TOSHIBA

**Field Intelligent Device – Premium Value Series**

# Electromagnetic Flowmeter

**GF630 /LF610**
**GF632 /LF612**
**1/2" to 36" (15 to 900 mm)**

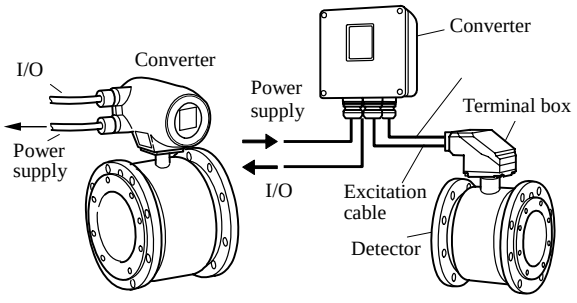
## Introduction

The electromagnetic flowmeter uses Faraday's Law of electromagnetic induction to measure the process flow. The device consists of two units: a detector, through which the fluid to be measured flows and in which low-level signals proportional to flow rates are obtained; and a converter, which supplies excitation current to the detector, and amplifies the signals from the detector and then processes and converts the signals into the 4–20mAdc current signal or communication signal. Combined with a multi-functional converter LF610 (combined type) or LF612 (separate type) equipped with its original patented **Noise–Sentry** noise-suppression circuit and advanced algorithms. The GF630 has a very high tolerance to noise, giving the unit a very stable output even for slurry fluid measurement. IR (Infrared) switches enable the parameter setting of the converter without removing the cover. Flow direction can be set in either way, and its unique 128 x 128 dot matrix LCD display allows the LCD to be rotated electronically to 90, 180 and 270 degrees without opening the cover.

The AF900 hand-held terminal (HART*[1] communicator) can be used to communicate with the flowmeter from a remote place. PROFIBUS-PA*[2] interface is available as an option.

*1: HART protocol (Highway Addressable Remote Transducer) is a communication protocol for industrial sensors recommended by the HCF (HART Communication Foundation).

*2: PROFIBUS is the communication protocol for factory and process automation that the PROFIBUS Organization recommends. Instead of analog control with a conventional analog signal (4-20mA), it is the fieldbus which digitizes all signals. Flowmeters support PROFIBUS-PA.




**Combined type**
**GF630/LF610**
**GF630/LF610F**

**Separate type**
**GF632/LF612**
**GF632/LF612F**

***Figure 1. Configuration***

**GF630/LF610**
**GF630/LF610F**

**GF632**

**LF612**
**LF612F**

***Figure2. GF630 Premium Value series Flowmeters***

Certification number Z01207

NSF/ANSI61 Certification Pending

## Specifications

### ■ Overall Specifications

**Measurement range in terms of flow velocity:**

0 –1.0 ft/s to 0 – 32.8 ft/s (0 – 0.3 m/s to 0 –10 m/s).

0 – 0.3 ft/s to 0 – 1.0 ft/s (0 – 0.1 m/s to 0 – 0.3 m/s) range is available optionally for meter size 1/2" to 18" (15 to 450 mm).

**Accuracy:**

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

**±0.2 % of Rate** *1.

*1 This pulse output error result is established under standard operating conditions at Toshiba's flow calibration facility, Fuchu Japan (NIST Traceable).

*1 Individual meter measurement error may vary up to ±0.5% of Rate at 1.64 ft/s (0.5m/s) or more. Or it may vary up to ±0.3% of rate ±0.039 inch/s (1mm/s) at 1.64 ft/s (0.5m/s) or less.

*1 Current output: plus ± 8μA (0.05% of span).

*1 Refer to individual calibration data for each individual meter's measurement error.

**< 20" and 24” (500 mm and 600 mm) >**

**±0.3 % of Rate** [*2].

[*2] This pulse output error result is established under standard operating conditions at Toshiba's flow calibration facility, Fuchu Japan.

[*2] Individual meter measurement error may vary up to ±0.5% of Rate at 3.28 ft/s (1.0 m/s) or more. Or it may vary up to ±0.3% of rate ±0.079 inch/s (2 mm/s) at 3.28 ft/s (1.0 m/s) or less.

[*2] Current output: plus ± 8µA (0.05% of span).

[*2] Refer to individual calibration data for each individual meter's measurement error.

**< 28" to 36” (700 mm to 900 mm) >**

**±0.5 % of Rate** [*3].

[*3] This pulse output error result is established under standard operating conditions at Toshiba's flow calibration facility, Fuchu Japan.

[*3] Individual meter measurement error may vary up to ±0.8% of Rate at 3.28 ft/s (1.0 m/s) or more. Or it may vary up to ±0.4% of rate ±0.157 inch/s (4 mm/s) at 3.28 ft/s or less.

[*3] Current output: plus ± 8µA (0.05% of span).

[*3] Refer to individual calibration data for each individual meter's measurement error.

**Fluid conductivity:** 5µS/cm minimum

**Fluid temperature:**

-4 to 212 °F (-20 to +100 °C): FEP lining

-4 to 248 °F (-20 to +120 °C): PTFE lining

-4 to 140 °F (-20 to + 60 °C): Polyurethane lining

14 to 140 °F (-10 to + 60 °C): Chloroprene Rubber lining

**Ambient temperature:** -4 to 140 °F (-20 to +60 °C)

**Structure:** IP 67 and NEMA 4X Watertight

**Power consumption:**

17W (27VA) or less

19W (29VA) or less (with PROFIBUS)

**Conformance to European Community Directives:**

EMC directive 89/336/EEC

The low voltage 93/68/EEC

**Approved hazardous location certifications:**

Model: GF630/LF610F and GF632/LF612F

cFMus explosion proof:

FM Class I, Division 2, Groups A,B,C, and D.
FM Class II, Division 2, Groups E, F and G.
FM Class III.

## ■ Model GF630 and GF632 Detector

**Mounting style:**

Flange connection type, ISO13359 for direct replacement of existing ISO13359 magmeters.

**Fluid pressure:**

0 psi or 0 bar (0 Pa) to the nominal pressure of the connection flange

**Note:** Before shipping from the manufacturer, each detector unit is tested by following test condition.
Pressure… twice of the pressure index number (ex. 300 psi in ANSI 150 case)
Time… 15 minutes

**Connection flange standards:**

ANSI 150 : 1/2” to 24” ( 15 to 600 mm )

AWWA : 28” to 36” ( 700 to 900 mm )

JIS10K : 1/2” to 36” ( 15 to 900 mm )

**Principal materials:**

**Case** — carbon steel

**Flange material** — carbon steel

**Linings —**

FEP: Meter sizes 1/2” to 10” (15 to 250mm)

PTFE: Meter sizes 12” to 24” (300 to 600mm)

Polyurethane (PU):
Meter sizes 1/2” to 16” (15 to 400mm)

Chloroprene Rubber (CR):
Meter sizes 18” to 36” (450 to 900mm)

**Electrodes —**

Type - Super smooth, polished with self cleaning finish, and non stick shape.

316L stainless steel (for PU, CR lining).

Hastelloy C equivalent (for FEP, PTFE lining).

**Measuring tube material** — 304 stainless steel

**Terminal box** — Aluminum alloy (for separate type)

**Grounding ring** —

PU, CR, FEP lining:
None (std.), 316 stainless steel (opt.)

PTFE lining: 316 stainless steel (std.)

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

**Dimensions and weights:** See Figure 3 and 4.

**Cable connection port:** for separate type detectors.

**Applicable diameter —**
0.433 to 0.512 inch (11 to 13mm)

**Cable glands** —

GF632 without cFMus Approval:
Provided as standard, G1/2 male screws

GF632 with cFMus Approval:
Not provided, 1/2-14NPT male screws are required.

## ■ Model LF610 and LF612 converters

**Input signals**

**Analog signal** — the voltage signal from detector, proportional to process flow rate (for LF612 separate type converter).

**Digital input DI (opt.)**
Signal type: 20 to 30Vdc voltage signal
Input resistance: 2.7kΩ
Number of inputs: one point

**DI function** — One of the following functions can be assigned to the optional DI signal.

**Range switching** — Selects either the higher or lower range in the unidirectional or bidirectional 2-range setting.

**Totalizer control** — Starts and stops the built-in totalizer.

**Fixed-value outputs** — Outputs fixed-values for current and pulse outputs.

**Zero adjustment** — Executes zero adjustment (on-stream at zero flow rate).

**Output signals**

**Current output:**

4–20 mAdc (load resistance 0 to 750Ω)

**Note:** The current output cannot be used with the PROFIBUS-PA communication.

**Digital outputs** — One point (std.) and one more point is optionally available as follows.

**Digital output DO1 (std.):**

Output type: Transistor open collector
Number of outputs: One point
Output capacity: 30Vdc, 200mA maximum

**Digital output DO2 (opt.):**

Output type: Solid-state relay output (non polarity)

Number of outputs: One point

Output capacity: 150Vdc, 150mA maximum or 150Vac (peak to peak), 100mA maximum

**DO1 and DO2 functions** — One of the following functions can be assigned to DO1 (std.) and/or DO2 (opt.)

- **Pulse output (available only for DO1,DO2)**

Pulse rate: 3.6 to 36,000,000 pulses/hr (DO1)
3.6 to 360,000 pulses/hr (DO2)
(Over 3,600,000 pulses/hr, auto-setting)
Pulse width: 0.5 to 500ms (but less than half of the period for 100% flow rate)

**Note:** The same and simultaneous pulse is not available between DO1 and DO2.

- **Multi-range selection outputs (Note 1)**
- **High, High high, Low, and/or Low low alarm outputs (Note 2)**
- **Empty pipe alarm output (Note 2)**
- **Preset count output**
- **Converter failure alarm output**

**Note 1:** Two outputs (DO1 and DO2) are needed for 4-range switching and forward/reverse 2-range switching.

**Note 2:** Normal Open (default set) or Normal Close is selected for alarm outputs when programming.
When power failure occurs, unit will be fault to Normal Open.

**Communications output:**

- **HART (std.)** — Digital signal is superimposed on 4–20mAdc current signal as follows:

Conforms to HART protocol

Load resistance: 240 to 750Ω
Load capacitance: 0.25μF maximum
Load inductance: 4mH maximum

- **PROFIBUS (opt.)**

Protocol: PROFIBUS-PA

Baud rate: 31.25kbps

Bus voltage: 9-30VDC

Consumption electric current of bus: less than 16mA

Manufacture Ident-No.: $093B_{HEX}$

Standard Ident-No.: $9740_{HEX}$

Slave address: 0-126 (Default address is 126)

Profile: Profile Ver.3.01 for Process Control Devices

Function blocks: AI(Flow)×1 , Totalizer×1

**LCD display:**

Full dot-matrix 128×128 dot LCD display (back–light provided)
The data on the LCD inside the converter can rotate to 90, 180, and 270 degrees by a software, without rotating the indicator itself. (Combined type only)

**Parameter settings** — Parameters can be set as follows:

- **IR Switches**: Three key switches are provided to set configuration parameters.
- **Digital communication**: The AF900 hand-held terminal or PROFIBUS is needed to set parameters.

- **Zero adjustment:** Zero point adjustment can be started by pressing the switch in the converter.
- **Damping:** 0.5 to 60 seconds (selectable in one second increments)

**"Field re-verification" Mag-Prover** – Toshiba's Zero span calibration tool allows unit to be re-calibrated and verified using an internal software program (For more information contact Toshiba International Corp.)

**Conditions when power fails:**

Parameter setting values are stored in non–volatile memory and the values will be restored when the power returns to normal condition. The outputs and display will remain as follows when power fails.

- Current output: 0mAdc
- Digital output: OFF
- LCD display: No display
- PROFIBUS: No communication

**Power supply:**

One of the following can be selected:

- 100 to 240Vac, 50/60Hz (std.) (allowable voltage 80 to 264Vac)
- 24Vdc (allowable voltage 18 to 36Vdc)
- 110Vdc (allowable voltage 90 to 130Vdc)

**Surge protection:**

Arresters are installed in the power supply and a current signal output circuit to help protect the meter from lightning and improve personnel safety.

**Case:** Aluminum alloy (equal to IP 67)

**Coating:** Acrylic resin-baked coating, pearl–gray colored

**Cable connection port:**

**Cable glands** —

LF610 and LF612 without cFMus Approval:

Provided as standard, G 1/2 male screws.
OD of cable $\phi$ 11 to 13mm
Material: Nylon 66

LF610F and LF612F with cFMus Approval:

Not provided, 1/2–14NPT male screws are required.

**Applicable diameter** —

0.433 to 0.512 inch (11 to 13mm)

Note: **When PROFIBUS option is specified, cable gland size is $\phi$ 6～8mm for signal cable, $\phi$ 11～13mm for power cable.**

**Vibration resistance:**

No resonance to the following levels of vibration:

- 10 to 150Hz with acceleration of 9.8m/s$^2$
- Vibration of 30Hz with 29.4 m/s$^2$ in 4h in each direction will not cause any defect to unit.

**Note:** Avoid using the flowmeter in an environment with constant vibration.

**Converter LF612 Dimensions and Weights:**
See Figure 5 (for separate type)

**MTBF:**

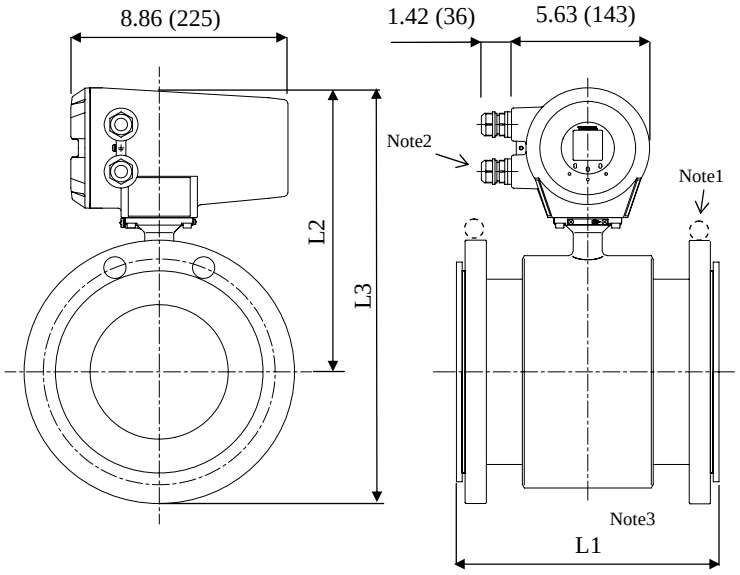
Converter: 220,000 hours (25 years) at 77 °**F** (25 °**C**) based on strict military specification MIL-HDBK-217F.

Detector: 350,000 hours (40 years) at 77 °**F** (25 °**C**) based on strict military specification MIL-HDBK-217F.

# Installation

## ■ Dimensions

### Combined type GF630/LF610 and GF630/LF610F




**Note1:** Eye bolts are provided at the flange for flowmeters sized 8" (200mm) or above.

**Note2:** Cable glands are not provided for GF630/LF610F cFMus approved type. Refer to the part Cable connection port at detector.

**Note3:** L1 of PTFE lining contains the thickness of grounding rings.

**Note4:** The weight of PTFE lining includes the weight of grounding rings.

**Note5:** 1 inch = 25.4mm

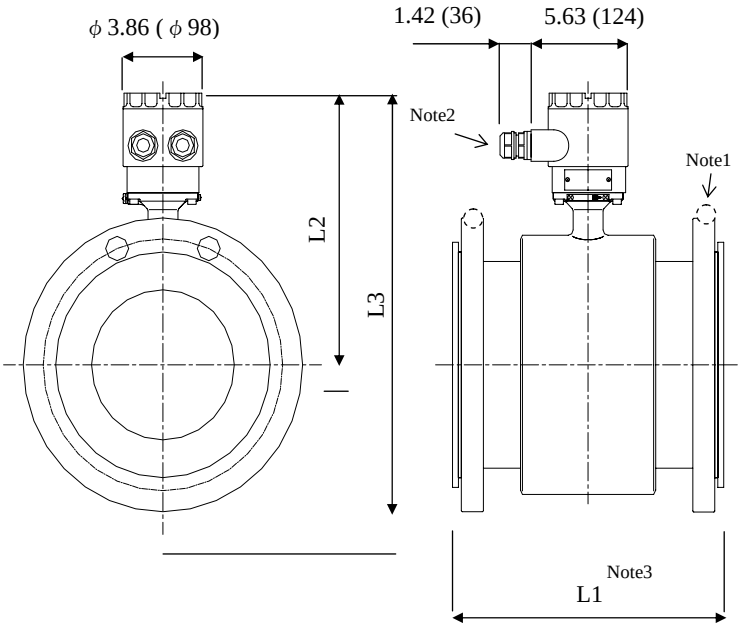
Unit: inch ( mm)

| ANSI 150 ( AWWA for meter size 28” to 36”) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | L1 | L2 | L3 | No. of | Weight (lbs) approx. | | | |
| (inch) | (inch) | (inch) | (inch) | bolts | FEP | PTFE | PU | CR |
| 1/2 | 7.9 | 8.7 | 10.4 | 4 | 16 | | 16 | |
| 1 | 7.9 | 9.1 | 11.2 | 4 | 18 | | 18 | |
| 1-1/4 | 7.9 | 9.3 | 11.6 | 4 | 20 | | 20 | |
| 1-1/2 | 7.9 | 9.4 | 12.0 | 4 | 23 | | 23 | |
| 2 | 7.9 | 9.8 | 12.8 | 4 | 29 | | 29 | |
| 2-1/2 | 7.9 | 10.3 | 13.8 | 4 | 34 | | 34 | |
| 3 | 7.9 | 10.5 | 14.3 | 4 | 42 | | 42 | |
| 4 | 9.8 | 11.0 | 15.5 | 8 | 56 | | 56 | |
| 5 | 9.8 | 11.8 | 16.8 | 8 | 71 | | 71 | |
| 6 | 11.8 | 12.3 | 17.9 | 8 | 84 | | 84 | |
| 8 | 13.8 | 13.3 | 20.1 | 8 | 128 | | 128 | |
| 10 | 17.7 | 14.1 | 22.1 | 12 | 188 | | 188 | |
| 12 | 19.7 | 15.1 | 24.6 | 12 | | 292 | 274 | |
| 14 | 21.7 | 16.0 | 26.5 | 12 | | 349 | 327 | |
| 16 | 23.6 | 17.1 | 28.8 | 16 | | 430 | 402 | |
| 18 | 23.6 | 18.0 | 30.5 | 16 | | 468 | | 441 |
| 20 | 23.6 | 18.9 | 32.7 | 20 | | 538 | | 508 |
| 24 | 23.6 | 21.1 | 37.1 | 20 | | 741 | | 699 |
| 28 | 27.6 | 22.7 | 41.0 | 28 | | | | 772 |
| 30 | 29.6 | 23.8 | 43.1 | 28 | | | | 882 |
| 32 | 31.5 | 24.9 | 45.8 | 28 | | | | 993 |
| 36 | 35.5 | 26.9 | 50.0 | 32 | | | | 1103 |

| JIS 10K | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | L1 | L2 | L3 | No. of | Weight (kg) approx. | | | |
| (mm) | (mm) | (mm) | (mm) | bolts | FEP | PTFE | PU | CR |
| 15 | 200 | 220 | 268 | 4 | 7 | | 7 | |
| 25 | 200 | 230 | 293 | 4 | 8 | | 8 | |
| 32 | 200 | 235 | 303 | 4 | 10 | | 10 | |
| 40 | 200 | 240 | 310 | 4 | 11 | | 11 | |
| 50 | 200 | 250 | 328 | 4 | 12 | | 12 | |
| 65 | 200 | 263 | 350 | 4 | 15 | | 15 | |
| 80 | 200 | 268 | 360 | 8 | 16 | | 16 | |
| 100 | 250 | 279 | 384 | 8 | 23 | | 23 | |
| 125 | 250 | 299 | 424 | 8 | 29 | | 29 | |
| 150 | 300 | 314 | 454 | 8 | 34 | | 34 | |
| 200 | 350 | 339 | 504 | 12 | 48 | | 48 | |
| 250 | 450 | 359 | 559 | 12 | 70 | | 70 | |
| 300 | 500 | 384 | 606 | 16 | | 101 | 93 | |
| 350 | 550 | 406 | 651 | 16 | | 137 | 127 | |
| 400 | 600 | 434 | 714 | 16 | | 149 | 136 | |
| 450 | 600 | 456 | 766 | 20 | | 171 | | 159 |
| 500 | 600 | 481 | 819 | 20 | | 185 | | 171 |
| 600 | 600 | 536 | 934 | 24 | | 253 | | 234 |
| 700 | 700 | 577 | 1030 | 24 | | | | 350 |
| 750 | 750 | 603 | 1088 | 24 | | | | 400 |
| 800 | 800 | 633 | 1143 | 28 | | | | 450 |
| 900 | 900 | 684 | 1244 | 28 | | | | 500 |

***Figure 3. GF630/LF610 and GF630/LF610F combined type flowmeters***
***Meter sizes 1/2" (15mm) to 36" (900mm)***

**Separate type GF632/LF612 and GF632/LF612F**




**Note1:** Eye bolts are provided at the flange for flowmeters sized 8" (200mm) or above.

**Note2:** Cable glands are not provided for GF632/LF612F cFMus approved type. Refer to the part Cable connection port at detector.

**Note3:** L1 of PTFE lining contains the thickness of grounding rings.

**Note4:** The weight of PTFE lining includes the weight of grounding rings.

**Note5:** 1 inch = 25.4mm

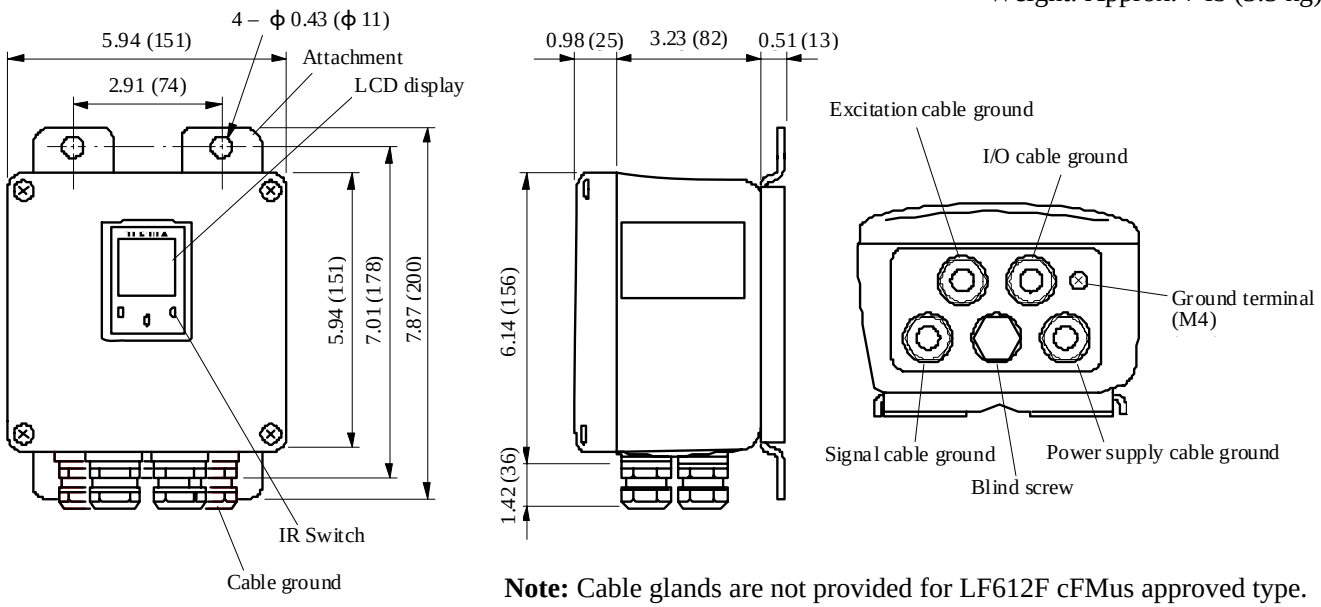
Unit: inch ( mm)

| ANSI 150 ( AWWA for meter size 28" to 36") | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | L1 | L2 | L3 | No. of | Weight (lbs) approx. | | | |
| (inch) | (inch) | (inch) | (inch) | bolts | FEP | PTFE | PU | CR |
| 1/2 | 7.9 | 4.9 | 8.5 | 4 | 12 | | 12 | |
| 1 | 7.9 | 5.1 | 9.3 | 4 | 14 | | 14 | |
| 1-1/4 | 7.9 | 5.3 | 9.7 | 4 | 16 | | 16 | |
| 1-1/2 | 7.9 | 5.4 | 10.1 | 4 | 18 | | 18 | |
| 2 | 7.9 | 5.7 | 10.9 | 4 | 25 | | 25 | |
| 2-1/2 | 7.9 | 6.1 | 11.9 | 4 | 29 | | 29 | |
| 3 | 7.9 | 6.2 | 12.4 | 4 | 38 | | 38 | |
| 4 | 9.8 | 6.5 | 13.6 | 8 | 51 | | 51 | |
| 5 | 9.8 | 7.1 | 14.9 | 8 | 67 | | 67 | |
| 6 | 11.8 | 7.5 | 15.9 | 8 | 80 | | 80 | |
| 8 | 13.8 | 8.2 | 18.2 | 8 | 124 | | 124 | |
| 10 | 17.7 | 8.8 | 20.2 | 12 | 183 | | 183 | |
| 12 | 19.7 | 9.5 | 22.7 | 12 | | 287 | 269 | |
| 14 | 21.7 | 10.1 | 24.6 | 12 | | 344 | 322 | |
| 16 | 23.6 | 10.9 | 26.9 | 16 | | 426 | 397 | |
| 18 | 23.6 | 11.5 | 28.6 | 16 | | 463 | | 437 |
| 20 | 23.6 | 12.2 | 30.8 | 20 | | 534 | | 503 |
| 24 | 23.6 | 13.8 | 35.2 | 20 | | 737 | | 695 |
| 28 | 27.6 | 20.8 | 39.1 | 28 | | | | 768 |
| 30 | 29.6 | 21.9 | 41.3 | 28 | | | | 878 |
| 32 | 31.5 | 23.0 | 43.9 | 28 | | | | 988 |
| 36 | 35.5 | 25.1 | 48.1 | 32 | | | | 1209 |

| JIS 10K | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Size | L1 | L2 | L3 | No. of | Weight (kg) approx. | | | |
| (mm) | (mm) | (mm) | (mm) | bolts | FEP | PTFE | PU | CR |
| 15 | 200 | 172 | 220 | 4 | 5 | | 5 | |
| 25 | 200 | 182 | 245 | 4 | 6 | | 6 | |
| 32 | 200 | 187 | 255 | 4 | 8 | | 8 | |
| 40 | 200 | 192 | 262 | 4 | 9 | | 9 | |
| 50 | 200 | 202 | 280 | 4 | 10 | | 10 | |
| 65 | 200 | 215 | 302 | 4 | 13 | | 13 | |
| 80 | 200 | 220 | 312 | 8 | 14 | | 14 | |
| 100 | 250 | 231 | 336 | 8 | 21 | | 21 | |
| 125 | 250 | 251 | 376 | 8 | 27 | | 27 | |
| 150 | 300 | 266 | 406 | 8 | 32 | | 32 | |
| 200 | 350 | 291 | 456 | 12 | 46 | | 46 | |
| 250 | 450 | 311 | 511 | 12 | 68 | | 68 | |
| 300 | 500 | 336 | 558 | 16 | | 99 | 91 | |
| 350 | 550 | 358 | 603 | 16 | | 135 | 125 | |
| 400 | 600 | 386 | 667 | 16 | | 147 | 134 | |
| 450 | 600 | 408 | 718 | 20 | | 169 | | 157 |
| 500 | 600 | 433 | 771 | 20 | | 183 | | 169 |
| 600 | 600 | 488 | 886 | 24 | | 251 | | 232 |
| 700 | 700 | 529 | 982 | 24 | | | | 348 |
| 750 | 750 | 555 | 1040 | 24 | | | | 398 |
| 800 | 800 | 585 | 1095 | 28 | | | | 448 |
| 900 | 900 | 636 | 1196 | 28 | | | | 548 |

***Figure 4. Separate type detectors GF632***
***Meter sizes 1/2" (15mm) to 36" (900mm)***

Weight: Approx. 7 lb (3.5 kg)




Unit: inch (mm)

**Note:** Cable glands are not provided for LF612F cFMus approved type. Refer to the part Cable connection port at detector.

**Note:** 1 inch = 25.4 mm

***Figure 5. Separate type converter LF612 and LF612F***

## ■ External Connections

**Combined type GF630/LF610 and GF630/LF610F flowmeters**

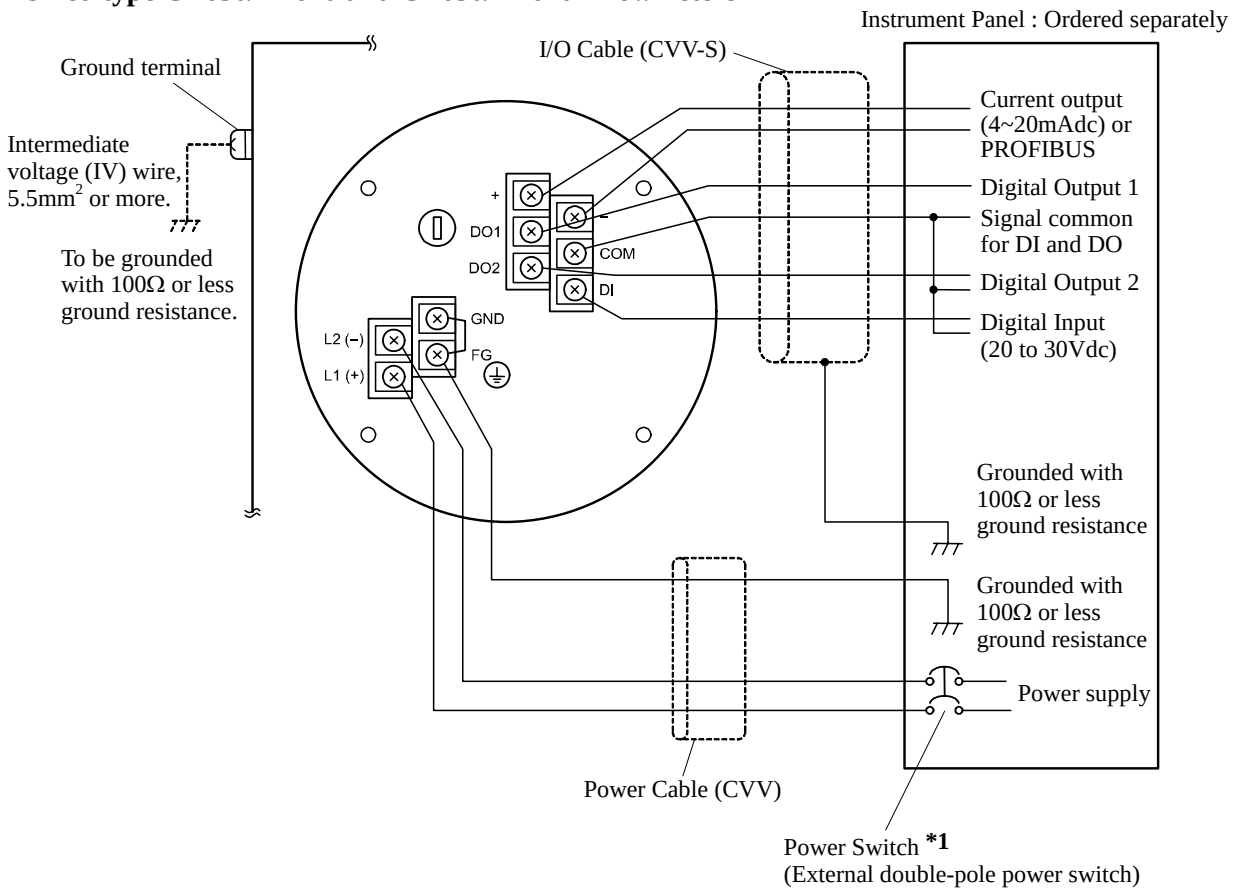



***Figure 6. Combined type GF630/LF610 and GF630/LF610F flowmeters Wiring Diagram***

**Separate type GF632/LF612 and GF632/LF612F flowmeters**

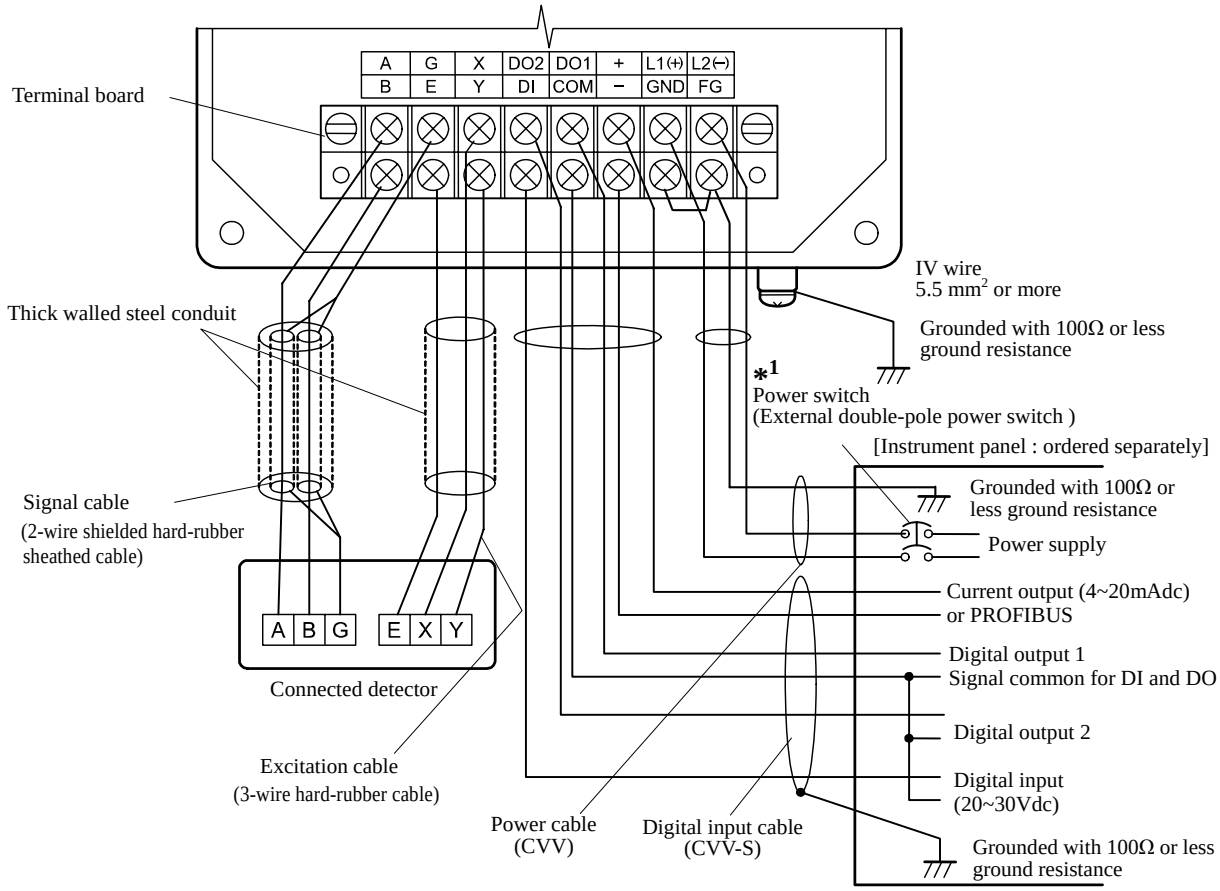



***Figure 7. Separate GF632/LF612 and GF632/LF612F type Converter Wiring Diagram***

***Table 1. LF610, LF610F, LF612 and LF612F Converters Signal Table***

| Symbol | Description | Cable |
|---|---|---|
| L1 (+) | Power supply | Power cable (CVV) |
| L2 (−) | | |
| GND | Ground (for arrester) | |
| FG | Frame ground | |
| DI | Digital Input (20～30Vdc) | I/O cable (CVV-S) |
| DO1 | Digital Output 1 | |
| DO2 | Digital Output 2 | |
| COM | Signal Common for DI, DO1, DO2 | |
| + | Current Output (4～20mAdc) or PROFIBUS | |
| − | | Shielded cable for PROFIBUS-PA |
| X | Excitation Output | Excitation cable (for LF612,LF612F only) |
| Y | | |
| E | | |
| A | Signal Input | Signal cable (for LF612,LF612F only) |
| B | | |
| G | | |

***1** Locate an external double-pole power switch on the power line near the flowmeter within easy reach of operation. Use the appropriate switch rating as shown below:
Switch rating: 250Vac, 6A or more In rush current: 15A or more

## ■ Wiring Precautions

(1) Explosion proof type flowmeters are not provided cable glands.
Refer to the part Cable connection port at detector and converter.

(2) Connect the grounding wire (IV wire 5.5mm² or more) to a good earth ground (100Ω or less ground resistance). Make the wire as short as possible. Do not use a common ground shared with other equipment where earth current may flow. An independent earth ground is recommended.

(3) The allowable cable lengths between the detector and converter for the separate type flowmeter depend on the electrical conductivity of the object fluid. See Figure 8.

(4) DO1, DO2 (opt.), and DI (opt.) use the same common terminal (COM). This COM can not connect to other equipments which have their own ground terminal. (Power supply for connecting to DI or DO, etc…) Need to wire separately.

## ■ Wiring Precautions (PROFIBUS)

(1) For wiring path, avoid places near electrical equipment that may cause electromagnetic induction or electrostatic induction interference (such as a motor, transformer and wireless transmitter).

(2) Use a PROFIBUS-PA cable for signal cable. In addition, make sure to use a shielded cable to improve noise resistance. Furthermore, installation of signal cable in metal conduit is recommended.

(3) General PROFIBUS-PA cables are designed for indoor use where cables are not exposed to humidity, rain, etc. When you install cables, make sure to check the operating conditions such as the operating temperature range of the cable by contacting its manufacturer.

(4) When you carry out cable end treatment of PROFIBUS-PA cable, use a dedicated cable stripper etc. so that the core wire of the cable will not be nicked or damaged. In addition, for cables, be careful of allowable maximum bend diameter etc. (Basically, do not install cables in a way cables are twisted or bent.).

(5) Consider installing a PROFIBUS-PA arrester in the communication path of PROFBUS-PA so that the electromagnetic flowmeter will not be affected by lightning etc.

(6) The electromagnetic flowmeter is not equipped with terminating resistors. Use the terminating resistor unit for PROFIBUS-PA or junction box, if necessary.

(7) Only one PROFIBUS-PA cable goes through a cable gland of the Electromagnetic Flowmeter. Use the junction box at system configuration.

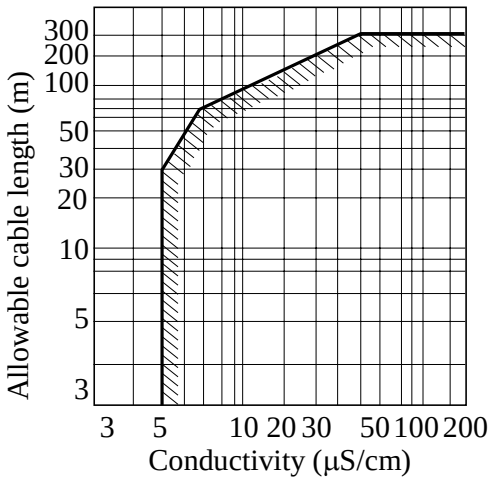



***Figure 8. Electrical Conductivity and Cable Length***

## ■ Meter Size

**To select the meter size:**

See Table 2 to 3 and find meter sizes within the velocity of 0.3 to 32.8 ft/s (0.1 to 10m/s ) for a specified full-scale (measuring range high limit) flow. Select one that has its full-scale velocity between 3.0 and 10 ft/s (1 and 3m/s).

**Note:** Make sure the full-scale flow rate used for the final planning stage stays within 32.8 ft/s (10m/s) in terms of flow velocity.

***Table 2. Flow Rate and Flow velocity (English unit)***

Unit: gal/min

| Size (inch) | Flow rate | | | | |
|---|---|---|---|---|---|
| | 0.328 ft/s | 0.98 ft/s | 3.0ft/s | 10 ft/s | 32.8 ft/s |
| 1/2' | 0.2801 | 0.8403 | 2.561 | 8.532 | 28.01 |
| 1 | 0.7781 | 2.334 | 7.115 | 23.72 | 77.81 |
| 1 ¼ | 1.275 | 3.824 | 11.66 | 38.86 | 127.5 |
| 1 ½ | 1.992 | 5.975 | 18.21 | 60.71 | 199.2 |
| 2 | 3.112 | 9.337 | 28.46 | 94.86 | 311.2 |
| 2 ½ | 5.260 | 15.78 | 48.09 | 160.3 | 526.0 |
| 3 | 7.967 | 23.90 | 72.85 | 242.8 | 796.7 |
| 4 | 12.45 | 37.35 | 113.8 | 379.4 | 1,245 |
| 5 | 19.45 | 58.35 | 177.9 | 592.9 | 1,945 |
| 6 | 28.01 | 84.03 | 256.1 | 853.8 | 2,801 |
| 8 | 49.80 | 149.4 | 455.3 | 1,518 | 4,980 |
| 10 | 77.81 | 233.4 | 711.5 | 2,372 | 7,781 |
| 12 | 112.0 | 336.1 | 1,025 | 3,415 | 11,200 |
| 14 | 152.5 | 457.5 | 1,394 | 4,648 | 15,200 |
| 16 | 199.2 | 597.5 | 1,821 | 6,071 | 19,920 |
| 18 | 252.1 | 756.3 | 2,305 | 7,684 | 25,210 |
| 20 | – | 933.7 | 2,846 | 9,486 | 31,120 |
| 24 | – | 1,344 | 4,098 | 13,660 | 44,820 |
| 28 | – | 1,830 | 5,578 | 18,590 | 61,000 |
| 30 | – | 2,101 | 6,403 | 21,340 | 70,020 |
| 32 | – | 2,390 | 7,285 | 24,280 | 79,670 |
| 36 | – | 3,025 | 9,221 | 30,740 | 100,800 |

***Table 3. Flow Rate and Flow velocity (SI unit)***

Unit: $m^3/h$

| Size (mm) | Flow rate | | | | |
|---|---|---|---|---|---|
| | 0.1 m/s | 0.3 m/s | 1.0 m/s | 3.0 m/s | 10 m/s |
| 15 | 0.06362 | 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 | – | 212.1 | 706.9 | 2,121 | 7,069 |
| 600 | – | 305.4 | 1,018 | 3,054 | 10,180 |
| 700 | – | 415.6 | 1,385 | 4,156 | 13,850 |
| 750 | – | 477.1 | 1,590 | 4,771 | 15,900 |
| 800 | – | 542.9 | 1,810 | 5,429 | 18,100 |
| 900 | – | 687.1 | 2,290 | 6,871 | 22,900 |

## ■ Calibration Range

If the calibration range is not specified, the standard range as shown below will be used. If the range is specified, we will use the specified range for calibration.

***Table 4. Standard Flow Range***

| Meter size inch(mm) | Standard flow range | | |
|---|---|---|---|
| | Flow rate (gal/min) | Flow rate ($m^3/h$) | Flow velocity (m/s) |
| 1/2 (15) | 25 | 2 | 3.144 |
| 1 (25) | 75 | 6 | 3.395 |
| 1 1/4 (32) | 125 | 10 | 3.454 |
| 1 1/2 (40) | 175 | 15 | 3.316 |
| 2 (50) | 300 | 25 | 3.537 |
| 2 1/2 (65) | 475 | 40 | 3.348 |
| 3 (80) | 650 | 60 | 3.316 |
| 4 (100) | 1,000 | 100 | 3.537 |
| 5 (125) | 1,750 | 150 | 3.395 |
| 6 (150) | 2,500 | 200 | 3.144 |
| 8 (200) | 4,500 | 300 | 2.653 |
| 10 (250) | 7,000 | 600 | 3.395 |
| 12 (300) | 10,000 | 900 | 3.537 |
| 14 (350) | 12,000 | 1,200 | 3.465 |
| 16 (400) | 16,000 | 1,600 | 3.537 |
| 18 (450) | 20,000 | 2,500 | 4.366 |
| 20 (500) | 25,000 | 3,000 | 4.244 |
| 24 (600) | 40,000 | 4,000 | 3.930 |
| 28 (700) | 50,000 | 5,000 | 3.610 |
| 30 (750) | 60,000 | 5,500 | 3.458 |
| 32 (800) | 70,000 | 6,000 | 3.315 |
| 36 (900) | 80,000 | 7,000 | 3.057 |

**Note:** The unit of "gal/min" is not exchanged (converted) by "$m^3/h$".

## ■ Piping Precautions

(1) Design piping so that the flowmeter detector pipe is always filled with the fluid being measured, whether the fluid is flowing or not.

(2) The detector has no adjustable piping mechanism. Install an adjustable short pipe where needed.

(3) The required straight pipe length should comply with the requirements as follows.

(4) Be sure to ground the flowmeter according to the flow meter instruction manual.

**Required straight pipe length**

| | | |
|---|---|---|
| Upstream side | When using 90-dgree bend, tee, diffuser or fully opened valve | $L \geq 5D$ |
| | When using other types of valves | $L \geq 10D$ |
| Downstream side | When no valve plate protrudes into the detector pipe | $L \geq 0$ |

L: Required straight pipe length, D: Meter size

## ■ Piping materials (to be ordered separately)

**Mating flanges:**

The flowmeter must be mounted with its detector pipe connected between the flanges in the pipeline. If no flanges are used where the flowmeter is to be mounted, mating flanges are required.

**Adjustable short pipe:**

When both the upstream and downstream pipe sections cannot be adjusted laterally along the pipeline, an adjustable short pipe may be required.

**Reducers:**

When the flowmeter with its Meter size smaller than that of the pipeline should be installed, reducers are required on both ends of the flowmeter detector.

**Reducers with pipe extensions:**

Reducers with adjustable piping mechanism.

**Gasket:**

Gasket is needed for piping. In the case of the detector with grounding ring and Teflon lining, additional gasket is needed between grounding ring and lining face.

## ■ About establishment environment

Do not store or install the flowmeter :

- Where there is direct sunlight.
- Where excessive vibration or mechanical shock occurs.
- Where high temperature or high humidity conditions exist.
- Where corrosive atmospheres exist.
- Places that can be submerged under water.
- Where there is a sloped floor. To put the flowmeter temporarily on the floor, place it carefully with something, such as a block, to support it so that the flowmeter will not topple over.

In areas like the following, there may be the case that infrared switches do not function correctly. (If these are unavoidable, use an appropriate cover.)

(1) Where unit (operation panel) is exposed to direct sunlight, reflection of light onto window pane and diffused light reflection.

(2) Where smoke and steam may occur.

(3) Where exposed to direct snow, ice or mud.

## Ordering Information

1. When ordering the GF630 series flowmeters, refer to Tables 6 to 8 (Type Specification Codes).
   An entry must be made for each of the columns in each of these tables.
2. Fluid characteristics:
   (1) Type of fluid to be measured and its characteristics
   (2) Fluid temperature
   (3) Fluid pressure
   (4) Electrical conductivity of the fluid
3. Measuring range
4. I/O function setting
5. Ordering scope:
   Flow calibration data: (required or not)
6. Other items
   Specifications other than standard items

***Consult a Toshiba representative before ordering when choosing materials of the wetted parts such as lining, electrodes, and grounding rings.***

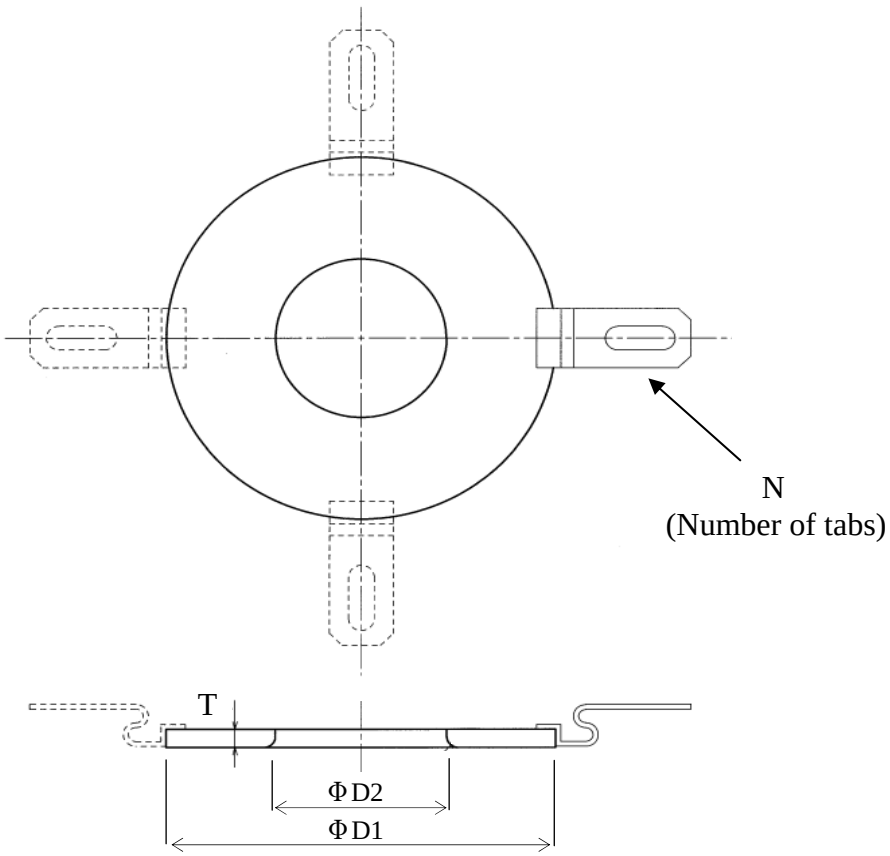
### ■ Ordering Grounding rings

When you purchase the grounding ring, refer to Table 5.

**Note:** The grounding ring ordering code includes 2-metal grounding rings and 2-EPDM gaskets.

***Table 5. Ordering code of the Grounding ring***

| Meter size | | ANSI 150 flange |
|---|---|---|
| inch | mm | |
| 1/2 | 15 | GFR01 |
| 1 | 25 | GFR02 |
| 1-1/4 | 32 | GFR03 |
| 1-1/2 | 40 | GFR04 |
| 2 | 50 | GFR05 |
| 2-1/2 | 65 | GFR06 |
| 3 | 80 | GFR08 |
| 4 | 100 | GFR10 |
| 5 | 125 | GFR12 |
| 6 | 150 | GFR15 |
| 8 | 200 | GFR20 |
| 10 | 250 | GFR25 |
| 12 | 300 | GFR30 |
| 14 | 350 | GFR35 |
| 16 | 400 | GFR40 |
| 18 | 450 | GFR45 |
| 20 | 500 | GFR50 |
| 24 | 600 | GFR60 |
| 28 | 700 | GFR70 |
| 30 | 750 | GFR75 |
| 32 | 800 | GFR80 |
| 36 | 900 | GFR90 |




| Meter size | | ANSI 150 ( AWWA for 28” to 36”) (Unit: inch) | | | | JIS 10K (Unit: mm) | | | |
|---|---|---|---|---|---|---|---|---|---|
| inch | mm | ΦD1 | ΦD2 | T | N | ΦD1 | ΦD2 | T | N |
| 1/2 | 15 | 1.65 | 0.63 | 0.16 | 2 | 42 | 16 | 3.0 | 2 |
| 1 | 25 | 2.36 | 1.06 | 0.16 | 2 | 60 | 27 | 3.0 | 2 |
| 1-1/4 | 32 | 2.76 | 1.34 | 0.16 | 2 | 70 | 34 | 3.0 | 2 |
| 1-1/2 | 40 | 3.03 | 1.65 | 0.12 | 2 | 77 | 42 | 3.0 | 2 |
| 2 | 50 | 3.74 | 2.05 | 0.12 | 2 | 95 | 52 | 3.0 | 2 |
| 2-1/2 | 65 | 4.69 | 2.44 | 0.12 | 2 | 115 | 67 | 3.0 | 2 |
| 3 | 80 | 5.08 | 3.03 | 0.12 | 2 | 125 | 82 | 3.0 | 2 |
| 4 | 100 | 5.91 | 4.09 | 0.12 | 2 | 150 | 104 | 3.0 | 2 |
| 5 | 125 | 7.28 | 5.08 | 0.12 | 2 | 185 | 129 | 3.0 | 2 |
| 6 | 150 | 8.46 | 6.06 | 0.12 | 2 | 215 | 154 | 3.0 | 2 |
| 8 | 200 | 10.43 | 8.03 | 0.12 | 4 | 265 | 204 | 3.0 | 4 |
| 10 | 250 | 13.11 | 10.04 | 0.12 | 4 | 325 | 255 | 3.0 | 4 |
| 12 | 300 | 15.59 | 12.01 | 0.12 | 4 | 372 | 305 | 3.0 | 4 |
| 14 | 350 | 17.32 | 13.11 | 0.12 | 4 | 416 | 333 | 3.0 | 4 |
| 16 | 400 | 19.80 | 15.12 | 0.12 | 4 | 479 | 384 | 3.0 | 4 |
| 18 | 450 | 21.34 | 17.05 | 0.12 | 4 | 534 | 433 | 3.0 | 4 |
| 20 | 500 | 23.58 | 19.02 | 0.12 | 4 | 589 | 483 | 3.0 | 4 |
| 24 | 600 | 27.95 | 22.99 | 0.12 | 4 | 691 | 584 | 3.0 | 4 |
| 28 | 700 | 31.65 | 27.13 | 0.12 | 4 | 804 | 689 | 3.0 | 4 |
| 30 | 750 | 33.86 | 29.13 | 0.12 | 4 | 860 | 740 | 3.0 | 4 |
| 32 | 800 | 35.87 | 31.14 | 0.12 | 4 | 911 | 791 | 3.0 | 4 |
| 36 | 900 | 39.80 | 35.12 | 0.12 | 4 | 1011 | 892 | 3.0 | 4 |

***Figure 9. Grounding ring***
***Meter sizes 1/2" (15mm) to 36" (900mm)***

### *Table 6. Specification Code (Flange type detector GF630 (Combined type) )*

| Model | | | | | Specification Code | | | | | | | | | Description | Lining | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | PU | CR | FEP | PTFE |
| G | F | 6 | 3 | 0 | | | | | | | | | | Combined (Integral) type | ● | ● | ● | ● |
| | | | | | | | | | | | | | | Meter size | | | | |
| | | | | | 0 | 1 | | | | | | | | ½" (15 mm) | ● | - | ● | - |
| | | | | | 0 | 2 | | | | | | | | 1" (25 mm) | ● | - | ● | - |
| | | | | | 0 | 3 | | | | | | | | 1-¼" (32 mm) | ● | - | ● | - |
| | | | | | 0 | 4 | | | | | | | | 1-½" (40 mm) | ● | - | ● | - |
| | | | | | 0 | 5 | | | | | | | | 2" (50 mm) | ● | - | ● | - |
| | | | | | 0 | 6 | | | | | | | | 2-½" (65 mm) | ● | - | ● | - |
| | | | | | 0 | 8 | | | | | | | | 3" (80 mm) | ● | - | ● | - |
| | | | | | 1 | 0 | | | | | | | | 4" (100 mm) | ● | - | ● | - |
| | | | | | 1 | 2 | | | | | | | | 5" (125 mm) | ● | - | ● | - |
| | | | | | 1 | 5 | | | | | | | | 6" (150 mm) | ● | - | ● | - |
| | | | | | 2 | 0 | | | | | | | | 8" (200 mm) | ● | - | ● | - |
| | | | | | 2 | 5 | | | | | | | | 10" (250 mm) | ● | - | ● | - |
| | | | | | 3 | 0 | | | | | | | | 12" (300 mm) | ● | - | - | ● |
| | | | | | 3 | 5 | | | | | | | | 14" (350 mm) | ● | - | - | ● |
| | | | | | 4 | 0 | | | | | | | | 16" (400 mm) | ● | - | - | ● |
| | | | | | 4 | 5 | | | | | | | | 18" (450 mm) | - | ● | - | ● |
| | | | | | 5 | 0 | | | | | | | | 20" (500 mm) | - | ● | - | ● |
| | | | | | 6 | 0 | | | | | | | | 24" (600 mm) | - | ● | - | ● |
| | | | | | 7 | 0 | | | | | | | | 28" (700 mm) | - | ● | - | - |
| | | | | | 7 | 5 | | | | | | | | 30" (750 mm) | - | ● | - | - |
| | | | | | 8 | 0 | | | | | | | | 32" (800 mm) | - | ● | - | - |
| | | | | | 9 | 0 | | | | | | | | 36" (900 mm) | - | ● | - | - |
| | | | | | | | | | | | | | | Connection flange standard | | | | |
| | | | | | | | A | | | | | | | ANSI 150 ( AWWA for mater size : 28" to 36" ) | ● | ● | ● | ● |
| | | | | | | | J | | | | | | | JIS 10K | ● | ● | ● | ● |
| | | | | | | | | | | | | | | Lining | | | | |
| | | | | | | | | U | | | | | | Polyurethane | ● | - | - | - |
| | | | | | | | | C | | | | | | Chloroprene Rubber | - | ● | - | - |
| | | | | | | | | F | | | | | | FEP | - | - | ● | - |
| | | | | | | | | P | | | | | | PTFE (Note1) | - | - | - | ● |
| | | | | | | | | | | | | | | Electrode Material | | | | |
| | | | | | | | | | B | | | | | 316L stainless steel | ● | ● | - | - |
| | | | | | | | | | F | | | | | Hastelloy C (Equivalent) | - | - | ● | ● |
| | | | | | | | | | | | | | | Flow and calibration velocity range | | | | |
| | | | | | | | | | | A | | | | 1.0 to 32.8 ft/s (standard range calibration) | ● | ● | ● | ● |
| | | | | | | | | | | B | | | | 1.0 to 32.8 ft/s (specified range calibration) | ○ | ○ | ○ | ○ |
| | | | | | | | | | | C | | | | 0.3 to 32.8 ft/s (specified range calibration) | ○ | ○ | ○ | ○ |
| | | | | | | | | | | | 1 | | | Standard | ● | ● | ● | ● |

Code explanation…●: Standard ○: Option —: Not available

**Note:** The grounding rings are provided to PTFE Lining, which material is 316 stainless steel and gasket material is EPDM rubber.

## *Table 7. Specification Code (Flange type detector GF632 (Separate type))*

| Model | | | | | Specification Code | | | | | | | | Description | | Lining | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | | PU | CR | FEP | PTFE |
| G | F | 6 | 3 | 2 | | | | | | | | | | Separate (Remote) type | | ● | ● | ● | ● |
| | | | | | | | | | | | | | | Meter size | | | | | |
| | | | | | 0 | 1 | | | | | | | | ½"(15mm) | | ● | - | ● | - |
| | | | | | 0 | 2 | | | | | | | | 1"(25mm ) | | ● | - | ● | - |
| | | | | | 0 | 3 | | | | | | | | 1¼"(32mm) | | ● | - | ● | - |
| | | | | | 0 | 4 | | | | | | | | 1½"(40mm) | | ● | - | ● | - |
| | | | | | 0 | 5 | | | | | | | | 2"(50mm) | | ● | - | ● | - |
| | | | | | 0 | 6 | | | | | | | | 2½"(65mm) | | ● | - | ● | - |
| | | | | | 0 | 8 | | | | | | | | 3"(80mm) | | ● | - | ● | - |
| | | | | | 1 | 0 | | | | | | | | 4"(100mm) | | ● | - | ● | - |
| | | | | | 1 | 2 | | | | | | | | 5"(125mm) | | ● | - | ● | - |
| | | | | | 1 | 5 | | | | | | | | 6"(150mm) | | ● | - | ● | - |
| | | | | | 2 | 0 | | | | | | | | 8"(200mm) | | ● | - | ● | - |
| | | | | | 2 | 5 | | | | | | | | 10"(250mm) | | ● | - | ● | - |
| | | | | | 3 | 0 | | | | | | | | 12"(300mm) | | ● | - | - | ● |
| | | | | | 3 | 5 | | | | | | | | 14"(350mm) | | ● | - | - | ● |
| | | | | | 4 | 0 | | | | | | | | 16"(400mm) | | ● | - | - | ● |
| | | | | | 4 | 5 | | | | | | | | 18"(450mm) | | - | ● | - | ● |
| | | | | | 5 | 0 | | | | | | | | 20"(500mm) | | - | ● | - | ● |
| | | | | | 6 | 0 | | | | | | | | 24"(600mm) | | - | ● | - | ● |
| | | | | | 7 | 0 | | | | | | | | 28"(700mm) | | - | ● | - | - |
| | | | | | 7 | 5 | | | | | | | | 30"(750mm) | | - | ● | - | - |
| | | | | | 8 | 0 | | | | | | | | 32"(800mm) | | - | ● | - | - |
| | | | | | 9 | 0 | | | | | | | | 36"(900mm) | | - | ● | - | - |
| | | | | | | | A | | | | | | | Connection flange standard | | | | | |
| | | | | | | | | | | | | | | ANSI 150 ( AWWA for mater size : 28" to 36" ) | | ● | ● | ● | ● |
| | | | | | | | J | | | | | | | JIS 10K | | ● | ● | ● | ● |
| | | | | | | | | | | | | | | Lining | | | | | |
| | | | | | | | | U | | | | | | Polyurethane | | ● | - | - | - |
| | | | | | | | | C | | | | | | Chloroprene Rubber | | - | ● | - | - |
| | | | | | | | | F | | | | | | FEP | | - | - | ● | - |
| | | | | | | | | P | | | | | | PTFE (Note1) | | - | - | - | ● |
| | | | | | | | | | | | | | | Electrode Material | | | | | |
| | | | | | | | | | B | | | | | 316L stainless steel | | ● | ● | - | - |
| | | | | | | | | | F | | | | | Hastelloy C (Equivalent) | | - | - | ● | ● |
| | | | | | | | | | | | | | | Flow and calibration velocity range | Cable glands and cFMus | | | | |
| | | | | | | | | | | A | | | | 1.0 to 32.8 ft/s(standard range calibration) | 1/2-14NPT connection port | ● | ● | ● | ● |
| | | | | | | | | | | B | | | | 1.0 to 32.8 ft/s(specified range calibration) | without cable glands. | ○ | ○ | ○ | ○ |
| | | | | | | | | | | C | | | | 0.3 to 32.8 ft/s(specified range calibration) | With cFMus logo. | ○ | ○ | ○ | ○ |
| | | | | | | | | | | H | | | | 1.0 to 32.8 ft/s(standard range calibration) | G1/2 connection port with | ● | ● | ● | ● |
| | | | | | | | | | | J | | | | 1.0 to 32.8 ft/s(specified range calibration) | cable glands. | ○ | ○ | ○ | ○ |
| | | | | | | | | | | K | | | | 0.3 to 32.8 ft/s(specified range calibration) | Without cFMus logo. | ○ | ○ | ○ | ○ |
| | | | | | | | | | | | 1 | | | Standard | | ● | ● | ● | ● |

Code explanation…●: Standard ○: Option —: Not available

**Note:** The grounding rings are provided to PTFE Lining, which material is 316 stainless steel and gasket material is EPDM rubber.

### *Table 8. Specification Code for converters*

| Model | | | | | Specification Code | | | | | | | | | Contents | LF610 type | LF612 type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | | |
| L | F | 6 | 1 | | | | | | | | | | | Electromagnetic flowmeter converter | | |
| | | | | 0 | | | | | | | | | | Combined (Integral) type | ● | — |
| | | | | 2 | | | | | | | | | | Separate (Remote) type | — | ● |
| | | | | | | | | | | | | | | Purpose | | |
| | | | | | A | | | | | | | | | Standard | ● | ● |
| | | | | | F | | | | | | | | | cFMus class I, Division 2 approved | ○ | ○ |
| | | | | | | | | | | | | | | Shape | | |
| | | | | | | A | | | | | | | | Integral type with case | ● | — |
| | | | | | | B | | | | | | | | Separate type with case | — | ● |
| | | | | | | | | | | | | | | Converter mounting fitting | | |
| | | | | | | | A | | | | | | | None | ● | ○ |
| | | | | | | | C | | | | | | | Panel, Accessory for wall mounting (BNP material: SUS304) | — | ● |
| | | | | | | | E | | | | | | | Accessory for pipe installation (BNP material: SUS304) | — | ○ |
| | | | | | | | | | | | | | | Digital input/output | | |
| | | | | | | | | 1 | | | | | | Digital output points 1 (DO1) | ● | ● |
| | | | | | | | | 2 | | | | | | Digital output points 2 (DO1+DO2) +Digital input point 1 (DI) | ○ | ○ |
| | | | | | | | | | | | | | | Current output and Communication function | | |
| | | | | | | | | | 1 | | | | | Current output + HART communication | ● | ● |
| | | | | | | | | | 2 | | | | | PROFIBUS communication (Current output is not usable) | ○ | ○ |
| | | | | | | | | | | | | | | Power supply | | |
| | | | | | | | | | | 1 | | | | 100Vac-240Vac, 50/60Hz | ● | ● |
| | | | | | | | | | | 2 | | | | 24Vdc | ○ | ○ |
| | | | | | | | | | | 3 | | | | 110Vdc | ○ | ○ |
| | | | | | | | | | | | | | | Instruction manual | | |
| | | | | | | | | | | | E | | | English | ● | ● |

Code explanation…●: Standard ○: Option —: Not available

ISO9001 and ISO14001 certified.

Misuse of this product can result in damages to property or human injury.
Read related manuals carefully before using this product.

Specifications are subject to change without notice.
Printed in Japan 2009-1 (TDOC)