TOSHIBA

6F8A0882

ELECTROMAGNETIC FLOWMETER DETECTOR

MODEL GF630, GF632

INSTRUCTION MANUAL

TOSHIBA CORPORATION

© TOSHIBA Corporation 2010
All Rights Reserved.

NOTES

Before using the equipment, please read this manual carefully and understand the contents, and then use the equipment correctly.

- **NEVER attempt to operate the equipment in any ways that are not described in this instruction manual.**
- **After reading this manual, store it with care in a place where it can be referred to whenever needed.**
- **Please be sure that this manual is delivered to the personnel who will use this product.**

NOTICE

We thank you very much for your purchase of our GF630 series electromagnetic flowmeter detector.

Integral type GF630/LF600,LF610 and LF620
Separate type detector GF632

This instruction manual describes the notes on using an electromagnetic flowmeter detector, installation, configuration and maintenance. It is intended for the personnel in charge of installation, operation and maintenance.
To use this product properly and safely, read this manual (6F8A0882) carefully before using this product. After reading this manual, store it in a place where it can be referred to whenever needed.
This manual uses the following markers to identify the integral type or separate type when it describes items specific to the integrated type or separate type. Items without this marker are common items to the integral type and separate type.

Integral type GF630/LF600,LF610 and LF620: (Integral)

Separate type detector GF632: (Separate)

Toshiba GF63* electromagnetic flowmeter detectors can be used in combination with various types of electromagnetic flowmeter conveters (LF600,LF610,LF620 and LF602,LF612,LF622).

For the notes on usage, connecting, wiring, installation, configuration and maintenance of the combined converter, check the model number of the combined converter and read the instruction manual of the relevant converter.

About **Safety Precautions**

Read the **Safety Precautions** described at the front carefully and understand the contents before using this product.

The "**Safely symbols**" used in the **"Safety Precautions**" are shown in a location such as in the margin to the left of the corresponding commentary in the main text.

NOTES

1. **The reproduction of the contents of this Manual in any form, whether wholly or in part, is not permitted without explicit prior consent and approval.**
2. **The information contained in this Manual is subject to change or review without prior notice.**
3. **Be sure to follow all safety, operating and handling precautions described in this Manual and the regulations in force in the country in which this product is to be used.**
4. **For the detail of the converter, Please refer to the converter LF600,LF610 ,LF620 and LF602, LF612 LF622 instruction manual.**

8th Edition Apr. 2011

SAFETY PRECAUTIONS

Safety signs and labels affixed to the product and/or described in this manual give important information for using the product safely. They help prevent damage to property and obviate hazards for persons using the product. Make yourself familiar with signal words and symbols used for safety signs and labels. Then read the safety precautions that follow to prevent an accident involving personal injury, death or damage to property.

Explanation of signal words

The signal word or words are used to designate a degree or level of hazard seriousness.
The signal words used for the product described in this manual are WARNING and CAUTION.

⚠ **WARNING**	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	Indicates a potentially hazardous situation which, if not avoided, may result in minor to moderate injuries or in property damage.

Safety symbols

The following symbols are used in safety signs and labels affixed to a product and/or in the manual for giving safety instructions.

	Indicates an action that is prohibited. Simply DON'T do this action. The prohibited action is indicated by a picture or text inside or next to the circle
	Indicates an action that is mandatory. DO this action. The mandatory action is indicated by a picture or text inside or next to the circle (white letters on a colored background).
	Indicates a potential hazard. The potentially hazardous situation is indicated by a picture or text inside or next to the triangle.

SAFETY PRECAUTIONS(continued)

Safety Precautions for Installation and Wiring

⚠ WARNING

- Do not use the GF630/LF600,LF610,LF620 and GF632 in an **explosive atmosphere**.

DON'T

Using this product except for the FM Approval type in an explosive atmosphere can cause **explosion**
.

⚠ CAUTION

- **Install a switch and fuse** to isolate the GF630/LF600,LF610,LF620 and GF632 from mains power.

DO

Power supply from mains power can cause **electric shock** or **circuit break-down**.

- Use an **appropriate device** to carry and install the GF630/LF600,LF610,LF620 and GF632.

DO

If this product **falls to the ground**, injury, or malfunction of or damage to the product, can be caused.

- **Turn off mains power** before conducting wiring work.

DO

Wiring while power is applied can cause **electric shock**.

- **Do not modify or disassemble** the GF630/LF600,LF610,LF620 and GF632 unnecessarily.

DON'T

Modifying or disassembling this product can cause **electric shock**, **malfunction of or damage to this product**.

- **Turn off mains power** before working on pipes.

DO

Working on pipes while power is applied can cause **electric shock**.

- **Ground** the GF630/LF600,LF610,LF620 and GF632 **independently from power equipment. (100 ohm or less ground resistance)**

DO

Operating this product without grounding can cause **electric shock** or **malfunction**.

- Do not conduct wiring work **with bare hands**.

DON'T

Remaining electric charge even if power is turned off can still cause **electric shock.**

Use **crimped terminal lugs** for the terminal board and GND terminal.

DO

Loose connections can cause **electric shock**, **fire from excessive current or system malfunction**.

- Do not work on piping and wiring **with wet hands**.

DON'T

Wet hands may result in **electric shock**.

The label shown left is placed near the terminal board for power supply on the converter.
(A black border and symbol on yellow triangle)
Be alert to **electric shock**.

SAFETY PRECAUTIONS (continued)

Safety Precautions for Maintenance and Inspection

<table>
<tr><th colspan="3">⚠ CAUTION</th></tr>
<tr><td colspan="2">■ Do not conduct wiring work with wet hands.

DON'T
Wet hands may result in electric shock.</td><td>■ Do not conduct wiring work when power is applied.
DON'T
Wiring while power is applied can cause electric shock.</td></tr>
<tr><td colspan="2">■ Do not touch the GF630/LF600,LF610,LF620 and GF632 main body when high temperature fluid is being measured.
DON'T
The fluid raises the main body temperature and can cause burns when touched.</td><td> 
The label shown left is placed near the terminal board for power input of the converter. (A black border and symbol on yellow triangle)
Be alert to electric shock.</td></tr>
</table>

Usage limitation

This product is **not manufactured for applying to a system requiring safety directly involved human life as follows**. Please contact your nearest Toshiba reprehensive if there is a possibility of using this product for such use.

- **Main control systems of nuclear power plants, safety protection systems in nuclear facilities or other important systems requiring safety**
- **Medical control systems relating to life support**

Warranty and Limitation of Liability

Toshiba does not accept liability for any damage or loss, material or personal, caused as a direct or indirect result of the operation of this product in connection with, or due to, the occurrence of any event of force majeure (including fire or earthquake) or the misuse of this product, whether intentional or accidental.

Handling Precautions

To obtain the optimum performance from the GF630/LF600,LF610,LF620 and GF632 for years of continuous operation, observe the following precautions.

(1) **Do not store or install** the flowmeter in:

- **places where there is direct sunlight**. If this is unavoidable, use an appropriate **sunshade**. If the control keys (infrared switches) are exposed to direct sunlight, **they may not function correctly**.
- places where there is snow and ice
  Infrared switches may not function correctly.
- places where **excessive vibration or mechanical shock** occurs.
- places where **high temperature or high humidity** conditions obtain.
- places where **corrosive atmospheres** obtain.
- **places submerged under water**.
- **place where there is slop floor**. To put the flowmeter temporarily on the floor, **place it carefully with something, such as stopper, to support it so that the flowmeter will not topple over**.

(2) In the case that the piping is **non-conductive** material, make sure to install the **grounding rings**(option) to each flange of detector using the M3 or M4 screw before piping.

(3) Wire cables **correctly and securely**.

Be sure to ground at the converter side **(grounding resistance 100 ohm or less**).

Avoid a common ground **used with other equipment** where earth current may flow. An **independent ground** is preferable

(4) Select cable paths away from electrical equipment (motors, transformers, or radio transmitters), which causes electromagnetic or electrostatic interference.

(5) If the inside of the converter and detector's terminal box are wetted or humidified, it may cause insulation deterioration, which can result in **fault or noise occurrence**. So do not conduct **wiring in the open air on rainy days**.
Also, be careful not to wet down the converter and detector's terminal box even in the case of indoor wiring, and complete wiring work in a short period of time.

(6) Make sure the fluid to be measured will not freeze in the detector pipe. This can cause damage to the detector pipe.

(7) Select appropriate wetted materials suited for the process fluid to be measured. Otherwise, fluid leakage due to corrosion can be caused.

(8) **Observe the following precautions when you open the converter housing cover**:

- **Do not open the cover in the open air unprotected against rain or wind**. This can cause **electric shock** or cause **damage to the flowmeter electronics**.

Do not open the cover **under high ambient temperature or high humidity conditions or in corrosive atmospheres**. This can cause **deterioration of system accuracy** or cause **damage to the flowmeter electronics**.

Handling Precautions (continued)

(9) Since a varistor is built in converter, **do not conduct a withstand voltage test for the converter**.
In addition, the voltage for checking the insulation of the converter must be **250VDC or lower.**

(10) This product may cause **interference to radio and television sets** if they are used near the installation site. **Use metal conduits etc. for cables to prevent this interference**.

(11) Radio transmitters such as transceivers or cellular phones may cause interference to the flowmeter if they are used near the installation site. Observe the following precautions when using them:

- **Close a transmitter cover** before using a transceiver.
- Do not use a transceiver whose output power is more than **5 W**.
- Move the antenna of a transceiver or a cellular phone **at least 50 cm** away from the flowmeter and signal cables when using it.
- **Do not use a radio transmitter or a cellular phone near the flowmeter** while it is operating online. The transmitter or cellular phone's output impulse noise may interfere with the flowmeter.
- **Do not install a radio transmitter antenna** near the flowmeter and signal cables.

(12) For reasons of flowmeter failure, inappropriate parameters, unsuitable cable connections or poor installation conditions, the flowmeter may not operate properly. To prevent any of these problems causing a system failure, **it is recommended that you have preventive measures designed and installed on the flowmeter signal receiving side**.

(13) **For installation and connectirn of the converter, check the model number of converter and read the instruction manual of the relevant converter.**

*** We assume no responsibility for nonconformity caused by violation of precautions described in this manual or used in violation of the installation method and the operation method stipulated in a relevant ordinance or other regulations.**

About disposal

When you dispose of this electromagnetic flowmeter detector, follow the ordinance or regulations of your state.

Table of Contents

1. Product Inspection and Storage

1.1 Product Inspection

GF630 series electromagnetic flowmeter is shipped in a cardboard container filled with shock-absorbing materials. Open the package carefully and check as follows:

- Make sure the following items are included in the package.

  For the **integral type** (when a converter and detector are united)

Integral

Electromagnetic flowmeter main unit	1 unit
Instruction manuals	One each for the converter and detector
Ground cable	2 pieces

  For the separate type (when a converter and detector are separated)

Separate

Electromagnetic flowmeter converter	1 unit
Electromagnetic flowmeter detector	1 unit
Instruction manuals	each for the converter and detector
Ground cable	2 pieces

- Inspect the flowmeter for indications of **damage** that may have occurred during shipment.
- Make sure the type and specifications of the flowmeter are in accordance with the **ordered specifications**.

If you cannot find the items listed above or any problem exists, contact your nearest Toshiba representative.

1.2 Strage

To store the electromagnetic flowmeter after opening the package, select a storing place as follows and keep it under the conditions described below:

⚠ CAUTION

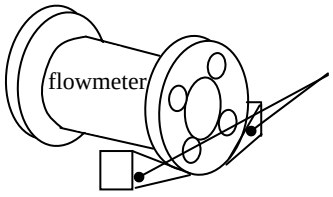
(1) Avoid places where there is **direct sunlight, rain or wind**.

(2) Store the product in a well-ventilated place. Avoid places of **extremely high humidity** or **extremely high or low temperature**. The following environment is recommended:
- **Humidity range: 10 to 90% RH (no condensation)**
- **Storage temperature: –25 to +65° C**

(3) Avoid places where **vibrations or mechanical shock occur**.

(4) If it leaves the cover of converter open while being stored, gradual deterioration of circuit isolation can be caused. And then **don't open the cover** until it is connected with wires.

(5) To put the flowmeter temporarily on the floor, **place it carefully with something, such as stopper, to support it so that the flowmeter will not topple over**.



Stopper, etc. to prevent from toppling over it.

2. Overview

The GF630 and GF632 electromagnetic flowmeter measures the volumetric flow rates of electrically conductive
materials on the basis of Faraday's Law of electromagnetic induction.
The device consists of two units: the GF630 and GF632 detector, through which the fluid to be measured flows,
and the converter, which receives the electromotive force signals from the detector, then converts the signals into the 4–20 mA dc signal.

Features

Every type of electromagnetic flowmeter has the following features:

- Fluid flow is not obstructed and pressure loss is negligible.
- The process fluid's temperature, pressure, density or flow conditions has no effect on the accuracy of the flowmeter.
- The flowmeter output is directly proportional to the process flow rate, thus it is easy to read its output.

3. Names of Parts

3.1 Appearance

3.1.1 Appearance of GF630/LF600 and LF610

Integral

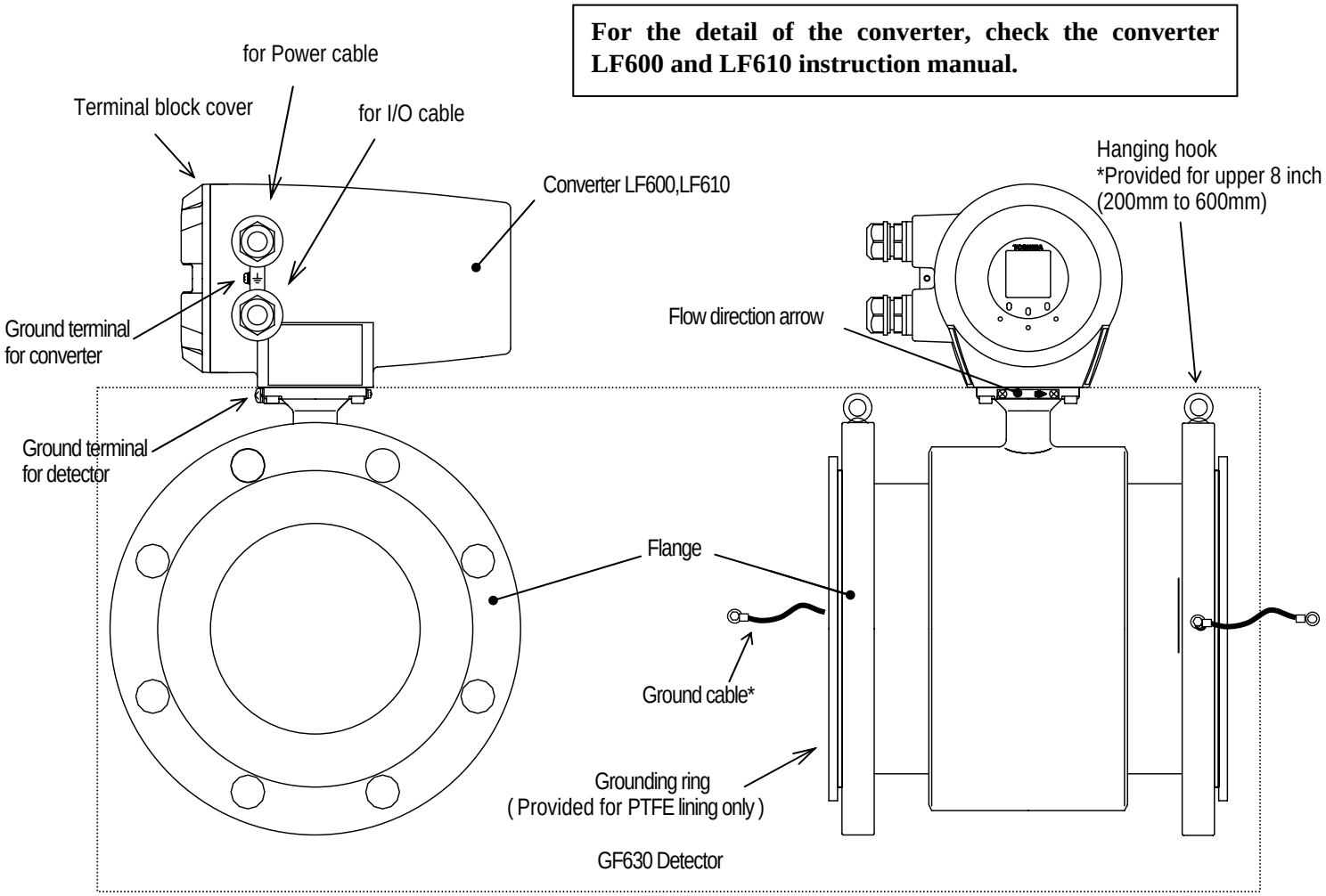


Figure 3.1.1 Appearance of GF630/LF600 and LF610

Note: The ground cables are included in the package, so install them to flanges as shown in the Fig.4.5 as needed. (The screws are equipped to detector flanges.)

3.1.2 Appearance of GF630/LF620

Integral

For the detail of the converter, check the converter LF620 instruction manual.

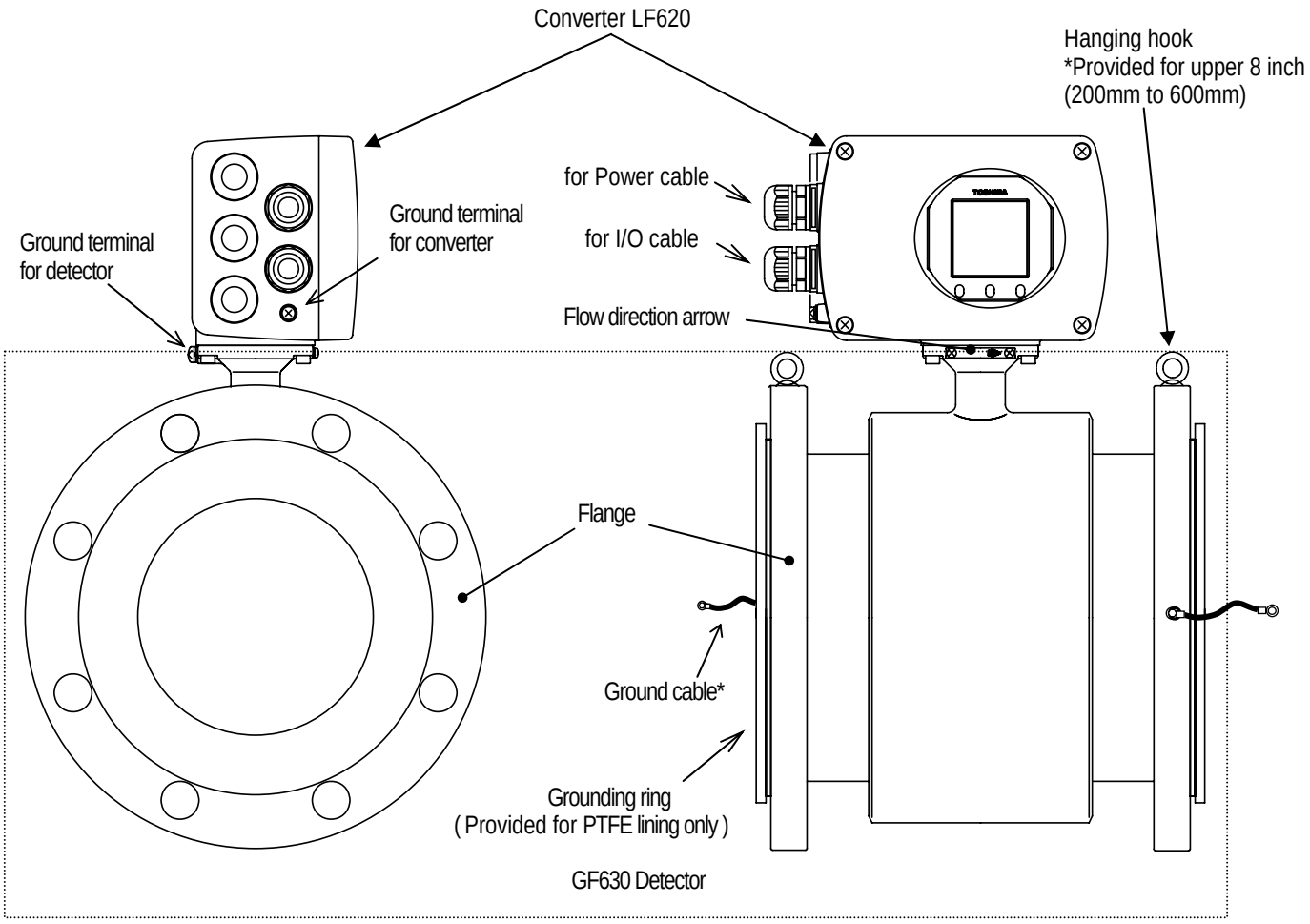


Figure 3.1.2 Appearance of GF630/LF620

Note: The ground cables are included in the package, so install them to flanges as shown in the Fig.4.5 as needed. (The screws are equipped to detector flanges.)

3.1.3 Appearance of Detector GF632

Separate

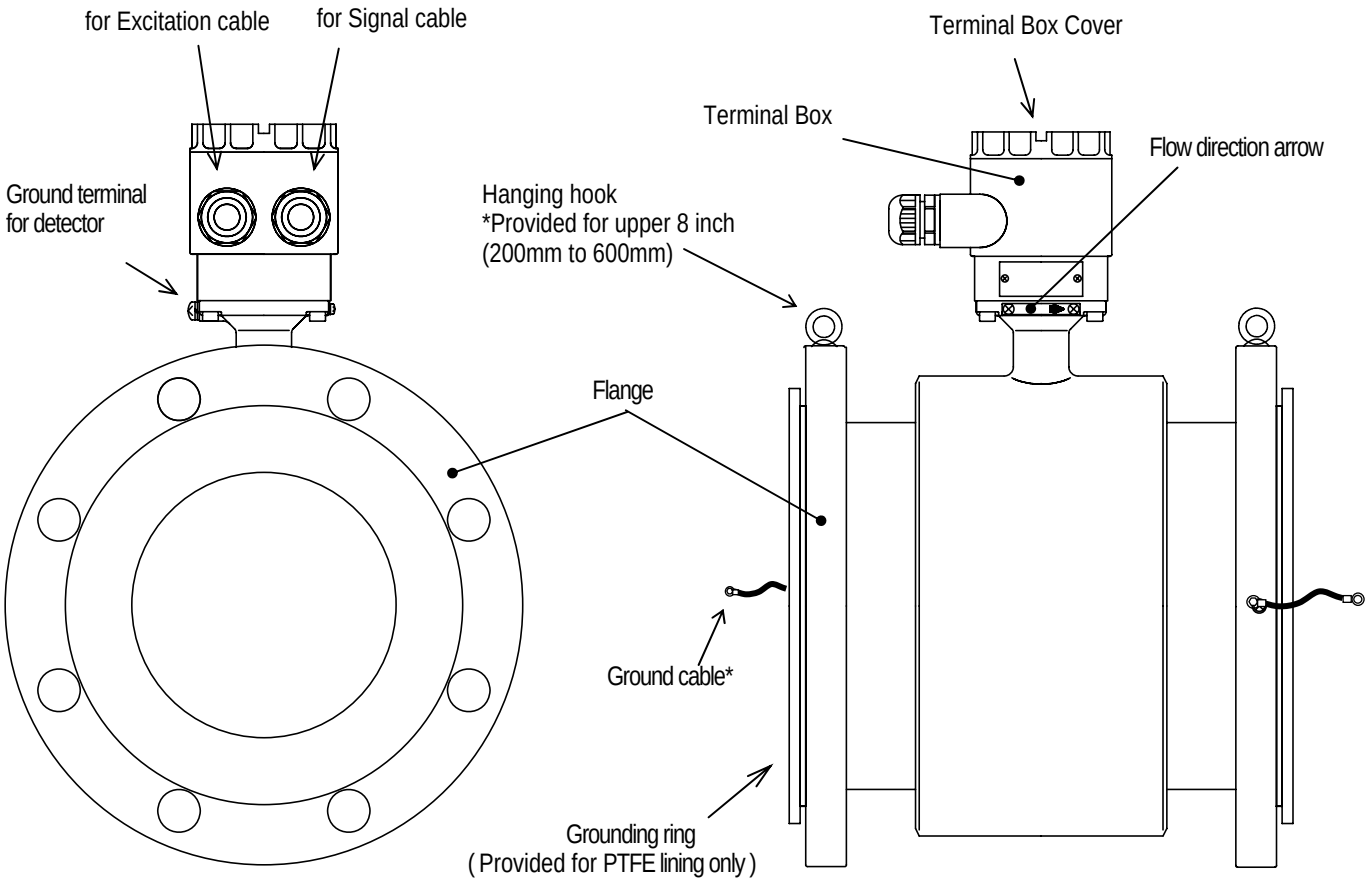


Figure 3.1.3 Appearance of Detector GF632

Note: The ground cables are included in the package, so install them to flanges as shown in the Fig.4.5 as needed. (The screws are equipped to detector flanges.)

3.2 Construction of the terminal blocks

3.2.1 Terminal Block Construction of GF630/LF600 and LF610,LF620 Type

Integral **For the detail of the converter, check the converter LF600,LF610 and LF620 instruction manual.**

3.2.2 Terminal Block Construction of GF632 Type

Separate

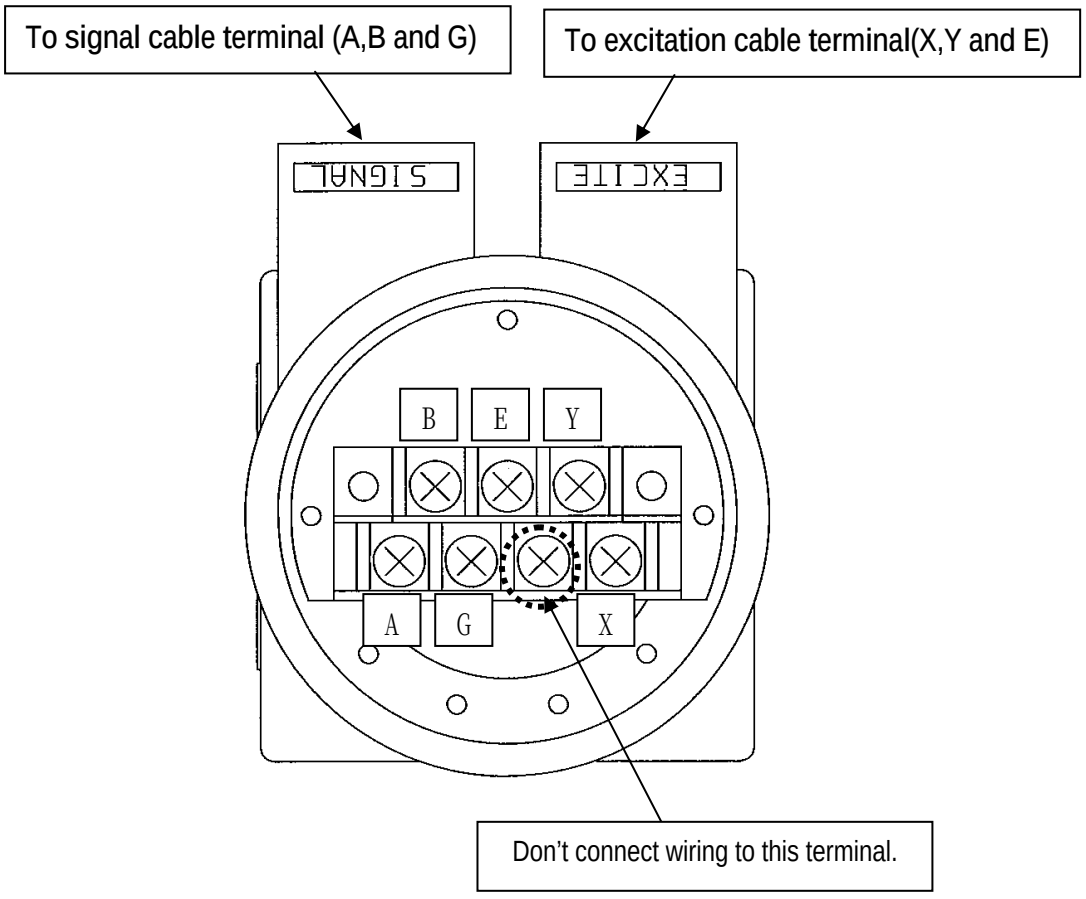


Figure 3.2.2 Terminal Block of GF632

4. Installation

Safety Precautions for Installation

⚠ WARNING

■ Do not use the GF630/LF600,LF610,LF620 and GF632 in an **explosive atmosphere**.

DON'T

Using this product except for FM Approval type in an explosive atmosphere can cause **explosion**.

⚠ CAUTION

■ **Ground the GF630/LF600,LF610,LF620 and GF632 independently from power equipment. (100 ohm or less ground resistance)**

DO

Operating this product without grounding can cause **electric shock** or **malfunction**.

■ **Use an appropriate device to carry and install the GF630/LF600,LF610,LF620 and GF632** .

DO

If his product **falls to the ground**, injury, or malfunction of or damage to the product, can be caused.

■ **Install a switch and fuse** to isolate the GF630/LF600,LF610,LF620 and GF632 from mains power.

DO

Power supply from mains power can cause **electric shock** or **circuit break-down**.

■ **Do not modify or disassemble the GF630/LF600,LF610,LF620 and GF632 unnecessarily.**

DON'T

Modifying or disassembling this product can cause **electric shock**, **malfunction or damage to this product.**

■ **Do not work on piping and wiring with wet hands.**

DON'T

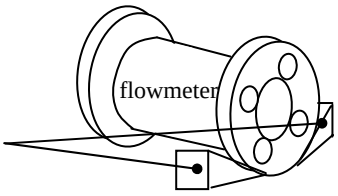
Wet hands may result in **electric shock**

The label shown left is placed near the terminal board for power supply to the converter.
Be alert to **electric shock**

■ To put the flowmeter temporarily on the floor, **place it carefully with something, such as stopper, to support it so that GF630/LF600,LF610,LF620 and GF632 will not topple over**.

DO

Stopper, etc. to prevent from toppling over it.



4.1 Notes on Selecting the Installation Location

1. Avoid places within the immediate proximity of equipment producing electrical interference (such as **motors, transformers, radio transmitters, electrolytic cells, or other equipment causing electromagnetic or electrostatic interference**).
2. **Avoid places where excessive pipe vibration occurs**.
3. Avoid places where fluid runs in a pulsating form.
4. Avoid places where there is **direct sunlight**. If this is unavoidable, use an appropriate **shade**
5. Avoid places where **corrosive atmospheres** or **high humidity conditions** obtain.
6. Avoid places of **too great an elevation or constricted areas** where clearance for installation or maintenance work is not provided.
7. Design piping so that the detector pipe is always filled with fluid, whether the fluid is flowingor not.
8. The detector has no adjustable piping mechanism. Install an adjustable short pipe where needed.
9. Chemical injections should be conducted on the downstream side of the flowmeter.

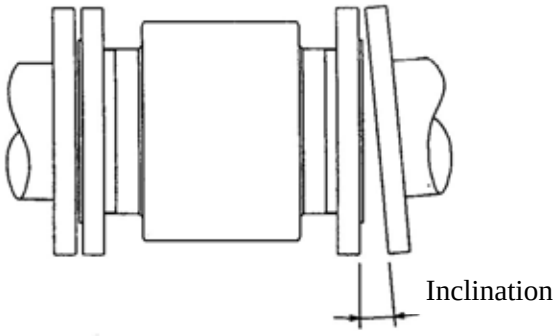
Separate 10. The standard length of the cable that connects **the detector and converter is 30m**. Select the converter installation location so that the distance of the detector and converter will not exceed 30m.

4.2 Mounting Procedure

4.2.1 Pipe checks

(1)Before installing pipes, check for any leaning or misplacement (or eccentricity) as illustrated in Figure 4.1. An attempt to unreasonably connecting pipes that are inclined may lead to a detector breakdown or fluid leakage. Connecting pipes in an eccentric state may also cause local wears and tears of linings and grounding rings, as well as measurement errors.
Before installing pipes, make sure to flash the interior of the pipes to remove deposited matters.

(a) Pipe leaning



(b) Pipe axis misplacement (or eccentricity)

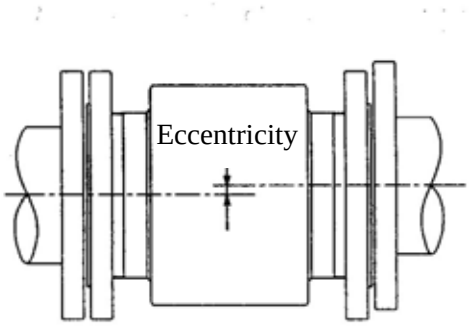


Figure 4.1 Pipe leaning and axis misplacement

(2) Preventing an Empty Pipe Condition

Fix the relevant pipes installed on both sides of the detector by attach fittings, etc. to support the pipe. By supporting the pipes, not only the pipe vibration is reduced but also the damage to the pipes by the electromagnetic flowmeter's weight and the fluid mass (see Figures 4.2 and 4.3).

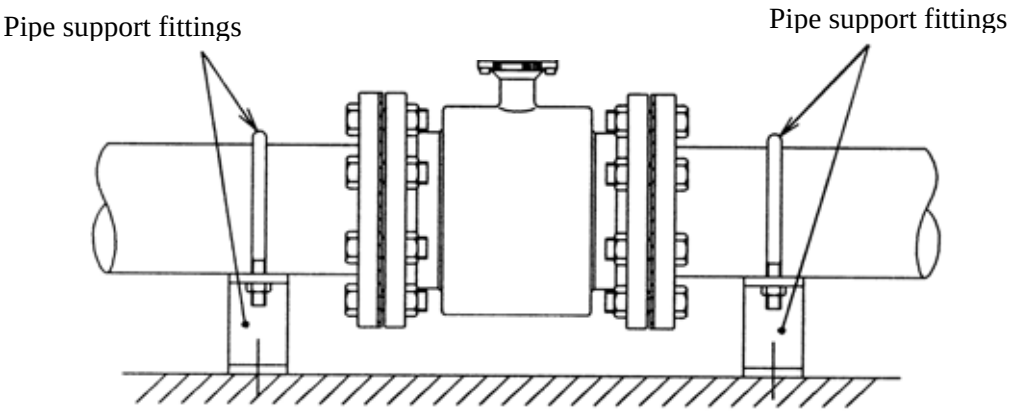


Figure 4.2 Example of Pipe Fixing Procedure

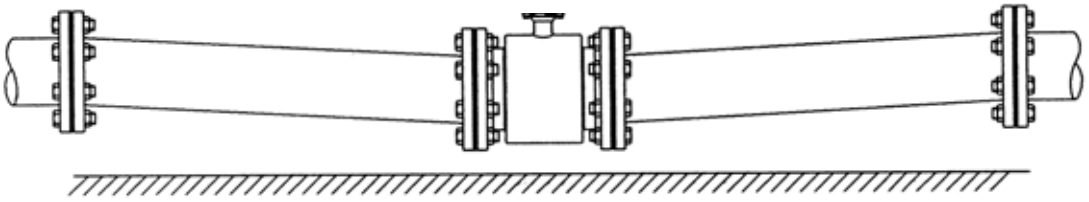


Figure 4.3 Model Diagram of Unsupported Pipes

4.2.2 Installation Procedure

In the case that the piping is **non-conductive** material, make sure to install the **grounding rings**(option) to each flange of detector using the M4 screw before piping . The M4 screws are prepared to each flange.

In addition, in the case of detector with FEP lining, make sure to install the gaskets between grounding ring and lining. The gaskets must be installed so as not to protrude into the measurement tube.

And install the ground cables to each flange of detector using the M5 screw as needed. The M5 screws, spring washers and washers are prepared to flange. And the ground cables are included in the package.

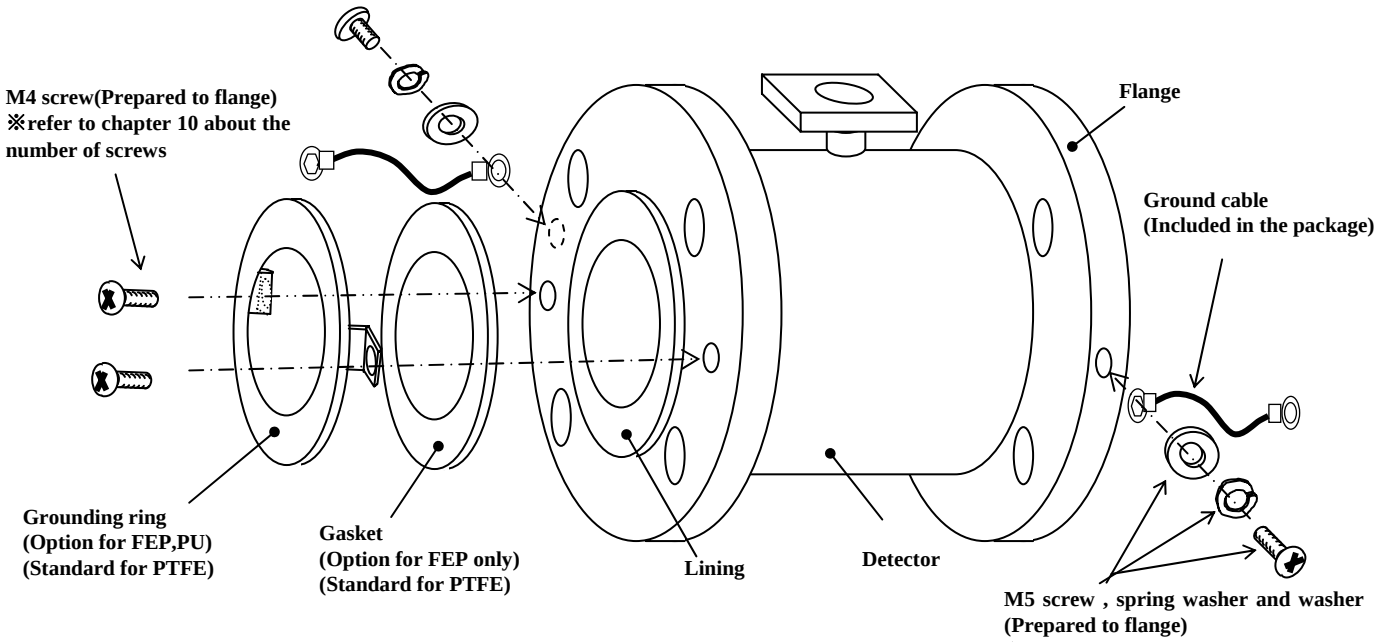


Figure 4.4 Install of grounding rings and ground cables

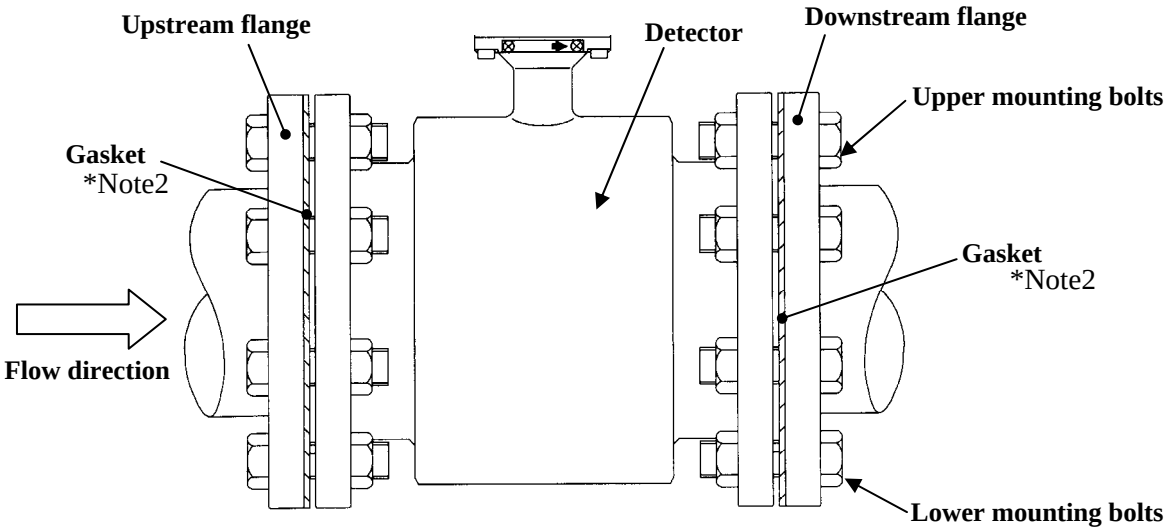


Figure 4.5 GF630, GF632 flowmeter detector piping connections

To mount the GF630 series, place it between the upstream and downstream pipe flanges and tighten it with flange bolts and nuts. See Figure 4.5 and follow the procedure below:

1. Insert two lower mounting bolts through the clearance holes in the upstream (or downstream) pipe flange.
2. Install a gasket* next to the upstream (or downstream) flange face and the other gasket next to the downstream (or upstream) pipe flange. The two mounting bolts can now be guided through the clearance holes in the downstream gasket and flange.
3. Place the GF630 series flowmeter detector between the two flange gasket, with the flowmeter detector body above the two bolts. The flowmeter must be oriented in accordance with the flow direction arrow.
4. Install the two upper mounting bolts through the clearance holes in the upstream and downstream gasket and flanges. Then install the remaining mounting bolts depending on the flange pattern used.
5. Thread nuts on both ends of the 4 (or more) mounting bolts, finger tight. **(See Table 4.1 Bolt length and tightening torque)**
6. While centering the flowmeter with the longitudinal axis of the pipeline, tighten the nuts with a wrench diagonally across in even increments. **(See Table 4.1 Bolt length and tightening torque)**

Note1: The flowmeter detector pipe axis must be aligned with the pipeline axis on both upstream and downstream sides. This is essential to have stable characteristics of flow measurement (especially for flowmeters with meter sizes of 50 mm or less).

Note2: In the case of detector with CR or PU lining, please avoid use of a gasket that is same materials with lining material. If the same materials were used, gasket and lining would bond mutually.

CAUTION

(1) When high-temperature fluid is being measured, radiant heat from the detector pipe surface and adjoining pipes may cause the ambient temperature of the converter to go above 60 °C. If the ambient temperature goes above 60° C, try to lower the temperature by measures such as wrapping heat-insulating materials over the detector pipe and adjoining pipes.

(2) To put the flowmeter temporarily on the floor, place it carefully with something, such as stopper, to support it so that GF630 and GF632 will not topple over.

Table 4.1 Bolt length and Nut tightening torque

Meter size		JIS 10K			
		Hexagon head bolts			Tightening torque [N・m]
		P.C.S	Diameter	Length [mm]	
15mm	1/2”	4	M12	50	6 to 8
25mm	1”	4	M16	55	16 to 21
32mm	1 1/4”	4	M16	55	21 to 26
40mm	1 1/2”	4	M16	55	18 to 22
50mm	2”	4	M16	55	31 to 39
65mm	2 1/2”	4	M16	60	48 to 60
80mm	3”	8	M16	60	23 to 29
100mm	4”	8	M16	60	35 to 44
125mm	5”	8	M20	75	66 to 82
150mm	6”	8	M20	75	89 to 111
200mm	8”	12	M20	75	79 to 99
250mm	10”	12	M22	80	125 to 156
300mm	12”	16	M22	80	128 to 160
350mm	14”	16	M22	85	156 to 194
400mm	16”	16	M24	90	212 to 265
450mm	18”	20	M24	95	210 to 262
500mm	20”	20	M24	95	268 to 334
600mm	24”	24	M30	100	372 to 465

Table 4.1 Bolt length and Nut tightening torque(continued)

Meter size		ANSI class 150			
		Machine Bolts			Tightening torque [N・m]
		P.C.S	Diameter	Length [inch]	
15mm	1/2”	4	1/2”	2”	7 to 9
25mm	1”	4	1/2”	2.16”	14 to 17
32mm	1 1/4”	4	1/2”	2.16”	19 to 24
40mm	1 1/2”	4	1/2”	2.36”	16 to 21
50mm	2”	4	5/8”	2.56”	37 to 46
65mm	2 1/2”	4	5/8”	2.95”	52 to 66
80mm	3”	4	5/8”	2.95”	55 to 69
100mm	4”	8	5/8”	2.95”	40 to 51
125mm	5”	8	3/4”	3.15”	68 to 85
150mm	6”	8	3/4”	3.15”	89 to 112
200mm	8”	8	3/4”	3.54”	119 to 149
250mm	10”	12	7/8”	3.86”	159 to 198
300mm	12”	12	7/8”	3.94”	183 to 229
350mm	14”	12	1”	4.33”	203 to 254
400mm	16”	16	1”	4.53”	232 to 289
450mm	18”	16	1 1/8”	4.92”	322 to 402
500mm	20”	20	1 1/8”	5.12”	336 to 420
600mm	24”	20	1 1/4”	5.70”	497 to 622

Table 4.1 Bolt length and Nut tightening torque(continued)

Meter size		DIN 10			
		Machine Bolts			Tightening torque [N・m]
		P.C.S	Diameter	Length [inch]	
15mm	1/2”	4	1/2”	2.22	7 to 9
25mm	1”	4	1/2”	2.37	15 to 18
32mm	1 1/4”	4	5/8”	2.71	25 to 31
40mm	1 1/2”	4	5/8”	2.71	22 to 27
50mm	2”	4	5/8”	2.87	29 to 36
65mm	2 1/2”	4	5/8”	2.87	53 to 66
80mm	3”	8	5/8”	2.87	28 to 34
100mm	4”	8	5/8”	3.02	41 to 51
125mm	5”	8	5/8”	3.06	57 to 72
150mm	6”	8	3/4”	3.35	92 to 116
200mm	8”	8	3/4”	3.35	129 to 162
250mm	10”	12	3/4”	3.50	128 to 160
300mm	12”	12	3/4”	3.66	159 to 199
350mm	14”	16	3/4”	3.50	150 to 188
400mm	16”	16	1”	3.76	240 to 300

Table 4.1 Bolt length and Nut tightening torque(continued)

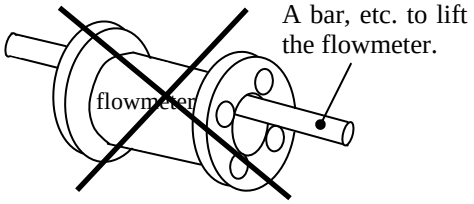
Meter size		DIN16			
		Machine Bolts			Tightening torque [N・m]
		P.C.S	Diameter	Length [inch]	
15mm	1/2”	4	1/2”	2.22	11 to 14
25mm	1”	4	1/2”	2.37	24 to 29
32mm	1 1/4”	4	5/8”	2.71	40 to 50
40mm	1 1/2”	4	5/8”	2.71	35 to 43
50mm	2”	4	5/8”	2.87	46 to 57
65mm	2 1/2”	4	5/8”	2.87	84 to 106
80mm	3”	8	5/8”	2.87	44 to 55
100mm	4”	8	5/8”	3.02	65 to 81
125mm	5”	8	5/8”	3.06	92 to 114
150mm	6”	8	3/4”	3.35	148 to 185
200mm	8”	12	3/4”	3.50	138 to 172
250mm	10”	12	1”	3.80	245 to 307
300mm	12”	12	1”	4.11	306 to 382
350mm	14”	16	1”	4.11	289 to 361
400mm	16”	16	1 1/8”	4.32	432 to 540

4.2.3 Precautions in transportation

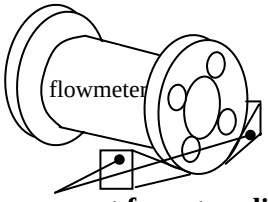
To prevent the device from being damaged during transportation, the original packing should be left untouched until the device arrives near the intended installation site.
The detector is equipped with hanging hooks. Lift it as shown in Figure 4.5. For information on the actual mass of each diameter, refer to Table 4.2.

CAUTION

(1)Never lift the detector by inserting a bar into its measurement pipe, because this will damage the linings, thus making it impossible to take stable measurements.

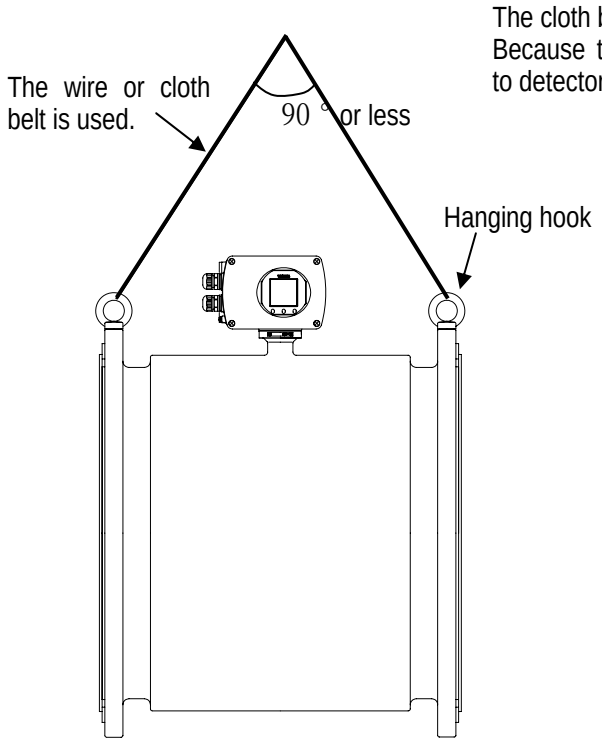


(2)To put the flowmeter temporarily on the floor, **place it carefully with something, such as stopper, to support it so that GF630/LF600, LF610, LF620 and GF632 will not topple over**.

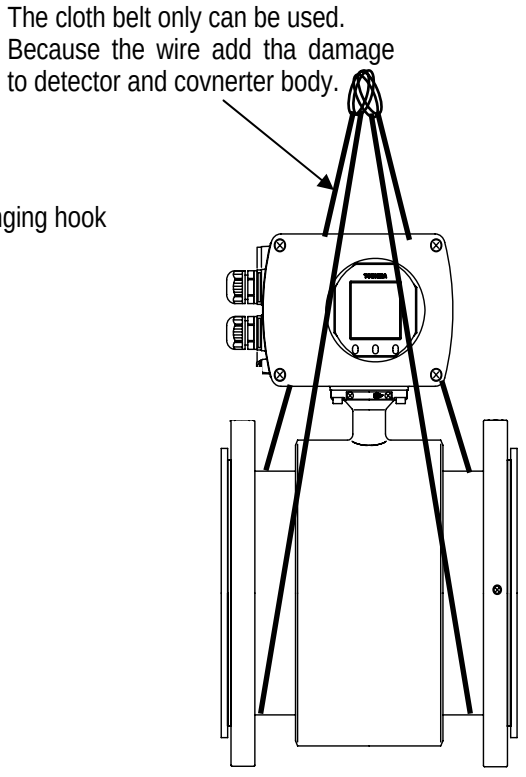


Stopper, etc. to prevent from toppling over it.

* The lifting work should be executed by those qualified for crane work or slinging work



(a) Meter size 200mm to 900mm
Hanging hooks are provided



(b) Meter size 15mm to 150mm
Hanging hooks are not provided

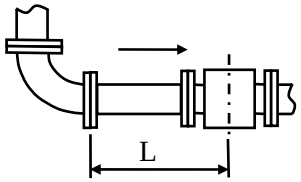
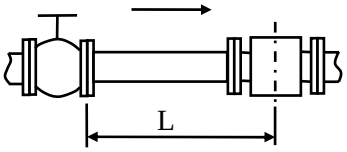
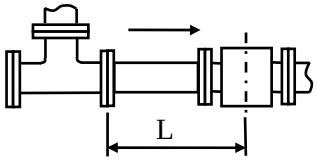
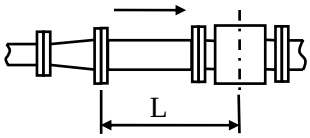
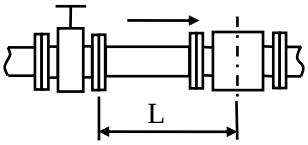
Figure 4.6 Transportation of GF630 series flowmeter detector

4.3 Piping Connections

(1) Required Pipe Length

If various joints are used upstream of the detector outlet, the straight pipe length as shown in Table 4.3 is required.

Table 4.3 Required straight pipe length on the upstream side

L=5D	L=10D
(1) 90 ° bent 	(5) Other valves (not fully opened) 
(2) Tee 	
(3) Diffuser 	
(4) Fully opened sluice valve 	

L: Required straight pipe length—straight pipe length plus half length of the detector.

D: Nominal bore size (diameter)

NOTES

The length of a reducer, if connected, can be counted as a part of the straight pipe length.
No straight pipe length is needed on the downstream side. If a butterfly valve is installed downstream of the detector, do not let the valve plate protrude into the pipe of the detector

(2) Pipe Orientation

The detector may be installed in horizontal, vertical or sloping pipe runs as shown in Figure 4.6. However, except for horizontal installation, fluid should flow from lower to upper directions. See Figure 4.6.

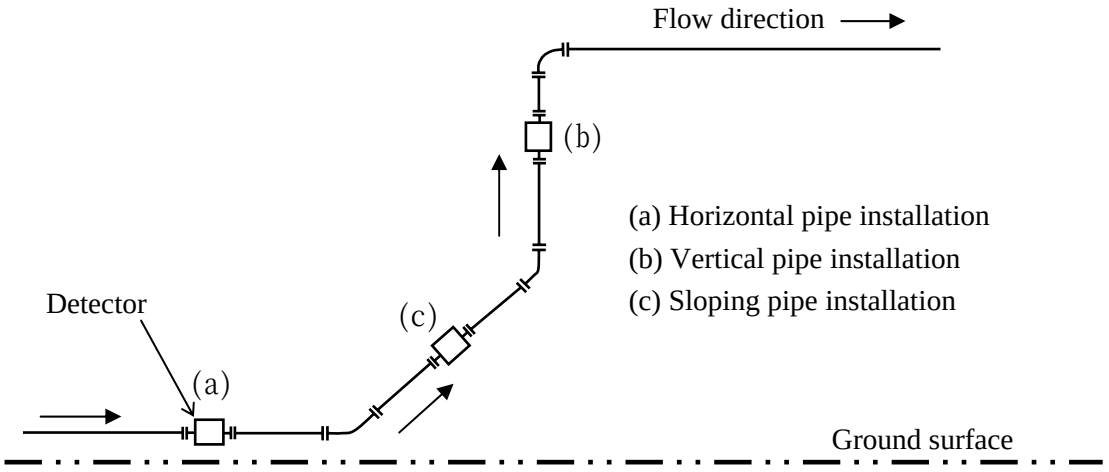


Figure 4.7 Detector Piping Orientation

The electrodes should be positioned horizontally against the ground surface in any piping installation. See Figure 4.7.

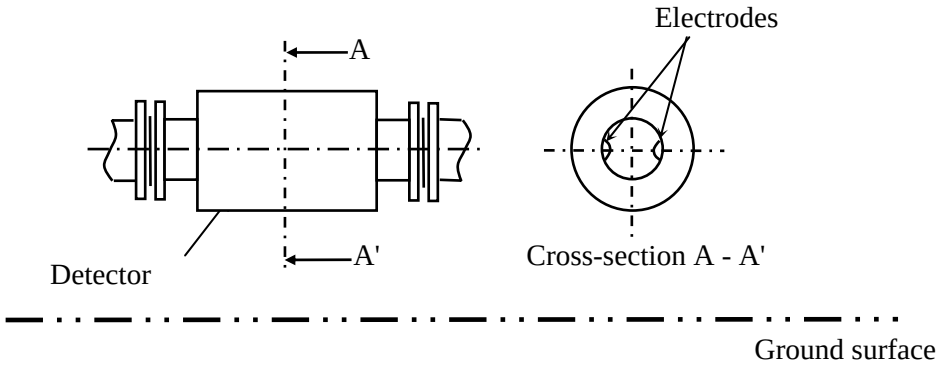


Figure 4.8 Installation position of the detector

(3) Flow Direction

Install the detector in accordance with the flow direction arrow on the detector. See Figure 4.8.

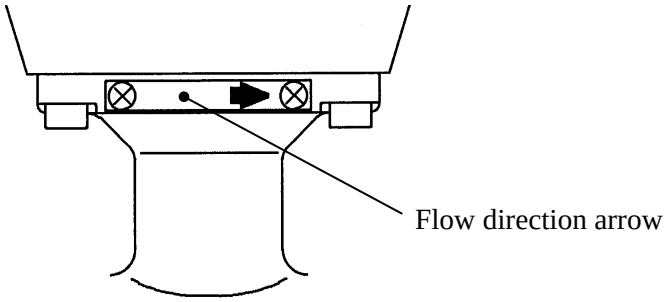


Figure 4.9 Flow direction arrow on the detector

(4) Preventing an Empty Pipe Condition

Design an upright pipe run (Figure 4.9) or sufficient head pressure (Fig. 4.10) at the downstream detector outlet if there is a possibility of the detector pipe becoming emptied.

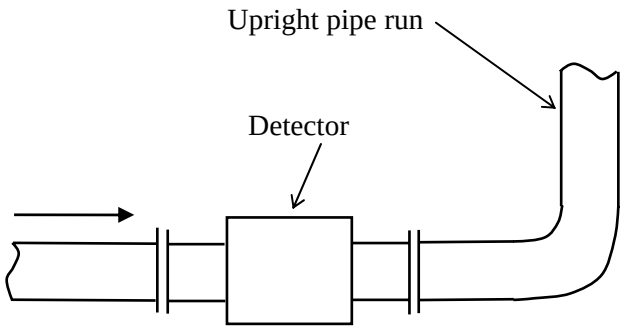


Figure 4.10 Detector with an upright pipe run at downstream outlet

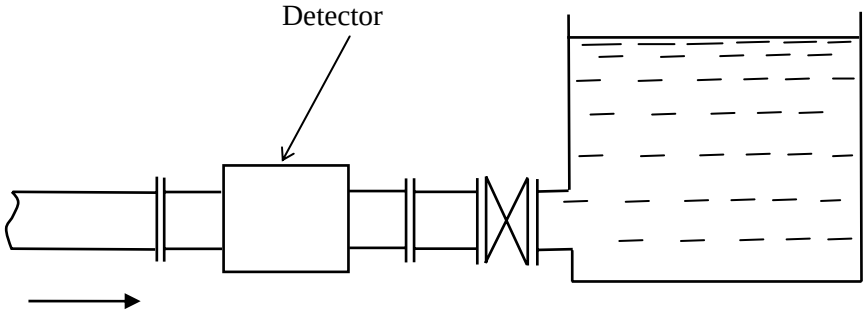


Figure 4.11 Detector with sufficient head pressure at downstream outlet

4.4 Grounding

⚠ CAUTION	
■ Do not wire cables and replace parts when power is supplied. DON'T Wiring work and replacing parts in the power-on state may cause electric shock.	■ Do not work on piping and wiring **with wet hands**. DON'T Wet hands may result in **electric shock**.

(1) Grounding of the GF630/LF620 type

Integral

Ground as shown in Figure 4.12. Make the grounding wire as short as possible. **Use grounding wire material of IV wire 5.5mm^2 or more. Do not share a grounding wire with other instruments where grounding current may flow. (An independent grounding is preferable.)**

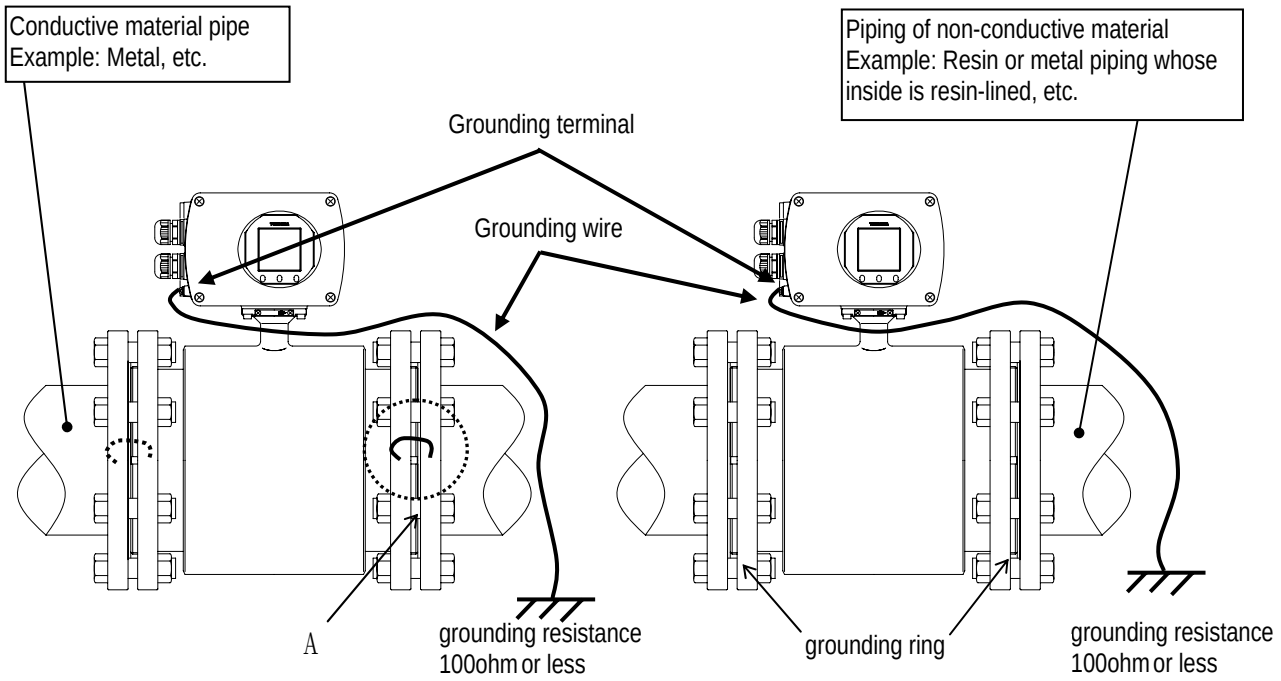


Figure 4.12 Grounding the GF630/LF620 Type

Please connect the grounding cables of detector to piping using the M5 screw shown as Figure4.13 as needed.
(In the case that there are no threaded hole with piping, please tap the threaded hole.)
※It is necessary to connect the ground cable surely electrically.

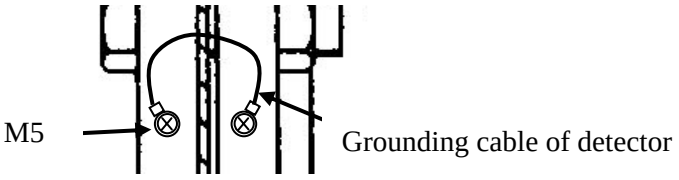


Figure4.13 Grounding cable connection (Detail of part A)

(2) Grounding of the GF632 type

Separate

Ground the external grounding terminal of the detector and the FG terminal of the converter (or external grounding terminal of the converter) securely (**grounding resistance 100ohm or lower)**. Use grounding wire material of **IV wire 5.5mm^2 or more. Do not share a grounding wire with other instruments where grounding current may flow. (An independent grounding is preferable.)**

If it is difficult to perform grounding work at the detector side because of a pit installation or other reasons, use a 3-core cable for the excitation cable and connect the E terminal of the detector to the E terminal of the converter. (The E terminal of the converter is internally connected with the FG terminal and the converter case.)

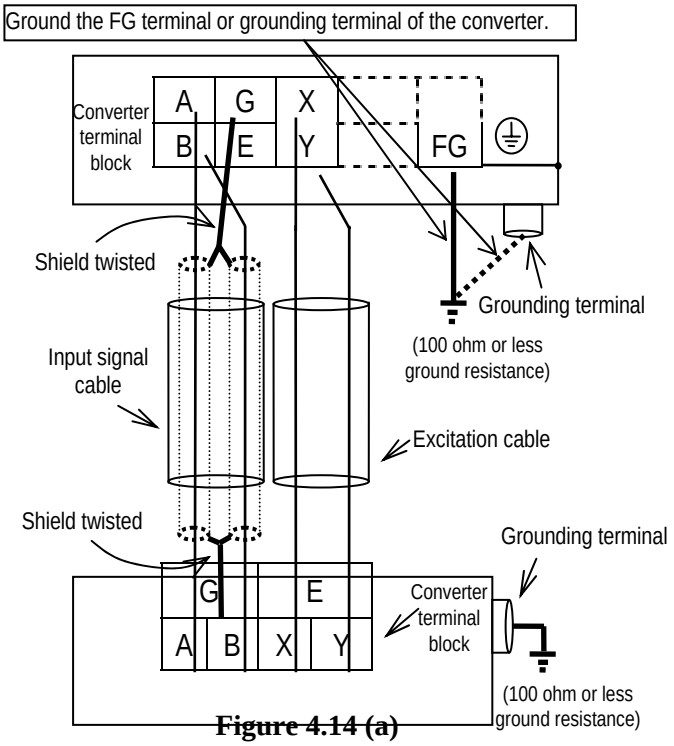


Figure 4.14 (a)

Wiring between Detector and Converter (For grounding the detector, see Figure 4.13 below.)

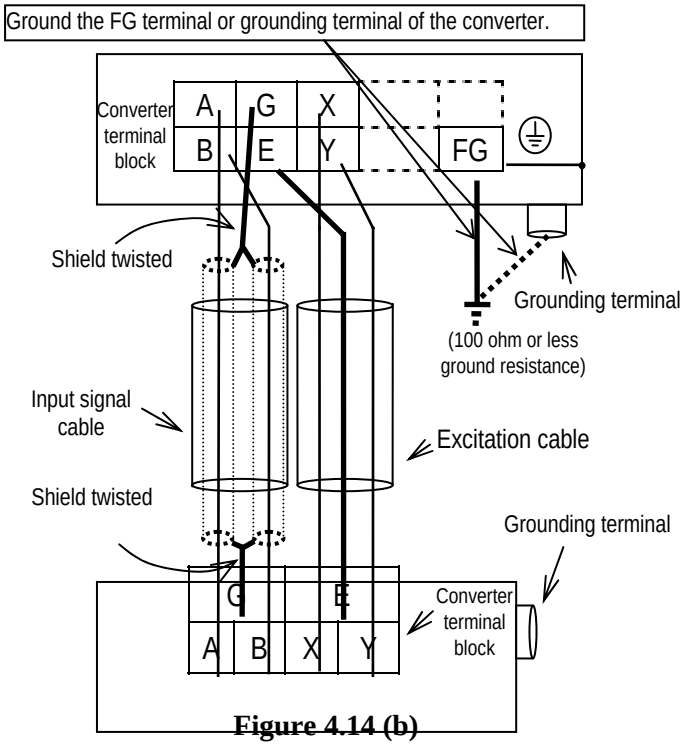
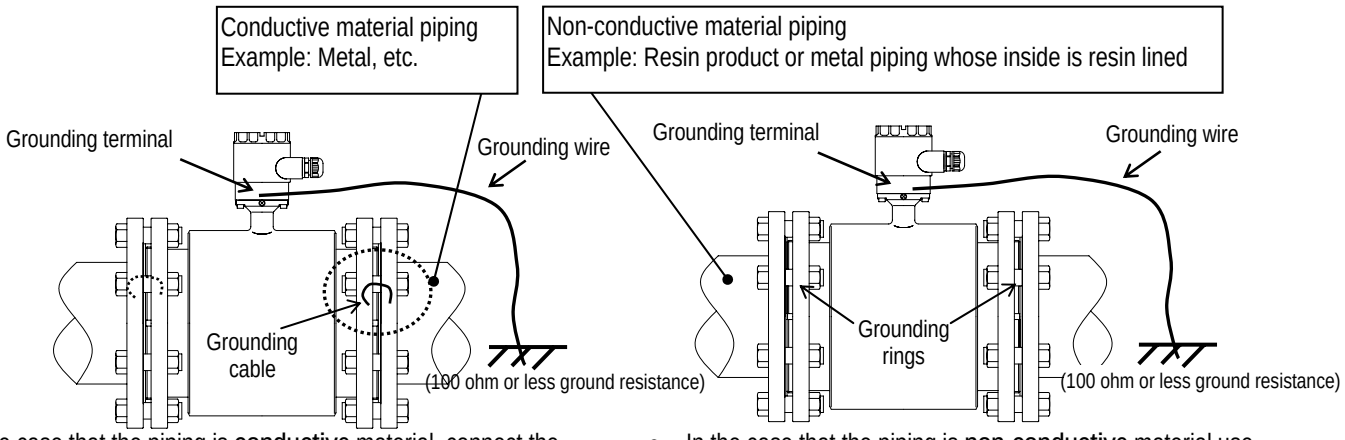


Figure 4.14 (b)

Wiring between Detector and Converter (when grounidng of the detector is difficut)



- In the case that the piping is conductive material, connect the grounding cable to the both ends of the piping flange as needed.
- In the case that the piping is non-conductive material use grounding rings.

Figure 4.15 Grounding the GF632 Type Detector

5. Wiring

Safety Precautions for Wiring

⚠ CAUTION	
■ **Install a switch and fuse** to isolate the GF630/LF600,LF610,LF620 and GF632 from mains power. DO Power supply from mains power can cause **electric shock** or **circuit break-down**.	■ **Turn off mains power** before conducting wiring work. DO Wiring while power is applied can cause **electric shock**.
■ **Do not work on piping and wiring with wet hands.** DON'T Wet hands may result in **electric shock**	■ **Ground the LF600,LF610,LF620 independently from power equipment. (100 ohm or less ground resistance)** DO Operating this product without grounding can cause **electric shock** or **malfunction**.
■ Do not conduct wiring work **with bare hands**. DON'T **Remaining electric charge** even if power is turned off can still cause **electric shock.**	■ For the power supply wiring and grounding wiring, use crimping terminals with insulated sleeve. DO There is a **risk of electric shock** due to drop-off or loosing, and a **risk of fire** and **equipment trouble** due to heat generation.
Do not modify or disassemble the GF630/LF600,LF610,LF620 and GF632 unnecessarily. DON'T Modifying or disassembling this product can cause **electric shock, malfunction of or damage to this product.**	The label shown left is placed near the power supply terminal on the converter. Be alert to **electric shock**.

Flowmeter accuracy may be affected **by the way wiring is executed. Proceed with correct wiring taking the precautions in following pages**.

Notes on wiring

⚠ CAUTION

(1) Select the cable runs **away from electrical equipment (motors, transformers, or radio transmitters) which causes electromagnetic or electrostatic interference**.

(2) Deterioration of flowmeter circuit insulation occurs if the converter interior or cable ends get wet or humidified. This in turn causes **malfunction of flowmeter or noise problems**. **Avoid a rainy day if the flowmeter is to be installed outdoors**. Even indoors, prevent water from splashing over the flowmeter. Try to finish the wiring as quickly as possible

(3) The converter has an arrestor installed inside. Therefore, **do not conduct a withstand voltage test for the converter**. To check the insulation of the converter, use a voltage of **250Vdc or less**.

(4) After wiring, be sure to install the terminal block protection cover.

Separate (5) Because the excitation cable and flow rate signal cable transmit very delicate signals, pass each of them separately through a thick steel conduit tube, keep them away from the large current wiring as far as possible, and do not install them in parallel.

5.1 Cables

Use the kind of cables shown in Table 5.1 to wire the converter.

Table 5.1 Installation Cables

Name	Cable name	Nominal cross-sectional area	Finished outer diameter	Description
Power cable	3-core vinyl sheathed cable or 2-core vinyl sheathed cable	2 mm²	11~13mm	CVV JIS C 3401 or equivalent
Output signal cable	The number of conductors the cable contains differs depending on the specification of the output signal cable. Use a shielded cable of finished outer diameter 11 to 13mm and nominal cross-sectional area 1.25mm^2.			CVV-S JIS -258-C or equivalent
Separate Flow rate signal cable	2-core shielded chloroprene cabtyre cable	0.75 mm^2	11~13mm	2PNCT-S JIS C 3327 or equivalent
Separate Excitation cable	3-core shielded chloroprene cabtypre cable	2 mm^2 1.25 m^2	11~13mm	2PNCT JIS C 3327 or equivalent

5.2 External Device Connections and Grounding

For the notes on connecting, wiring and installation of the combined converter, check the model number of the combined converter and read the instruction manual of the relevant converter.

5.3 Notes on Wiring

5.3.1 Notes on Instrumentation-Converter Wiring

- To avoid 2-point grounding, **ground the shield of output cable basically at the receiving side.**
- Use a grounding wire of IV wire 5.5mm^2 or more. The size of the external grounding terminal screws is M4. Do not share **a grounding wire with other instruments where grounding current may flow. (An independent grounding is preferable.)**
- Power cable
  When a 3-core cable is used: **Ground with the FG terminal.**
  When a 2-core cable is used: Use an external grounding terminal and make the cable as short as possible.

5.3.2 Notes on Wiring of the Separate type (GF632)

Separate

- The detector is shipped with a flow rate signal cable and excitation cable. Be sure to use those cables coming with the detector.
  Note: When the cable length exceeds 30m, cables may not be supplied. Check whether the cable is supplied with the specs.
- The allowable cable length between the detector and converter varies depending on the conductivity of the operating fluid. **Refer to the instruction manual of the combined detector.**
- When connecting with the detector, wire the cables in the order of the excitation cable and flow rate signal cable.
- Because the input cables transmit very delicate signals, pass the excitation cable and input signal cable **separately through a thick steel conduit tube , keep them away from the large current wiring as far as possible, and do not install them in parallel.**
- When replacing the flow rate signal cable and excitation cable, also refer to the instruction manual of the relevant detector. Order the detector terminal box cover packing from Toshiba or a Toshiba distributor.

5.4 Wiring

5.4.1 Terminal Treatment of Cables

Follow the procedures below to treat the terminals (at the converter side) of various cables and install the cables to the terminal block. Use appropriate cables based on the description in Section **5.1** "Cables." Crimp a **round type insulated crimp-type terminal** to the end of the cables.

(1) Power cable, current output cable, digital I/O cables

The necessary cables should be ordered from the person responsible for the installation. Strip the sheath of each conductor as shown in Figure 5.1 and attach a crimping terminal with insulated sleeve to it. The size of the crimping terminal is as follows:

M4: Integral type LF600 and LF610
M3.5: Integral type LF620, Separate type LF602, LF612 and LF622

- Connect the power cable to terminal blocks L1 and L2.
- Connect the current output cable to terminal blocks + and -.
- Connect the digital I/O cable to terminal blocks D1, D01, D02 and COM, as required.

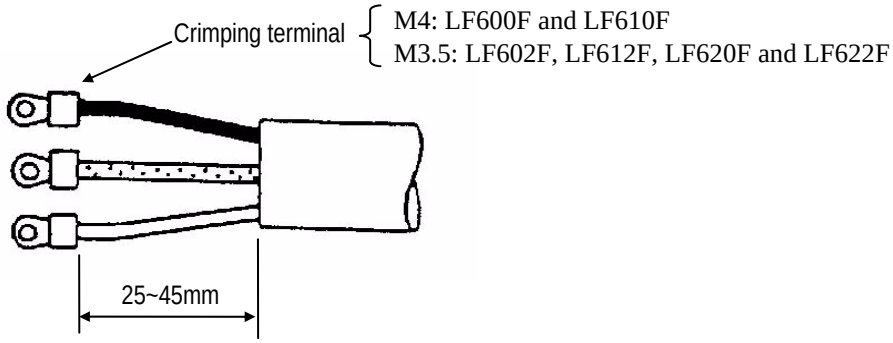


Figure 5.1 Terminal Treatment of Power Cable, Current Output Cable and Digital I/O cable

(2) Excitation cable

Separate

Strip the sheath from the end of each conductor as shown in Figure 5.2, attach an M3.5 crimping terminal with insulated sleeve, and connect it to the terminal blocks X and Y. Connect the red conductor to terminal block E.

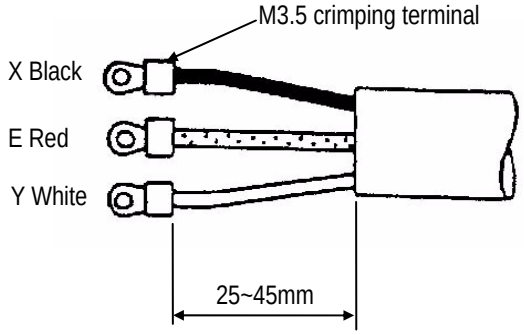


Figure 5.2 Terminal Treatment of Excitation Cable

(3) Connecting the input signal cable

Separate

Strip the sheath from the end of each conductor of a 2-core individually shielded cable as shown in Figure 5.4. Twist those shields and cover them with a thermal contraction tube or vinyl tube not to make contact with the case or core wires. Then attach an M3.5 crimping terminal with insulated sleeve as shown in Figure 5.3. Connect a crimping terminal to the A and B terminals on the terminal block and connect to each G terminal of the detector and converter.

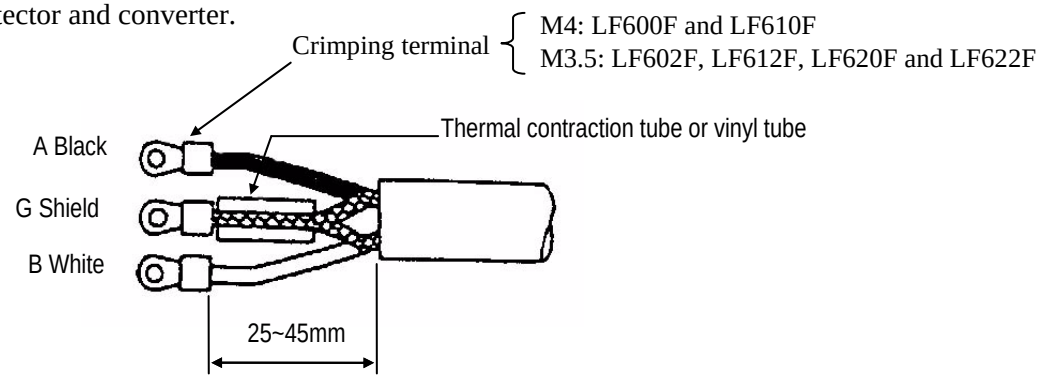
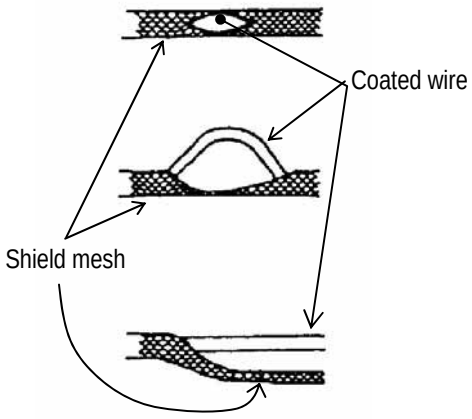


Figure 5.3 Terminal Treatment of Flow Rate Signal Cable

● Notes on signal cable shield processing work

When stripping an external sheath, intermediate and insulated sheath, be careful not to scratch or cut the internal conductors and shield mesh. Do not disjoint the shield mesh but treat it as shown in Figure 5.9.



a. Open the shield mesh with a pincette or the like.

b. Pull out the internal coated wires from the hole of the shielded mesh.

c. Pull out all internal coated wires and extend the shield mesh wire.

Figure 5.4 Treating the Signal Cable Shield Mesh

Separate 5.4.2 Cable Connection

Connect and install the terminal-treated cables to the terminal block.

*Connect the cables to the terminal block securely. A loose connection may cause incorrect measurement. After connecting a cable, try to pull it to check whether it has been connected securely.

(1) Put the terminated signal cable and excitation cable through this cable gland and packing as shown in Figure 5.5 . And turn the cable gland cap screw to keep the cable sealing.

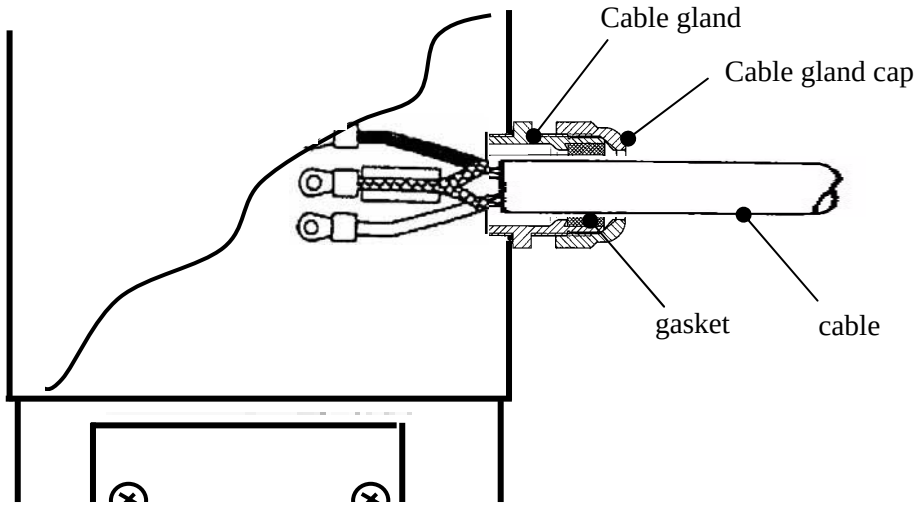


Figure 5.5 Cable connections

(2)Referring to **combined converter's manuals of "Connections and Grounding"**, connect each cable to the terminal block. **Tighten the screws of the terminal block tightly to ensure the secure connection**. A loose connection may cause incorrect measurement. **After connecting a cable, try to pull it to see whether it has been connected securely.**

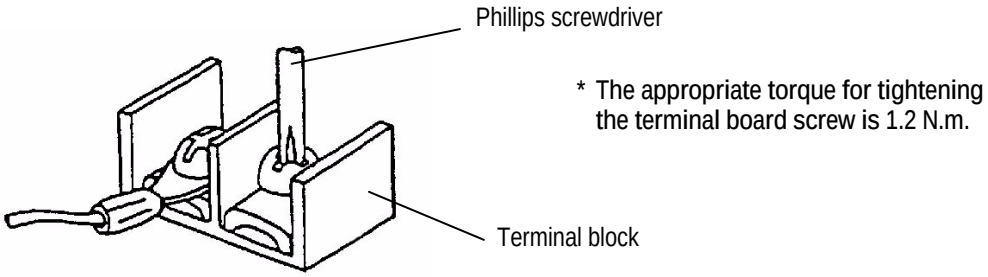
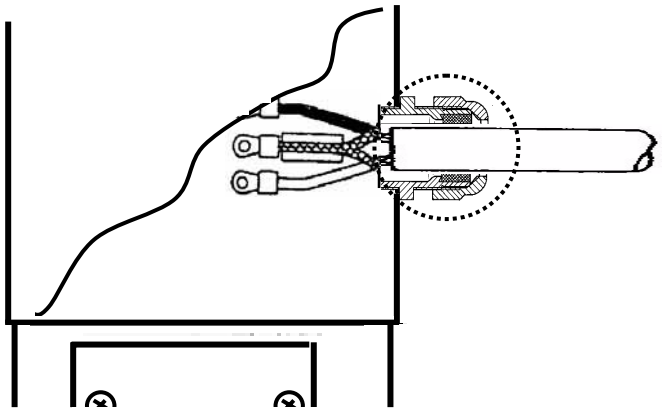


Figure 5.6 Connecting a Cable to Terminal Block

(3)After the terminal board connection, pull the cable a little so that the cable runs straight from the terminal board without unnecessary winding. However, if the sheath-removed part goes as far as where the packing is located, air may leave through there and the airtight structure may not function. See the incorrect example in Figure 5.7. Then tighten the cable gland with a wrench.

○ **Correct**



○ **Incorrect**

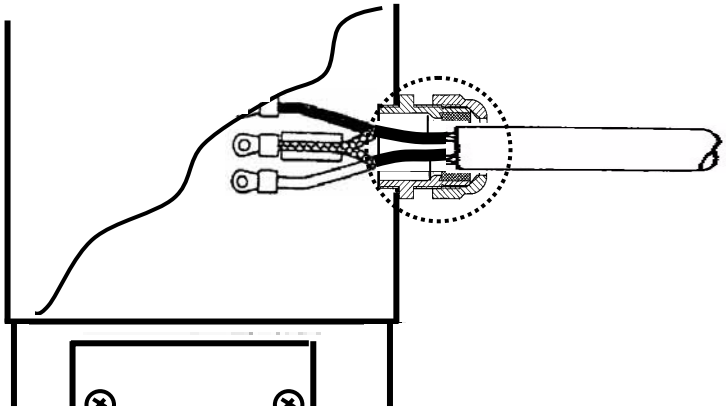


Figure 5.7 Cabling Procedure

(4) Attach the terminal box cover . To keep the seal, tighten securely the cover.

6. Operation

⚠ CAUTION	
■ Do not touch the terminal board when power is supplied.  DON'T Touching the terminal board when power is supplied can cause electric shock.	■ Do not touch the main body when high temperature fluid is being measured.  DON'T The fluid raises the main body temperature and can cause burns.

Preparatory check

Follow the procedure described below to prepare before starting the flow measurement (described with regard to the entire flowmeter).

System Check Check the items listed below

- Check **the wiring between the converter and related instruments**.
- Make sure **all the bolts of connection flanges on which the flowmeter** is mounted securely tightened.
- Make sure **the direction of flow arrow** is in accordance with actual flow.
- Make sure the flowmeter is **grounded** with 100 ohm or less ground resistance.
- Make sure the **housing covers** are securely tightened.

Placing System On-Stream

- **Let the fluid go through** the detector pipe. (Note 1)
- When the detector is filled with the fluid, **stop** the fluid and keep it still in the detector pipe.

Supplying Electric Power

- Make sure the **power supply** is as specified.

Checking Converter Parameters

- Check the configuration parameter settings. **Refer to combined converter's manual.**

Zero Adjustment

- Wait for 30 minutes to warm up the flowmeter. Then making sure the fluid holds still in the detector pipe, starts the **zero adjustment**. Refer to **combined converter's manual.**

On-line measurement

- After checking the items and conducting the zero adjustment as listed above, let the fluid go through the detector pipe. Output (4–20 mA dc) directly proportional to the flow rate can be obtained.

Note 1: If the detector pipe is not filled with the fluid to be measured, the flow rate will be indefinite and unable to be measured. Before using the flowmeter , be sure to fill the detector pipe the fluid to be measured.

7. Maintenance and Troubleshooting

Safety precaution for Maintenance and Troubleshooting

⚠ CAUTION	
■ **Do not conduct wiring work when power is applied.** DON'T Wiring while power is applied can cause electric shock.	■ **Do not touch the GF630/LF600,LF610,LF620 and GF632 main body when high temperature fluid is being measured.** DON'T The fluid raises the main body temperature and can cause burns.

7.1 Maintenance

■ **Cleaning**

The adhesion might be caused in the detector pipe when using it for a long term when the fluid including the electroconductive solid etc. is measured, and it causes the instruction decrease. Please confirm whether to cause the adhesion in the detector pipe when the phenomenon of instruct decreasing while using it is seen, and abnormality is not found even if it proofreading/confirms it.

Please clean with a soft brush etc. , and remove the adhesion thing. The instruction indicates a normal value by removing the adhesion. When using it in the line to which such a phenomenon occurs easily, it is recommended that the detector pipe be cleaned regularly (at least once a year).

Use always new packing when mounting the flowmeter detector in the pipeline.

■ **Calibration**

The converter LF60*, LF61* and LF62* has a built-in reference signal generation circuit that generates dummy flow rate signals. **This reference signal can be used to check the zero and span of the converter for the purpose of instrumentation maintenance or periodical inspection. Refer to combined converter's manual.**

■ **Operative life**

The operative life of this flowmeter is **10 years** from the date of shipment.

The life of the flowmeter differs depending on the environmental conditions and the way it was used. To extend the life of the flowmeter, **inspect the flowmeter periodically and clean or replace components** if necessary.

■ **Product disposal**

The electromagnetic flowmeter must be disposed of, according to the rules and regulations of your local government.

Especially if you dispose of electrolytic capacitors to replace parts, have it done by an agency which is licensed to handle industry waste materials.

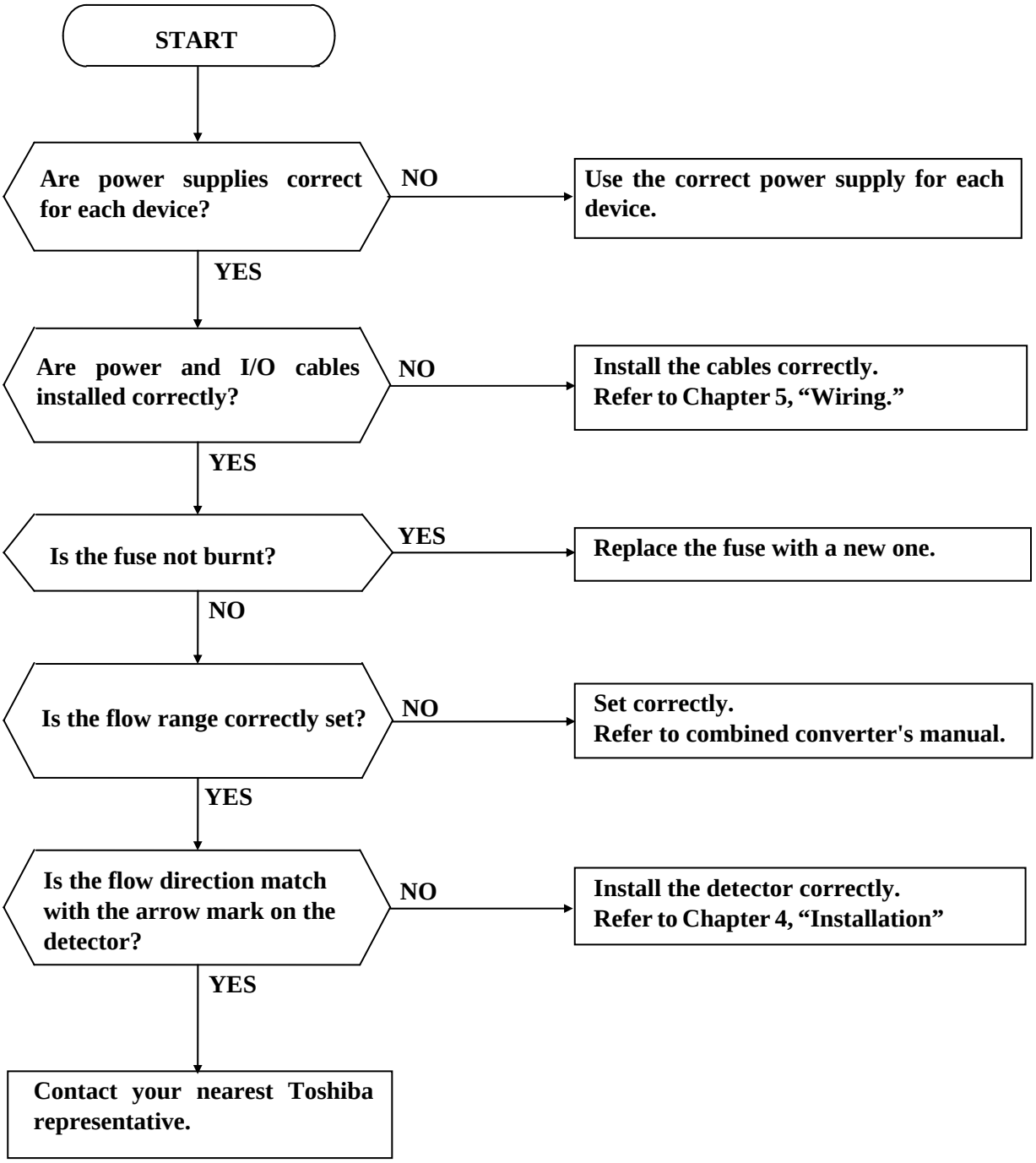
7.2 Troubleshooting

If a problem occurs while using the GF630/LF600,LF610,LF620 and GF632, follow the flowcharts described below.

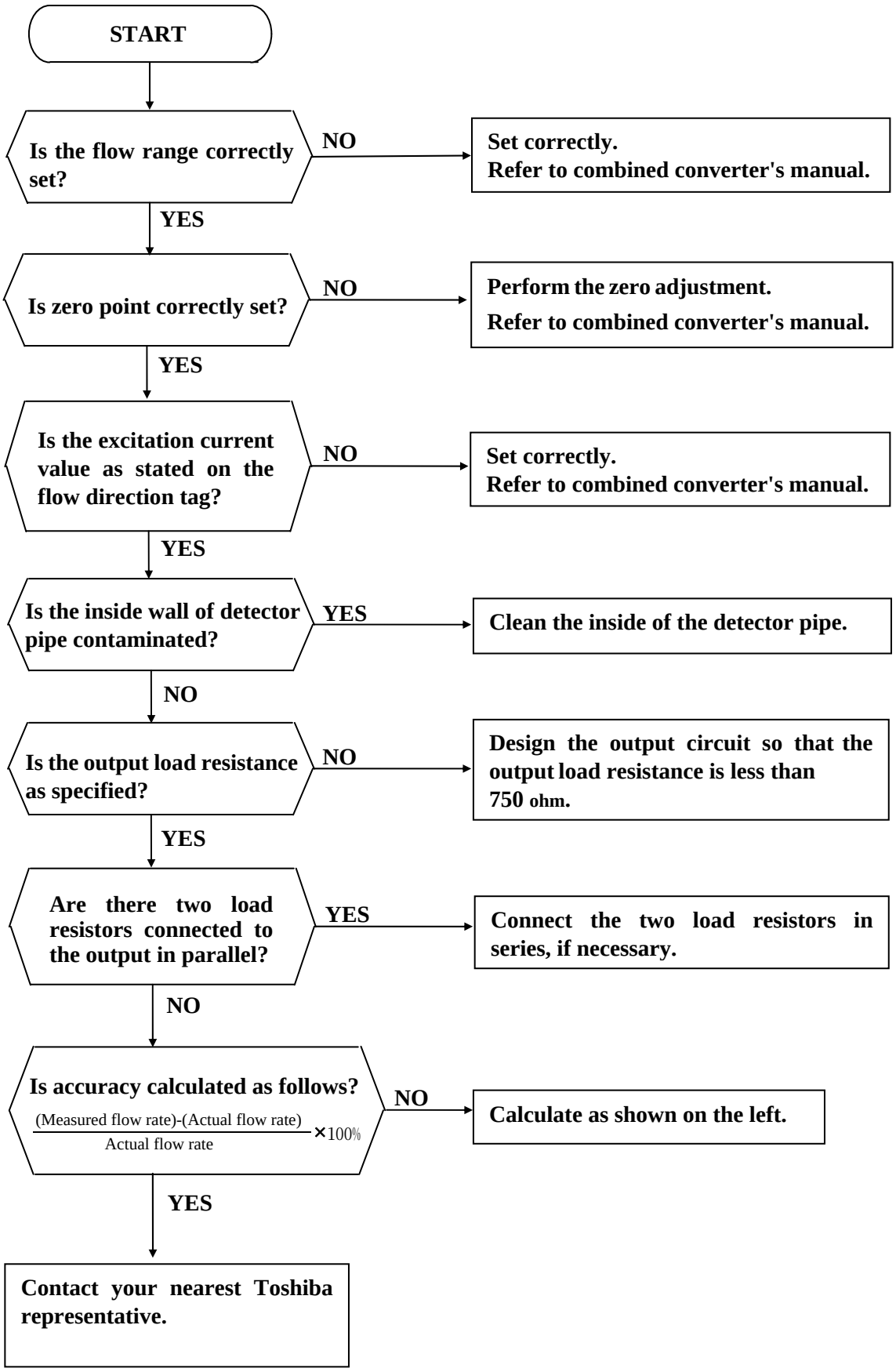
You may find a way to solve the problem. The flowcharts are based on three symptoms (1) to (3).

If you cannot solve the problem, contact your nearest Toshiba representative.

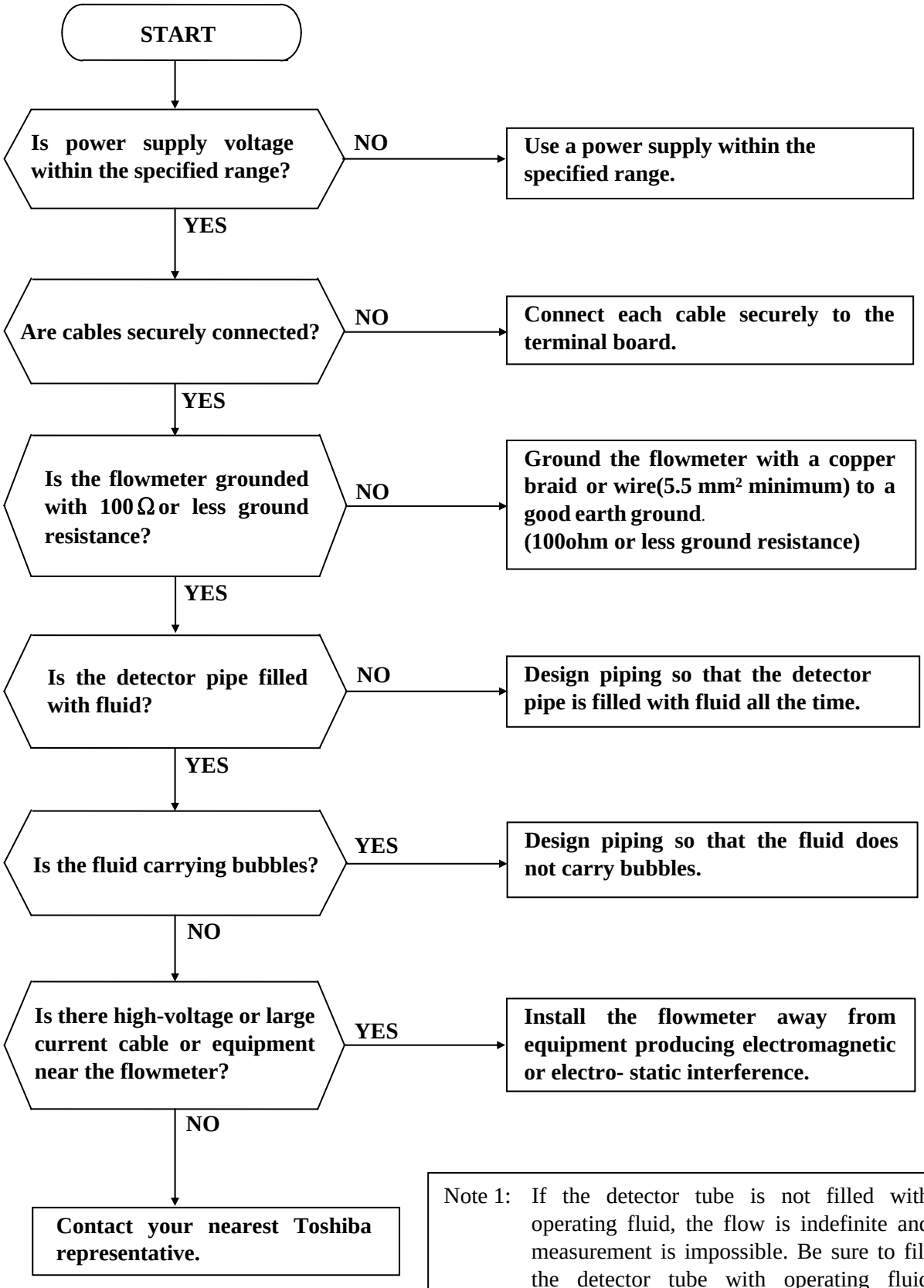
7.2.1 Flow rate is not indicated



7.2.2 Flow rate indicated is not correct



7.2.3 Flow rate indication is not stable



Note 1: If the detector tube is not filled with operating fluid, the flow is indefinite and measurement is impossible. Be sure to fill the detector tube with operating fluid before starting measurement.

8. Principle of Operation

The operating principle of the electromagnetic flowmeter is based on Faraday's Law of electromagnetic induction and it is designed to measure the volumetric flow rate of fluid. An insulated pipe of diameter D is placed vertically to the direction of a magnetic field with flux density B (see Figure 8.1). When an electrically conductive fluid flows in the pipe, an electrode voltage E is induced between a pair of electrodes placed at right angles to the direction of magnetic field. The electrode voltage E is directly proportional to the average fluid velocity V.

The following expression is applicable to the voltage.

$$E = K \times B \times D \times V \text{ [V]} \quad \text{..... (Eq. 8.1)}$$

E = induced electrode voltage [V]
K = constant
B = magnetic flux density [T]
D = meter pipe diameter [m]
V = fluid velocity [m/s]

Volumetric flow rate Q [m^3/s] is:

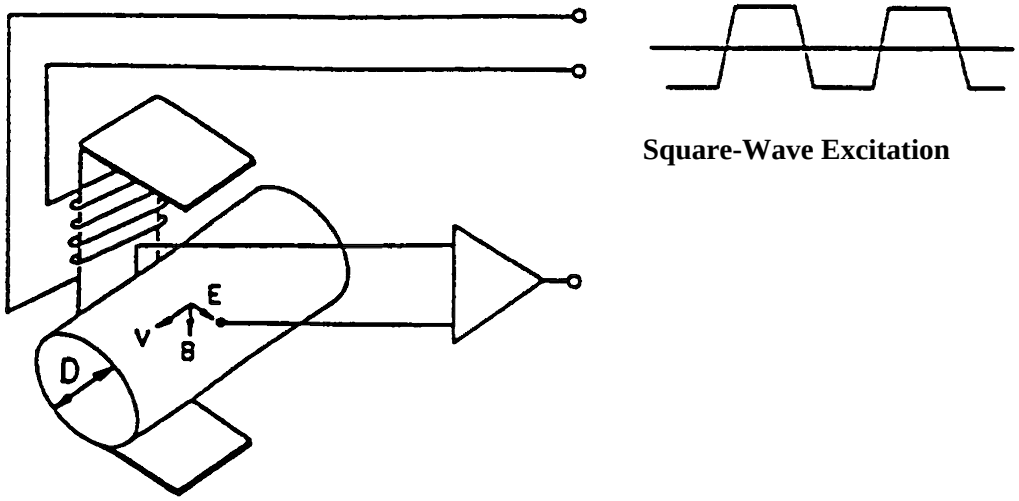
$$Q = \frac{\pi \times D^2}{4} \times V \quad \text{.....(Eq. 8.2)}$$

Using the Equation 8.1 and 8.2

$$E = K \times B \times D \times \frac{4}{\pi \times D^2} \times Q$$

$$E = \frac{4 \times K \times B}{\pi \times D} \times Q \quad \text{.....(Eq. 8.3)}$$

Therefore, volumetric flow rate is directly proportional to the induced voltage.



Square-Wave Excitation

Figure 8.1 Principle of Operation

The GF630/LF600,LF610,LF620 and GF632 uses the square-wave excitation method, which provides long-term stable operation. With square-wave excitation, the GF630/LF600,LF610,LF620 and GF632 offers reliable measurement without being affected by electrostatic or electromagnetic interference, or electrochemical polarization between the electrodes and the fluid to be measured.

9. Specifications

The flowmeter specifications and the type specification code used when ordering the flowmeter are described in this chapter.

9.1 Specifications

Meter size: 15, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600mm

Measuring range: 0-0.3m/s to 0-10m/s (measuring range by flow rate conversion)
(0-0.1m/s to 0-0.3m/s range is available optionally for meter sizes 15mm to 450mm.)

Accuracy: (Accuracy when combined with the converter)

< 1/2" to 18"(15mm to 450 mm) >

±0.2 % of Rate *

* This pulse output error result is established under standard operating conditions at Toshiba's admitted flow calibration facility.
* Individual meter's measurement error may vary up to ±0.5% of Rate at 1.64 ft/s (0.5m/s) or more and ±0.3% of rate ±0.039 inch/s (1mm/s) at 1.64 ft/s or less.
* Current output: plus ± 8μA (0.05% of span).
* Refer to individual calibration data for each individual meter's measurement error.

< 20" to 24" (500mm to 600mm) >

± 0.3 % of Rate *

* This pulse output error result is established under standard operating conditions at Toshiba's admitted flow calibration facility.
* Individual meter's measurement error may vary up to ±0.5 % of Rate at 3.28 ft/s (1.0 m/s) or more and ± 0.3% of Rate ±0.079 inch/s (2 mm/s) at 3.28 ft/s (1.0 m/s) or less.
* Current output: plus ± 8μA (0.05% of span.)
* Refer to individual calibration data for each individual meter's measurement error.

Fluid conductivity: 5 μS/cm minimum

Fluid temperature: –20 to +100 °C (FEP)
–20 to +120 °C (PTFE)
–20 to +60 °C (Polyurethane)

Ambient temperature: –20 to + 60℃

Storage temperature: -25 to +65℃

Storage humidity: 10 to 90%RH (no condensation)

Fluid pressure: Up to 1MPa (JIS 10K, ANSI class 150,DIN PN 10)
Up to 1.6MPa (DIN PN 16)

Connection flange standard: See Table 9.1 Type Specification Code.

Principal materials

Case Carbon steel
Lining FEP (standard for meter sizes 15 to 250mm)
PTFE (standard for meter sizes 300 to 600mm)
Polyurethane (PU) (standard for meter sizes 15 to 400mm)
Electrodes 316L stainless steel (Polyurethane)
Hastelloy C equivalent (FEP, PTFE)
Grounding rings None (standard for Polyurethane, FEP)
316 stainless steel (optional for Polyurethane, FEP)
316 stainless steel (standard for PTFE)

See Table 9.1 Type Specification Code for optional materials and other related information.

Coating: Corrosion resistant resin coating (std.), pearl-gray colored

Structure: IP67 and NEMA 4X

Separate **Cable connection port**: 1/2-14NPT male screw for both signal cable and exciting cable

Separate **Cable length:** Allowable cable length between the converter and the detector varies with the electrical conductivity of fluid. See Figure 9.1

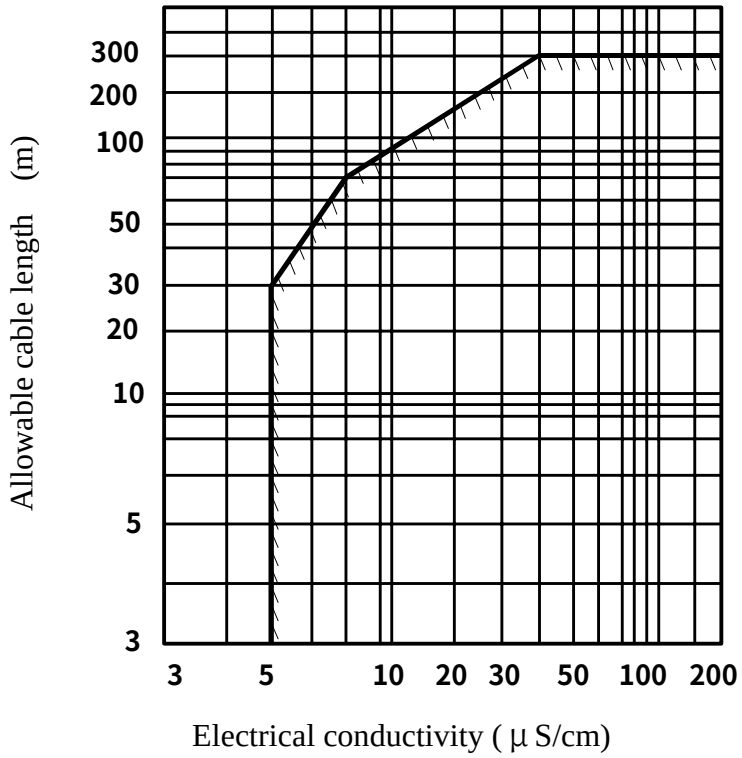


Figure 9.1 Electrical Conductivity vs. Cable Length

Calibration range **:**

It calibration by standard Range shown in the table below when Range is not specified.
It calibration when there is specification by flowing quantity Range in which the customer is specified. Is this specification Range flowing quantity of Table 9.1. Please confirm becoming in the upper bound value from the flow velocity chart.

Table 9.1 Standard Flow Range

Meter size		Standard Flow range	
		Flow rate (m^3/h)	Flow velocity (m/s)
15 mm	1/2”	2	3.144
25mm	1”	6	3.395
32mm	1 1/4”	10	3.454
40mm	1 1/2”	15	3.316
50mm	2”	25	3.537
65mm	2 1/2”	40	3.348
80mm	3”	60	3.316
100mm	4”	100	3.537
125mm	5”	150	3.395
150mm	6”	200	3.144
200mm	8”	300	2.653
250mm	10”	600	3.395
300mm	12”	900	3.537
350mm	14”	1,200	3.465
400mm	16”	1,600	3.537
450mm	18”	2,500	4.366
500mm	20”	3,000	4.244
600mm	24”	4,000	3.930

To select the meter size: See Table 9.2 and find meter sizes within the velocity of 0.1 to 10 m/s for a specified full-scale (measureing range high limit) flow. Select one that has its full-scale velocity between 1 and 3 m/s.

Make sure the full-scale flow rate used for the final planning stage stays within 10 m/s in terms of flow velocity.

Table 9.2 Flow velocity vs. flow volume

Unit: m3/h

Size (mm)	Flow rate				
	0.1m/s	0.3m/s	1m/s	3m/s	10m/s
15	0.0631	0.1908	0.6361	1.908	6.361
25	0.1767	0.5301	1.767	5.301	17.67
32	0.2895	0.8686	2.895	8.686	28.95
40	0.4523	1.357	4.523	13.57	45.23
50	0.7067	2.120	7.067	21.20	70.67
65	1.195	3.583	11.95	35.83	119.5
80	1.809	5.428	18.09	54.28	180.9
100	2.827	8.482	28.27	84.82	282.7
125	4.417	13.25	44.17	132.5	441.7
150	6.361	19.08	63.61	190.8	636.1
200	11.31	33.93	113.1	229.3	1,131
250	17.67	53.01	176.7	530.1	1,767
300	25.45	76.34	254.5	763.4	2,545
350	34.64	103.9	346.4	1,039	3,464
400	45.23	135.7	452.3	1,357	4,523
450	57.25	171.7	572.5	1,717	5,725
500	-	212.2	706.9	2,121	7,069
600	-	305.4	1,018	3,054	10,180

9.2 Type Specification Code

Table 9.1 Type Specification Code

Model number					Specification code							Contents	Lining		
1	2	3	4	5	6	7	8	9	10	11	12		PU	FEP	PTFE
G	F	6	3									Flanged connection electromagnetic flowmeter detector			
				0								Integral type	●	●	●
				2								Separate type	●	●	●
												Meter size			
					0	1						15mm	●	●	—
					0	2						25mm	●	●	—
					0	3						32mm	●	●	—
					0	4						40mm	●	●	—
					0	5						50mm	●	●	—
					0	6						65mm	●	●	—
					0	8						80mm	●	●	—
					1	0						100mm	●	●	—
					1	2						125mm	●	●	—
					1	5						150mm	●	●	—
					2	0						200mm	●	●	—
					2	5						250mm	●	●	—
					3	0						300mm	●	—	●
					3	5						350mm	●	—	●
					4	0						400mm	●	—	●
					4	5						450mm	—	—	●
					5	0						500mm	—	—	●
					6	0						600mm	—	—	●
							A					Connection flange standard			
												ANSI 150	●	●	●
							J					JIS 10K	●	●	●
							D					DIN PN 10(meter size:15～400mm)	○	○	○
							E					DIN PN 16(meter size:15～400mm)	○	○	○
								U				Lining			
								F				Polyurethane (PU)	●	—	—
								P				FEP	—	●	—
												PTFE (*NOTE 1)	—	—	●
									B			Electrode Material			
												316L stainless steel	●	—	—
									F			Hastelloy C equivalent	—	●	●
										A		Flow and calibration velocity range / NPT1/2			
												0.3 to 10m/s (standard range calibration) / Without cable	●	●	●
										B		0.3 to 10m/s(specified range calibration) / Glands	○	○	○
										C		0.1 to 10m/s(specified range calibration) / Instruction manual: English	○	○	○
										H		0.3 to 10m/s (standard range calibration) / G1/2	●	●	●
										J		0.3 to 10m/s(specified range calibration) / With cable	○	○	○
										K		0.1 to 10m/s(specified range calibration) / glands, Instruction manual: English	○	○	○
											1	Grounding ring			
												Without Grounding ring	●	●	●
											2	With Grounding ring (316 stainless steel)	○	○	○

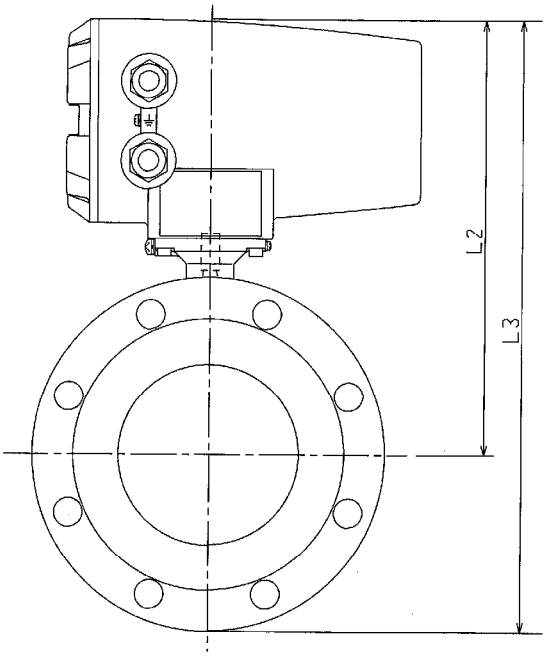
● : Standard ○ : Option —: Unselectable

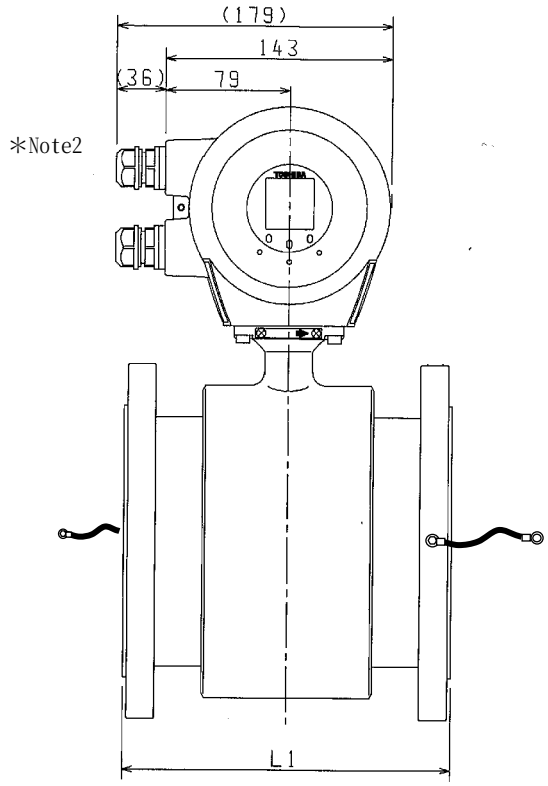
Note: The grounding rings are provided to PTFE Lining, which material is 316 stainless steel.

10. Outline Dimensions

10.1 Outline dimensions of GF630/LF600,LF610

Integral **(1) Meter size of 15 to 150mm (1/2 to 6 inch) for JIS and ANSI**



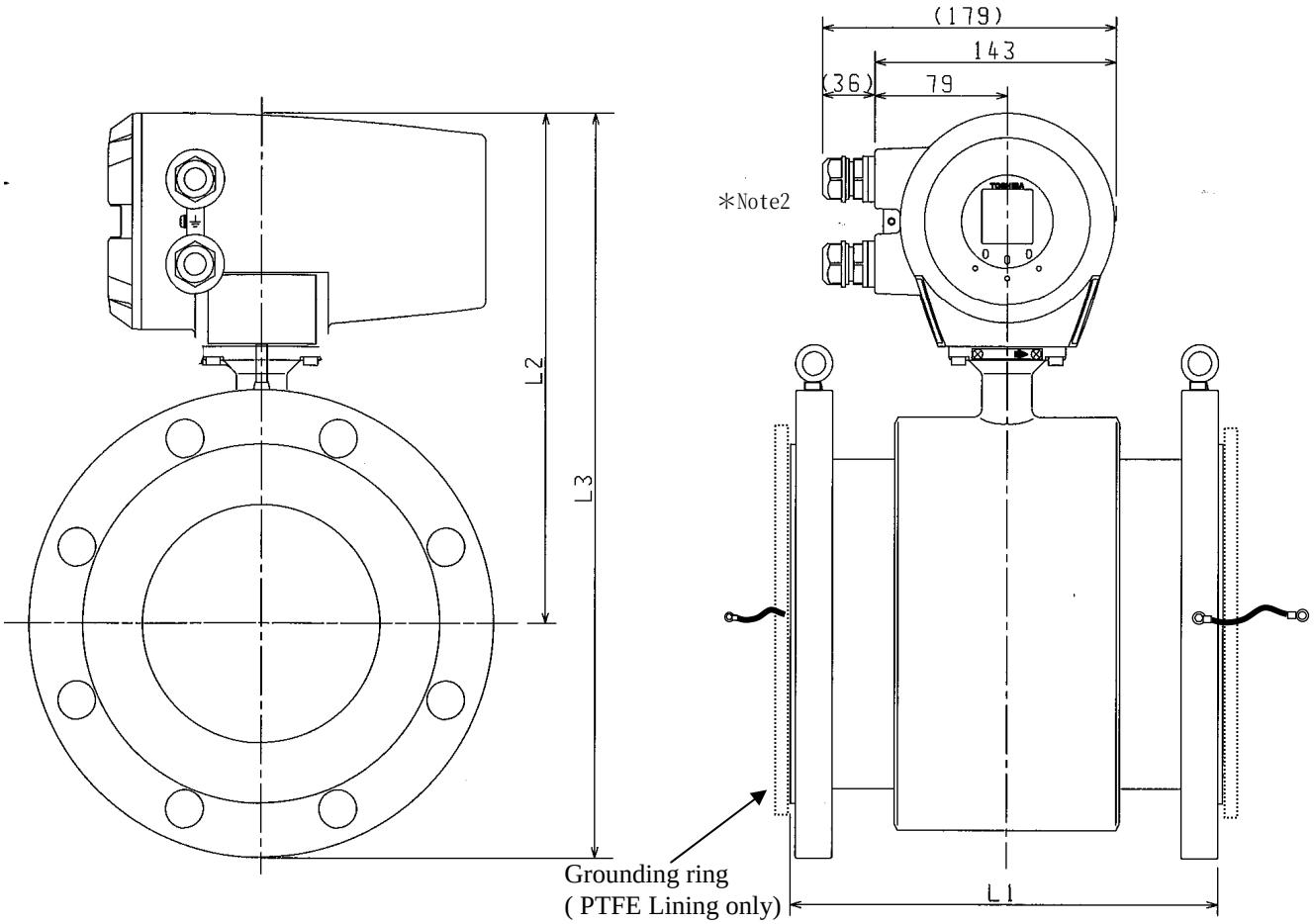


Meter Size		L1±6 (mm)	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg)	
				JIS10K	ANSI class 150	JIS10K	ANSI class 150
15mm	1/2"	200	220	268	264	7	7
25mm	1"	200	230	293	284	8	8
32mm	1 1/4"	200	235	303	294	10	9
40mm	1 1/2"	200	240	310	304	11	10
50mm	2"	200	250	328	326	12	13
65mm	2 1/2"	200	263	350	351	15	15
80mm	3"	200	268	360	363	16	19
100mm	4"	250	279	384	393	23	25
125mm	5”	250	299	424	426	29	32
150mm	6"	300	314	454	453	34	38

NOTES

(1) For the detail dimension of converter, check the converter LF600,LF610 instruction manual.
(2) Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

(2) Meter size of 200 to 600mm (8 to 24 inch)

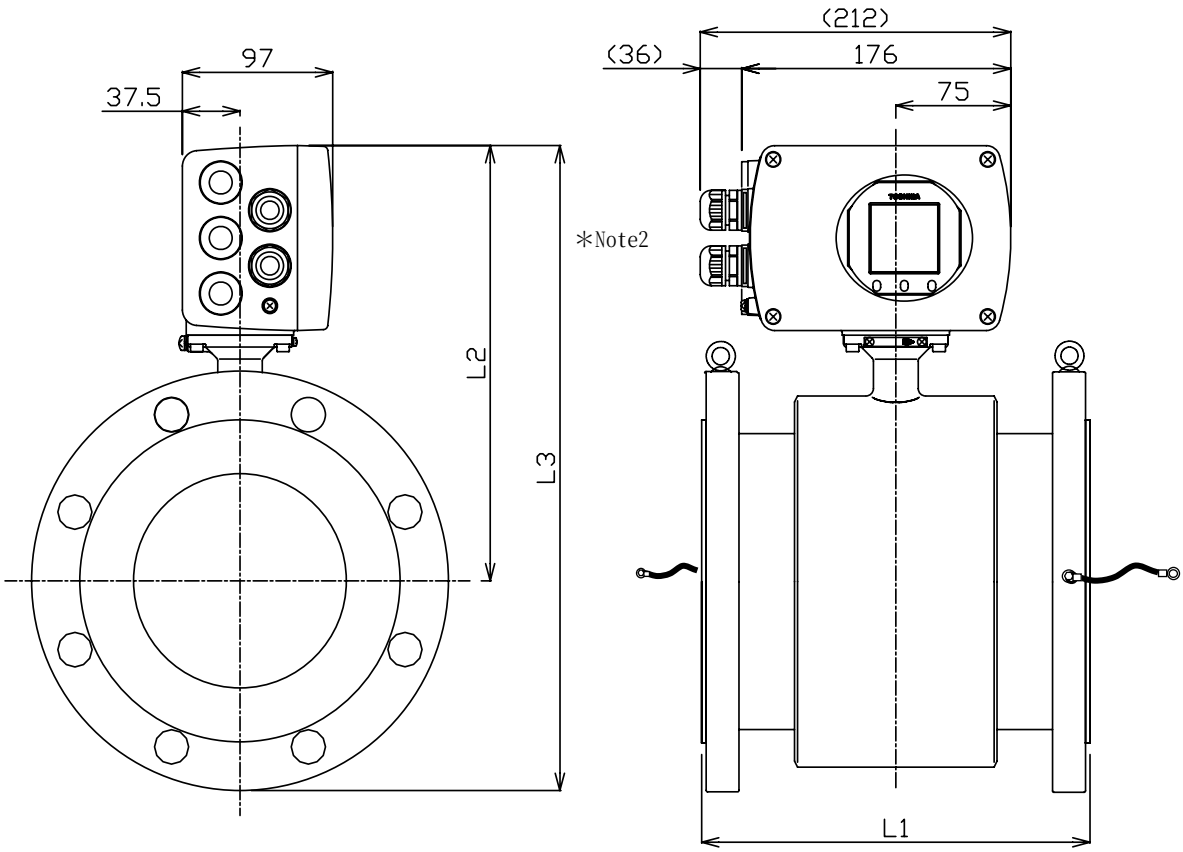


Meter Size		L1±6 *1 (mm)	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg) *2			
						PU and FEP		PTFE	
				JIS10K	ANSI 150	JIS10K	ANSI 150	JIS10K	ANSI 150
200mm	8"	350	339	504	510	48	58		
250mm	10"	450	359	559	562	70	85		
300mm	12"	500	384	606	625	100	124	105	132
350mm	14"	550	406	651	673	140	148	145	158
400mm	16"	600	434	714	732	150	182	160	195
450mm	18"	600	456	766	774	170	200	180	212
500mm	20”	600	481	819	830	185	230	195	244
600mm	24”	600	536	934	942	255	317	265	336

NOTES (1) For the detail dimension of converter, check the converter LF600,LF610 instruction manual.
*1) L1 of PTEF Lining contains the thickness of grounding rings.
*2) Mass of PTFE Lining contains the mass of grounding rings.
*3) Flange standard of DN700 or more is AWWA.
(2)Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

10.2 Outline dimensions of GF630/LF620

Integral **(1) Meter size of 15 to 200mm (1/2 to 6 inch) for JIS and ANSI**



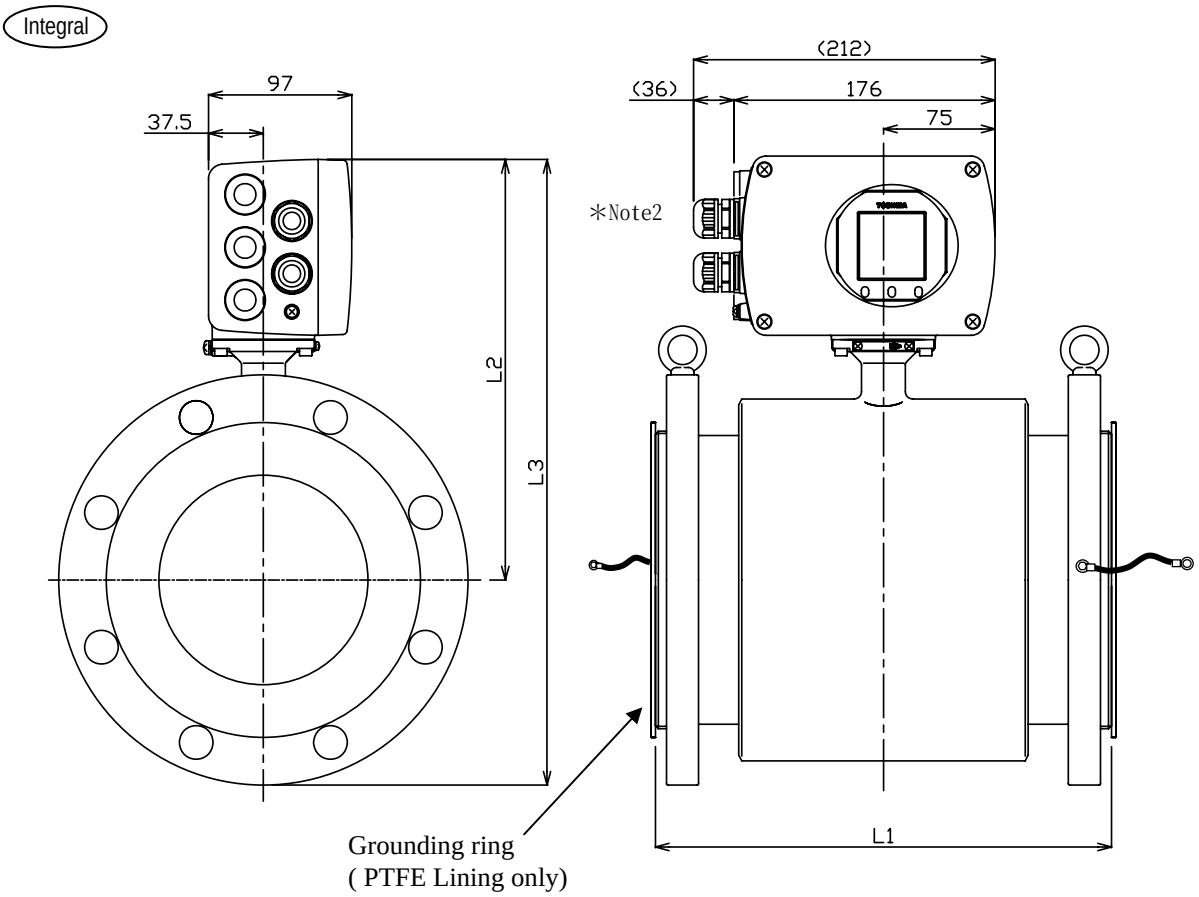
Meter Size		L1±6 (mm)	L2±5 (mm)	L3 ±5(mm)			Mass Approx. (kg)		
				JIS10K	ANSI class 150	DIN 10/16	JIS10K	ANSI class 150	DIN 10/16
15mm	1/2"	200	205	253	249	253	7	7	8
25mm	1"	200	215	278	269	273	8	8	8
32mm	1 1/4"	200	220	288	279	291	10	9	11
40mm	1 1/2"	200	225	295	289	300	11	10	13
50mm	2"	200	235	313	311	318	12	13	14
65mm	2 1/2"	200	248	335	337	340	15	15	17
80mm	3"	200	253	345	348	353	16	19	19
100mm	4"	250	264	369	378	374	23	25	27
125mm	5"	250	284	409	411	409	29	32	31
150mm	6"	300	299	439	439	442	34	38	37

NOTES

(1)For the detail dimension of converter, check the converter LF620 instruction manual.

(2)Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

(2) Meter size of 200 to 600mm (8 to 24 inch) for JIS and ANSI



Meter Size		L1±6 *1 (mm)	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg) *2			
						PU, FEP		PTFE	
				JIS10K	ANSI 150	JIS10K	ANSI 150	JIS10K	ANSI 150
200mm	8"	350	324	489	495	48	58		
250mm	10"	450	344	544	547	70	85		
300mm	12"	500	369	591	610	100	124	105	132
350mm	14"	550	391	636	658	140	148	145	158
400mm	16"	600	419	699	717	150	182	160	195
450mm	18"	600	441	751	759	170	200	180	212
500mm	20”	600	466	804	815	185	230	195	244
600mm	24”	600	521	919	927	255	317	265	336

NOTES

(1) For the detail dimension of converter, check the converter LF620 instruction manual.

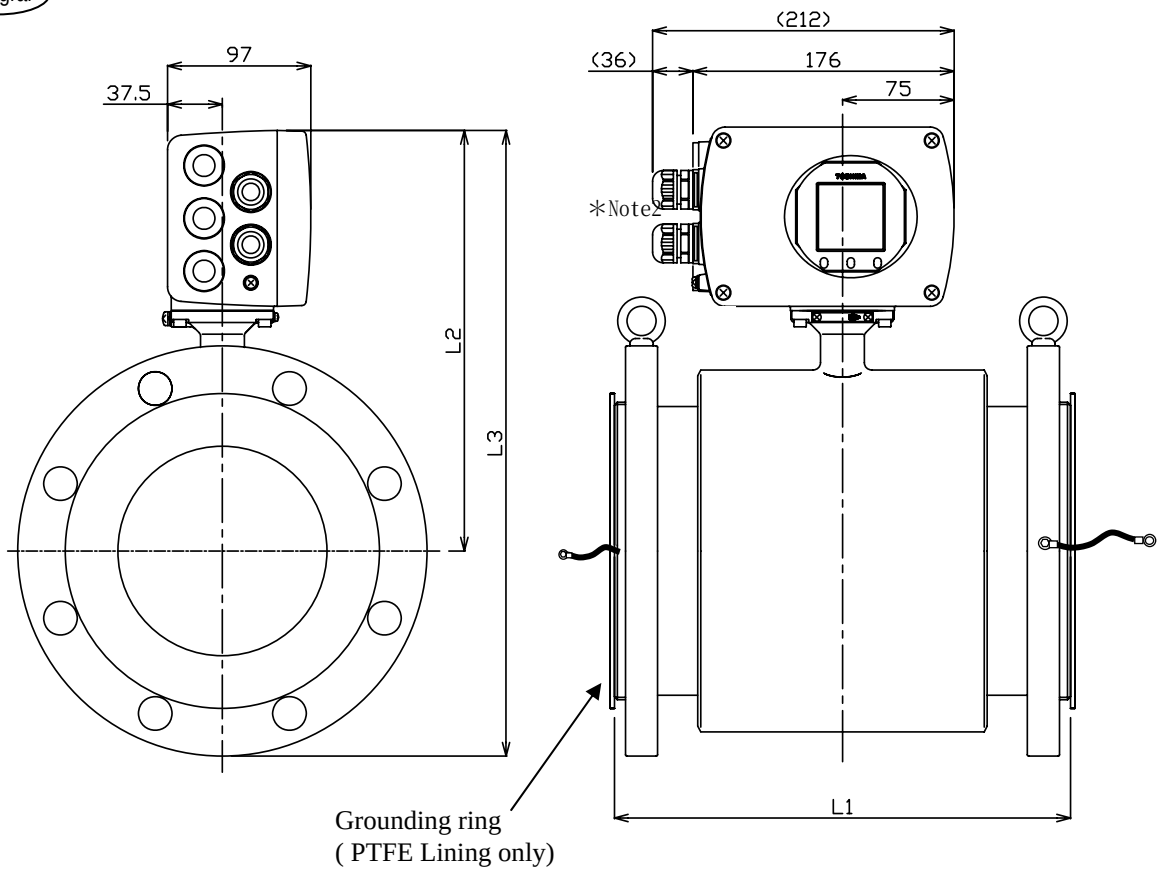
*1) L1 of PTEF Lining contains the thickness of grounding rings.

*2) Mass of PTFE Lining contains the mass of grounding rings.

(2)Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

(3) Meter size of 200 to 400mm (8 to 16 inch) for DIN Flanges

Integral



Meter Size		L1±6 *1 (mm)	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg) *2			
						PU and FEP		PTFE	
				DIN 10	DIN 16	DIN 10	DIN 16	DIN 10	DIN 16
200mm	8"	350	324	494	494	56	56		
250mm	10"	450	344	542	547	74	80		
300mm	12"	500	369	591	599	111	126	121	136
350mm	14"	550	391	644	651	146	164	156	174
400mm	16"	600	419	702	709	151	175	161	185

NOTES

(1) For the detail dimension of converter, check the converter LF620 instruction manual.

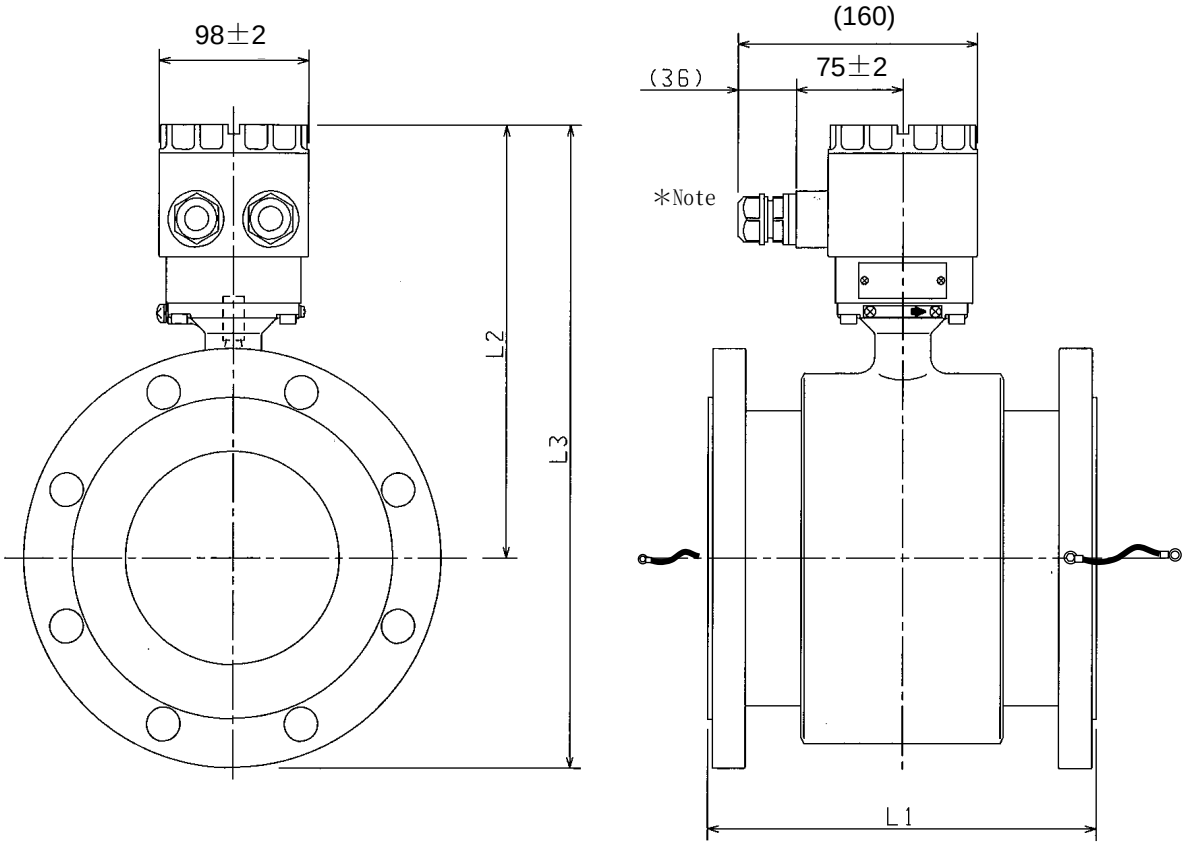
*1) L1 of PTEF Lining contains the thickness of grounding rings.

*2) Mass of PTFE Lining contains the mass of grounding rings.

(2)Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

10.3 Outline dimensions of GF632

Separate **(1) Meter size of 15 to 150mm (1/2 to 6 inch)**

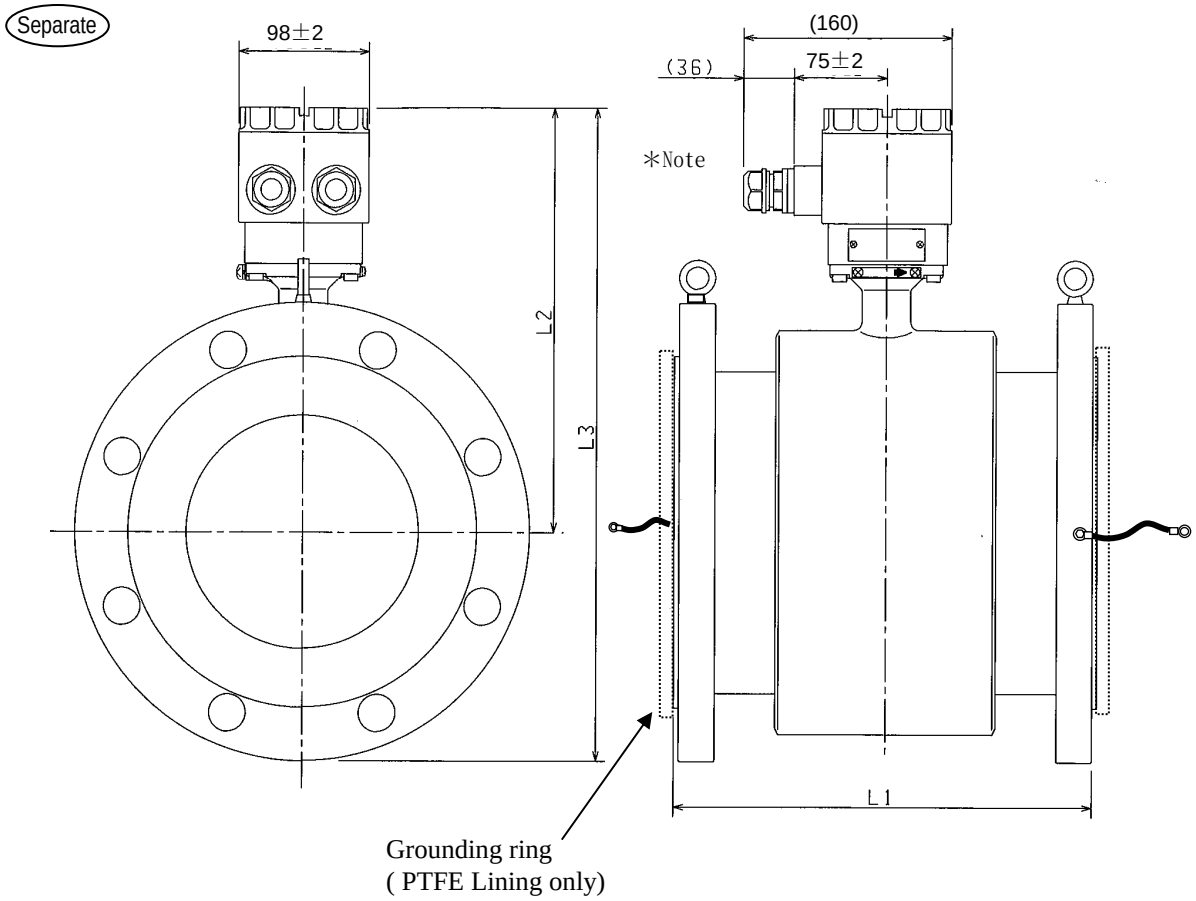


Meter Size		L1±6 (mm)	L2±5 (mm)	L3 ±5(mm)			Mass Approx. (kg)		
				JIS10K	ANSI class 150	DIN 10/16	JIS10K	ANSI class 150	DIN 10/16
15mm	1/2"	200	172	220	216	220	6	5	7
25mm	1"	200	182	245	236	240	7	6	7
32mm	1 1/4"	200	187	255	246	258	9	7	10
40mm	1 1/2"	200	192	262	256	267	10	8	12
50mm	2"	200	202	280	278	285	11	11	13
65mm	2 1/2"	200	215	302	303	307	14	13	16
80mm	3"	200	220	312	315	320	15	17	18
100mm	4"	250	231	336	345	341	22	23	26
125mm	5"	250	251	376	378	376	28	30	30
150mm	6"	300	266	406	405	409	33	36	36

NOTE

Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

(2) Meter size of 200 to 600mm (8 to 24 inch) for JIS and ANSI Flanges



Meter Size		L1±6 *1 (mm)	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg) *2			
						PU, FEP		PTFE	
				JIS10K	ANSI 150	JIS10K	ANSI 150	JIS10K	ANSI 150
200mm	8"	350	291	456	462	47	56		
250mm	10"	450	311	511	514	70	83		
300mm	12"	500	336	558	577	100	122	105	130
350mm	14"	550	358	603	625	145	146	145	156
400mm	16"	600	386	666	684	150	180	160	193
450mm	18"	600	408	718	726	170	198	180	210
500mm	20"	600	433	771	782	185	228	195	242
600mm	24"	600	488	886	894	255	315	265	334

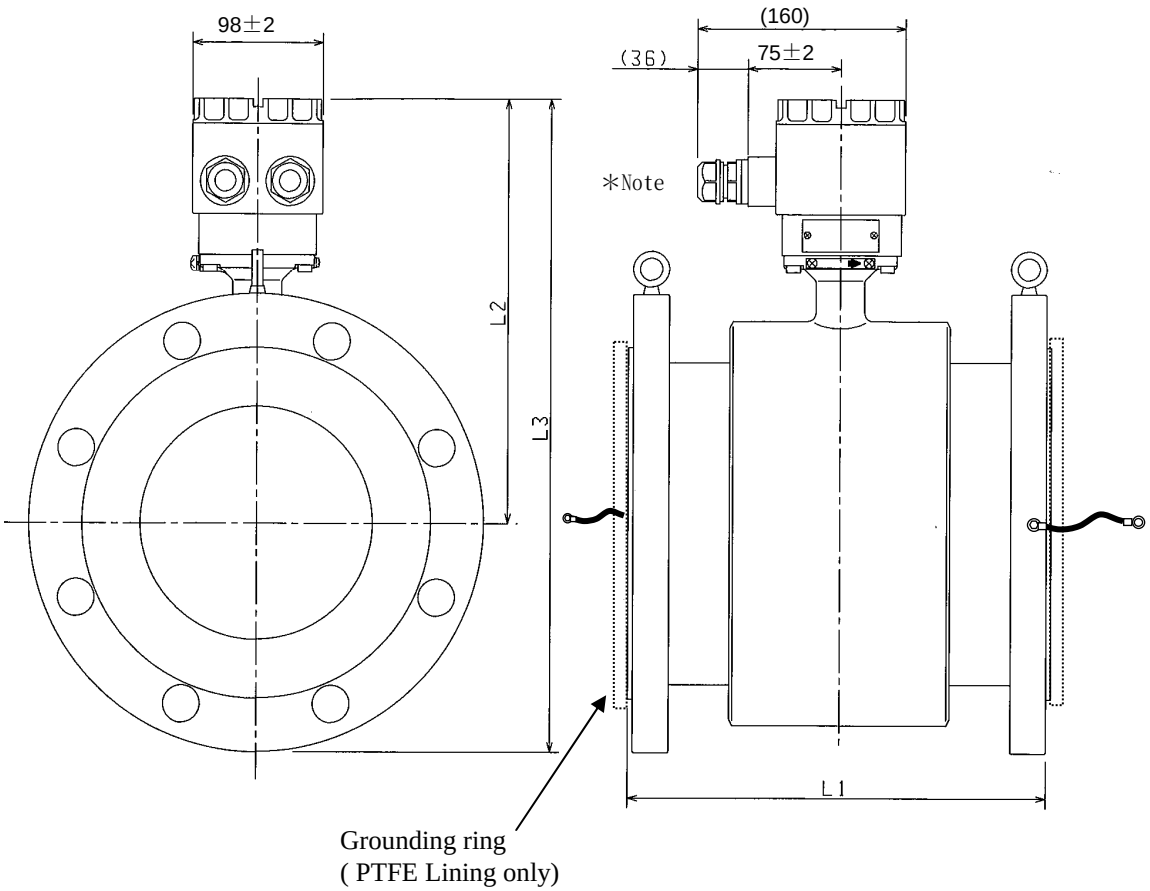
NOTES

Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

*1) L1 of PTEF Lining contains the thickness of grounding rings.

*2) Mass of PTFE Lining contains the mass of grounding rings.

(3) Meter size of 200 to 400mm (8 to 16 inch) for DIN Flanges



Meter Size		L1±6 (mm) *1	L2±5 (mm)	L3 ±5(mm)		Mass Approx. (kg) *2			
						PU, FEP		PTFE	
				DIN 10	DIN 16	DIN 10	DIN 16	DIN 10	DIN 16
200mm	8"	350	291	461	461	55	55		
250mm	10"	450	311	509	514	73	79		
300mm	12"	500	336	558	566	110	125	120	135
350mm	14"	550	358	611	618	145	163	155	173
400mm	16"	600	386	669	676	150	174	160	184

NOTES

Cable glands are not provided for GF630 with NPT1/2 at cable connection port.
Refer to the Cable connection port at type specification code.

*1) L1 of PTEF Lining contains the thickness of grounding rings.

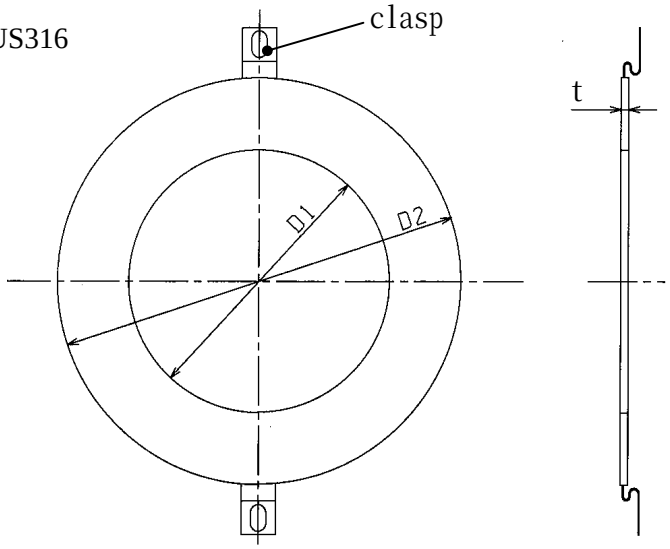
*2) Mass of PTFE Lining contains the mass of grounding rings.

10.4 Outline dimensions of Grounding ring

(1) Meter size of 15 to 600mm (1/2 to 24 inch) for JIS and ANSI Flanges

Option for Polyurethan and FEP

Material : SUS316



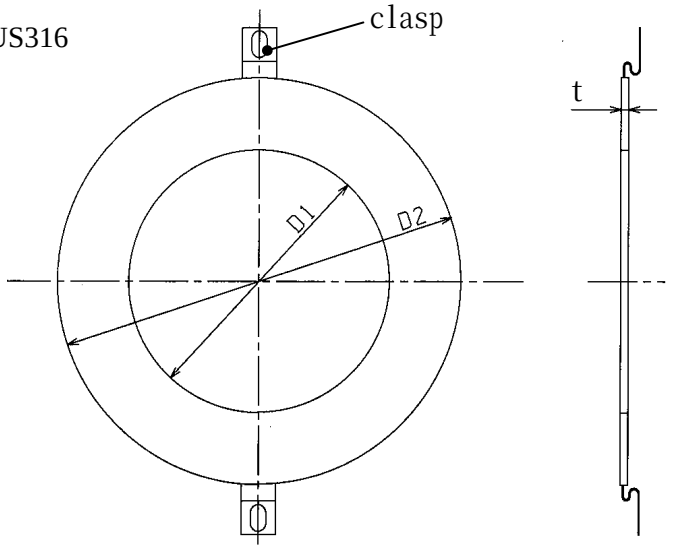
Meter Size		D1(mm)		D2 (mm)		Number of clasp	Mass Approx. (kg)	T (mm)
		JIS10K	ANSI 150	JIS10K	ANSI 150			
15mm	1/2"	16		42		2	0.1	3
25mm	1"	27		60		2	0.1	
32mm	1 1/4"	34		70		2	0.1	
40mm	1 1/2"	42		77		2	0.1	
50mm	2"	52		95		2	0.2	
65mm	2 1/2"	67	62	115	119	2	0.2	
80mm	3"	82	77	125	129	2	0.2	
100mm	4"	104		154		2	0.2	
125mm	5"	129		185		2	0.3	
150mm	6"	154		215		2	0.4	
200mm	8"	204		265		4	0.6	
250mm	10"	255		333	325	4	0.9	
300mm	12"	305		396	372	4	1.3	
350mm	14"	333		440	416	4	1.6	
400mm	16"	384		503	479	4	2.0	
450mm	18"	433		542	534	4	2.0	
500mm	20"	483		599	589	4	2.4	
600mm	24"	584		710	691	4	3.0	

*1) When the grounding ring will apply to the FEP lining, please attach the gaskets between the grounding ring and lining. (Refer to Fig 4.4.)

(2) Meter size of 15 to 400mm (1/2 to 16 inch) for DIN Flanges

Option for Polyurethan and FEP

Material : SUS316



Meter Size		D1(mm)		D2 (mm)		Number of clasp	Mass Approx. (kg)	T (mm)
		DIN 10	DIN 16	DIN 10	DIN 16			
15mm	1/2"	16		42		2	0.1	3
25mm	1"	27		60		2	0.1	
32mm	1 1/4"	34		70		2	0.1	
40mm	1 1/2"	42		77		2	0.1	
50mm	2"	52		95		2	0.2	
65mm	2 1/2"	67		115		2	0.2	
80mm	3"	82		125		2	0.2	
100mm	4"	104		150		2	0.3	
125mm	5"	129		185		2	0.4	
150mm	6"	154		215		2	0.5	
200mm	8"	204		265		4	0.6	
250mm	10"	255		325		4	0.8	
300mm	12"	305		372		4	0.9	
350mm	14"	333		416	440	4	1.6	
400mm	16"	384		479	503	4	2.0	

*1) When the grounding ring will apply to the FEP lining, please attach the gaskets between the grounding ring and lining. (Refer to Fig 4.4.)

USER'S FORM
NOTES

Write down the address and phone number of the distributor from which you purchased this product, the product code, SER.NO. and so on.

Distributor Address _____ Name _____ Phone number ( ) —
Product code LF_____ SER.NO._____

変　更　記　録　REVISIONS

変更記号 REV.MARK 変更発行日 REV.ISSUED	ページ PAGE	変更箇所・変更内容 CHANGED PLACE AND CONTENTS	承認 APPROVED BY	調査 CHECKED BY	担当 PREPARED BY	保管 REGISTERED
⓪		First edition			H.Nojiri Jan. 31. 06	
①	17 18 39 39 42 45 46	表 4JIS20K 削除、ﾄﾙｸ値見直し 流体圧力表記見直し ﾌﾗﾝｼﾞ規格、電極材質変更に伴い、仕様、形番表見直し 分離形端子箱寸法見直し	R.Hirai May.18.06	R.Hirai May.18.06	H.Nojiri May.18.06	
②	16 17 10 11 23 24 43 44 45 46 47	配管ガスケットに関する注記の追記と削除 アース線位置変更 L2、L3 寸法および質量見直し ケーブルグランドに関する注記追記 アースリング寸法見直し	R.Hirai Aug.7.06	R.Hirai Aug.7.06	H.Nojiri Aug.7.06	
③	1 16 38 39 42 43 44 45 46	Updated…Number of revision Added … Description the gasket between lining and grounding ring Deleted…Fluid temperature : Chloroprene rubber Deleted…Lining :Chloroprene rubber Changed…Lining: PTFE Meter sizes 300 to 400 → Meter sizes 300 to 600 Deleted…Electrodes : Chloroprene rubber Deleted…Chloroprene rubber from Table 9.2 Changed…Dimension and mass	R.Hirai Sep.12.06	R.Hirai Sep.12.06	H.Nojiri Sep.12.06	
④	1 10,1 1 ,20 18,1 9 39 40	Changed the edition 4th to edition 5th Changed the range that Hanging hook is applied. Added Meter size(DN700-900) in Table4.1. Added Meter size Added CR into Fluid temperature Added CR into Principal materials Reviewed description of coating	R.Hirai Jun.10.08	W.Fukai Jun.10.08	H.Nojiri Jun.10.08	

変 更 記 録 REVISIONS

変更記号 REV.MARK 変更発行日 REV.ISSUED	ページ PAGE	変更箇所・変更内容 CHANGED PLACE AND CONTENTS	承認 APPROVED BY	調査 CHECKED BY	担当 PREPARED BY	保管 REGISTERED
	41 42 43 45,47 1,3,4 5,10, 12,13 24,26 29,34 35,38 44,45 1,29	Added Meter size Added Meter size into Fig.9.2 Added CR and Meter size into table9.2 Added Meter size into outline dimension Added LF610 Added LF612				
(5)	1 7 11 12 21,22 23 27 43 46 48 49,50 51 52 53,55 54 56 1,3,4 5,13 14,23 27,29 32,37 38,41 23 1,32	Changed the edition 5th to edition 6th Changed Table of Contents Added a page about Appearance of GF630/LF620 (Page number after this page is changed.) Changed Title number 3.1.2 to 3.1.3 Added 2 pages of Tables of DIN Flanges Changed Figure 4.6 (b) Changed Figure 4.12 Added information of DIN Flanges Added DIN Flanges into table9.2 Added Ground cables to the Figure Added 3 pages about GF630/LF620 into outline dimension Added DIN Flanges into table Added words "for JIS and ANSI Flanges" Added a page about DIN Flanges(DN200-400) Added a page about Grounding ring for DIN Flanges Added LF620 Added LF610 Added LF622	M.Nozawa Aug.31.10	W.Fukai Aug.31.10	Y. Yamaguchi Aug.31.10	
(6)	1 37 42 43,47 47 50 48,49 50,51 52	Changed the edition 6th to edition 7th Added LF61* and LF622 Changed description of the Accuracy (Page number after this page is changed) Changed the table number Changed contents of DIN flanges Deleted words "for JIS and ANSI" Corrected mistakes of word (dimention→dimension, conveter→converter)	M.Nozawa Nov.1.10	T.Iijima Oct.15.10	Y. Yamaguchi Oct.15.10	

変 更 記 録 REVISIONS

変更記号 REV.MARK 変更発行日 REV.ISSUED	ページ PAGE	変更箇所・変更内容 CHANGED PLACE AND CONTENTS	承認 APPROVED BY	調査 CHECKED BY	担当 PREPARED BY	保管 REGISTERED
(7)	1	Changed the edition 7th to edition 8th	M. Nozawa Apr, 13, '11	M. Nozawa Apr, 13, '11	R. Hajiri Apr. 12. '11	
	10-12	Deleted Meter size 700 to 900mm				
	19,20	Deleted Meter size 700 to 900mm in Table 4.1				
	27	Changed converter type LF600,610 to LF620				
	32,33	Changed the size of the size of the crimping terminal				
	42	Deleted Meter size 700 to 900mm in Meter size				
		Deleted Meter size 700 to 900mm in Meter size in Accuracy				
	43	Deleted Chloroprene rubber				
	47	Deleted Chloroprene rubber. Added Grounding ring in the 12th digit.				
	48-57	Changed dimensions				
		Deleted Meter size 700 to 900mm and Chloroprene rubber				

配布先 DISTRIBUTION	部数 COPY					発行 ISSUED Development & Designing Measuring Instrument Group Microelectronics & Software Dept.	承認 R. Hirai APPROVED BY Jan. - 31 - 06
							調査 W. Fukai CHECKED BY Jan. - 31 - 06
							担当 H. Nojiri PREPARED BY Jan. - 31 - 06
							F 保管 REGISTERED

TOSHIBA CORPORATION

FCF50017