

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 4–20 mA dc current signal or communication*1&2 signal. The meter features a **Mount-Anywhere** magnetic field distribution technology, the meter is highly immune to upstream flow disturbances. Combined with a multi-functional converter LF622 (separate type) equipped with its **Noise-Sentry** original noise-suppression circuit and advanced algorithms. The LF664 has a very high tolerance to noise, giving the unit a very stable output even for slurry fluid measurement. IR (Infrared) switches enable 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.

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

*2: Modbus is the communication protocol. Physical layer is RS485.

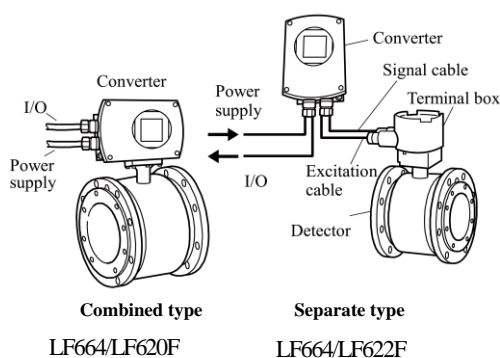


Figure 1. Configuration

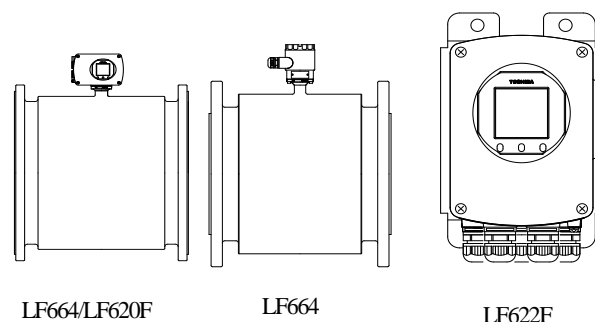


Figure 2. LF664 Mount-Anywhere series Flowmeters



Certified to NSF/ANSI/CAN 61
For HR lined flowmeter

Cable gland openings have only dust caps which are not water tight. Water tight status is not met until properly wired and connected.

Specifications

Overall Specifications

Measurement range in terms of flow velocity:

1.0 ft/s to 32.8 ft/s (0.3 m/s to 10 m/s)

Accuracy:

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

±0.3 % of Rate *1.

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

*1 Individual meter 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.

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

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

< 28" to 78" (700 mm to 1950 mm) >

±0.5 % of Rate *2.

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

*2 Individual meter's measurement error may vary up to ± 0.8 % of Rate at 3.28 ft/s (1.0 m/s) or more and ±0.4% of Rate ±0.157 inch/s (4mm/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.

Fluid conductivity: 5µS/cm minimum.

Fluid temperature:

Natural Rubber lined flow meter

14 to 140 °F (–10 to +60 °C):

For meter size 20” to 40”(500mm to 1000mm)

14 to 104 °F (–10 to +40 °C):

For meter size 42” (1050mm) and over

Hard Rubber lined flow meter

14 to 140 °F (–10 to +60 °C):

For meter size 20” to 40”(500mm to 1000mm)

14 to 104 °F (–10 to +40 °C):

For meter size 42” (1050mm) and over

Ambient temperature: 14 to 140 °F (-10 to +60 °C)

Structure:

Standard — IP 67 and NEMA 4X Watertight

Option — IP68 and NEMA 6P Submersible type allows for accidental submergence up to 15m for 48 hours. Natural rubber and Hard rubber lined detector tubes are NEMA 6P/IP68 compliant when a TOSHIBA approved Potting kit is properly Field or Factory installed.

Power consumption:

10W (14VA) or less (at AC100V and Excitation current 0.2A)

17W (24VA) or less (with communication)

Approved hazardous location certifications:

Model: LF664/LF620F and LF664/LF622F

cFMus Nonincendive for use in

hazardous (classified) locations:

Class I, II, III, Division 2, Groups A-G

Detector and converter combination:

LF664/LF620F: Combined type with Ex approval of Class I, II, III, Division 2 (cFMus).

LF664/LF622F: Separate type with Ex approval of Class I, II, III, Division 2 (cFMus).

Mount-Anywhere Technology:

With TOSHIBA’s unique magnetic field distribution technology the meter is highly immune to upstream flow disturbances.

<20” and 24” (500mm and 600mm)>

A minimum of 1D(diameter) length of upstream straight pipe from the flange is required to maintain the specific performance.

<28” to 78” (700mm to 1950mm)>

A minimum of 3D (diameters) length of upstream straight pipe from the flange is required to maintain the specification performance.

Note: The test results were obtained and demonstrated at TOSHIBA's admitted flow calibration facility.

■ **Model LF664 Detector**

Mounting style: Flanged connection type

Fluid pressure:

20” and 24” ANSI 150# flange rating, 235 psig @ 100°F (38°C)

28” to 78” AWWA Class D flange rating, 225 psig @ 100°F (38°C)

Connection flange standards:

ASME B 16.5 class 150 : 20” and 24” (500 and 600 mm)

AWWA class D : 28” and over (700 mm and over)

Principal materials:

Case — Carbon Steel

Linings —

Hard Rubber (NSF certified)

Natural Rubber

Electrodes —

Type-Super smooth, polished with

Self-cleaning finish and non stick shape

AISI 316L stainless steel (standard)

Titanium (opt)

Hastelloy C-276 equivalent (opt)

Grounding rings (option) —

AISI304, AISI316, Titanium,

Hastelloy C-276 equivalent

Note: See Table 3 for optional materials and other related information.

Measuring tube material — 304 stainless steel

Coating:

Polyurethane, gray color(std)

Black tar epoxy resin coating 0.5mm (opt) for IP68 and NEMA6P

Cable connection port (for separate type detectors)

Cable gland:

Not provided, 1/2-14NPT male threads, Cable glands not provided.

Dimensions and weight: See figure 3,4,5 and 6

■ Model LF620 and LF622 converters

Input signals

Analog signal — the voltage signal from detector, proportional to process flow rate (for LF622 separate type converter).

Digital input DI

Signal type: 20 to 30Vdc voltage signal

Input resistance: 2.7k Ω

Number of inputs: one point

Note: DI cannot be used with the Modbus communication.

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

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

Totalizer control — ‘Starts and stops’ or ‘Rest and start’ the built-in totalizer.

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

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

Output signals

Current output:

4–20mA_{dc} (load resistance 0 to 750 Ω)

Digital outputs — Two points are available as follows.

Digital output DO1:

Output type: Transistor open collector

Number of outputs: One point

Output capacity: 30V_{dc}, 200mA maximum

Note: DO1 cannot be used if Modbus communication connection is 3 lines.
(Refer table 5 for details)

Digital output DO2 :

Output type:

Solid-state relay output (non polarity)

Number of outputs: One point

Output capacity: 150V_{dc}, 150mA maximum or 150V_{ac} (peak to peak), 100mA maximum

Note: DO2 cannot be used with the Modbus communication. (Refer table 5 for details)

DO1 and DO2 functions — One of the following functions can be assigned to DO1 and/or DO2 .

• Pulse output (available only for DO1, DO2)

Pulse rate: MAX 10kHz (10000pps)(DO1)

MAX 100Hz (100pps)(DO2)

(Over 1kpps, 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 4–20mA_{dc} current signal as follows:

Conforms to HART protocol

Load resistance: 240 to 750 Ω

Load capacitance: 0.25 μ F maximum

Load inductance: 4mH maximum

•Modbus (opt.)

Physical layer : RS485

Protocol : Modbus

Mode : RTU

Baudrate : 4800, 9600, 19200bps

Data length : 8bit

Parity bit : None, Odd, Even

Stop bit : 1bit, 2bit

Error check : CRC-16

Max. station number : 32(with Master device)

Max. cable length : 1.2km (Note)

Note: This length is specification of 3 line connection.

LCD display:

Full dot-matrix 128×128 dot LCD display (back-light provided)

A parameter change will rotate the display.

Parameter settings — Parameters can be set as follows:

• **IR Switches:** Three key switches are provided to set configuration parameters.

• **Digital communication:** HART or Modbus is needed to set parameters.

• **Zero adjustment:** Zero point adjustment can be started by pressing the switch in the converter.

• **Damping:** 0.1 to 60 seconds (selectable in one second increments)

“Converter Field re-verification” Mag-Prover –

Toshiba’s Zero span verification tool allows unit to be re-verified using an internal software program. The meter’s excitation current is a NIST traceable parameter. This parameter can be verified in the field through the converter to verify the meter is still within factory calibration (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: 0mA_{dc}
- Digital output: OFF
- LCD display: No display
- HART: No communication
- Modbus: No communication

Power supply:

One of the following can be selected:

100 to 240Vac (allowable voltage range: 80 to 264Vac
50/60Hz)

24V_{dc} (allowable voltage range: 18 to 36V_{dc}) or
110V_{dc} (allowable voltage range: 90 to 130V_{dc})

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 —**

LF620 and LF622 without cFMus Approval:

Provided as standard, outer diameter of cable ϕ
11~13mm
Material Nylon 66
G (PF) 1/2 male threads.

LF620F and LF622F with cFMus Approval:

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

Applicable diameter —

0.433 to 0.512 inch (11 to 13mm)

Vibration resistance:

No resonance to the following levels of vibration:

- 10 to 150Hz with acceleration of 9.8m/s²
- Vibration of 30Hz with 29.4 m/s² in 4h in each direction will not cause any defect to unit.

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

Dimensions and Weights:

See Figure 7 (for Separate type)

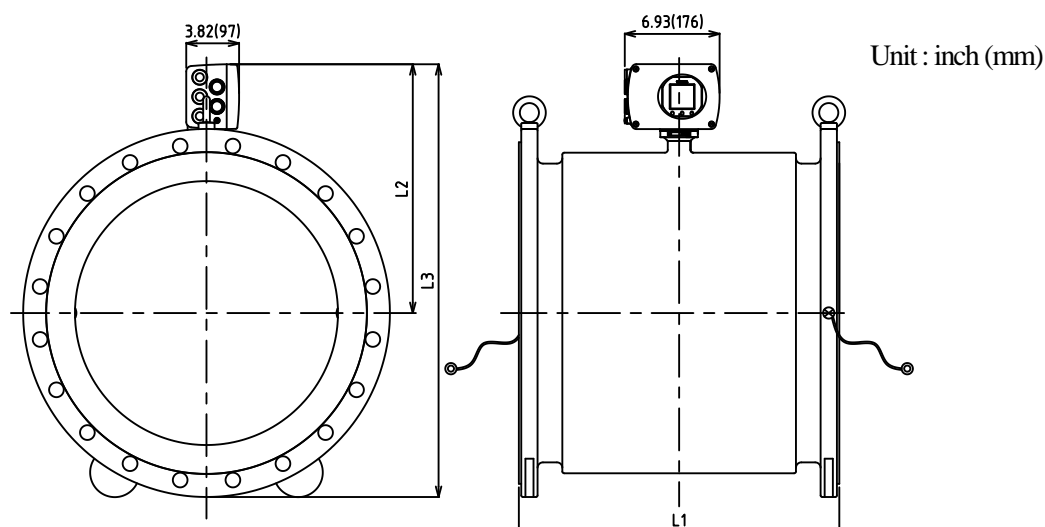
MTBF:

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

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

Installation

• Dimensions



Note1: Cable glands are not provided for LF654 of cFMus approved type. Refer to the cable connection port at converter.

Note2: 1 inch = 25.4mm

ASME B 16.5 class 150 dimensions:

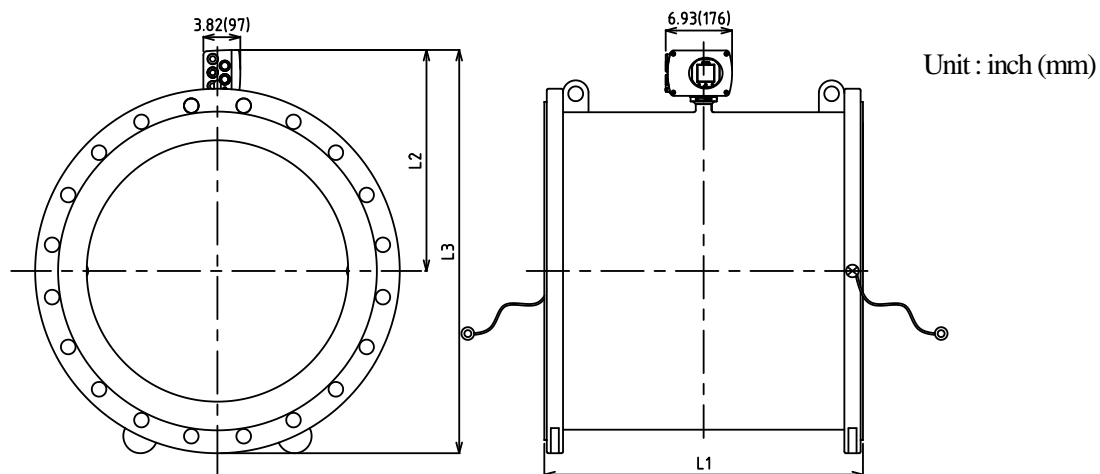
Dimension without grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 20" | 23.62 | 17.54 | 31.29 | 20 | approx. 530 |
| 24" | 23.62 | 19.61 | 35.61 | 20 | approx. 710 |

Dimension with grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 20" | 23.86 | 17.54 | 31.29 | 20 | approx. 540 |
| 24" | 23.86 | 19.61 | 35.61 | 20 | approx. 720 |

**Figure 3. LF664/LF620F combined type flow meters.
Meter sizes 20" (500mm) and 24" (600mm)**



Note1: Cable glands are not provided for LF654 of cFMus approved type. Refer to the cable connection port at converter.

Note2: 1 inch = 25.4mm

AWWA class D dimensions:

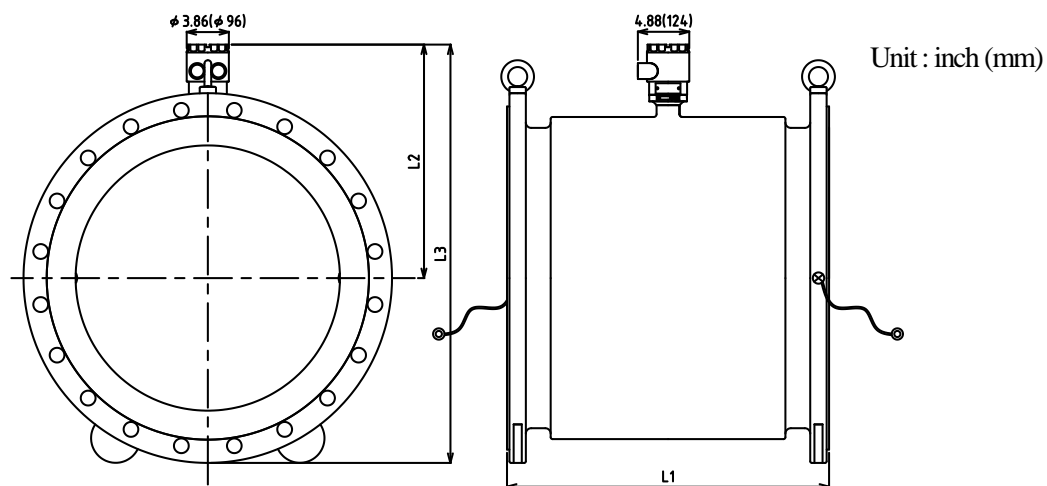
Dimension without grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 28 | 27.56 | 21.79 | 40.04 | 28 | approx. 640 |
| 30 | 29.53 | 22.80 | 42.17 | 28 | approx. 710 |
| 32 | 31.50 | 23.92 | 44.79 | 28 | approx. 840 |
| 36 | 35.43 | 25.93 | 48.93 | 32 | approx. 1100 |

Dimension with grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 28 | 27.80 | 21.79 | 40.04 | 28 | approx. 650 |
| 30 | 29.76 | 22.80 | 42.17 | 28 | approx. 730 |
| 32 | 31.73 | 23.92 | 44.79 | 28 | approx. 860 |
| 36 | 35.67 | 25.93 | 48.93 | 32 | approx. 1120 |

**Figure 4. LF664/LF620F combined type flow meters.
Meter sizes 28" (700mm) and 36" (900mm)**



Note1: Cable glands are not provided for LF654 of cFMus approved type. Refer to the cable connection port at converter.
 Note2: 1 inch = 25.4mm

ASME B 16.5 class 150 dimensions:

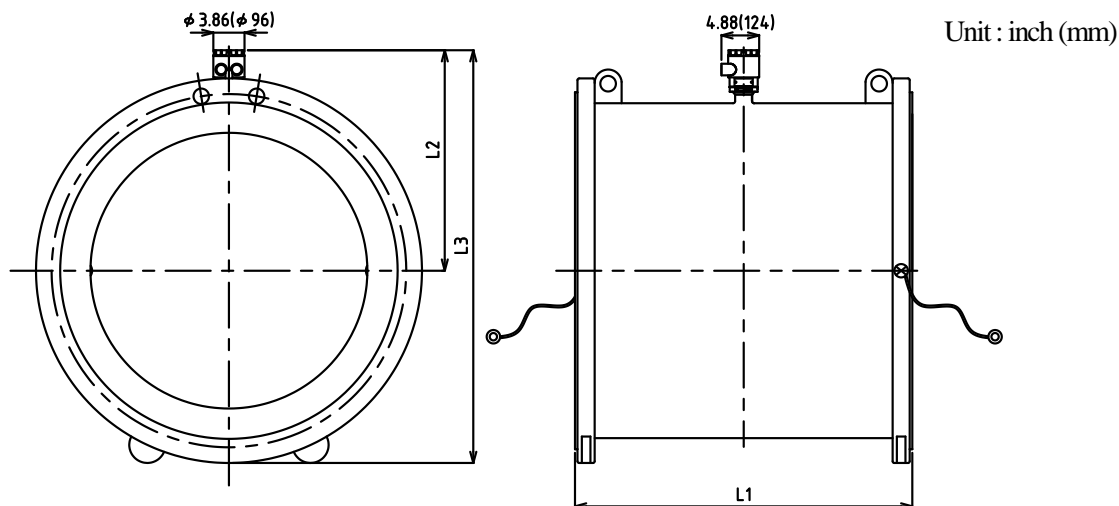
Dimension without grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 20" | 23.62 | 16.24 | 29.99 | 20 | approx. 530 |
| 24" | 23.62 | 18.31 | 34.31 | 20 | approx. 710 |

Dimension with grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 20" | 23.86 | 16.24 | 29.99 | 20 | approx. 540 |
| 24" | 23.86 | 18.31 | 34.31 | 20 | approx. 720 |

Figure 5. LF664 Detector
Meter sizes 20" (500mm) and 24" (600mm)



Note1: Cable glands are not provided for LF654 of cFMus approved type. Refer to the cable connection port at converter.

Note2: 1 inch = 25.4mm

AWWA class D dimensions:

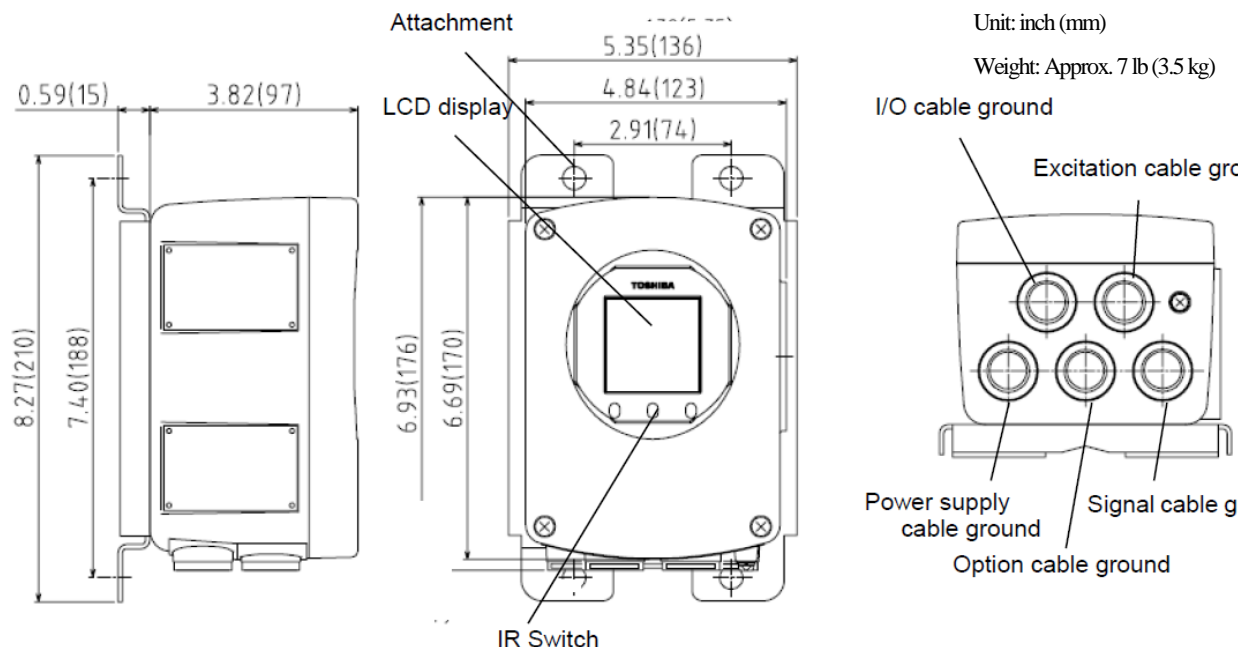
Dimension without grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 28 | 27.56 | 20.49 | 38.74 | 28 | approx. 640 |
| 30 | 29.53 | 21.50 | 40.87 | 28 | approx. 710 |
| 32 | 31.50 | 22.62 | 43.49 | 28 | approx. 840 |
| 36 | 35.43 | 24.61 | 47.61 | 32 | approx. 1100 |
| 40 | 39.37 | 26.73 | 52.11 | 36 | approx. 1300 |
| 42 | 41.34 | 27.74 | 54.23 | 36 | approx. 1500 |
| 48 | 47.24 | 30.75 | 60.50 | 44 | approx. 2050 |
| 54 | 55.12 | 33.74 | 66.87 | 44 | approx. 2600 |
| 60 | 59.06 | 36.73 | 73.23 | 52 | approx. 3450 |
| 66 | 62.99 | 39.74 | 79.74 | 52 | approx. 4400 |
| 72 | 70.87 | 42.78 | 86.02 | 60 | approx. 4950 |
| 78 | 78.74 | 45.91 | 92.40 | 64 | approx. 6400 |

Dimension with grounding ring

| Meter size (inch) | L1 (inch) | L2 (inch) | L3 (inch) | Number of Bolts | Weight (lbs) |
|----------------------|--------------|--------------|--------------|--------------------|-----------------|
| 28 | 27.80 | 20.49 | 38.74 | 28 | approx. 650 |
| 30 | 29.76 | 21.50 | 40.87 | 28 | approx. 730 |
| 32 | 31.73 | 22.62 | 43.49 | 28 | approx. 860 |
| 36 | 35.67 | 24.61 | 47.61 | 32 | approx. 1120 |
| 40 | 39.76 | 26.73 | 52.11 | 36 | approx. 1330 |
| 42 | 41.73 | 27.74 | 54.23 | 36 | approx. 1550 |
| 48 | 47.64 | 30.75 | 60.50 | 44 | approx. 2100 |
| 54 | 55.51 | 33.74 | 66.87 | 44 | approx. 2650 |
| 60 | 59.45 | 36.73 | 73.23 | 52 | approx. 3520 |
| 66 | 63.39 | 39.74 | 79.74 | 52 | approx. 4510 |
| 72 | 71.26 | 42.78 | 86.03 | 60 | approx. 5050 |
| 78 | 79.13 | 45.91 | 92.40 | 64 | approx. 6540 |

Figure 6. LF664 Detector
Meter sizes 28" (700mm) and 78" (1950mm)



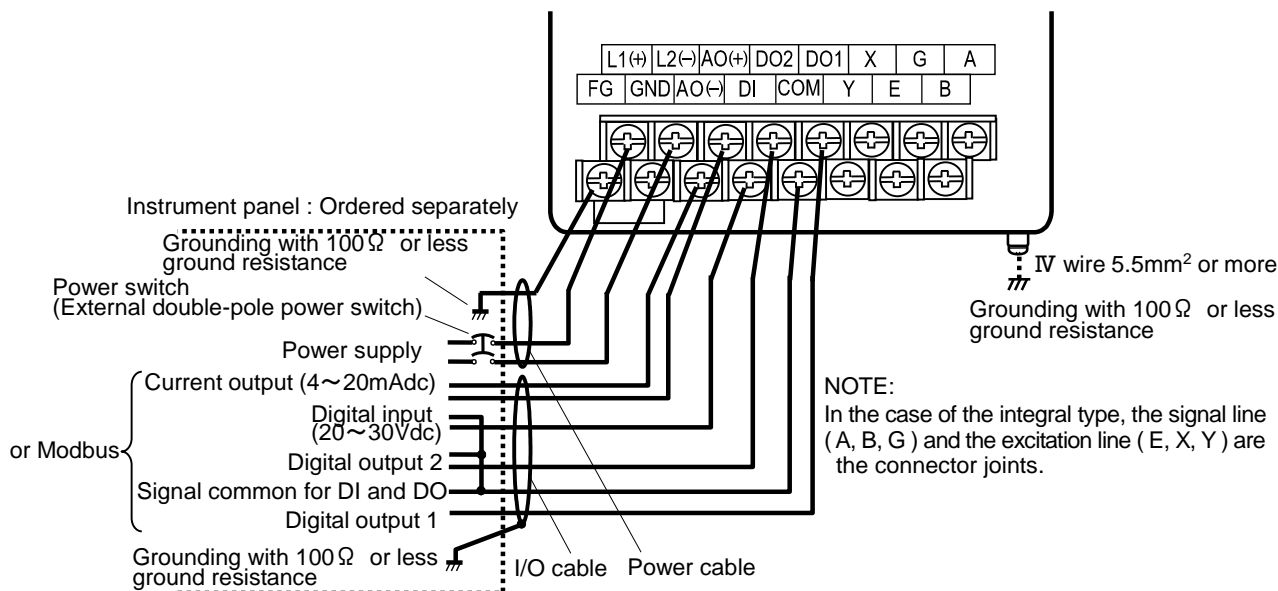
Note: Cable glands are not provided for LF622F cFMus approved type.

Refer to the part Cable connection port at converter.

Note: 1 inch = 25.4 mm

External Connections

Combined type LF664/LF620F flowmeter



***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

Figure 8. Combined type LF664/LF620F flowmeter Wiring Diagram

• Separate type LF664/LF622F flowmeter

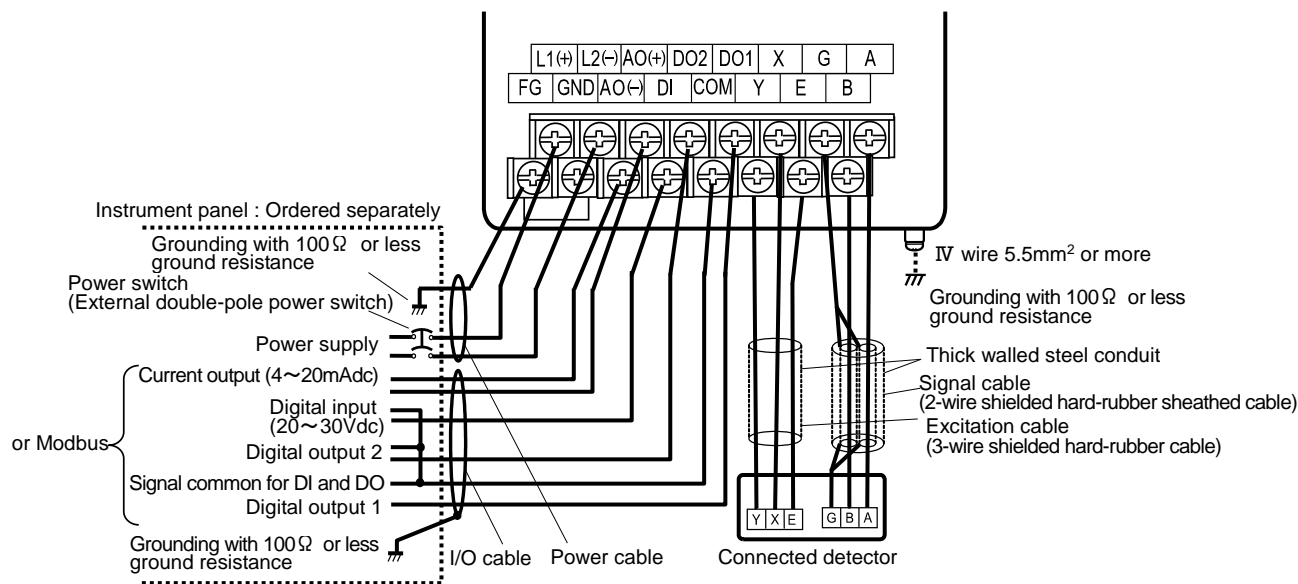


Figure 9. Separate type LF664/LF622F flowmeter wiring Diagram

Table 1. LF620, LF620F, LF622 and LF622F Converters Signal Table

| Symbol | Description | Cable |
|--------|--------------------------------|--|
| L1 (+) | Power supply | Power cable |
| L2 (-) | | |
| GND | Ground (for arrester) | |
| FG | Frame ground | |
| DI | Digital Input (20~30Vdc) | I/O cable |
| DO1 | Digital Output 1 | |
| DO2 | Digital Output 2 | |
| COM | Signal Common for DI, DO1, DO2 | |
| + | Current Output (4~20mAdc) | |
| - | | |
| X | Excitation Output | Excitation cable (for LF622F only) |
| Y | | |
| E | | |
| A | Signal Input | Signal cable (for LF622F only) |
| B | | |
| G | | |
| T+ | Modbus(+) | Twisted-pair polyethylene insulated vinyl sheath cable (JKEV,AWG24(0.2mm ²)) |
| T- | Modbus(-) | |
| TG | Modbus(GND) | |

Note: Symbol of the terminal is changed as follows for Modbus.

DO2 → T+, DI → T-, COM → TG

■ Wiring Precautions

- (1) Explosion proof type flowmeters are not provided with 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 10.
- (4) DO1, DO2 and DI use the same common terminal (COM). This COM can not be connected to other equipment which have their own ground terminal. (Power supply for connecting to DI or DO, etc...) Need to wire separately.

■ Wiring Precautions (Modbus)

- (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) General 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.
- (3) When you carry out cable end treatment, use a dedicated cable stripper to avoid the core wire of the cable being nicked or damaged. In addition, for cables, be careful of allowable maximum bend diameter. (Do not allow excessive twisting or bending of cables).
- (4) The electromagnetic flowmeter is not equipped with terminating resistors. Use the terminating resistor unit for Modbus or junction box, if necessary.

- (5) Only one Modbus cable goes through a cable gland of the Electromagnetic Flowmeter. Please use the junction box at system configuration.
- (6) Install a terminator to flowmeter that connected to end of Modbus network.

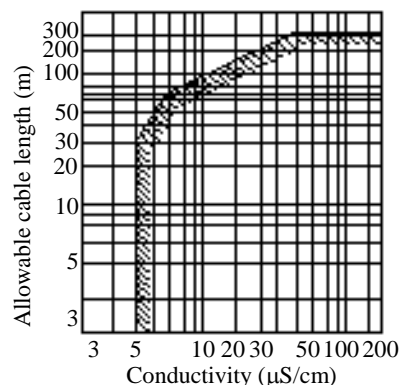


Figure 10. Electrical Conductivity and Cable Length

■ Meter size

To select the meter size:

See the table2 below 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 32.8ft/s (10m/s) in terms of flow velocity.

Table 2. Flow rate and flow velocity unit: gal/min

| Meter size inch | Flow velocity | | | |
|--------------------|---------------|--------|---------|-----------|
| | 0.98 ft/s | 3 ft/s | 10 ft/s | 32.8 ft/s |
| 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 |
| 40" | 3,735 | 11,433 | 38,109 | 124,997 |
| 42" | 4,117 | 12,551 | 41,833 | 137,239 |
| 48" | 5,378 | 16,392 | 54,640 | 179,280 |
| 54" | 6,806 | 20,747 | 69,143 | 226,883 |
| 60" | 8,403 | 25,611 | 85,359 | 280,090 |
| 66" | 10,168 | 31,125 | 103,751 | 340,303 |
| 72" | 12,100 | 36,884 | 122,939 | 403,315 |
| 78" | 14,201 | 43,285 | 144,284 | 473,411 |

■ 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.
- When placing the flowmeter temporarily on the floor, support it, i.e., with a block so that the flowmeter does 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 separate type LF660/LF622 flowmeter, refer to Table 3 and 4 (Type Specification Code).
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. Calibration range
5. I/O function setting
6. Ordering scope:
Flow calibration data: (required or not)
7. Other items
Specifications other than standard items

Consult a Toshiba representative when choosing materials for lining, electrodes, and grounding rings.

Table 3. Specification Code (Flange type LF664 Flowmeter)

| Model number | | | | | Specification code | | | | | | | | | Contents | A | B |
|--------------|---|---|---|---|--------------------|---|---|---|----|----|----|----|----|---|-----------------------|-----------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | | |
| L | F | 6 | 6 | 4 | | | | | | | | | | Electromagnetic flowmeter detector Hazardous location certification type | ● | ● |
| | | | | | 5 | 0 | | | | | | | | Meter size 20" (500mm) | ● | ● |
| | | | | | 6 | 0 | | | | | | | | 24" (600mm) | ● | ● |
| | | | | | 7 | 0 | | | | | | | | 28" (700mm) | ● | ● |
| | | | | | 7 | 5 | | | | | | | | 30" (750mm) | ● | ● |
| | | | | | 8 | 0 | | | | | | | | 32" (800mm) | ● | ● |
| | | | | | 9 | 0 | | | | | | | | 36" (900mm) | ● | ● |
| | | | | | A | 0 | | | | | | | | 40" (1000mm) | | ● |
| | | | | | A | 1 | | | | | | | | 42" (1050mm) | | ● |
| | | | | | A | 2 | | | | | | | | 48" (1200mm) | | ● |
| | | | | | A | 3 | | | | | | | | 54" (1350mm) | | ● |
| | | | | | A | 5 | | | | | | | | 60" (1500mm) | | ● |
| | | | | | A | 7 | | | | | | | | 66" (1650mm) | | ● |
| | | | | | A | 8 | | | | | | | | 72" (1800mm) | | ● |
| | | | | | A | 9 | | | | | | | | 78" (1950mm) | | ● |
| | | | | | | | A | | | | | | | Mounting style (Note 1)(Note 3) Detector/Converter combined type (LF664/LF620F) Detector/Converter separate type (LF664/LF622F) | ● | ● |
| | | | | | | | B | | | | | | | | | |
| | | | | | | | C | | | | | | | Connection flange standard ASME B 16.5 class 150, AWWA class D (Note 2) | ● | ● |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | K | | | | | Electrode material AISI316L Titanium Hastelloy C-276 equivalent | ● ○ ○ | ● ○ ○ |
| | | | | | | | | | C | | | | | | | |
| | | | | | | | | | F | | | | | | | |
| | | | | | | | | | E | | | | | Lining material Hard rubber (NSF certified) Natural rubber | ○ ● | ○ ● |
| | | | | | | | | | | | N | | | | | |
| | | | | | | | | | | | | | | Grounding ring material Not provided AISI304 AISI316 Hastelloy C-276 equivalent Titanium | ○ ● ○ ○ ○ | ○ ● ○ ○ ○ |
| | | | | | | | | | | A | | | | | | |
| | | | | | | | | | | B | | | | | | |
| | | | | | | | | | | C | | | | | | |
| | | | | | | | | | | H | | | | | | |
| | | | | | | | | | | E | | | | | | |
| | | | | | | | | | | A | | | | Dedicated preformed cable Not provided | ● | ● |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | F | | Coating Polyurethane *Direct burial detector coating Contact Toshiba International Corp. (Houston) | ● | ● |
| | | | | | | | | | | | | | | | | |

Code explanation ●: Standard ○:Option

Note1: Combined type is available from 20" to 36", Separate type is available from 20" to 78"

Note2: Meter size 20"(500mm), 24"(600mm) are ASME B 16.5 class 150, Meter size 28"(700mm) and over is AWWA class D.

Note3: Potting kit is available for submersible option when selecting separate (remote) type with Hard rubber or Natural rubber lining. Please consult Toshiba for details.

Table 4. Specification Code for converters

| Model | | | | Specification Code | | | | | | | | | | Contents | LF620 type | LF622 type |
|-------|---|---|---|--------------------|---|---|---|---|----|----|----|----|----|---|---------------|---------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | | | |
| L | F | 6 | 2 | | | | | | | | | | | Electromagnetic flowmeter converter | | |
| | | | | 0 | | | | | | | | | | Combined (Integral) type | ● | — |
| | | | | 2 | | | | | | | | | | Separate (Remote) type | — | ● |
| | | | | | F | | | | | | | | | Purpose cFMus class I, II, III, Division 2 approved | ● | ● |
| | | | | | | A | | | | | | | | Shape Standard type with case | ● | ● |
| | | | | | | | A | | | | | | | Converter mounting fitting None | ● | ○ |
| | | | | | | | C | | | | | | | Panel, Accessory for wall mounting (BNP material: SUS304) | — | ● |
| | | | | | | | E | | | | | | | Accessory for pipe installation (BNP material: SUS304) | — | ○ |
| | | | | | | | | 2 | | | | | | Digital input/output Digital output points 2 (DO1+DO2) +Digital input point 1 (DI) | ● | ● |
| | | | | | | | | | 1 | | | | | Current output and Communication function(Note1) Current output + HART communication | ● | ● |
| | | | | | | | | | 3 | | | | | Current output + Modbus (RS485) communication | ○ | ○ |
| | | | | | | | | | | 1 | | | | Power supply(Note2) 100Vac-240Vac 50/60Hz, 110Vdc | ● | ● |
| | | | | | | | | | | 2 | | | | 24Vdc | ○ | ○ |
| | | | | | | | | | | 3 | | | | 110Vdc | ○ | ○ |
| | | | | | | | | | | | E | | | Instruction manual English | ● | ● |

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

Note 1: When Modbus communication is provided, digital output points 1(DO1) and digital output points(DO2), digital input point 1(DI), HART communication cannot be used.

Refer Table 5 for more details.

Note2: Select 110Vdc for test report inspected under the condition of 110Vdc.

Table5. Communication functions and output selection table

| Selection of Function | | Availability of outputs | | | |
|----------------------------------|---------------------------|-------------------------|-------------|-----|----|
| Code (10 th digit) | Selected Communication | 4-20mA _{dc} | DO1 | DO2 | DI |
| 1 | HART | ✓ | ✓ | ✓ | ✓ |
| 3 | Modbus | ✓ | ✓ (Note) | X | X |

Code explanation: ✓:Available X:Not Available

Note: When digital output 1 function and Modbus communication function are used at one time, TG (signal ground) of the Modbus communication function cannot be connected (2 line connection).

ISO9001 and ISO14001 are certified.

Specifications are subject to change without notice.

Printed in Japan 2021-11(TBLS)

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