

Introduction

The LF140/LF240 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. The two units are integrally mounted.

The power for the LF140/LF240 is supplied from the same source as that of the 4–20 mA dc current signal. Therefore, the LF140/LF240 requires only one two-wire cable. This makes the total costs of the LF140/LF240 including those of installation and operation much lower compared with conventional flowmeters.

The AF100 hand-held terminal or the Model 275 HART communicator can be used to communicate with the flowmeter from remote places using the HART communications protocol. See the LF240 Converter specifications for details about the HART protocol.

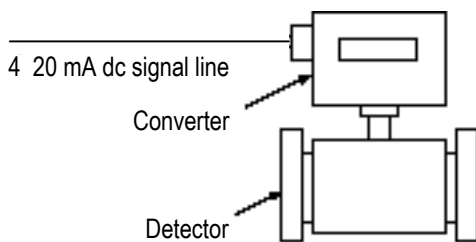


Figure 1. LF140/LF240 Configuration

Specifications

Overall Specifications

Measurement range in terms of flow velocity:

0–0.5 m/s to 0–10 m/s

Accuracy: See the following table.

Flow rate as a percent of range	Accuracy	
	0.5–1.0 m/s	1.0–10 m/s
0 – 50%	±0.5% FS	±0.25% FS
50 – 100%		±0.5% of rate

Note: The accuracy is measured under standard operating conditions at Toshiba's calibration facility.

Fluid conductivity: 50 μS/cm minimum

Fluid temperature: –10 to 120 °C

Ambient temperature: –10 to 60 °C

Structure: NEMA 4 (IP 67) watertight



Figure 2. LF140/LF240 Electromagnetic Flowmeter

Model LF140 Detector

Mounting style: Flanged connections

Meter sizes: 25 mm (1"), 40 mm (1-1/2), 50 mm (2"), 80 mm (3") and 100 mm (4")

Fluid pressure: –0.1 to 2.0 MPa

Connection flange standards: ANSI 150 and 300, BS10 and 16, DIN PN10 and PN16, JIS10K, JIS16K and JIS20K

Principal materials:

Case — carbon steel

Linings — Teflon PFA (standard)

Electrodes — 316L stainless steel (standard)

Grounding rings — 316 stainless steel (standard)

See Table 2 for optional materials and other related information.

Coating — phthalic acid resin coating, pearl-gray colored (standard)

Model LF240 Converter

Output signal

4–20 mA dc analog signal with HART protocol

Communications: Conforms to the HART protocol.

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

Power supply: 24 V dc (16 to 45 V dc)

Load resistance: 0 Ω to 1330 Ω (See Figure 3)

Communications load resistance:

240 Ω to 1000 Ω (See Figure 3.)

Load capacitance: 0.25 μF maximum

Cable length: 2 km maximum (approximate value when 0.75 mm² shielded cable is used under standard operating conditions.)

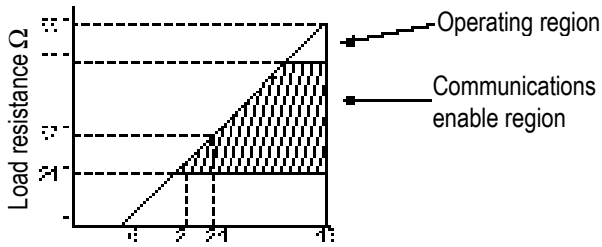


Figure 3. Load resistance and Power supply voltage

LCD display: Shows flow rate and total flow in various engineering units.

Parameter settings: Configuration parameters can be set using the control keys on the LCD display.

Zero adjustment: Zero point adjustment can be started by pressing a combination of control keys on the LCD display.

Damping: 1 to 60 s for the range above 2 m/s and 3 to 60 s for the range 2 m/s or below (selectable in 1 s increments)

Conditions when power fails:

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

- Current output: 0 mA dc
- LCD display: No display

Housing: Aluminum alloy

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

Cable connection port — A cable gland with a cap nut is provided for the port.

Applicable cable diameter: 11 to 13 mm

Cable gland material: Nylon 66

Port hole in housing: GPF 1/2 female screw

Vibration resistance:

- No resonance to the following levels of vibration:
- 5 to 150 Hz with acceleration of 9.8 m/s²

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

Installation

■ Dimensions

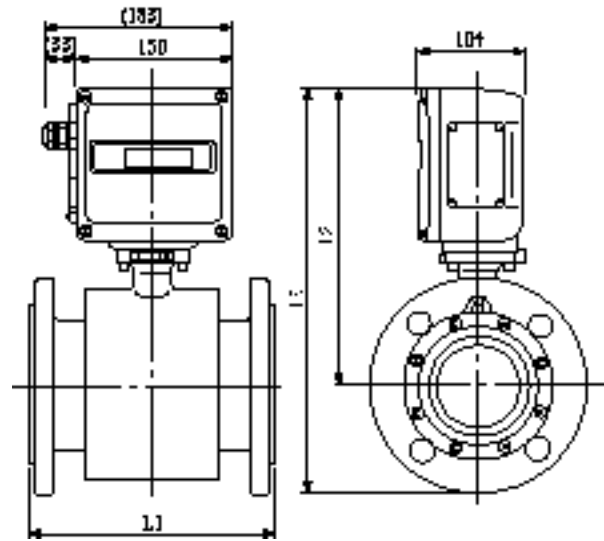


Figure 4. LF140/LF240 Dimensions

See the following tables for dimensions of L1, L2 and L3 in Figure 4.

BS10 and DIN PN10 flange dimensions:

Meter size (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Mass (kg)
25	160	245	302.5	approx. 8
40	170	253	328	approx. 10
50	180	262	344.5	approx. 11
80	230	276	376	approx. 17
100	240	294	404	approx. 21

ANSI class 150 flange dimensions:

Meter size (inch)	L1 (inch)	L2 (inch)	L3 (inch)	Mass (lb)
1	6 1/4	14 3/4	17	approx. 18
1 1/2	6 3/4	15 1/4	17 3/8	approx. 22
2	7	15 1/2	17 5/8	approx. 24
3	9	16 1/8	18 1/4	approx. 38
4	9 1/2	17	19 1/8	approx. 47

JIS 10K flange dimensions:

Meter size (mm)	L1 (mm)	L2 (mm)	L3 (mm)	Mass (kg)
25	160	245	307	approx. 8
40	170	253	323	approx. 10
50	180	262	339	approx. 11
80	230	276	368	approx. 17
100	240	294	399	approx. 21

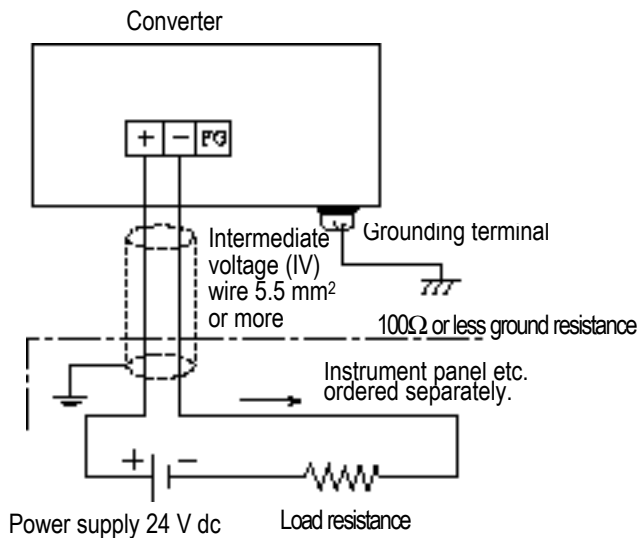


Figure 5. Wiring Diagram

Wiring Precautions

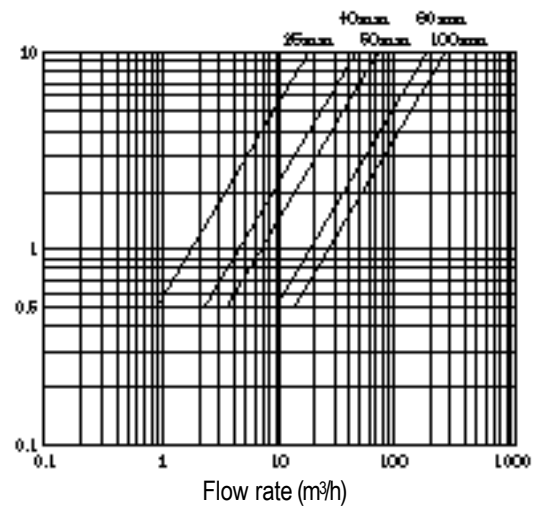
- (1) Connect the grounding wire (IV wire 5.5 mm² or more) to a good earth ground (100 Ω or less ground resistance). Make the wire as short as possible. Avoid using a common ground shared with other equipment where earth current may flow. An independent earth ground is recommended.
- (2) A fuse is not included on the 4-20 mA signal line in the converter circuit. Therefore, provide an overcurrent protection circuit for the external power supply unit.
- (3) Provide a surge protector, if necessary, for the external receiving instruments.
- (4) To prevent a multi-point grounding, ground the shielded cable on the receiving instrument side.

■ Meter Size

To select meter size:

See Figure 6 and find meter sizes within the velocity of 0.5 to 10 m/s, (vertical scale) for a specified full-scale (measuring range high limit) flow rate (horizontal scale). Select one meter size that is less or equal to the pipe size. When more than one meter size fits, select one which has a full-scale velocity of between 1 and 3 m/s.

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



Meter size mm (inch)	Flow velocity		
	0.5 m/s	1 m/s	10 m/s
25 (1")	0.884 m ³ /h	1.767 m ³ /h	17.67 m ³ /h
40 (1.5")	2.262 m ³ /h	4.523 m ³ /h	45.23 m ³ /h
50 (2")	3.534 m ³ /h	7.067 m ³ /h	70.67 m ³ /h
80 (3")	9.05 m ³ /h	18.09 m ³ /h	180.9 m ³ /h
100 (4")	14.14 m ³ /h	28.27 m ³ /h	282.7 m ³ /h

Figure 6. Flow Rate and Flow Velocity

Ordering Information

1. When ordering the LF140/LF240 flowmeter, refer to Table 1 and 2 (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. Ordering scope:
 - (1) Actual flow calibration data:
(required or not)
5. Other items
Specifications other than standard items

Table 1. Type Specification Code (Model LF240 Converter)

Model	Specification Code													Description
12345	6	7	8	9	10	11	12	13	14					
LF240														Electromagnetic flowmeter converter LF240 Converter
	A													Usage General-purpose
		A												Mounting structure Detector-converter combined type
			A											Display LCD display provided
				1	1									Standard
						1								Communications function provided (HART protocol)
							A	A						Standard
														Coating
													A	Acrylic resin-baked coating, pearl-gray colored
													Z	other

Table 2. Type Specification Code (Model LF140 Detector)

Model	Specification Code													Description
12345	6	7	8	9	10	11	12	13	14					
LF140														Electromagnetic flowmeter detector LF140
		E												Meter size
		F												25mm
		G												40 mm
		H												50 mm
		J												80 mm
														100 mm
													L	Mounting structure LF140/LF240 combined type
														Connection flange standard
													C	ANSI 150
													D	ANSI 300
													E	BS 10
													F	BS 16
													G	DIN PN 10
													H	DIN PN 16
													J	JIS 10K
													K	JIS 16K
													L	JIS 20K
													Z	other
													B	Electrode Material
													C	316L stainless steel (standard)
													D	Ti (titanium)
													E	Pt-Ir (platinum/iridium)
													F	Ta (tantalum)
													Z	Hastelloy C other
													C	Lining Material
													Z	Teflon PFA (standard) other
													C	Grounding Ring Material
													D	316 stainless steel (standard)
													E	316L stainless steel
													F	Ti (titanium)
													G	Ta (tantalum)
													H	Pt-Ir (platinum/iridium)
													Z	Hastelloy C other
													A	Nuts, Bolts, and Packings not provided
													A	Standard
													B	Coating
													Z	phthalic acid resin coating (std.) other



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

Specifications are subject to change without notice
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