

**Introduction**

Combined with a multi-functional converter LF620 (combined type) or LF622 (separate type) equipped with its original noise-suppression circuit and advanced algorithms. IR (Infrared) switches enable parameter setting of the converter without removing the cover. Flow direction can be set in either way, and its 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 terminal block in LCD side make easy to wire in case of the combined type.

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

\*\* DevComm2000 Smart Device Communicator available through TIC for performing HART device configurations on PC or laptop.

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

\*3: Modbus is the communication protocol that Modicon Inc. developed. Physical layer is RS485.



**Figure1. LF620 series Flowmeter Converters**



Certification number  
 Z01207

**Specifications**

■ **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: 2.7kΩ  
 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 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:**

4–20mA dc (load resistance 0 to 750Ω)

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

**Digital outputs** — Two points are available as follows.

**Digital output DO1 :**

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

**Note:** DO1 cannot be used if Modbus communication connection is 3 lines.

**Digital output DO2 :**

Output type: Solidstate relay output (non polarity)  
 Number of outputs: One point  
 Output capacity: 150Vdc, 150mA maximum or 150 V ac (peak to peak), 100mA maximum

**Note:** DO2 cannot be used with the Modbus communication.

**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 (10,000pps) (DO1)  
Max 100Hz ( 100pps) (DO2)  
(Over 1kpps, auto-setting)  
Pulse width: 0.3 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 2)**  
**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 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  
Baurate : 31.25kbps  
Bus voltage : 9-30VDC  
Consumption electric current of bus:less than 16mA  
Manufacture Ident-No. : 093B<sub>HEX</sub>  
Standard Ident-No. : 9740<sub>HEX</sub>  
Slave address : 0-126 (Default address is 126)  
Profile : Profile Ver.3.01 for Process Control Devices  
Function blocks : AI(Flow) × 1 , Totalizer × 1
- **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, PROFIBUS or Modbus 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)

**Zero and span calibration:** Built-in calibration signal source allows converter unit check.

**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
- Digital output: OFF
- LCD display: No display
- PROFIBUS: No communication

#### Power supply:

One of the following can be selected:

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

**Surge protection:** Arresters are installed in the power supply, and a current signal output circuit.

#### Structure:

IP 67 and NEMA 4X Watertight

**Case:** Aluminum alloy (equivalent of IP 67)

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

#### Cable connection ports:

##### Cable glands —

LF620 and LF622 without cFMus Approval:  
Provided as standard  
OD of cable  $\phi$  11~13mm  
Material Nylon 66  
G (PF) 1/2 male threads..

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

LF620F and LF622F with cFMus Approval:  
Not provided, 1/2-14NPT male threads are required.

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

**Vibration resistance:**

No resonance to the following levels of vibration:

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

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

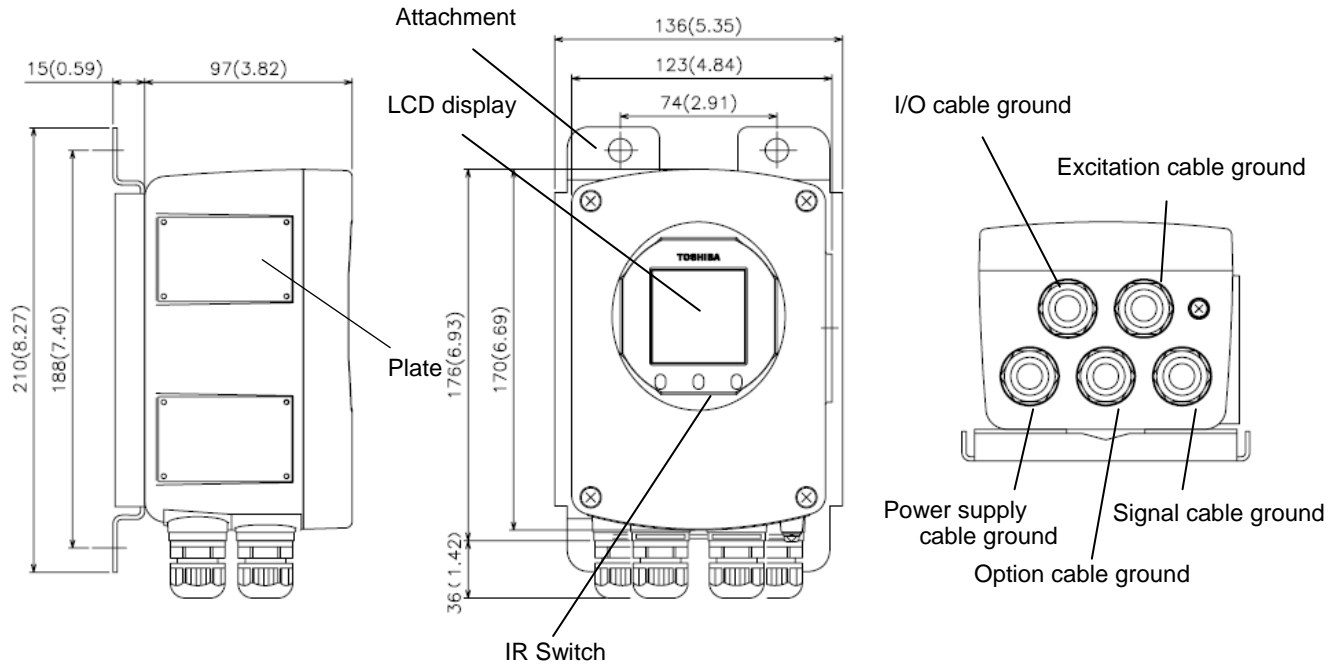
**Converter LF622 dimensions and weights:**

See Figure 2 (for Separate type)

**MTBF:**220,000 hours at 25 deg.C (77 deg.F) based on MIL-HDBK-217F

■ Installation

• Dimension

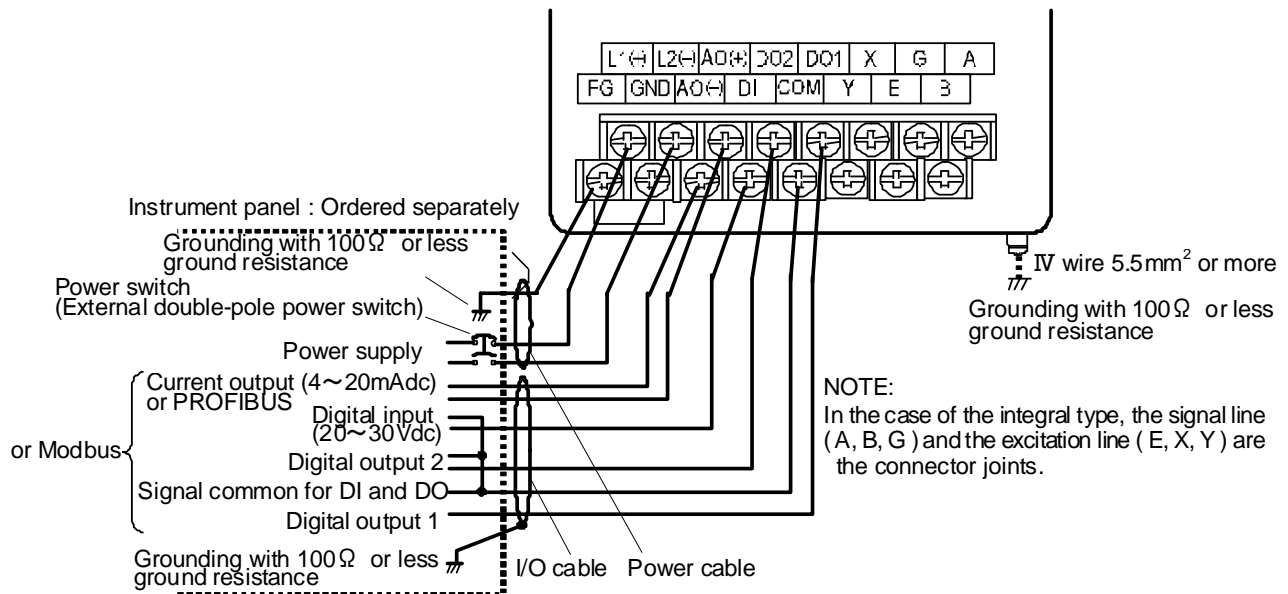


**Note:** Cable glands are not provided for LF622F cFMus approved type. Refer to the part Cable connection port at detector.

**Figure 2. Separate type converter LF622 and LF622F**

## External Connections

### Combined type Converter LF620



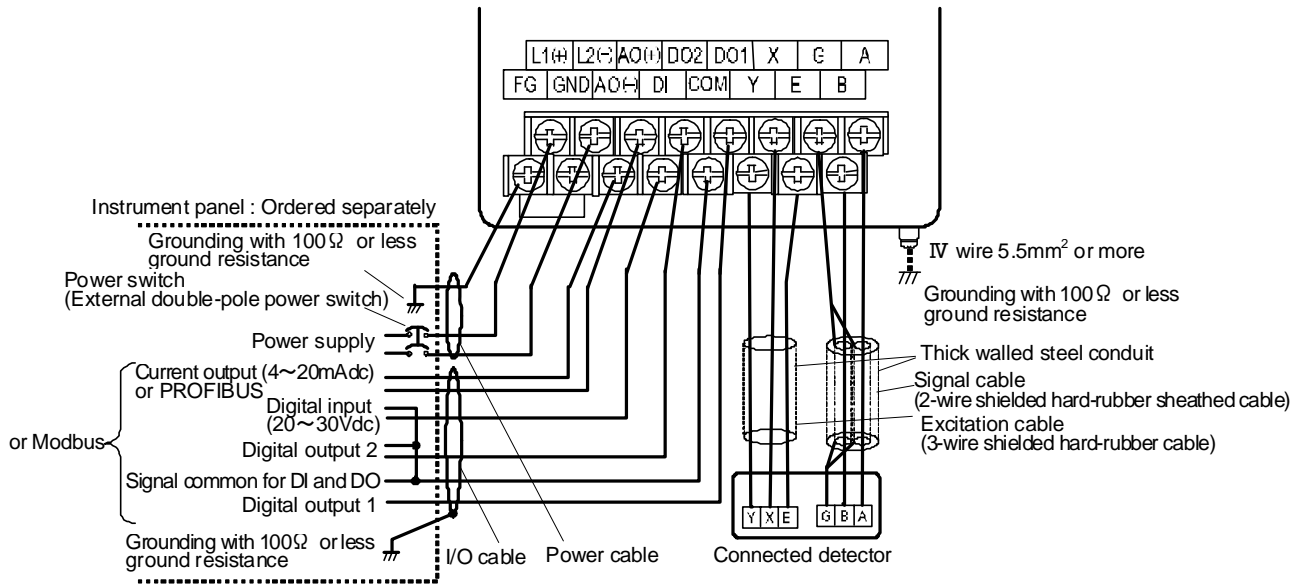
\*1 Locate an external double-pole power switch on the power line near the flowmeter within easy reach of operation.

Use the appropriate switch rating as shown below:

Switch rating: 250Vac, 6A or more

In rush current: 15A or more

**Figure 3. Combined type LF620 and LF620F converters Wiring Diagram**



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 (4~20mA dc) or PROFIBUS	Shielded cable for PROFIBUS-PA
-		
X	Excitation Output	Excitation cable (for LF622, LF622F only)
Y		
E		
A	Signal Input	Signal cable (for LF622, LF622F only)
B		
G		
T+	Modbus(+)	Twisted-pair polyethylene insulated vinyl sheath cable (JKEV, AWG24(0.2mm <sup>2</sup> ))
T-	Modbus(-)	
TG	Modbus(GND)	

**Note:** Symbol of the terminal is changed as follows for Modbus.  
 DO2 → T+, DI → T-, COM → TG

**Figure 4. Separate type LF622 and LF622F converters wiring Diagram**

## ■ Wiring Precautions

- (1) Connect the grounding wire (IV wire 5.5mm<sup>2</sup> 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.
- (2) The allowable cable lengths between Toshiba detector and Toshiba converter for the separate type flowmeter depend on the electrical conductivity of the object fluid. Refer to each specification sheet.
- (3) DO1, DO2, and DI 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 or 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) Use a PROFIBUS-PA cable or a RS485 twist-pair 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 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 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 PROFIBUS-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. Please use the junction box at system configuration.
- (8) Install a terminator to flowmeter that connected to end of Modbus network.

**Table 1. 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	—	●
					A										Purpose		
					F										cFMus class I, Division 2 non-approved	○	○
															cFMus class I, Division 2 approved	●	●
						A									Shape		
															Standard type with case	●	●
							A								Converter mounting fitting		
							C								None	●	○
							E								Panel, Accessory for wall mounting (BNP material: SUS304)	—	●
															Accessory for pipe installation (BNP material: SUS304)	—	○
															Digital input/output		
								2							Digital output points 2 (DO1+DO2) +Digital input point 1 (DI)	●	●
															Current output and Communication function(Note1)		
									1						Current output + HART communication	●	●
									2						PROFIBUS communication	○	○
									3						Current output + Modbus (RS485) communication	○	○
															Power supply(Note 2)		
										1					100Vac-240Vac 50/60Hz, 110Vdc	●	●
										2					24Vdc	○	○
										3					110Vdc	○	○
															Instruction manual		
													E		English	●	●

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

Note 1: When PROFIBUS communication is provided, current output(4-20mA) and HART communication cannot be used.  
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 2 for more details.

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

**Table2. Communication functions and output selection table**

Selection of Function		Availability of outputs			
Code (10 <sup>th</sup> digit)	Selected Communication	4-20mA dc	DO1	DO2	DI
1	HART	✓	✓	✓	✓
2	PROFIBUS	X	✓	✓	✓
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.



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 2011-6 (TDOC)

© TOSHIBA Corporation 2011

All Rights Reserved.