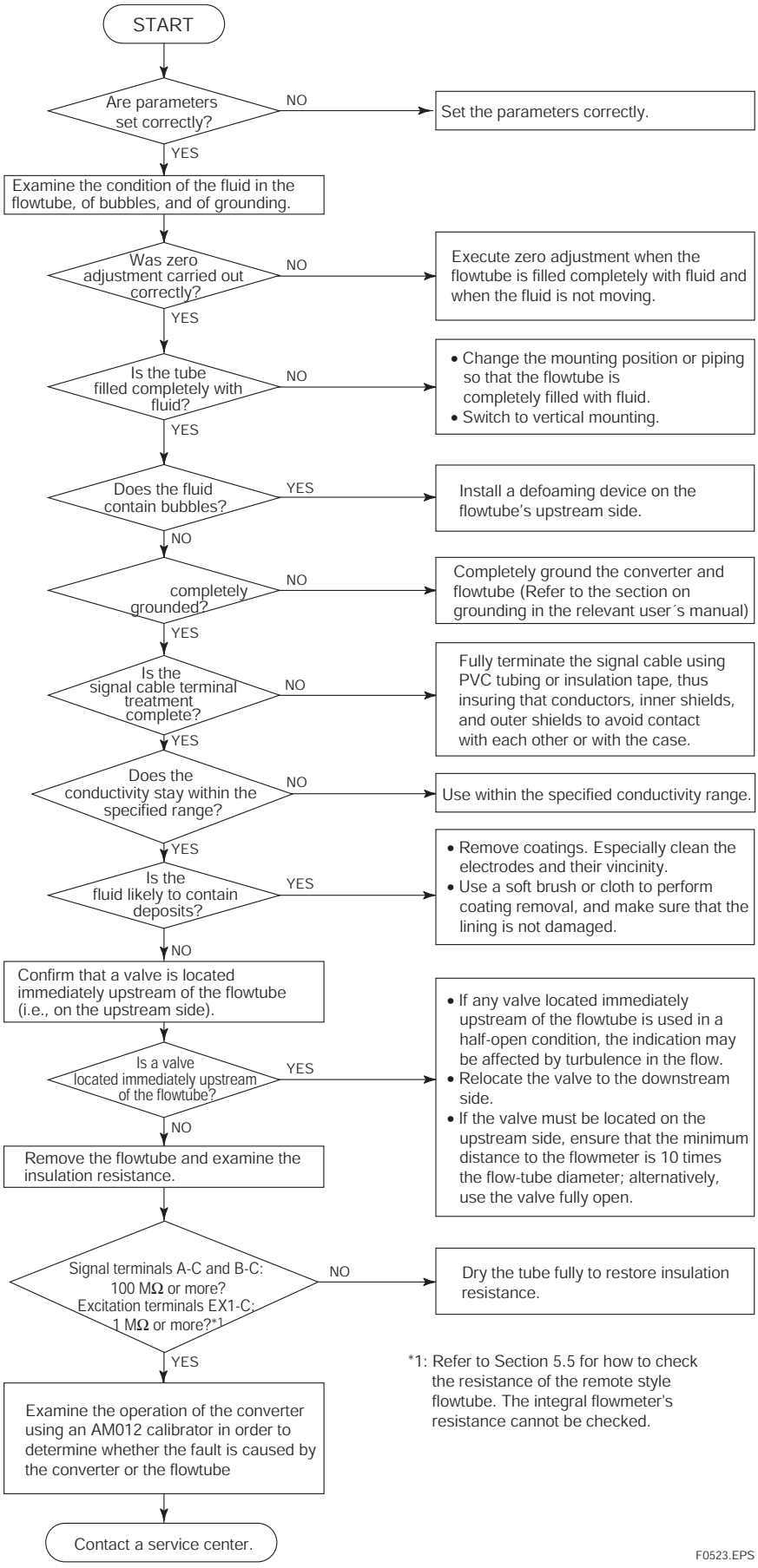


*1: Refer to Section 5.5 for how to check the resistance of the remote style flowtube. The integral flowmeter's resistance cannot be checked.

5.6.2 Unstable Zero



5.6.3 Disagreement Between Indication and Actual Flow



*1: Refer to Section 5.5 for how to check the resistance of the remote style flowtube. The integral flowmeter's resistance cannot be checked.

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6. OUTLINE

STANDARD SPECIFICATIONS

Converter

Excitation Method:
Pulsed DC excitation

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

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

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

Communication Line Conditions:
Load Resistance:
BRAIN : 250 to 600 Ω (including cable resistance)
HART : 230 to 600 Ω (including cable resistance)
Distance from Power Line: 15 cm (6 in) or more (parallel wiring should be avoided.)

BRAIN:

Communication Distance:
Up to 2 km (1.25 miles), when polyethylene insulated PVC-sheathed cables (CEV cables) are used.
Communication distance varies depending on the type of cable and wiring used.
Load Capacitance: 0.22 μF or less
Load Inductance: 3.3 mH or less
Input Impedance of Communicating Device:
10 kΩ or more (at 24 kHz)

HART:

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

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

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

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

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

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

Indicator::
Full dot-matrix LCD (32x132 pixels) (*2)

Lightning Protection:
The lightning protection is built into the current output, pulse/alarm/status input and output terminals as standard.

Protection/Rating:
IP66, IP67

Coating/Paint:
All items are painted with polyurethane corrosion resistant paint.

Flowtube body:	RAL 7047
Connection box:	Mint green coating (Munsell 5.6 BG 3.3/2.9 or its equivalent)
Converter housing:	Mint green coating (Munsell 5.6 BG 3.3/2.9 or its equivalent)

Flowtube Material:

Housing:	Carbon steel
Flanges:	Carbon steel

Converter / Terminal box Material:
Case and Cover: Aluminum alloy

Wiring Port Threads / Mounting:
- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 x 1.5 female
- Direction of electrical connection can be changed even after delivery
  Note: In case of submersible types RXF□□□W... , or of /DHC option types the direction can not be changed after delivery.
- Terminal Connections: M4 size screw terminal

Grounding:
Grounding resistance 100 Ω or less

*1: Select one of the following 3 choices
- 1 Pulse output, 1 Status/Alarm output
- 1 Status/Alarm output, 1 Status input
- 2 Status/Alarm outputs

*2: For models without an indicator, the hand-held terminal is necessary to set parameters.

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Functions

How to Set Parameters:
The indicator's LCD and three infra-red switches enable users to set parameters without opening the cover. Parameters can also be set by means of the HHT (hand-held terminal). (*1)

Displayed Languages:
Users can choose one of the following languages : English, French, German, Italian, Japanese or Spanish. (*1)

Display Customisation:
Select
- 1- line to 3- line mode
- Flowrate as
  - Instantaneous flow rate
  - Instantaneous flow rate (%)
  - Instantaneous flow rate (bar graph)
- Current output value (mA)
- Totalized value
- Tag No.
- Electrode diagnostic results (*1)

Totalizer Functionality:
The flow rate is counted one pulse at a time according to the setting of totalization pulse weights. For forward and reverse flow measurement functions, the totalized values of the flow direction (forward or reverse) and the flow direction are displayed on the indicator together with the units. The difference of totalized values between the forward and reverse flow rate can be displayed. Totalization for the reverse flow rate is carried out only when "Forward and reverse flow measurement function" is selected. .(*1)

Damping Time Constant:
Time constant (63% response) can be set from 0.3 s to 200.0 s. (*1)

Span / Full Scale Flow Range Setting (20mA):
Span flows can be programmed in units such as volume flow rate, mass flow rate, time, or flow rate value. The velocity unit can also be set. (*2)
Volume Flow Rate Unit:
kcf, cf, mcf, Mgal (US),
kgal (US), gal (US), mgal (US), kbbl (US)*,
bbl (US)*, mbbl (US)*, µbbl (US)*,
Ml (Megaliter), m^3, kl (kiloliter), l (liter), cm^3
Mass Flow Rate Unit (Density must be set.):
lb (US-pound), klb (US), t (ton), kg, g
Velocity Unit:
ft, m (meter)
Time Unit:
s (sec), min, h (hour), d (day)
* "US oil" or "US beer" can be selected.
The converter will provide 20 mA output current at the programmed span / full scale flow range.

Pulse Output:
Scaled pulses can be generated by programming the "pulse unit" and the "pulse scale " parameters.
Pulse Width: Duty cycle 50% or fixed pulse width (0.05, 0.1, 0.5, 1, 20, 33, 50, 100 ms) can be selected arbitrarily.
Output Rate: 0.0001 to 10,000 pps (pulse/second) (*2)

Multi-range / Auto Range Span Function:
Status input enables to select up to two ranges. For automatic range switching, the status of up to four ranges can be shown in status outputs and on the indicator. (*1)(*2)

Fwd/Rev Flow Measurement Functions
Flows in both forward and reverse directions can be measured. Set the parameter F20 or F21 = Fwd/Rev Rngs. The status is shown in status outputs and on the indicator during reverse flow measurement. (*1)(*2)

Totalization Switch:
The status is output if a totalized value becomes equal or greater than the set value. (*2)

Preset Totalization:
The parameter setting or status input enables the totalized value to be preset to a setting value or zero. (*1)

Positive Zero Return (PZR / 0 % Signal Lock):
Status input will force display and all outputs to 0 %. (*1)(*2)

Alarm Selection Function:
Alarms are classified into the System Alarms (hard failures), Process Alarms (such as 'Empty Pipe', 'Signal Overflow' and 'Adhesion Alarm'), Setting Alarms and Warnings. Whether alarms should be generated or not can be selected for each item. The current output generated for an alarm can be selected arbitrarily from among 2.4 mA or less, fixed to 4 mA, 21.6 mA or more, or HOLD. (*1)

Alarm Output:
Alarms are generated only for the items selected via the 'Alarm Selection Function' in menu ´G´, if relevant failures occur. (*2)

Self Diagnostic Functions:
If alarms are generated, details of the System Alarms, Process Alarms, Setting Alarms and Warnings are displayed together with concrete descriptions of countermeasures. (*1)

Flow Upper / Lower Limit Alarms:
If a flow rate becomes greater or smaller than the set value, this alarm is generated. In addition, two upper limits (H, HH) and two lower limits (L, LL) can be set. If a flow rate gets higher or lower than any of the set values, the status is output. (*2)

Adhesion (Electrode Coating) Diagnostics:
This function enables monitoring of the adhesion level of insulating substances to the electrodes. Depending on the status of adhesion, users are notified by a warning or an alarm via status outputs. (*1)(*2)

Protection/Rating:
- IP66, IP67, if RXF□□□G is selected
- IP68, if RXF□□□W is selected

*1: For models without an indicator, the hand-held terminal is necessary to set parameters.
*2: Select one of the following 3 choices
- 1 Pulse output, 1 Status/Alarm output
- 1 Status/Alarm output, 1 Status input
- 2 Status/Alarm outputs

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Flowtubes (Remote / Integral flowmeter)

Combined Converter selection:

- A remote flowtube for sizes of up to 400 mm can be combined with the RXFA11 Converter or the RXFA14 Converter. If a combined converter is changed from RXFA11 to RXFA14 or vice versa, a new meter factor must be adjusted by flow calibrations.
- A remote flowtube for sizes of 450 mm or larger can be combined with the RXFA11 Converter only.
- Maximum Cable Length:
  Combination of RXF remote flowtube and RXFA11:
  up to 200 m (660 ft)
  Combination of RXF remote flowtube and RXFA14:
  up to 100 m (330 ft)

Wiring Port Threads / Mounting (Remote Flowtube):

- Electrical Connection: ANSI 1/2 NPT female
  ISO M20 x 1.5 female
- Direction of Electrical Connection: The direction can be changed even after delivery.
  Note: In case of submersible types RXF□□□W... or /DHC option types the direction can not be changed after delivery.
- Terminal Connection at Terminal Box: M4 size screw

Grounding:

Grounding resistance 100 Ω or less

Available Materials for Flowtubes

Size 15 mm (0.5 in) to 1000 mm (40 in)

Part Name		Material
Flowtube housing		Carbon steel
Flange		Carbon steel
Pipe + Neck		Stainless steel
Terminal Box (Remote Flowtube) Converter housing	Case, Cover (15 to 1000 mm) (0.5 to 40 in)	Aluminum alloy

T05-1.EPS

Available Material for Lining

Hard rubber
Hardness (shore D) = 78 ± 5
Temperature range: see diagram on page 6-6

Available Material for Electrodes:

Stainless steel AISI316L / 1.4404
Hastelloy C276 or its equivalent (*1) / 2.4819

Electrode Construction:

Non-replaceable electrode style for flowsignal- and grounding electrodes
Internally Inserted:
∅ 8 mm

*1: Hastelloy is a registered trademark of Haynes International Inc.

Overview about Sizes and Styles

Unit: mm (in)

Use	Process Connection	Lining	Remote Flowtube	Integral Flowmeter
General-purpose Use	Flange	Hard Rubber	15 (0.5),25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16), 450(18), 500 (20), 600 (24), 700 (28), 800 (32), 900 (36), 1000 (40)	15 (0.5),25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16)
Submersible Style	Flange	Hard Rubber	15 (0.5), 25 (1.0), 32 (1.25), 40 (1.5), 50 (2.0), 65 (2.5), 80 (3.0), 100 (4.0), 125 (5.0), 150 (6.0), 200 (8.0), 250 (10), 300 (12), 350 (14), 400 (16), 450 (18), 500 (20), 600 (24), 700 (28), 800 (32), 900 (36), 1000 (40)	—

T21.EPS

STANDARD PERFORMANCE

Reference Conditions:

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

- Fluid temperature: 20 °C ±10 °C (+68 °F ±18 °F)
- Ambient temperature: 25 °C ±5 °C (+77 °F ±9 °F)
- Warm-up time: 30 min
- Straight runs
  Upstream > 10 x DN
  Downstream > 5 x DN
- Properly grounded
- Properly centered

Accuracy (at reference conditions)

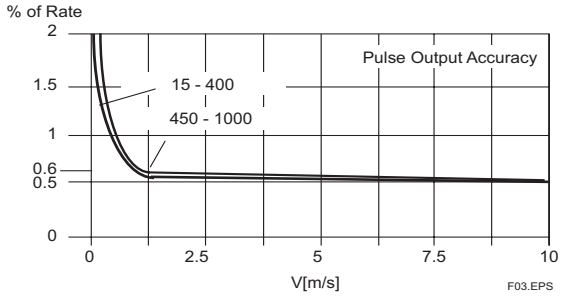
Pulse Output Accuracy:

Hard rubber lining:

Size mm (in)	Flow Velocity V m/s (ft/s)	Accuracy
15 (0.5) to 400 (16)	$V < 0.25$ (0.8)	± 2.5 mm/s
	$0.25 \leq V \leq 10$ (0.8) (33)	± 0.5 % of Rate ± 1.25 mm/s
450 (18) to 1000 (40)	$V < 0.25$ (0.8)	± 3.75 mm/s
	$0.25 \leq V < 10$ (0.8) (33)	± 0.5 % of Rate ± 2.5 mm/s

T02.EPS

Size 15 mm (0.5 in) to 1000 mm (40 in)



Current Output Accuracy:

Pulse output accuracy plus 0.05 % of Span

Repeatability:

± 0.175 % of Rate (V ≥ 1 m/s (3.3 ft/s))

± 0.05 % of Rate ± 1.25 mm/s (V < 1 m/s (3.3 ft/s))

Temperature coefficient:

< ± 0.02 % of reading / °C process temperature
typical:
< ± 0.01 % of reading / °C process temperature

Maximum Power Consumption:

Integral Flowmeter: 12 W

Remote Flowtube:
Combined with RXFA11: 20 W
Combined with RXFA14: 12 W

Insulation Resistance (Performance Requirements):

Integral Flowmeter :
100 MΩ between power terminals and ground terminal at 500 V DC
100 MΩ between power terminals and each output/ status input terminal at 500 V DC
20 MΩ between ground terminal and each output/ status input terminal at 100 V DC
20 MΩ between output/status input terminals at 100 V DC

Remote Flowtube:
100 MΩ between excitation terminals and each signal terminal at 500 V DC
100 MΩ between signal terminals at 500 V DC (*1)

Withstand Voltage (Performance)):

Integral Flowmeter
Between power supply terminals and ground terminal: 1390 V AC for 2 s
Between power supply terminals and input/output terminals: 1390 V AC for 2 s

Remote Flowtube
Between excitation current terminal and ground terminal: 1500 V AC for 1 min
Between signal terminals and ground terminal 1500 V AC for 1 min
Between signal terminals and excitation current terminal: 2000V AC for 1 min (*1

Safety Requirement Standards:

EN 61010-1

- Altitude at installation site: Max. 2000 m above sea level
- Installation category based on IEC 1010:
  Overvoltage category II ("II" applies to electrical equipment which is supplied from the fixed installation like distribution board.)
- Pollution degree based on IEC 1010
  Pollution degree 2 ("Pollution degree" describes the degree to which a solid, liquid, or gas which deteriorates dielectric strength or surface resistivity is adhering. "2" applies to a normal indoor atmosphere.)

EMC Conformity Standards:

EN 61326
EN 61000-3-2, EN 61000-3-3

⚠ CAUTION

*1: • Before performing the Insulation Resistance Test or the Withstand Voltage Test please obey the following caution:
- Following the relevant test, wait for more than 10 s after the power supply has been turned off before removing the cover.
- After testing, be sure to use a resistor for discharge and return the short bar to its correct position.
- Screws must be tightened to a torque of 1.18 Nm or more.
- After closing the cover, the power supply can be restored.

Pressure Equipment Directive (PED):
Module: H
Type of Equipment: Piping
Type of Fluid: Liquid
Group of Fluid: 2

General-Purpose Use/Submersible Style

MODEL	DN (mm) (*1)	PS (MPa) (*1)	PS DN (MPa · mm)	CATEGORY(*2)
RXF015G/W	15	4	60	Article 3, (*3) paragraph 3
RXF025G/W	25	4	100	Article 3, (*3) paragraph 3
RXF032G/W	32	4	128	SEP
RXF040G/W	40	4	160	SEP
RXF050G/W	50	4	200	SEP
RXF065G/W	65	2	130	SEP
RXF080G/W	80	2	160	SEP
RXF100G/W	100	2	200	SEP
RXF125G/W	125	2	250	SEP
RXF150G/W	150	2	300	SEP
RXF200G/W	200	2	400	SEP
RXF250G/W	250	2	500	I
RXF300G/W	300	2	600	I
RXF350G/W	350	1	350	I
RXF400G/W	400	1	400	I
RXF450G/W	450	1	450	I
RXF500G/W	500	1	500	I
RXF600G/W	600	1	600	I
RXF700G/W	700	1	700	I
RXF800G/W	800	1	800	I
RXF900G/W	900	1	900	I
RXF10LG/W	1000	1	1000	I

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*1: PS: Maximum allowable pressure for Flowtube
DN: Nominal size
*2: For details, see "Table 4 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC."
*3: RXF015G to RXF025G/W are outside the scope of PED's CE marking.

NORMAL OPERATING CONDITIONS

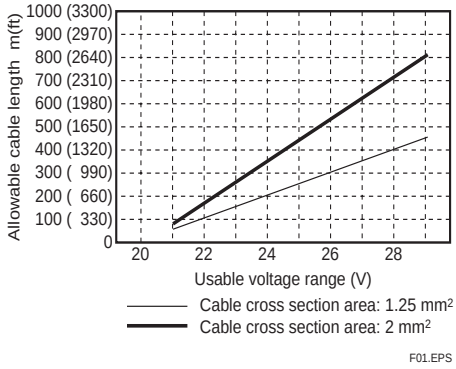
Ambient Temperature: -40 °C to 60 °C (-40 °F to 140 °F)
- Minimum temperature should also be limited according to minimum fluid temperature of linings.
- Indicator's operating range (integral flowmeter): -20 °C to 60 °C (-5 °F to 140 °F)
- Maximum temperature should be 50 °C (122 °F) in the case of Power supply code 2 (integral flowmeter).

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

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

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

Supplied Power and Cable Length for Power Supply Code 2

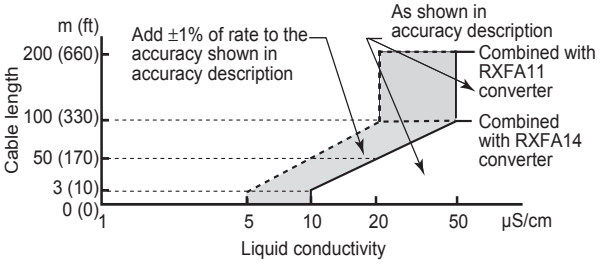


F01.EPS

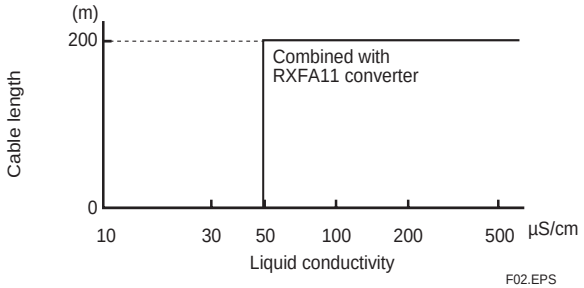
Fluid Conductivity:
Size 15 to 400 mm (0.5 to 16 in): 5 µS/cm or larger
Size 450 to 1000 mm (18 to 40 in): 50 µS/cm or larger

Cable Length and Liquid Conductivity (Remote Flowtube):

Size 15 to 400 mm (0.5 to 16 in)



Size 450 to 1000 mm (18 to 40 in)



F02.EPS

Measurable Flow Rate Range:

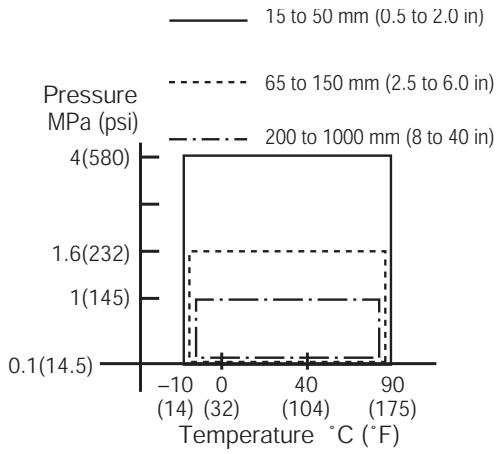
SI Units (Size: mm, Flow rate: m³/h)

Size (mm)	0 to Min. Span Flow Rate (m³/h)	0 to Max. Span Flow Rate (m³/h)	Default settings (m³/h)
15	0 to 0.190	0 to 6.361	2.5
25	0 to 0.530	0 to 17.671	5
32	0 to 0.867	0 to 28.967	10
40	0 to 1.357	0 to 45.23	15
50	0 to 2.120	0 to 70.68	20
65	0 to 3.583	0 to 119.45	50
80	0 to 5.428	0 to 180.95	75
100	0 to 8.482	0 to 282.74	100
125	0 to 13.254	0 to 441.7	150
150	0 to 19.086	0 to 636.1	250
200	0 to 33.930	0 to 1130.9	400
250	0 to 53.016	0 to 1767.1	600
300	0 to 76.341	0 to 2544.6	1000
350	0 to 103.92	0 to 3463	1200
400	0 to 135.12	0 to 4523	1500
450	0 to 171.768	0 to 5725	2000
500	0 to 212.07	0 to 7068	3000
600	0 to 305.37	0 to 10178	4000
700	0 to 415.65	0 to 13854	5000
800	0 to 542.88	0 to 18095	7000
900	0 to 687.09	0 to 22902	9000
1000	0 to 848.25	0 to 28274	10000

T11.EPS

Fluid Temperature and Pressure:

The following figure shows maximum allowable fluid pressure for the flowtube itself. Further fluid pressure should also be limited according to the flange rating.



F05-2.EPS

Vibration Conditions:

Level of vibration in conformity with IEC 60068-2-6 (SAMA 31.1-1980)

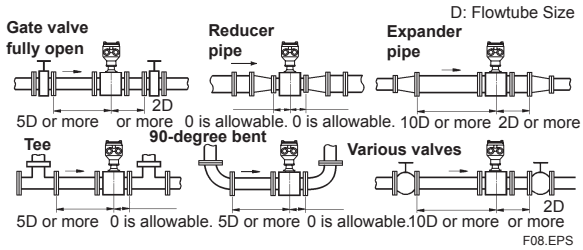
- Integral flowmeter: 1 G or less (frequency 250 Hz or less)
- Remote Flowtube (size 2.5 to 400 mm (0.1 to 16 in)): 2 G or less (frequency 250 Hz or less)

Note: Avoid locations with much vibration (where the pipe vibration frequency is 250 Hz or more), which may cause damage to the equipment.

CAUTIONS FOR INSTALLATION

Mounting of Flowmeters and Required Lengths of Straight Runs

(See JIS B7554 “Electromagnetic flowmeters. ”)



Required straight runs

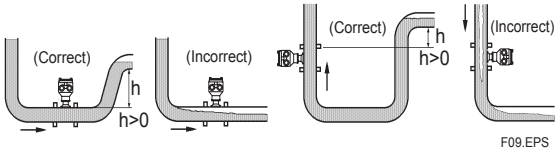
- Do not install anything in the vicinity that may interfere with the magnetic field, induced signal voltages, or flow velocity distributions of the flowmeter.
- A straight run may not be required on the downstream side of the flowmeter. However, if a downstream valve or other fitting causes irregularity deviation in flows, provide a straight run of 2D to 3D on the downstream side.
- Highly recommend to mount valves on the downstream side so that deviated flows do not occur in the flowtube and to avoid startup from an empty condition.

Maintaining Stable Fluid Conductivity

Do not install the flowmeter where fluid conductivity tends to become uneven. If chemicals are fed near the upstream side of an electromagnetic flowmeter, they may affect the flowmeter’s indications. To avoid this situation, it is recommended that the chemical feed ports are located on the downstream side of the flowmeter. If it is unavoidable that chemicals must be fed on the upstream side, provide a sufficient length of straight run (approximately 50D) to ensure the proper mixture of fluids.

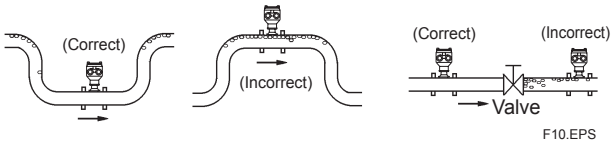
Piping Configuration

- Pipes must be fully filled with liquids.
  It is essential that pipes remain filled at all times, or flow rate indications may be affected and measurement errors may be caused.
- Pipes shall be designed so as to maintain the flowtube always filled with fluids.
- Vertical mounting is effective in cases where fluids tend to separate or solid matter may be precipitated. When employing vertical mounting, direct the fluids from the bottom to the top to ensure that pipes remain fully filled.



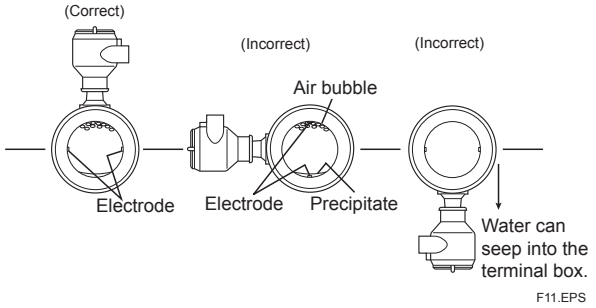
Mounting Positions

- Avoid Air Bubbles:
  - If air bubbles enter a measurement pipe, flow rate indications may be affected and measurement errors may be caused.
  - In cases where fluids contain air bubbles, piping must be designed to prevent them from accumulating in the measurement pipe of a flowtube.
  - If a valve exists near the flowtube, try to mount the flowtube on the valves upstream side in order to prevent a possible reduction of pressure inside the pipe,thereby avoiding the possibility of air bubbles.



Avoiding of Air Bubbles

- Mounting Orientation:
  - If electrodes are perpendicular to the ground, air bubbles near the top or precipitates at the bottom may cause measurement errors.
  - Ensure that the terminal box of a remote flowtube and converter of an integral style are mounted above the piping to prevent water from entering them.



Mounting Orientation

ACCESSORIES

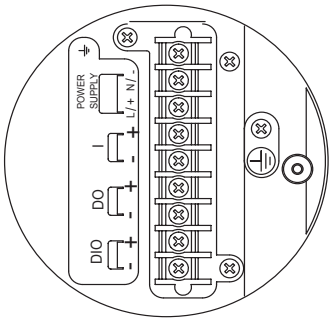
Remote Flowtube:
Hexagonal wrench: 2 pcs.

Integral Flowmeter:
Time lag Fuse (T2.0A, 250 V): 1 pc.
Hexagonal wrench: 2 pcs.

TERMINAL CONFIGURATION AND TERMINAL WIRING

Integral Flowmeter

Terminal configuration



Terminal wiring

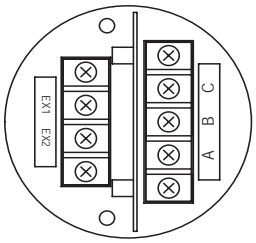
Terminal Symbols	Description
⏚	Functional grounding
N/- L/+	Power supply
I+ I-	Current output 4 to 20mA DC
DO+ DO-	Pulse output/Alarm output/ Status output
DIO+ DIO-	Alarm output/Status output Status input
⏚	Protective grounding (Outside of the terminal)

F41.EPS

Remote Flowtube

Note : If submersible style ´W´ or condensation proof option /DHC is selected, waterproof glands and cable are attached. Cable length must be defined by using option code /L***.

Terminal configuration



size 15 to 1000 mm (0.5 to 40 in)

Terminal wiring

Terminal Symbols	Description
A B C	Flow signal output
EX1 EX2	Excitation current input
⏚	Protective grounding (Outside of the terminal)

F42.EPS

Recommended Excitation, Power and Output Cable:

Use polyvinyl chlorid insulated and shealted portable

power cables.

· Outer diameter: 6.6 to 12 mm (0.26 to 0.47 in)

· Nominal Cross section: 0.5 to 2.5 mm²

Dedicated signal cable:

Model	Suffix Code	Description
RXFC	· · · · · · · · · · · · ·	Magnetic Flowmeter Dedicated signal cable for the RXF series
Termination	-0 · · · · · · · · · · ·	No Termination.
	-4 · · · · · · · · · · ·	A set of termination parts for M4 screws is attached. Terminated for the RXFA11/14 Converter.
Cable Length	-L ■■■ · · ·	Designate the cable length, unit: meter Following "L", specify the cable in three digits (e.g. 002, or 005) for a length up to 5 m, or as a multiple of 5 m (i.e. 005, 010, 015, ...). The maximum cable length: 200 m for combined use with RXFA11 100 m for combined use with RXFA14
Option	/C■	With termination parts sets. Following "C", specify the q'ty of sets of termination parts in one digits.

T04.EPS

NOTE

If RXF Remote Flowtube is ordered with option /L*** signal cable and excitation cable will be supplied with the flowtube.

Please specify L*** with 3 digits length code.

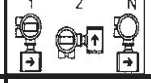
L005 ≡ 5m

L015 ≡ 15m

MODEL AND SUFFIX CODE

RXF STANDARD (Flange Type)

General-purpose Use/Submersible Style

	Model		Description		Restrictions
Size	RXF015		DN15 / 0.5"		
	RXF025		DN25 / 1"		
	RXF032		DN32 / 1.25"		
	RXF040		DN40 / 1.5"		
	RXF050		DN50 / 2"		
	RXF065		DN65 / 2.5"		
	RXF080		DN80 / 3"		
	RXF100		DN100 / 4"		
	RXF125		DN125 / 5"		
	RXF150		DN150 / 6"		
	RXF200		DN200 / 8"		
	RXF250		DN250 / 10"		
	RXF300		DN300 / 12"		
	RXF350		DN350 / 14"		
	RXF400		DN400 / 16"		
	RXF450		DN450 / 18"		remote flowtube only
	RXF500		DN500 / 20"		remote flowtube only
	RXF600		DN600 / 24"		remote flowtube only
	RXF700		DN700 / 28"		remote flowtube only
	RXF800		DN800 / 32"		remote flowtube only
	RXF900		DN900 / 36"		remote flowtube only
	RXF10L		DN1000 / 40"		remote flowtube only
Use		G	General Type		
		W	Submersible Type	flowtube junctionbox is potted with electrode- and excitation cable attached	only for -R ,-P, -T, -N only with option /L***
Output Communication Converter Style		-E	Integral flowmeter, 4-20mA DC; HART		up to RXF400
		-D	Integral flowmeter, 4-20mA DC; BRAIN		up to RXF400
		-R	Remote Flowtube including converter RXFA14G, HART		up to RXF400
		-P	Remote Flowtube without converter (usage RXFA14G)		up to RXF400
		-T	Remote Flowtube including converter RXFA11G, HART		
		-N	Remote Flowtube without converter (usage RXFA11G)		
Power Supply		1	Version 100-240 VAC / 100-120 VDC		only for -E ,-D, -R, -T
		2	Version 24 VAC / VDC		only for -E, -D, -R
		N	Remote flowtube without converter		only for -P, -N
Lining		Y	Hardrubber		
Electrode Material		L	AISI316L / 1.4404		
		H	Hastelloy C276 equivalent / 2.4819		
Electrode Structure		1	Non - replaceable		
Grounding Electrode Material		N	No grounding electrode		
		L	AISI316L / 1.4404		
		H	Hastelloy C276 equivalent / 2.4819		
Process Connection *3 Flange Carbon Steel Hole pattern according to DIN2501		-CD1	DIN PN10	for DN200 to DN1000	
		-CD2	DIN PN16	for DN 65 to DN 150	
		-CD4	DIN PN40	for DN 15 to DN 50	
Lay Length *1		1	Standard according to lay-length table on page 11		
		3	Lay length according to lay-length table on page 11		from RXF450 to RXF10L
		4	Lay length according to lay-length table on page 11		from RXF450 to RXF10L
Electrical Connection		-2	ANSI 1/2 NPT female		
		-4	ISO M20x1.5 female		
Display		1	Integral flowmeter / Remote converter with horizontal indicator		 *2
		2	Integral flowmeter / Remote converter with vertical indicator *2		
		N	Integral flowmeter without indicator / Remote flowtube *2		
Calibration		B	Standard (0.5%)		

*1: Standard lay length (-[][][]1) according ISO 13359 for RXF015 to RXF400.
*2: not for output communication code ´-T´.
*3: Instrument flange will connect to customer pipe flange according to EN 1092-1

OPTIONAL SPECIFICATIONS FOR FLOWTUBES

Option code for flowtubes (combinations possible) (restrictions for selected option code)	**/*** **	**Comment for selected option code**
Stainless steel tag plate (additional)	**/SCT**	TAG-No. max 16 digits (HART Software Tag-No. max 8 digits programmable)
Condensation proof	**/DHC**	- only for remote flowtube - flowtube junctionbox is potted with electrode- and excitation cable attached - standard length 30m - cable length must be specifed with additional option /L***
Cable length per customer specification	**/L*** **	Limitation in length is: - RXFA11G: max. 200 m - RXFA14G: max. 100 m incremental steps for length: - 2 m, 5 m and multiple of 5 m (002, 005, 010, 015 ...) **for "W" Style (submersible)** two cables attached and sealed with PU potting in flowtube junctionbox other cable ends headshrunk sealed, termination parts are attached **for /DHC** two cables attached and sealed with PU potting in flowtube junctionbox other cable ends terminated for connection to RXFA11/14 converter **otherwise** both ends terminated but not attached
Active pulse-output	**/EM**	Standard Transistor-Puls output is disarmed Output voltage: 24 V DC (+/-20 %) Output current 30 - 150 mA - Pulse rate: 0.0001 - 2 pps (pulse/second) - Pulse width: 20, 33, 50 or 10 0ms.

LAY-LENGTH TABLE:

Size	Lay length code		
	1	3	4
RXF015	200	not applicable	not applicable
RXF025			
RXF032			
RXF040			
RXF050			
RXF065			
RXF080			
RXF100	250		
RXF125			
RXF150	300		
RXF200	350		
RXF250	450		
RXF300	500		
RXF350	550		
RXF400	600		
RXF450	690	650	600
RXF500	750	650	600
RXF600	800	780	600
RXF700	900	910	700
RXF800	1050	1040	800
RXF900	1200	1170	900
RXF10L	1300	n/a	1000

T01.EPS

RECOMMENDED GASKETS BETWEEN FLOWTUBES AND USER'S FLANGES

Use compressed non-asbestos fiber gaskets, PTFE gaskets or gaskets which have equivalent elasticity.

EXTERNAL DIMENSIONS

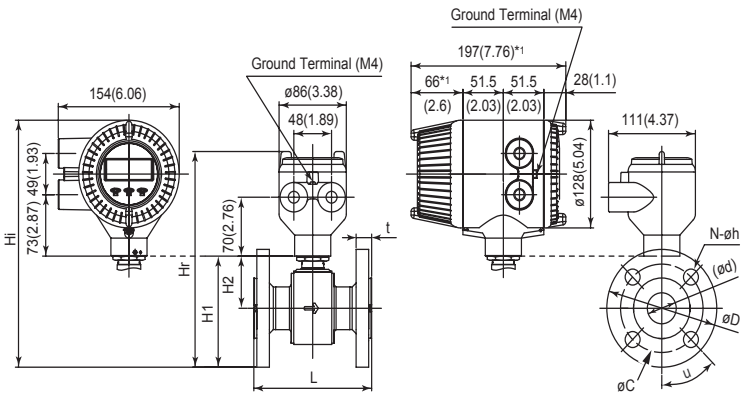
RXF015-RXF050

Unit: mm (approx. in)

RXF015
RXF025
RXF032
RXF040
RXF050

G
W — **D E N P R T** **1 2 N** **Y** □ **1** □ — **C A** □ **1** **C D 4 1**

Integral Flowmeter **Remote Flowtube** **Integral Flowmeter** **Remote Flowtube**



Model	Process Connection		CA1 (ANSI Class 150)				CA2 (ANSI Class 300)				CD4 (DIN PN40)			
	Size code		025	032	040	050	025	032	040	050	025	032	040	050
	Size		25 (1)	32 (1.25)	40 (1.5)	50 (2)	25 (1)	32 (1.25)	40 (1.5)	50 (2)	25 (1)	32 (1.25)	40 (1.5)	50 (2)
	Lining code		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remote flowtube	Face-to-face length	L^{0}_{-3}	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)	200 (7.87)
	Outside dia.	øD	108.0 (4.25)	117.3 (4.62)	127.0 (5.00)	152.4 (6.00)	124.0 (4.88)	133.4 (5.25)	155.4 (6.12)	165.1 (6.50)	115 (4.53)	140 (5.51)	150 (5.91)	165 (6.50)
	Thickness	t *3	18.2 (0.72)	19.7 (0.78)	21.5 (0.85)	23.1 (0.91)	21.5 (0.85)	23.1 (0.91)	24.6 (0.97)	26.4 (1.04)	22 (0.87)	22 (0.87)	22 (0.87)	24 (0.94)
	Inner diameter of lining	ød	27 (1.06)	33.3 (1.31)	38 (1.50)	48.5 (1.91)	27 (1.06)	33.3 (1.31)	38 (1.50)	48.5 (1.91)	27 (1.06)	33.3 (1.31)	38 (1.50)	48.5 (1.91)
	Pitch circle dia.	øC	79.2 (3.12)	88.9 (3.50)	98.6 (3.88)	120.7 (4.75)	88.9 (3.50)	98.6 (3.88)	114.3 (4.50)	127.0 (5.00)	85 (3.35)	100 (3.94)	110 (4.33)	125 (4.92)
	Bolt hole interval	u°	45	45	45	45	45	45	45	22.5	45	45	45	45
Integral flowmeter	Hole dia.	øh	15.7 (0.62)	15.7 (0.62)	15.7 (0.62)	19.1 (0.75)	19.1 (0.75)	19.1 (0.75)	22.4 (0.88)	19.1 (0.75)	14 (0.75)	19 (0.75)	19 (0.75)	18 (0.71)
	Number of holes	N	4	4	4	4	4	4	4	8	4	4	4	4
	Height	H1	112 (4.40)	120 (4.71)	131 (5.17)	155 (6.11)	120 (4.72)	128 (5.02)	146 (5.73)	162 (6.36)	115 (4.54)	131 (5.15)	143 (5.63)	162 (6.36)
	Height	H2	78.5 (3.08)	90 (3.54)	90 (3.54)	90 (3.54)	78.5 (3.08	90 (3.54)	90 (3.54)	79 (3.11)	78.5 (3.08	90 (3.54)	90 (3.54)	90 (3.54)
Remote flowtube	Max. Height	Hr	236 (9.28)	244 (9.59)	255 (10.05)	279 (10.99)	244 (9.60)	252 (9.90)	270 (10.61)	286 (11.24)	239 (9.42)	255 (10.03)	267 (10.51)	286 (11.24)
	Weight kg (lb) *2		3.9 (8.5)	4.5 (9.9)	5.4 (11.9)	7.4 (16.4)	5.0 (11.0)	5.8 (12.9)	7.8 (17.1)	9.0 (19.8)	4.7 (10.4)	6.1 (13.4)	6.9 (15.2)	8.7 (19.2)
Integral flowmeter	Max. Height	Hi	273 (10.76)	281 (11.06)	293 (11.53)	31.7 (12.47)	281 (11.07)	289 (11.38)	307 (12.09)	323 (12.72)	277 (10.90)	292 (11.51)	304 (11.98)	323 (12.72)
	Weight kg (lb)		5.6 (12.2)	6.2 (13.6)	7.1 (15.7)	9.1 (20.1)	6.7 (14.7)	7.5 (16.6)	9.5 (20.8)	10.7 (23.6)	6.4 (14.1)	7.8 (17.2)	8.6 (19.0)	10.4 (22.9)

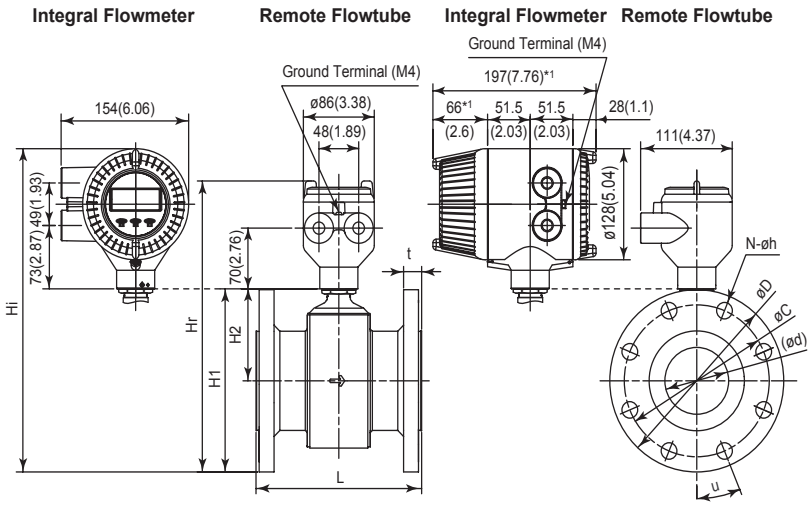
*1: When indicator code N is selected, subtract 12 mm (0.47 in) from the value in the figure.
*2: Waterproof glands and a cable are attached to each submersible style flowtube. Add 9.5 kg (20.9 lb) per 30m to the weight in the table.
*3: Thickness of metallic flange + flange facing but without lining. For t - dimension including lining add 3 mm.

F30.EPS

RXF065-RXF125

Unit: mm (approx. in)

RXF065
RXF080 G — D E N P R T 1 2 N Y □ 1 □ — C A □ 1
RXF100 W — C D 2
RXF125



Model	Process Connection		CA1 (ANSI Class 150)				CA2 (ANSI Class 300)				CD2 (DIN PN16)			
	Size code		065	080	100	125	065	080	100	125	065	080	100	125
	Size		65 (2.5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)	65 (2.5)	80 (3)	100 (4)	125 (5)
	Lining code		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remote flowtube	Face-to-face length	L $^{0}_{-3}$	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)	200 (7.87)	200 (7.87)	250 (9.84)	250 (9.84)
	Outside dia.	øD	190.5 (7.50)	209.6 (8.25)	228.6 (9.00)	254.0 (10.00)	190.5 (7.50)	209.6 (8.25)	254.0 (10.00)	279.4 (11.00)	185 (7.28)	200 (7.87)	220 (8.66)	250 (9.84)
	Thickness	t *2	29.4 (1.16)	32.4 (1.28)	27.9 (1.10)	27.9 (1.10)	29.4 (1.16)	32.4 (1.28)	35.8 (1.41)	39.1 (1.54)	24 (0.94)	24 (0.94)	24 (0.94)	26 (1.02)
	Inner diameter of lining	ød	63.3 (2.77)	76.9 (3.03)	102.9 (4.04)	127.7 (5.03)	63.3 (2.77)	76.9 (3.03)	102.9 (4.04)	127.7 (5.03)	63.3 (2.77)	76.9 (3.03)	102.9 (4.04))	127.7 (5.03)
	Pitch circle dia.	øC	149.4 (5.88)	168.1 (6.62)	190.5 (7.50)	215.9 (8.50)	149.4 (5.88)	168.1 (6.62)	200.2 (7.88)	235.0 (9.25)	145 (5.71)	160 (6.30)	180 (7.09)	210 (8.27)
	Bolt hole interval	u°	22.5	22.5	22.5	22.5	22.5	22.5	22.5	22.5	45	22.5	22.5	22.5
Integral flowmeter	Hole dia.	øh	22.4 (0.88)	22.4 (0.88)	19.1 (0.75)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	19 (0.75)	19 (0.75)	19 (0.75)	19 (0.75)
	Number of holes	N	8	8	8	8	8	8	8	8	4	8	8	8
	Height	H1	182 (7.18)	197 (7.77)	220 (8.66)	247 (9.72)	184 (7.24)	200 (7.87)	233 (9.16)	260 (10.22)	180 (7.07)	193 (7.59)	216 (8.49)	245 (9.65)
	Height	H2	105.5 (4.15)	105.5 (4.15)	119 (4.68)	130 (5.11)	105.5 (4.15)	105.5 (4.15)	119 (4.68	130 (5.11)	105.5 (4.15)	105.5 (4.15)	119 (4.68	130 (5.11)
Remote flowtube	Max. Height	Hr	306 (12.06)	321 (12.65)	344 (13.54)	371 (14.61)	308 (12.13)	324 (12.76)	357 (14.04)	384 (15.11)	304 (11.95)	317 (12.47)	340 (13.37)	369 (14.53)
	Weight kg (lb)*3		12.6 (27.7)	16.6 (36.6)	17.7 (39.1)	20.8 (45.9)	12.6 (27.7)	16.6 (36.6)	26.8 (59.1)	34.9 (76.9)	10.6 (23.3)	11.9 (26.2)	14.5 (32.0)	19.3 (42.5)
Integral flowmeter	Max. Height	Hi	344 (13.53)	359 (14.13)	382 (15.02)	409 (16.08)	346 (13.62)	362 (14.25)	394 (15.52)	421 (16.58)	341 (13.43)	354 (13.94)	377 (14.85)	407 (16.00)
	Weight kg (lb)		14.3 (31.4)	18.3 (40.4)	19.4 (42.8)	22.5 (49.6)	14.3 (31.4)	18.3 (40.4)	28.5 (62.8)	36.6 (80.7)	12.3 (27.1)	13.6 (29.9)	16.2 (35.7)	21.0 (46.2)

*1: When indicator code N is selected, subtract 12 mm (0.47 in) from the value in the figure.

*2: Thickness of metallic flange + flange facing but without lining. For t - dimension including lining add 3 mm.

*3: When submersible type or option code DHC is selected, waterproof glands and cables are attached.
Add 9.5 kg (20.9 lb) per 30m length to the weight in the table.

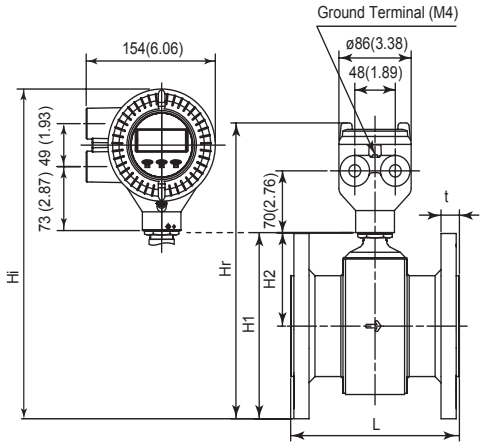
F31.EPS

RXF150, RXF200

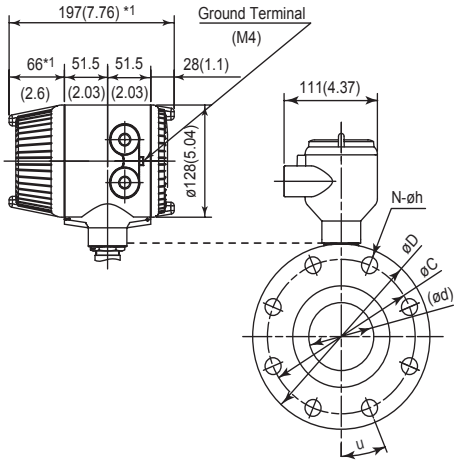
Unit: mm (approx. in)

AXF150 G
AXF200 W — D E N P R T 1 2 N Y □ 1 □ — C A □ 1
C D □

Integral Flowmeter **Remote Flowtube**



Integral Flowmeter **Remote Flowtube**



Model	Process Connection		CA1(ANSI Class 150)		CA2 (ANSI Class 300)		CD1 (DIN PN10)	CD2 (DIN PN16)	
	Size code		150	200	150	200	200	150	200
	Size		150 (6)	200 (8)	150 (6)	200 (8)	200 (8)	150 (6)	200 (8)
	Lining code		Y	Y	Y	Y	Y	Y	Y
Remote flowtube	Face-to-face length	L^{0}_{-3}	300 (11.81)	350 (13.78)	300 (11.81)	350 (13.78)	350 (13.78)	300 (11.81)	350 (13.78)
	Outside dia.	øD	279.4 (11.00)	342.9 (13.50)	317.5 (12.50)	381.0 (15.00)	340 (13.39)	285 (11.22)	340 (13.39)
	Thickness	t *2	30.4 (1.20)	33.4 (1.31)	43.5 (1.71)	46.1 (1.81)	29 (1.14)	27 (1.06)	29 (1.14)
	Inner diameter of lining	ød	156.3 (6.15)	205.1 (8.07)	156.3 (6.15)	205.1 (8.07)	205.1 (8.07)	156.3 (6.15)	205.1 (8.07)
	Pitch circle dia.	øC	241.3 (9.50)	298.5 (11.75)	269.7 (10.62)	330.2 (13.00)	295 (11.61)	240 (9.45)	295 (11.61)
Integral flowmeter	Bolt hole interval	u°	22.5	22.5	15	15	22.5	22.5	15
	Hole dia.	øh	22.4 (0.88)	22.4 (0.88)	22.4 (0.88)	25.4 (1.00)	23 (0.91)	23 (0.91)	23 (0.91)
	Number of holes	N	8	8	12	12	8	8	12
	Height	H1	281 (11.05)	337 (13.29)	300 (11.80)	357 (14.04)	336 (13.23)	284 (11.16)	336 (13.23)
	Height	H2	137.5 (5.40)	164 (6.45)	137.5 (5.40)	164 (6.45)	164 (6.45)	137.5 (5.40)	164 (6.45)
Remote flowtube	Max. Height	Hr	405 (15.93)	461 (18.17)	424 (16.68)	481 (18.92)	460 (18.11)	408 (16.04)	460 (18.11)
	Weight kg (lb) *3		30.9 (68.0)	49.2 (108.4)	52.5 (115.7)	78.8 (173.7)	42.5 (93.7)	28.7 (63.2)	41.9 (92.5)
Integral flowmeter	Max. Height	Hi	442 (17.41)	499 (19.64)	461 (18.16)	518 (20.39)	498 (19.59)	445 (17.52)	498 (19.59)
	Weight kg (lb)		32.6 (71.8)	50.9 (112.2)	54.2 (119.5)	80.5 (177.5)	44.2 (97.5)	30.4 (66.9)	43.6 (96.2)

*1: When indicator suffix code N is selected, subtract 12 mm (0.47 in) from the value in the figure.
*2: Thickness of metallic flange + flange facing but without lining. For t - dimension including lining add 3 mm.
*3: When submersible type or option code DHC is selected, waterproof glands and cables are attached.
Add 9.5 kg (20.9 lb) per 30m length to the weight in the table.

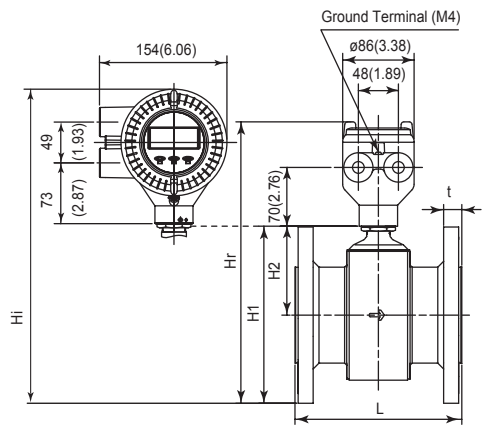
F32.EPS

RXF250-RXF400

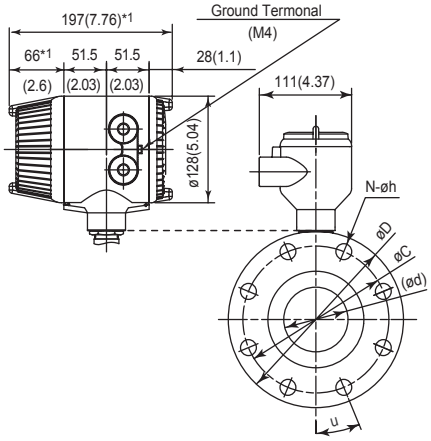
Unit: mm (approx. in)

RXF250
RXF300 G — DENPRT 1 2 N Y □ 1 □ — C A □ 1
RXF350 W — C D □
RXF400

Integral Flowmeter Remote Flowtube



Integral Flowmeter Remote Flowtube



Model	Process Connection		CA1 (ANSI Class 150)				CD1 (DIN PN10)			
	Size code		250	300	350	400	250	300	350	400
	Size		250 (10)	300 (12)	350 (14)	400 (16)	250 (10)	300 (12)	350 (14)	400 (16)
	Lining code		Y	Y	Y	Y	Y	Y	Y	Y
Remote flowtube Integral flowmeter	Face-to-face length	L^{0}_{-5}	450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)	450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)
	Outside dia.	øD	406.4 (16.00)	482.6 (19.00)	533.4 (21.00)	596.9 (23.50)	395 (15.55)	445 (17.52)	505 (19.88)	565 (22.24)
	Thickness	t *2	30.2 (1.19)	31.7 (1.25)	34.9 (1.37)	36.5 (1.44)	26 (1.02)	26 (1.02)	26 (1.02)	26 (1.02)
	Inner diameter of lining	ød	259 (10.20)	309.9 (12.20)	323.4 (12.73)	373.5 (14.70)	259 (10.20)	309.9 (12.20)	323.4 (12.73)	373.5 (14.70)
	Pitch circle dia.	øC	362.0 (14.25)	431.8 (17.00)	476.3 (18.75)	539.8 (21.25)	350 (13.78)	400 (15.75)	460 (18.11)	515 (20.28)
	Bolt hole interval	u°	15	15	15	11.25	15	15	11.25	11.25
	Hole dia.	øh	25.4 (1.00)	25.4 (1.00)	28.4 (1.12)	28.4 (1.12)	22 (0.87)	22 (0.87)	22 (0.87)	26 (1.02)
	Number of holes	N	12	12	12	16	12	12	16	16
	Height	H1	399 (15.72)	461 (18.16)	503 (19.79)	560 (22.05)	394 (15.49)	443 (17.42)	529 (20.83)	584 (23.00)
	Height	H2	191.5 (7.53)	218.5 (8.59)	236 (9.29)	262 (10.30)	191.5 (7.53)	218.5 (8.59)	277 (10.91)	302 (11.89)
Remote flowtube	Max. Height	Hr	523 (20.60)	585 (23.04)	627 (24.68)	684 (26.93)	518 (20.37)	567 (22.30)	653 (25.71)	708 (27.87)
	Weight kg (lb)*3		83.4 (183.8)	104.5 (230.4)	151.5 (334.0)	184.9 (407.7)	73.0 (161.0)	79.4 (174.9)	112.5 (248.0)	129.7 (285.9)
Integral flowmeter	Max. Height	Hi	561 (22.07)	623 (24.52)	664 (26.15)	722 (28.41)	555 (21.85)	604 (23.78)	650 (25.59)	706 (27.78)
	Weight kg (lb)		85.1 (187.6)	106.2 (234.2)	153.2 (337.8)	186.6 (411.4)	74.7 (164.7)	81.1 (178.7)	114.2 (251.7)	131.4 (289.6)

*1: When indicator suffix code N is selected, subtract 12 mm (0.47 in) from the value in the figure.
*2: Thickness of metallic flange + flange facing but without lining. For t - dimension including lining add 3 mm.
*3: When submersible type or option code DHC is selected, waterproof glands and cables are attached.
Add 9.5 kg (20.9 lb) per 30m length to the weight in the table.

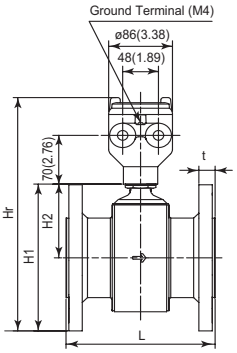
F33.EPS

RXF450-RXF10L

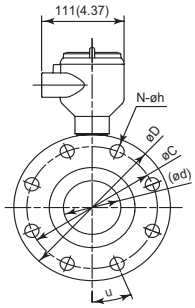
RXF450
RXF500
RXF600
RXF700 **G** **N** **CA1** **1**
RXF800 **W** — **T** **NY**□**1**□— **CD1** □ **1**
RXF900
RXF10L

Unit: mm (approx. in)

Remote Flowtube



Remote Flowtube



Model	Process Connection		CA1 (ANSI Class 150)			CD1(DIN PN10)						
	Size code		450	500	600	450	500	600	700	800	900	10L
	Size		450 (18)	500 (20)	600 (24)	450 (18)	500 (20)	600 (24)	700 (28)	800 (32)	900 (36)	1000 (40)
	Lining code		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Remote Flowtube	Face-to-face length L	Lay lenght code 1	690 (27.17)	750 (29.53)	800 (31.50)	690 (27.17)	750 (29.53)	800 (31.50)	900 (35.43)	1050 (41.34)	1200 (47.24)	1300 (51.18)
		Lay lenght code 3	650 (25.59)	650 (25.59)	780 (30.71)	650 (25.59)	650 (25.59)	780 (30.71)	910 (35.83)	1040 (40.94)	1170 (46.06)	----
		Lay lenght code 4	600 (23.62)	600 (23.62)	600 (23.62)	600 (23.62)	600 (23.62)	600 (23.62)	700 (27.56)	800 (31.50)	900 (35.43)	1000 (39.37)
	Outside dia.	ØD	635 (25.00)	698.5 (27.50)	812.8 (32.00)	615 (24.21)	670 (26.38)	780 (30.71)	895 (35.24)	1015 (39.96)	1115 (43.90)	1230 (48.43)
	Thickness	t*2	39.7 (1.56)	42.9 (1.69)	47.7 (1.88)	28 (1.10)	28 (1.10)	28 (1.10)	30 (1.18)	32 (1.26)	34 (1.34)	34 (1.34)
	Inner diameter of lining	Ød	436 (17.17)	478 (18.82)	586 (23.07)	436 (17.17)	478 (18.82)	586 (23.07)	691 (27.20)	791 (31.14)	890 (35.04)	994 (39.13)
	Pitch circle dia.	C	476.2 (22.66)	635 (25.00)	749.3 (29.50)	565 (22.24)	620 (24.41)	725 (28.54)	840 (33.07)	950 (37.40)	1050 (41.34)	1160 (45.67)
	Bolt hole interval	θ°	11.25	9	9	9	9	9	7.5	7.5	6.4	6.4
	Hole dia.	h	31.7 (1.25)	31.7 (1.25)	35 (1.38)	26 (1.02)	26 (1.02)	30 (1.18)	30 (1.18)	33 (1.30)	33 (1.30)	36 (1.42)
	Number of holes	N	16	20	20	20	24	20	24	24	28	28
	Height	H1	651 (25.63)	450 (17.72)	500 (19.69)	641 (25.24)	450 (17.72)	500 (19.69)	550 (21.65)	600 (23.62)	650 (25.59)	700 (27.56)
	Height	H2	334 (13.15)	426 (16.77)	474 (18.66)	334 (13.15)	426 (16.77)	474 (18.66)	529 (20.83)	584 (22.99)	633 (24.92)	682 (26.85)
	Max. Height	Hr	775 (30.51)	930 (36.61)	1028 (40.47)	765 (30.12)	930 (36.61)	1028 (40.47)	1133 (44.61)	1238 (48.74)	1337 (52.64)	1436 (56.54)
	Weight kg (lb)*1		300 (661.4)	360 (793.7)	450 (992.1)	229 (526.9)	253 (557.8)	382 (842.2)	490 (1080.3)	659 (1452.8)	844 (1860.7)	1160 (2557.4)

*1: When submersible type or option code DHC is selected, waterproof glands and cables are attached.
Add 9.5 kg (20.9 lb) per 30m length to the weight in the table.
*2: Thickness of metallic flange + flange facing but without lining. For t - dimension including lining add 3 mm.

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Unless otherwise specified, differences in the dimensions are refering to the following table.

General tolerance in the dimensional outline drawing.

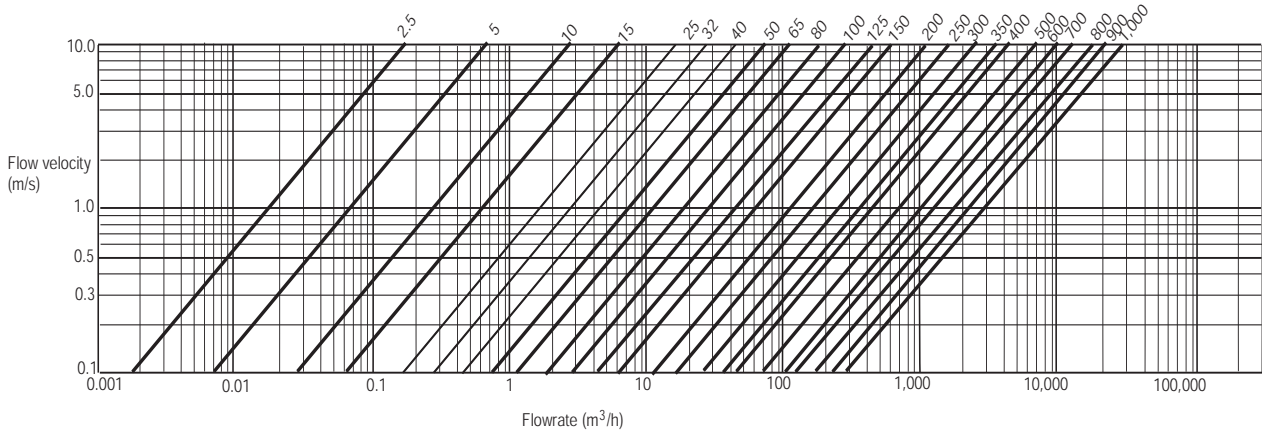
Unit : mm (approx.inch)

Category of basic dimension		Tolerance	Category of basic dimension		Tolerance
Above	Equal or below		Above	Equal or below	
	3 (0.12)	±0.7 (60.03)	500 (19.69)	630 (24.80)	±5.5 (62.17)
3 (0.12)	6 (0.24)	±0.9 (60.04)	630 (24.80)	800 (31.50)	±6.25 (60.25)
6 (0.24)	10 (0.39)	±1.1 (60.04)	800 (31.50)	1000 (39.37)	±7.0 (60.28)
10 (0.39)	18 (0.71)	±1.35 (60.05)	1000 (39.37)	1250 (49.21)	±8.25 (60.32)
18 (0.71)	30 (1.18)	±1.65 (60.06)	1250 (49.21)	1600 (62.99)	±9.75 (60.38)
30 (1.18)	50 (1.97)	±1.95 (60.08)	1600 (62.99)	2000 (78.74)	±11.5 (60.45)
50 (1.97)	80 (3.15)	±2.3 (60.09)	2000 (78.74)	2500 (98.43)	±14.0 (60.55)
80 (3.15)	120 (4.72)	±2.7 (60.11)	2500 (98.43)	3150 (124.02)	±16.5 (60.65)
120 (4.72)	180 (7.09)	±3.15 (60.12)			
180 (7.09)	250 (9.84)	±3.6 (60.14)			
250 (9.84)	315 (12.40)	±4.05 (60.16)			
315 (12.40)	400 (15.75)	±4.45 (60.18)			
400 (15.75)	500 (19.69)	±4.85 (60.19)			

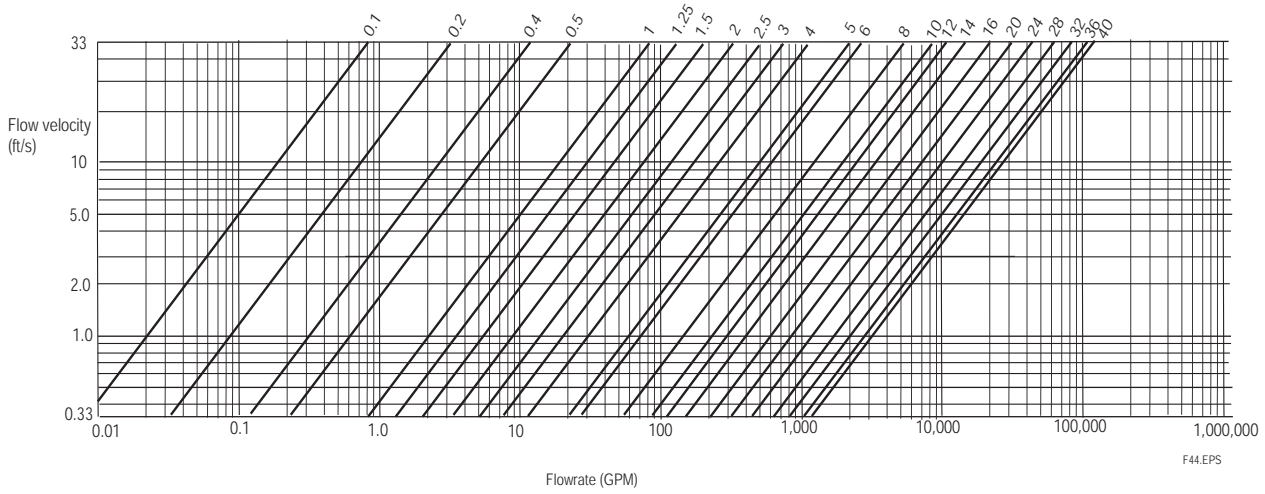
Remarks: The numeric is based on criteria of tolerance class IT18 in JIS B 0401.

SIZING DATA (Measurable flow velocity is from 0 m/s.)

SI Units Size: mm



English Units Size: in



ORDERING INFORMATION

Note 1: When ordering a remote flowtube and a remote converter, specify the flow span, unit, pulse weight and totalizer display pulse weight for the order details of the flowtube.
Then these parameters will be set in the combined converter before shipment.

Note 2: Some options, if ordered, require the relevant specifications to be input when ordering.

1. Model, specification and option codes.
2. Converter for combined use (when ordering a remote type flowtube)

   Model, suffix code, optional code, and tag number (if specified) of a converter for combined use.

   Refer to “ORDERING INFORMATION” of

   GS 01R21C01-E-H, GS 01R21C02-E-H.
3. Tag number

   Each tag number can be specified in up to 16 characters in a combination of letters (upper or lower case), numbers, “-” and “.”. If specified, the tag number is inscribed on the product’s name plate and tag plate (if optional code SCT is selected). If the product is an integral flowmeter, the tag number is also written into the memory of its converter. For HART protocol, up to 8 characters can be specified. If the user wishes to change only the setting to be written into a converter’s memory, specify the software tag.
   If a tag number is not specified, the tag number is set as a blank.
4. Flow rate spans and units

   Flow span can be specified with the numeric within the value of 0.0001 to 32000.
   And it can be up to five digits, to a maximum of 32000 ignoring the decimal point.
   And a fraction is limited to the fourth decimal place.
   Integral flowmeters are set to the first range in the forward direction. Remote flowtubes are set to the first range in the forward direction of the converter (RXFA11 or RXFA14) with which they are to be combined.

   If a flow rate span and its unit are not specified, the relevant product is delivered with the default setting in m³/h given in table “Measurable Flow rate Range” on page 6-6.
5. Output pulse weight

   If specified, volume per pulse shall be set. Unless specified, the relevant product is delivered with 0.1 m³/pulse for sizes up to RXF100 and 1 m³/pulse for larger sizes. However DO or DIO output is set to “No function”. If needed please activate in F20/F21.
6. Totalizer display pulse weight

   If specified, volume per pulse shall be set. Unless specified, the relevant product is delivered with 0.1 m³/pulse for sizes up to RXF100 and 1 m³/pulse for larger sizes. However totalizer line is not displayed on indicator. If needed please activate in B40/B41/B42.
7. Fluid name

RELATED INSTRUMENTS

BT200 Brain Terminal: GS 1C0A11-E

RXFA11 Magnetic Flowmeter Remote Converter : GS 01R21C01-00E-E

RXFA14 Magnetic Flowmeter Remote Converter : GS 01R21C02-00E-E

7. PED (PRESSURE EQUIPMENT DIRECTIVE)

This chapter describes further requirements and notices concerning the PED (Pressure Equipment Directive). The description in this chapter is prior to other description in this User's Manual.

(1) Technical Data

Module: H
Type of Equipment: Piping
Type of Fluid: Liquid
Group of Fluid: 2

General-Purpose Use / Submersible Style

MODEL	DN (mm) (*1)	PS (MPa) (*1)	PS DN (MPa · mm)	CATEGORY(*2)
RXF015G/W	15	4	60	Article 3, (*3) paragraph 3
RXF025G/W	25	4	100	Article 3, (*3) paragraph 3
RXF032G/W	32	4	128	SEP
RXF040G/W	40	4	160	SEP
RXF050G/W	50	4	200	SEP
RXF065G/W	65	2	130	SEP
RXF080G/W	80	2	160	SEP
RXF100G/W	100	2	200	SEP
RXF125G/W	125	2	250	SEP
RXF150G/W	150	2	300	SEP
RXF200G/W	200	2	400	SEP
RXF250G/W	250	2	500	I
RXF300G/W	300	2	600	I
RXF350G/W	350	1	350	I
RXF400G/W	400	1	400	I
RXF450G/W	450	1	450	I
RXF500G/W	500	1	500	I
RXF600G/W	600	1	600	I
RXF700G/W	700	1	700	I
RXF800G/W	800	1	800	I
RXF900G/W	900	1	900	I
RXF10LG/W	1000	1	1000	I

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*1: PS: Maximum allowable pressure for Flowtube
DN: Nominal size
*2: For details, see "Table 4 covered by ANNEX II of EC Directive on Pressure Equipment Directive 97/23/EC."
*3: RXF015G to RXF025G/W are outside the scope of PED's CE marking.

(2) Installation

WARNING

- Tighten the bolts of the piping joints according to the prescribed torque values.
- Take measures to protect the flowmeters from forces caused by vibration channeled through the piping.

(3) Operation

WARNING

- The instrument should be operated with the temperature and pressure of the fluid under normal operating conditions.
- The ambient temperature should be that of normal operating conditions.
- Take measures to prevent excessive pressure such as water hammer, etc. To avoid water hammer prevent the pressure from exceeding the PS (maximum allowable pressure) by setting the system's safety valves, etc. appropriately.
- Should external fire occur, take safety measures at the device itself or system-wide prevent it having an effect on the flowmeters.
- Avoid using fluids exceeding the corrosion proof limitations of the lining and electrodes.
- Take measures not to abrade the metal pipe, and avoid abrading the lining by using fluids such as slurry and sand are contained.
- The operator is responsible that no corrosion and/or erosion is caused by the medium, which reduces the safety of the unit as pressure vessel. Corrosion and erosion can make the unit fail and can lead to the endangering of persons and facilities. If corrosion and erosion are possible, the integrity of the tubes has to be checked periodically.

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