TOSHIBA

Field Intelligent Device – Premium Value Series

Electromagnetic Flowmeter

GF630 /LF600
GF632 /LF602
1/2" to 36" (15 to 900 mm)

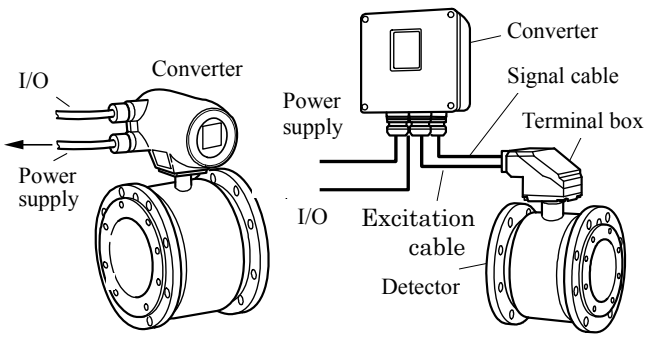
Introduction

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 multi-functional converter LF600 (combined type) or LF602 (separate type) equipped with its original patented **Noise–Sentry** noise-suppression circuit and advanced arithmetic operation capability, 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 electronically to be rotated 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 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 the factory automation and process automation that PROFIBUS Organization recommends. Instead of analog control with a conventional analog signal (4-20mA), it is one kind of the fieldbus which digitized all signals. Flowmeters support PROFIBUS-PA.



Combined type
GF630/LF600
GF630/LF600F

Separate type
GF632/LF602
GF632/LF602F

Figure 1. Configuration

GF630/LF600
GF630/LF600F

GF632

LF602
LF602F

Figure2. GF630 Premium Value series Flowmeters

Certification number
Z01207

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.

Accuracy: ±0.2 % of Rate *.

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

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, 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/LF600F and GF632/LF602F
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 to 150 psi, or 0 to 10 bar (0 to 1 MPa)
(To be within the applicable flange limitation)

Connection flange standards: ANSI 150, JIS10K

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 Polyurethane 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 LF600 and LF602 converters

Input signals

Analog signal — the voltage signal from detector, proportional to process flow rate (for LF602 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:
4–20mAdc (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**
- **Digital Output Active Status (DO1 and DO2) (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.
The status when power failure is kept 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 1 second increments)

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

Conditions when power fails:
The outputs and display will remain as follows 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.
- 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 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 —
LF600 and LF602 without cFMus Approval:
Provided as standard, G 1/2 male screws.
OD of cable ϕ 11 to 13mm
Material: Nylon 66

LF600F and LF602F 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 glands size is ϕ 6～8mm for signal cable, ϕ 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
  No defect in putting vibration to each direction of 30Hz with 29.4 m/s^2 in 4h.

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

Converter LF602 Dimensions and Weights:

See Figure 5 (for separate type)

MTBF:

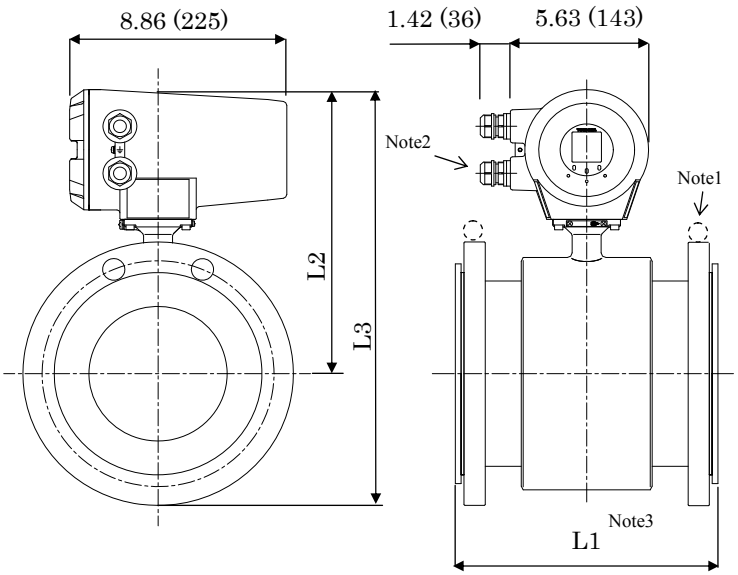
Converter: 220,000 hours (25 years) at 77 **°F** (25 **°C**) based on strict military specification MIL-HDBK-217F.

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

Installation

■ Dimensions

Combined type GF630/LF600 and GF630/LF600F



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

Note2: Cable glands are not provided for GF630/LF600F 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 mass of PTFE lining contains the mass of grounding rings.

Note5: 1 inch = 25.4mm

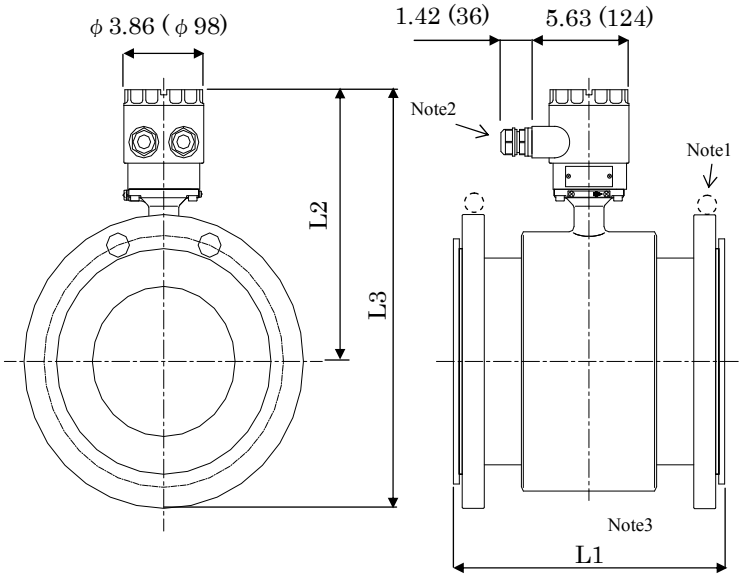
Unit: inch (mm)

ANSI 150								
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/LF600 and GF630/LF600F combined type flowmeters
Meter sizes 1/2" (15mm) to 36" (900mm)

Separate type GF632/LF602 and GF632/LF602F



Unit: inch (mm)

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

Note2: Cable glands are not provided for GF632/LF602F cFMus approved type. Refer to the part Cable connection port at detector.

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

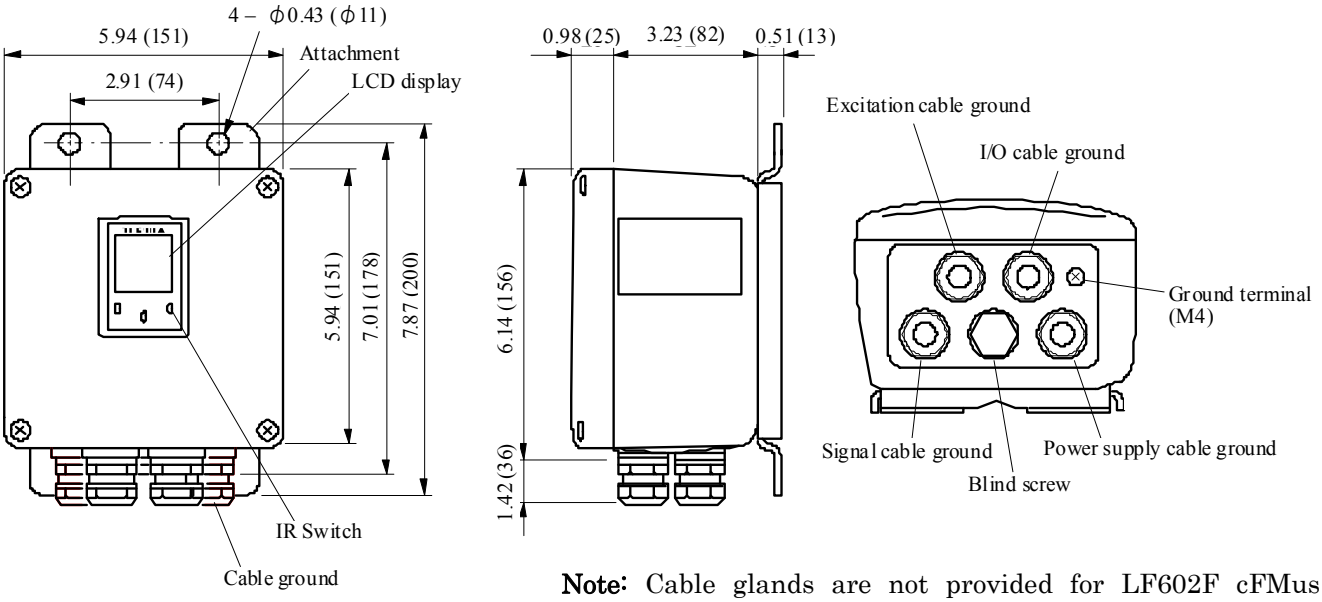
Note4: The mass of PTFE lining contains the mass of grounding rings.

Note5: 1 inch = 25.4mm

ANSI 150								
Size (inch)	L1 (inch)	L2 (inch)	L3 (inch)	No. of bolts	Weight (lbs) approx.			
					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 (mm)	L1 (mm)	L2 (mm)	L3 (mm)	No. of bolts	Weight (kg) approx.			
					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/LF602 and GF632/LF602F
Meter sizes 1/2" (15mm) to 36" (900mm)



Unit : inch (mm)

Note: Cable glands are not provided for LF602F cFMus approved type. Refer to the part Cable connection port

Figure 5. Separate type converter LF602 and LF602F

■ External Connections

Combined type GF630/LF600 and GF630/LF600F flowmeters

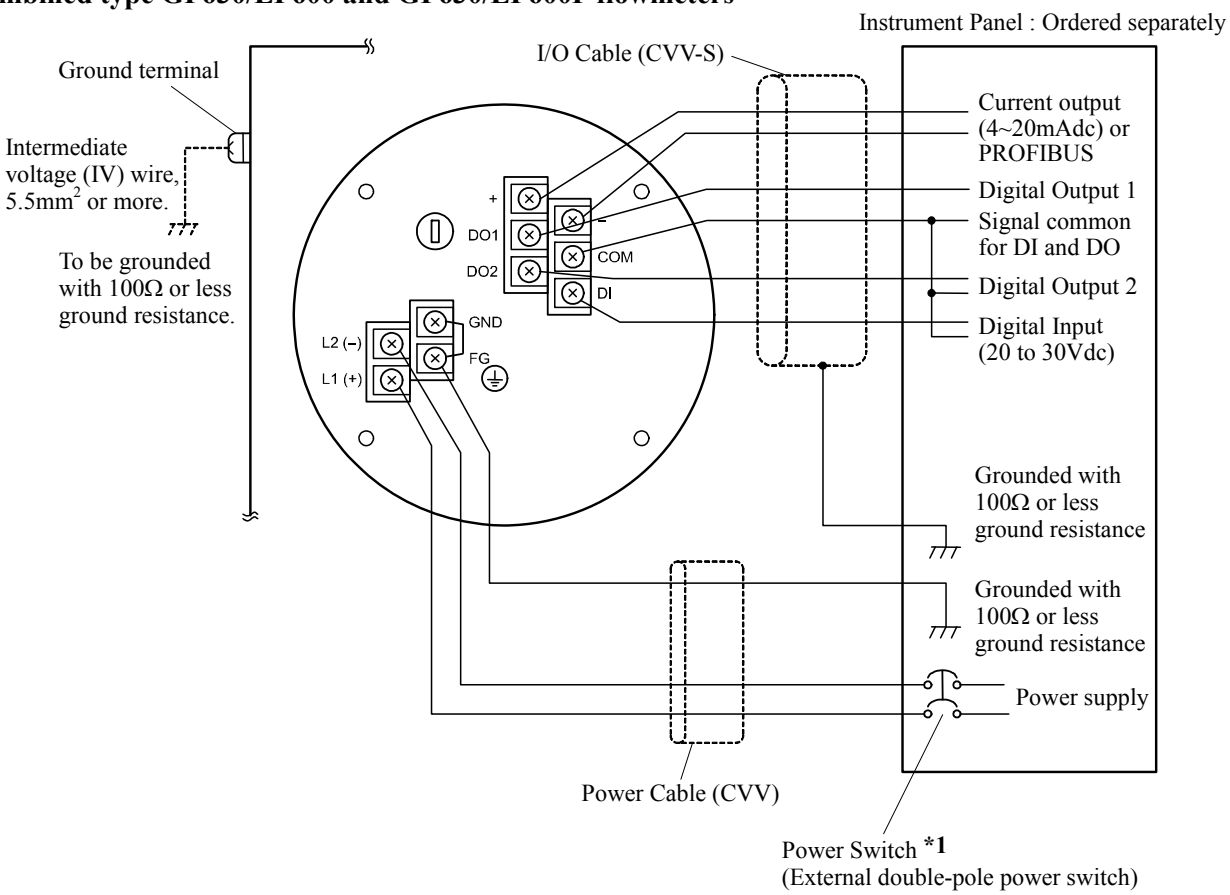


Figure 6. Combined type GF630/LF600 and GF630/LF600F flowmeters Wiring Diagram

Separate type GF632/LF602 and GF632/LF602F flowmeter

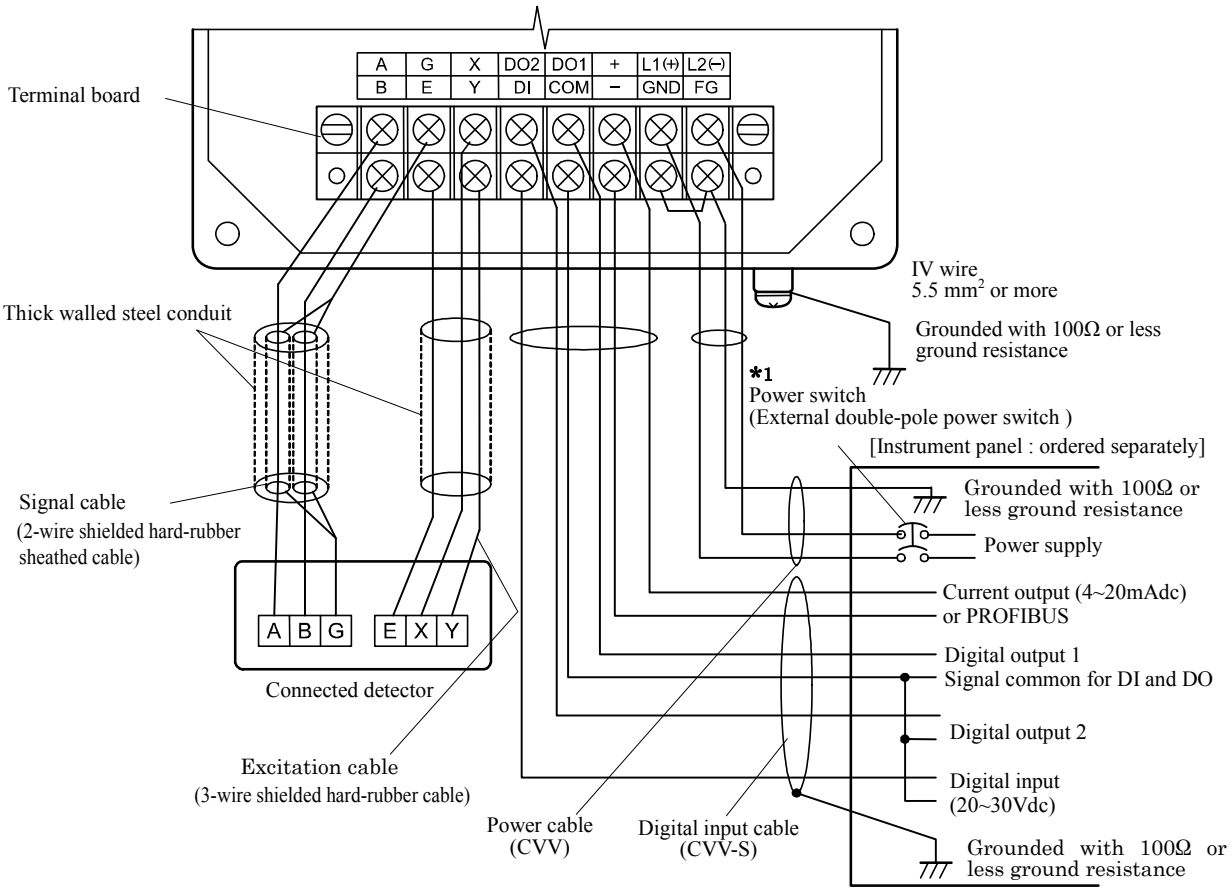


Figure 7. Separate GF632/LF602 and GF632/LF602F type Converter Wiring Diagram

Table 1. LF600, LF602 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 LF602 only)
Y		
E		
A	Signal Input	Signal cable (for LF602 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 below.

(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.

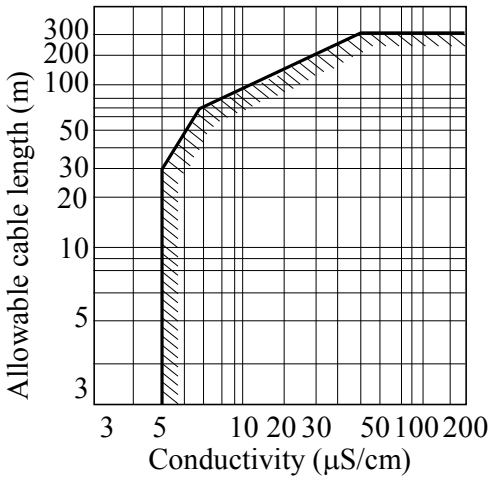


Figure 8. Electrical Conductivity and Cable Length

■ Meter Size

To select the meter size:

See Figure 9 and find meter sizes within the velocity of 0.1 to 10m/s for a specified full-scale (measuring range high limit) flow. Select one that has its full-scale velocity between 1 and 3m/s.

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

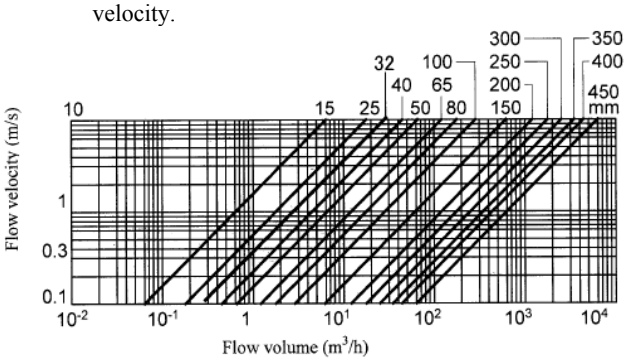


Figure 9. Meter Size Selection

Table 2. Standard Flow Range (SI unit)

Unit: m^3/h

Size (mm)	Flow rate		
	0.3 m/s	1.0 m/s	10 m/s
15	0.1908	0.6361	6.361
25	0.5301	1.767	17.67
32	0.8686	2.895	28.95
40	1.357	4.523	45.23
50	2.120	7.067	70.67
65	3.584	11.95	119.5
80	5.428	18.09	180.9
100	8.482	28.27	282.7
125	13.25	44.17	441.7
150	19.08	63.61	636.1
200	33.93	113.1	1131
250	53.01	176.7	1767
300	76.34	254.5	2545
350	103.9	346.4	3464
400	135.7	452.3	4523
450	171.7	572.5	5725
500	212.1	706.9	7069
600	305.4	1018	10180
700	415.6	1385	13850
750	477.1	1590	15900
800	542.9	1810	18100
900	687.1	2290	22900

Table 3. Standard Flow Range (English unit)

Unit: gal/min

Size (inch)	Flow rate		
	0.98ft/s	3.28ft/s	32.8ft/s
1/2'	0.8401	2.801	28.01
1	2.334	7.780	77.80
1 ¼	3.824	12.75	127.5
1 ½	5.975	19.91	199.1
2	9.334	31.12	311.2
2 ½	15.78	52.61	526.1
3	23.90	79.65	796.5
4	37.35	124.5	1,245
5	58.34	194.5	1,945
6	84.01	280.1	2,801
8	149.4	498.0	4,980
10	233.4	778.0	7,780
12	336.1	1,121	11,205
14	457.5	1,525	15,252
16	597.5	1,991	19,914
18	756.0	2,521	25,206
20	933.9	3,112	31,124
24	1,345	4,482	44,821
28	1,830	6,098	60,982
30	2,101	7,001	70,008
32	2,390	7,969	79,694
36	3,025	10,083	100,829

■ 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 grounding 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 ≥ 5D
	When using other types of valves	L ≥ 10D
Downstream side	When no valve plate protrudes into the detector pipe	L ≥ 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 in:

- Where there is direct sunlight.
- Where excessive vibration or mechanical shock occurs.
- Where high temperature or high humidity conditions obtain.
- Where corrosive atmospheres exit.
- Places that can be submerged under water.
- Where there is a slop 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 places like the following places, there is the case that infrared switches do not function correctly. (If this is unavoidable, use an appropriate cover.)

- •Where gets very bright light onto operation panel. (direct sunlight, reflection light of sunlight by windowpanes, diffused reflection light of strength etc.)
- •Where smoke and steam occur near.
- •Where a snow, ice or mud that may attached.

Ordering Information

1. When ordering the GF630 series flowmeters, refer to Tables 5 to 7 (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 Toshiba representative before ordering when choose materials of the wetting parts such as lining, electrodes, and grounding rings.

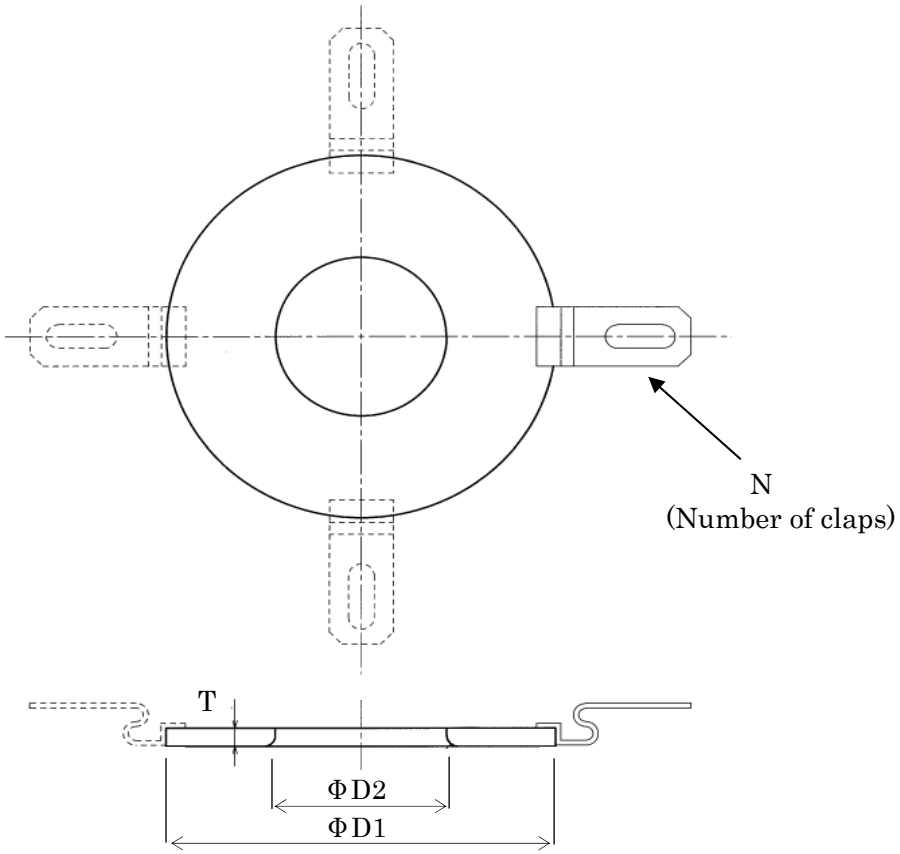
■ About order to the Grounding ring

When you purchase the grounding ring, refer to Table 4.

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

Table 4. Ordering code of the Grounding ring

Meter size		ANSI 150 frange
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 (Unit: inch)				JIS 10K (Unit: mm)			
inch	mm	ΦD1	ΦD2	T	N	ΦD1	ΦD2	T	N
1/2	15	1.85	0.63	0.16	2	47	16	4.0	2
1	25	2.56	1.06	0.16	2	65	27	4.0	2
1-1/4	32	2.95	1.34	0.16	2	75	34	4.0	2
1-1/2	40	3.15	1.65	0.12	2	80	42	3.0	2
2	50	3.90	2.05	0.12	2	99	52	3.0	2
2-1/2	65	4.69	2.44	0.12	2	119	67	3.0	2
3	80	5.08	3.03	0.12	2	129	82	3.0	2
4	100	6.06	4.09	0.12	2	154	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	*1	*1	*1	*1	*1	*1	*1	*1
30	750	*1	*1	*1	*1	*1	*1	*1	*1
32	800	*1	*1	*1	*1	*1	*1	*1	*1
36	900	*1	*1	*1	*1	*1	*1	*1	*1

***1:option(Build-to-order manufacturing)**

Figure 10. Grounding ring
Meter sizes 1/2" (15mm) to 36" (900mm)

Table 5. 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 inch (15 mm)	●	-	●	-
					0	2								1 inch (25 mm)	●	-	●	-
					0	3								1-¼ inch (32 mm)	●	-	●	-
					0	4								1-½ inch (40 mm)	●	-	●	-
					0	5								2 inch (50 mm)	●	-	●	-
					0	6								2-½ inch (65 mm)	●	-	●	-
					0	8								3 inch (80 mm)	●	-	●	-
					1	0								4 inch (100 mm)	●	-	●	-
					1	2								5 inch (125 mm)	●	-	●	-
					1	5								6 inch (150 mm)	●	-	●	-
					2	0								8 inch (200 mm)	●	-	●	-
					2	5								10 inch (250 mm)	●	-	●	-
					3	0								12 inch (300 mm)	●	-	-	●
					3	5								14 inch (350 mm)	●	-	-	●
					4	0								16 inch (400 mm)	●	-	-	●
					4	5								18 inch (450 mm)	-	●	-	●
					5	0								20 inch (500 mm)	-	●	-	●
					6	0								24 inch (600 mm)	-	●	-	●
					7	0								28 inch (700 mm)	-	●	-	-
					7	5								30 inch (750 mm)	-	●	-	-
					8	0								32 inch (800 mm)	-	●	-	-
					9	0								36 inch (900 mm)	-	●	-	-
							A							Connection flange standard				
							A							ANSI 150	●	●	●	●
							J							JIS 10K	●	●	●	●
								U						Lining				
								U						Polyurethane	●	-	-	-
								C						Chloroprene Rubber	-	●	-	-
								F						FEP	-	-	●	-
								P						PTFE (Note1)	-	-	-	●
									B					Electrode Material				
									B					316L stainless steel	●	●	-	-
									F					Hastelloy C (Equivalent)	-	-	●	●
										A				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 6. 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								24"(700mm)		-	●	-	-
					7	5								24"(750mm)		-	●	-	-
					8	0								24"(800mm)		-	●	-	-
					9	0								24"(900mm)		-	●	-	-
							A							Connection flange standard ANSI 150		●	●	●	●
							J							JIS 10K		●	●	●	●
								U						Lining Polyurethane		●	-	-	-
								C						Chloroprene Rubber		-	●	-	-
								F						FEP		-	-	●	-
								P						PTFE (Note1)		-	-	-	●
									B					Electrode Material 316L stainless steel		●	●	-	-
									F					Hastelloy C (Equivalent)		-	-	●	●
										A				Flow and calibration velocity range: 1.0 to 32.8 ft/s (standard range calibration)	Cable glands and cFMus: 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 7. Specification Code for converters

Model					Specification Code								Contents	LF600 type	LF602 type
1	2	3	4	5	6	7	8	9	10	11	12	13	14			
L	F	6	0											Electromagnetic flowmeter converter		
				0										Combined (Integral) type	●	—
				2										Separate (Remote) type	—	●
					A									Purpose Standard	●	●
					F									cFMus class I, Division 2 approved	○	○
						A								Shape Integral type with case	●	—
						B								Separate 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)	—	○
								1						Digital input/output Digital output points 1 (DO1)	●	●
								2						Digital output points 2 (DO1+DO2) +Digital input point 1 (DI)	○	○
									1					Current output and Communication function Current output + HART communication	●	●
									2					PROFIBUS communication (Current output is not usable)	○	○
										1				Power supply 100Vac-240Vac, 50/60Hz	●	●
										2				24Vdc	○	○
										3				110Vdc	○	○
											E			Instruction manual 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.
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