

## Positioning Module Terminal Block Conversion Module

FA-LTBQ75M,FA-LTBQ75DP

### User's Manual

Thank you for purchasing the FA Goods products.

Before using the products, please read this manual and the relevant manuals carefully to handle the products correctly.

**mitsubishi electric engineering company limited**

### SAFETY PRECAUTIONS

(Read these precautions before using the FA Goods products.)

Before using the products, please read this manual and the relevant manuals carefully, and pay full attention to safety to handle the products correctly.

The precautions given in this manual are concerned with the FA Goods products only.

For the safety precautions of the programmable controller system, refer to the user's manual for the programmable controller used.

In this manual, the safety precautions are classified into two levels: "⚠️WARNING" and "⚠️CAUTION".

 **WARNING**

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.

 **CAUTION**

Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Under some circumstances, failure to observe the precautions given under "⚠️CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

## [Design Precautions]



### WARNING

- Configure safety circuits externally to ensure that the entire system operates safely even when a fault occurs in the external power supply, the programmable controller, or the FA Goods products. Failure to do so may result in an accident due to an incorrect output or malfunction.
  - (1) Emergency stop circuits, protection circuits, and protective interlock circuits for conflicting operations (such as forward/reverse rotations or upper/lower limit positioning) must be configured externally.
  - (2) Outputs may remain on or off due to a failure of a component such as a relay, transistor, and triac in an output terminal module. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit of an output terminal module, when a load current exceeding the rated current or an overcurrent caused by a load short-circuit flows for a long time, it may cause smoke and fire. To prevent this, configure an external safety circuit, such as a fuse.
- Configure a circuit so that the programmable controller is turned on first and then the external power supply. If the external power supply is turned on first, an accident may occur due to an incorrect output or malfunction.

## [Design Precautions]



### CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm (3.94 inches) or more between them. Failure to do so may result in malfunction or failure due to noise.
- When using a terminal block conversion module for a high-speed counter module, do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 150mm (5.91 inches) or more between them. Failure to do so may result in malfunction or failure due to noise.
- Keep a distance of 100mm (3.94 inches) or more between a thermocouple or RTD (Resistance Temperature Detector) and the main circuit line or AC control lines. Also, keep the thermocouple or RTD away from a circuit that includes harmonics, such as a high-voltage circuit and a load circuit of an inverter. If not, the thermocouple or RTD is more likely to be affected by noise, surges, and induction.
- At power-on or power-off, a voltage may occur or a current may flow between output terminals for a moment. To use an analog signal converter or analog terminal block conversion module, start the control after analog outputs become stable.
- Do not place an analog signal converter or analog terminal block conversion module near a device that generates magnetic noise.
- When a device such as a lamp, heater, or solenoid valve is controlled through an output terminal module, a large current (approximately 10 times greater than normal) may flow when the output is turned from off to on. Therefore, use an output terminal module that has a sufficient current rating.

## [Installation Precautions]



### WARNING

- Shut off the external power supply (all phases) used in the system before installation. Failure to do so may result in electric shock or damage to the products.

## [Installation Precautions]



### CAUTION

- Use FA Goods products in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the products.
- Securely fix the products with a DIN rail or screws. Incorrect installation may cause malfunction, failure, or drop of the module. When using the products in an environment of frequent vibrations, fix the products with screws.
- Tighten the screws within the specified torque range. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or products, resulting in drop, short circuit, or malfunction.
- Attach DIN rail stoppers on the right and left sides of the spring clamp conversion module (FA1-TESV\*\*) to fix the module securely.
- Shut off the external power supply (all phases) used in the system before mounting or removing the products. Failure to do so may result in damage to, malfunction of, or failure of the products.
- Do not directly touch any conductive parts and electronic components of the products. Failure to do so may cause malfunction or failure of the products.
- Install the products in the correct orientation if it is specified. Failure to do so may result in damage to or deterioration of the products.
- When drilling screw holes, be careful not to drop chips into the inside of the products or conductive parts. Such foreign matter can cause a fire, failure, or malfunction.
- When using replacement relays/triacs/transistors for a terminal module or signal conversion modules, use them in the correct combination. Incorrect combination may cause failure.
- Shut off the power supply before installing/removing a replacement relay/triac/transistor for a terminal module. Failure to do so may cause failure or malfunction.
- Securely install replacement relays/triacs/transistors on a terminal module and securely mount a signal conversion modules on an installation base. Failure to do so may cause damage to or drop of the products, or malfunction due to poor contact. Follow the correct procedure to install/remove them. Failure to do so may cause damage to or drop of the products, or malfunction due to poor contact.
- When relay/triac/transistor modules are installed on a terminal module or a signal conversion module is mounted on the installation base, hold the terminal module or installation base to transport them or install them to a panel. Holding the relay/triac/transistor or signal conversion module may cause drop or failure of the terminal module or installation base.

## [Wiring Precautions]



### WARNING

- Shut off the external power supply (all phases) used in the system before wiring. Failure to do so may result in electric shock or damage to the products.
- After wiring, attach the included terminal cover to the products before turning them on for operation. Failure to do so may result in electric shock.

## [Wiring Precautions]



### CAUTION

- Use applicable solderless terminals and tighten them within the specified torque range. Failure to do so may cause failure, damage, or malfunction.
- Check the rated voltage and terminal layout before wiring to the products, and connect the cables correctly. Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 100mm or more between them. Failure to do so may result in malfunction due to noise.
- When using a terminal block conversion module for a high-speed counter module, do not install the control lines or communication cables together with the main circuit lines or power cables. Keep a distance of 150mm (5.91 inches) or more between them. Failure to do so may result in malfunction or failure due to noise.
- Keep a distance of 100mm (3.94 inches) or more between a thermocouple or RTD (Resistance Temperature Detector) and the main circuit line or AC control lines. Also, keep the thermocouple or RTD away from a circuit that includes harmonics, such as a high-voltage circuit and a load circuit of an inverter. If not, the thermocouple or RTD is more likely to be affected by noise, surges, and induction.
- Do not place an analog signal converter or analog terminal block conversion module near a device that generates magnetic noise.
- Place the cables in a duct or clamp them. If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the products or cables or malfunction due to poor contact.
- Tighten the terminal screws within the specified torque range. Undertightening can cause short circuit, fire, or malfunction. Overtightening can damage the screw and/or products, resulting in drop, short circuit, or malfunction.
- Tighten the connector screws within the specified torque range. Undertightening can cause short circuit, fire, or malfunction. Overtightening can damage the screw and/or products, resulting in drop, short circuit, fire, or malfunction.
- Securely connect connectors to the products. Failure to do so may cause malfunction.
- When disconnecting a cable from the products, do not pull the cable by the cable part. For the cable with connector, hold the connector part of the cable. For the cable connected to the terminal block, loosen the terminal screw. Pulling the cable connected to the products may result in malfunction or damage to the products or cable.
- Check the interface type and correctly connect the cable. Incorrect wiring (connecting the cable to an incorrect interface) may cause failure of the products and external device.
- Prevent foreign matter such as dust or wire chips from entering the products. Such foreign matter can cause a fire, failure, or malfunction.
- The products must be installed in control panels. Connect the main power supply to the products in the control panel through a relay terminal block. Wiring and replacement of the products must be performed by qualified maintenance personnel with knowledge of protection against electric shock.
- When connecting the products with a programmable controller, check that the product configuration is correct. An incorrect configuration may cause failure or malfunction.
- Use the products with no force applied to their connectors. Applied force may cause failure or disconnection.
- Attach protective covers or signal conversion modules to unused connectors or empty slots of the products. Failure to do so may cause a fire, failure, or malfunction due to foreign matter.
- When using replacement relays/triacs/transistors for a terminal module or signal conversion modules, use them in the correct combination. Incorrect combination may cause failure of a programmable controller, terminal module, installation base, or external device.
- Securely install replacement relays/triacs/transistors on a terminal module and securely mount a signal conversion modules on an installation base. Failure to do so may cause damage to or drop of the products, or malfunction due to poor contact. Follow the correct procedure to install/remove them. Failure to do so may cause damage to or drop of the products, or malfunction due to poor contact.
- Individually ground the FG terminal of the products with a ground resistance of 100 ohms or less. Failure to do so may result in electric shock or malfunction.

**[Startup and Maintenance Precautions]**

 **WARNING**

- Do not touch any terminal while power is on. Doing so will cause electric shock or malfunction.
- Shut off the external power supply (all phases) used in the system before cleaning the products or retightening the terminal screws, connector screws, or products fixing screws. Failure to do so may result in electric shock or cause failure or malfunction of the products. Undertightening can cause drop of the screw, short circuit, or malfunction. Overtightening can damage the screw and/or products, resulting in drop, short circuit, or malfunction.

**[Startup and Maintenance Precautions]**

 **CAUTION**

- Do not disassemble or modify the products. Doing so may cause failure, malfunction, injury, or a fire.
- Use any radio communication device such as a cellular phone or PHS (Personal Handy-phone System) more than 25cm away in all directions from the programmable controller and FA Goods products. Failure to do so may cause malfunction.
- Shut off the external power supply (all phases) used in the system before mounting or removing the products. Failure to do so may cause failure or malfunction of or damage to the products.
- After the first use of the products, do not connect/remove the products and cables more than 50 times (IEC 61131-2 compliant). Exceeding the limit may cause malfunction.
- Startup and maintenance of a control panel must be performed by qualified maintenance personnel with knowledge of protection against electric shock. Lock the control panel so that only qualified maintenance personnel can operate it.
- Before handling the products, touch a conducting object such as a grounded metal to discharge the static electricity from the human body. Failure to do so may cause failure or malfunction of the products.

**[Disposal Precautions]**

 **CAUTION**

- When disposing of the products, treat them as industrial waste.

**[Transportation Precautions]**

 **CAUTION**

- Do not apply shock that exceeds the shock resistance described in the general specifications during transportation since the products are precision devices. Doing so may cause failure of the module.
- The halogens (such as fluorine, chlorine, bromine, and iodine), which are contained in a fumigant used for disinfection and pest control of wood packaging materials, may cause failure of the products. Prevent the entry of fumigant residues into the product or consider other methods (such as heat treatment) instead of fumigation. The disinfection and pest control measures must be applied to unprocessed raw wood.

**REVISIONS**

\*The manual number is given on the bottom left of the last page.

Print Date	*Manual Number	Revision
March, 2018	50D-FG0235	First edition
September, 2019	50D-FG0235-A	Modified parts 7. EXTERNAL CONNECTION EXAMPLE

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## 1. INTRODUCTION

This manual describes the specifications and handling of the terminal block conversion modules used in combination with Mitsubishi Electric Corporation positioning modules.

## 2. GENERAL SPECIFICATIONS

Item	Specifications				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	-25 to 75°C				
Operating ambient humidity	5 to 95%RH, non-condensing				
Storage ambient humidity	5 to 95%RH, non-condensing				
Vibration resistance	Applicable standard	JIS B 3502, IEC 61131-2			
		Frequency	Constant acceleration	Half amplitude	Sweep count
	Under intermittent vibration	5 to 8.4Hz	—	3.5mm	10 times each in X, Y, and Z directions
		8.4 to 150Hz	9.8m/s <sup>2</sup> (1G)	—	
	Under continuous vibration	5 to 8.4Hz	—	1.75mm	—
8.4 to 150Hz		4.9m/s <sup>2</sup> (0.5G)	—		
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s <sup>2</sup> (15G), 3 times each in X, Y, and Z bidirections)				
Operating atmosphere	No corrosive gases				
Operating altitude <sup>*1</sup>	2000m or lower				
Installation location	Inside a control panel				
Overvoltage category <sup>*2</sup>	II or less				
Pollution degree <sup>*3</sup>	2 or less				

\*1: Do not use or store the products under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction.

\*2: This category indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.

\*3: This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.



### 3. PERFORMANCE SPECIFICATIONS

#### 3-1. FA-LTBQ75M

Item		Model	FA-LTBQ75M
Number of supported axes			2 axes (2 units used for 4 axes)
Input signals	Rated voltage		24 VDC (CLASS 2)
	Rated current		5mA
	Used voltage range		4.5 to 26.4 VDC (CLASS 2)
Terminal block	Terminal block screw		M3 screw, Number of terminals:26P, 7.62mm pitch Tightening torque range: 50 to 75N·cm(5.2 to 7.6kgf·cm, 4.51 to 6.6lbf·in), UL standard conformity tightening torque: 80N·cm, 7.1lbf·in
	Applicable wire		22 to 16 AWG: 0.3 to 2mm <sup>2</sup> (with solderless terminal use)
Installation method	screw		M4 × 0.7mm × 8mm or more Tightening torque range: 78 to 118N·cm (8 to 12kgf·cm, 7 to 10lbf·in)
	DIN rail		Applicable DIN rail: TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
Withstand voltage			500 VAC for 1 minute (between all DC external terminals and earth)
Weight			Approx. 150g

#### 3-2. FA-LTBQ75DP

Item		Model	FA-LTBQ75DP
Number of supported axes			2 axes (2 units used for 4 axes, 4 units used for 8 axes)
Input signals	Rated voltage		24 VDC (CLASS 2)
	Rated current		5mA
	Used voltage range		4.5 to 26.4 VDC (CLASS 2)
Output signals	Rated voltage		24 VDC (CLASS 2)
	Max. used voltage		30 VDC (CLASS 2)
	Max. used current		0.1A
Terminal block	Terminal block screw		M3 screw, Number of terminals:20P, 7.62mm pitch Tightening torque range: 50 to 75N·cm(5.2 to 7.6kgf·cm, 4.51 to 6.6lbf·in), UL standard conformity tightening torque: 80N·cm, 7.1lbf·in
	Applicable wire		22 to 16 AWG: 0.3 to 2mm <sup>2</sup> (with solderless terminal use)
Installation method	screw		M4 × 0.7mm × 8mm or more Tightening torque range: 78 to 118N·cm (8 to 12kgf·cm, 7 to 10lbf·in)
	DIN rail		Applicable DIN rail: TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
Withstand voltage			500 VAC for 1 minute (between all DC external terminals and earth)
Weight			Approx. 140g

## 4. CONNECTABLE MODULES AND CABLES

### 4-1. FA-LTBQ75M

Module model for a programmable controller	Cable for connecting with the programmable controller module	Module model	Connected Devices	
MELSEC-Q Series Positioning Module	QD75M1 QD75M2 QD75M4 QD75MH1 QD75MH2 QD75MH4 QD77MS2 <sup>*1,*2</sup> QD77MS4 <sup>*1,*2</sup> QD77MS16 <sup>*1,*2</sup>	FA-CBL**Q7	FA-LTBQ75M	External devices Connection signals For terminal block conversion

\*1: The following signals for connecting a differential output type manual pulse generator or incremental synchronous encoder cannot be used.  
QD77MS\*\*: HAH, HAL, HBH, HBL

\*2: Replace signal names as follows.

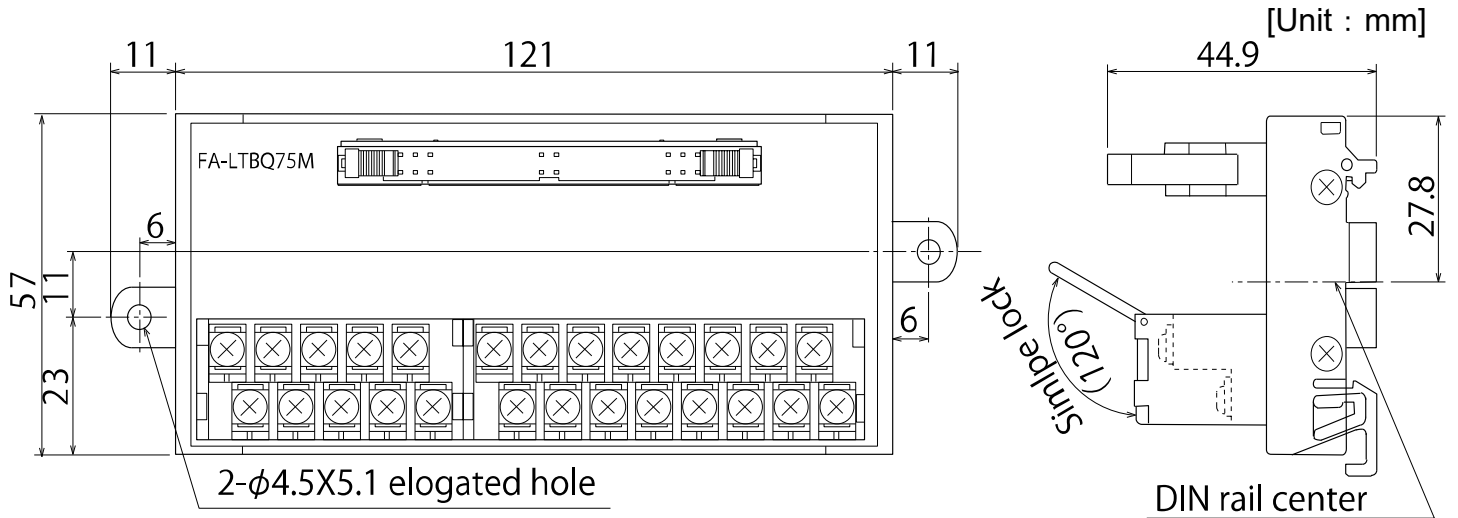
No	FA-LTBQ75M Terminal names	QD77MS** Signal names
1	PULSER A+	5V
2	PULSER B+	5V
3	PULSER A-	HA
4	PULSER B-	HB
5	P5	5V
6	1.CHG	DI1
7	2.CHG	DI2

### 4-2. FA-LTBQ75DP

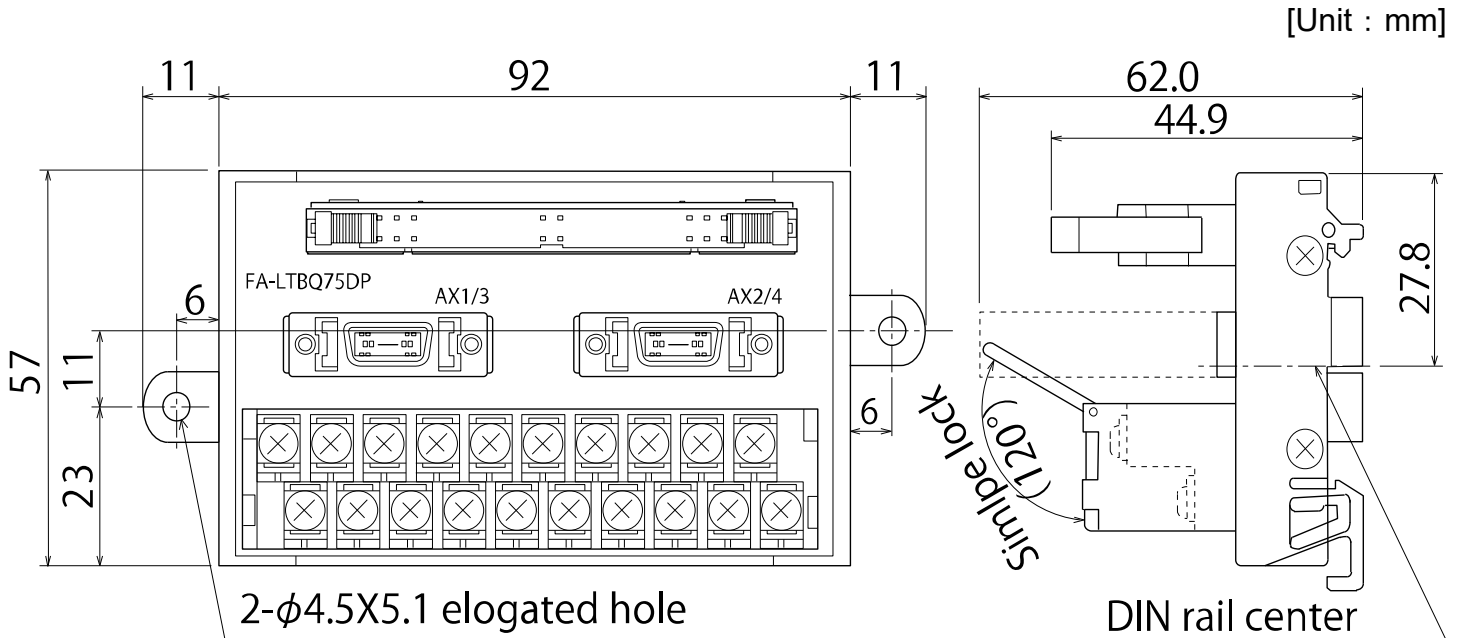
Module model for a programmable controller	Cable for connecting with the programmable controller module	Module model	Cable for connecting with the servo amplifier	Servo amplifier	
MELSEC iQ-R Series Positioning Module	RD75D2 RD75D4	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7DM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifier
	RD75P2 RD75P4	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7PM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifier
MELSEC-Q Series Positioning Module	QD75D1 QD75D1N QD75D2 QD75D2N QD75D4 QD75D4N QD70D4 QD70D8	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7DM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifier
	QD75P1 QD75P1N QD75P2 QD75P2N QD75P4 QD75P4N	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7PM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifier
MELSEC-L Series Positioning Module	LD75D1 LD75D2 LD75D4	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7DM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifiers
	LD75P1 LD75P2 LD75P4	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7PM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifiers
MELSEC iQ-F Series Positioning Module	FX5-20PG-P	FA-CBL**Q7	FA-LTBQ75DP	FA-CBLQ7PM*J3	Mitsubishi Electric general purpose AC servo amplifier MR-J3A/J4A series
				FA-CBLQ7DG*	General purpose stepping motor, general purpose servo amplifiers

## 5. EXTERNAL DIMENSIONS

5-1. FA-LTBQ75M

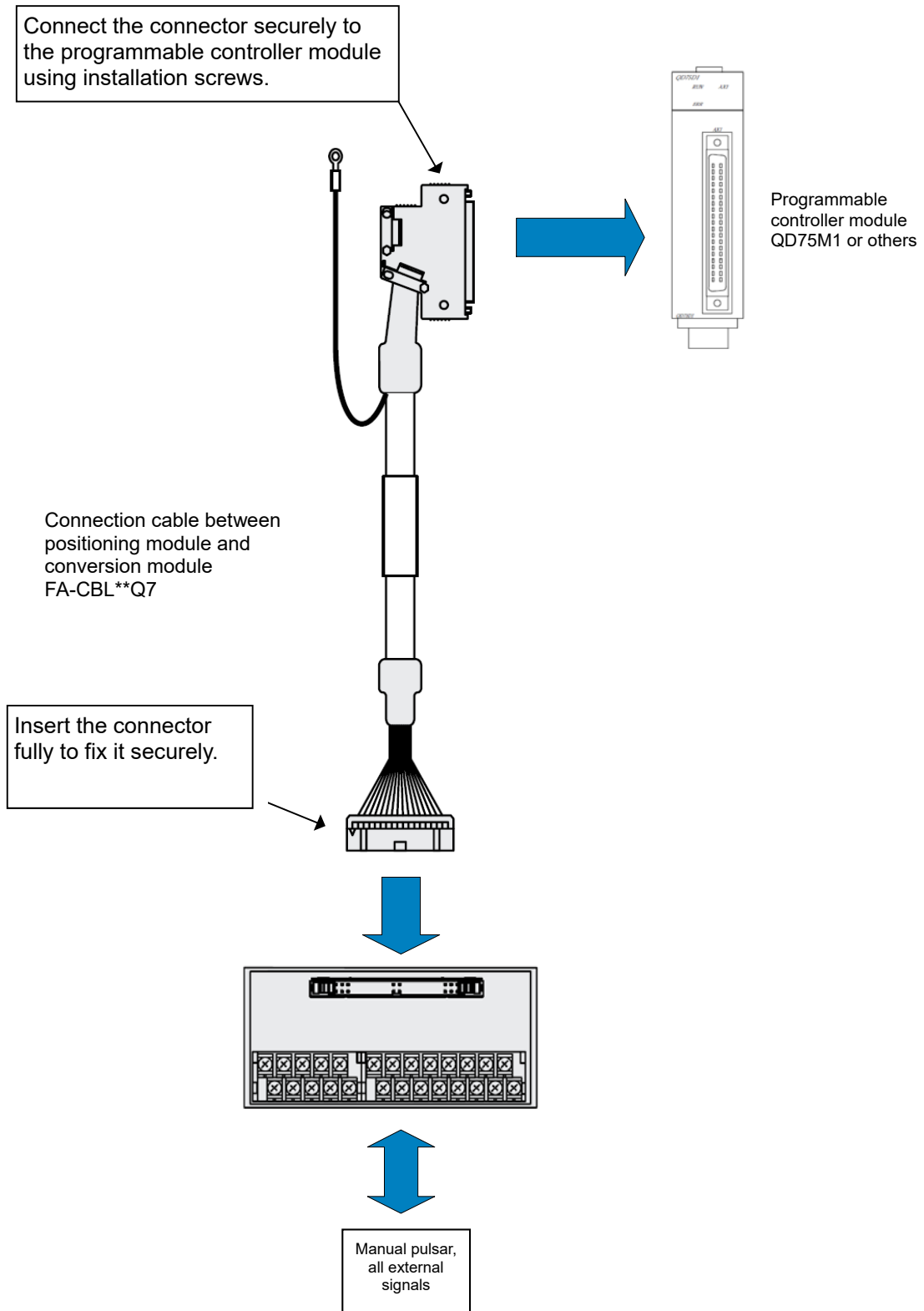


5-2. FA-LTBQ75DP



## 6. CONNECTING METHOD

### 6-1. Connection example with a connector module of a programmable controller (FA-LTBQ75M)



6-2. Connection example with a connector module of a programmable controller and servo amplifier (FA-LTBQ75DP)

(1) When connected to Mitsubishi Electric Corporation MR-J3A/J4A Series

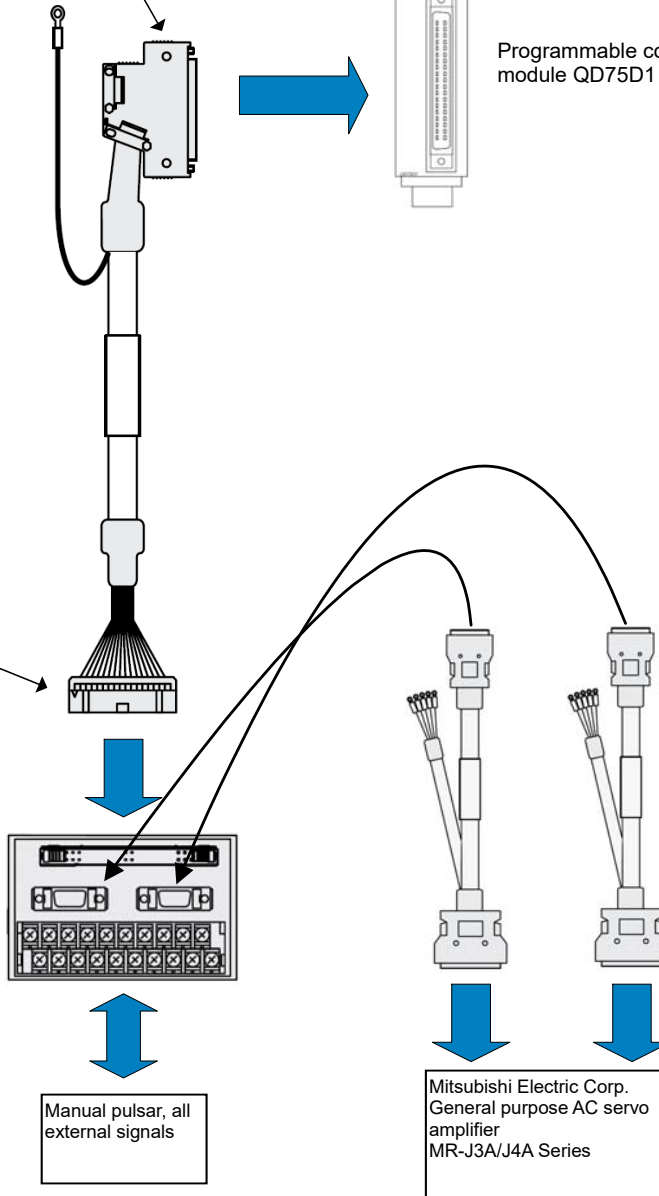
Connect the connector securely to the programmable controller module using installation screws.



Programmable controller module QD75D1 or others

Connection cable between positioning module and conversion module FA-CBL\*\*Q7

Insert the connector fully to fix it securely.



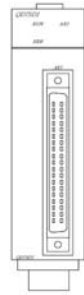
Connection cable between conversion module and servo amplifier  
FA-CBLQ7DM\*J3  
FA-CBLQ7PM\*J3

Manual pulsar, all external signals

Mitsubishi Electric Corp.  
General purpose AC servo amplifier  
MR-J3A/J4A Series

(2)When connected to general purpose stepping motors, servo amplifiers

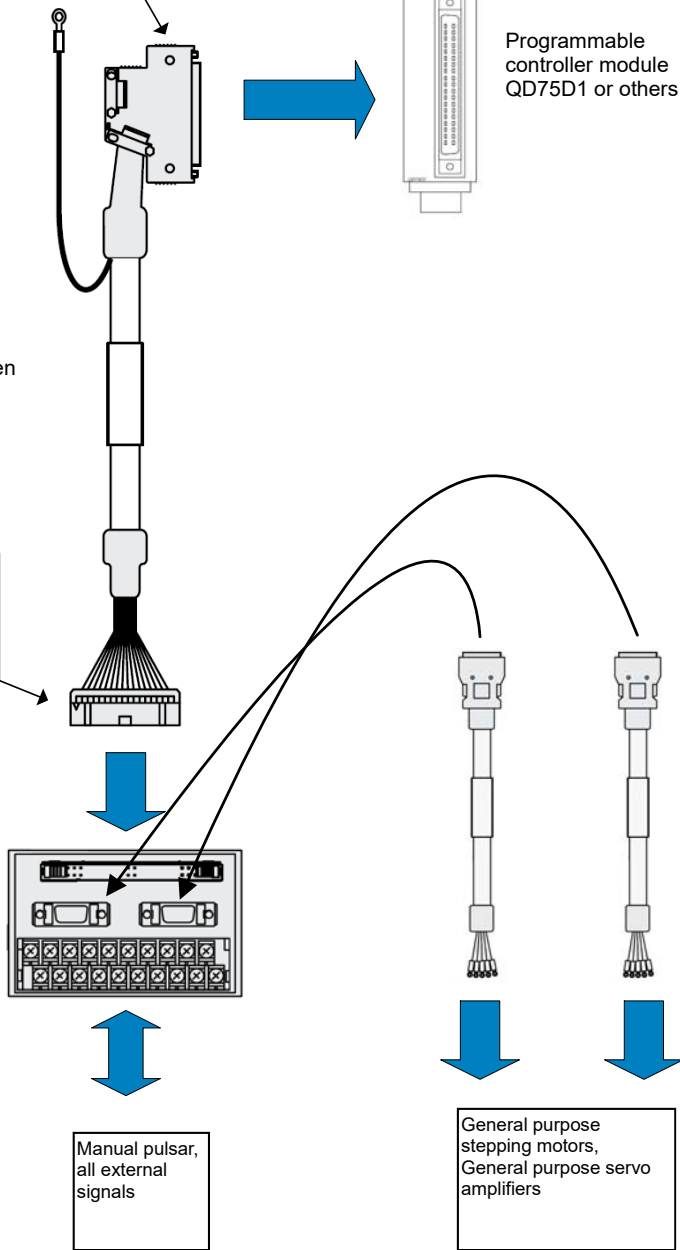
Connect the connector securely to the programmable controller module using installation screws.



Programmable controller module QD75D1 or others

Connection cable between positioning module and conversion module FA-CBL\*\*Q7

Insert the connector fully to fix it securely.



Connection cable between conversion module and servo amplifier FA-CBLQ7DG\*

Manual pulsar, all external signals

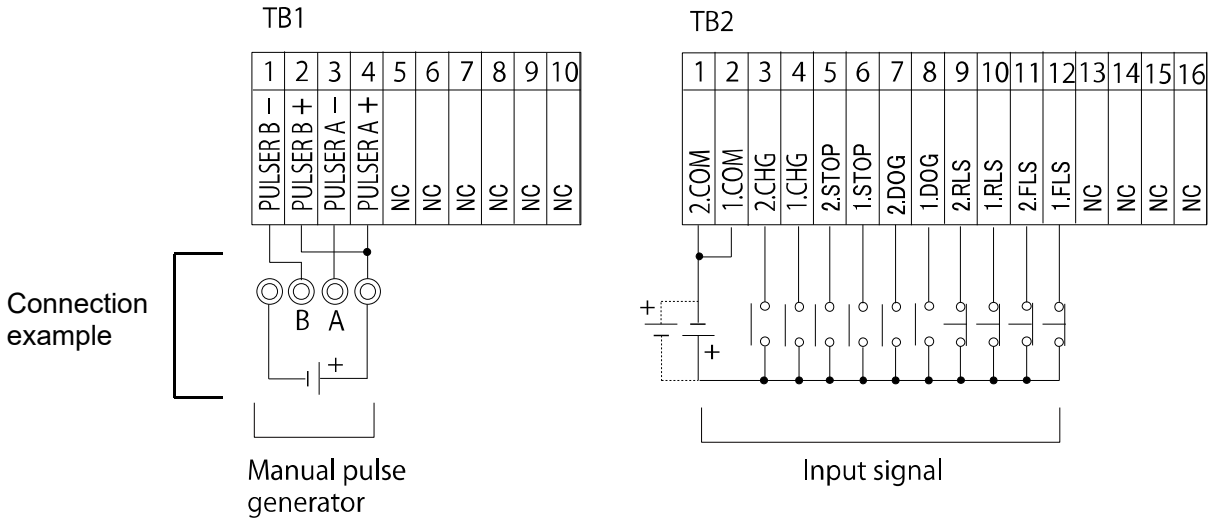
General purpose stepping motors, General purpose servo amplifiers

# 7. EXTERNAL CONNECTION EXAMPLE

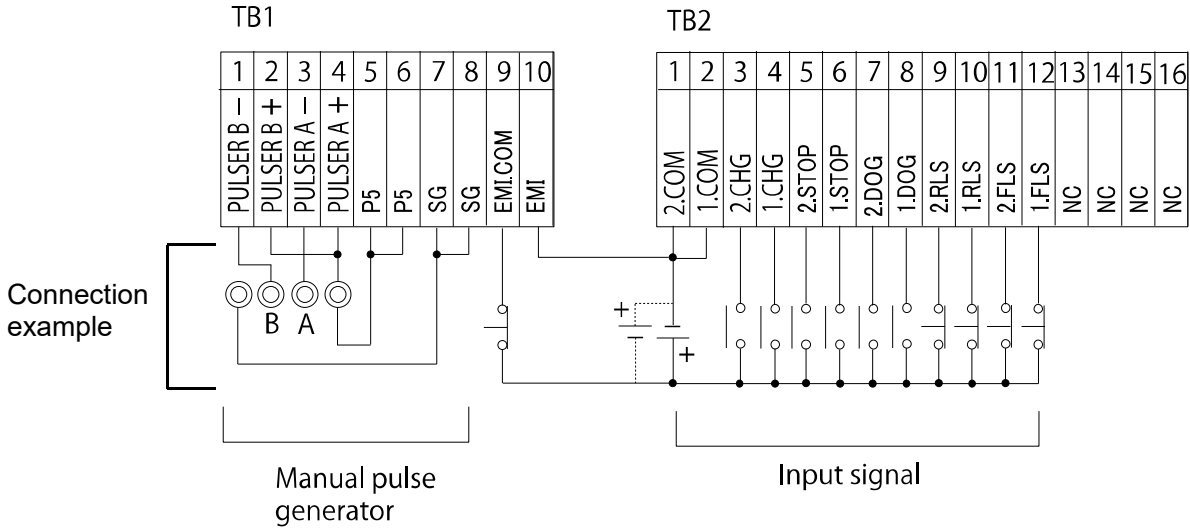
## 7-1. FA-LTBQ75M

\*1: Regarding a manual pulse generator, use the MR-HDP01 manufactured by Mitsubishi Electric.

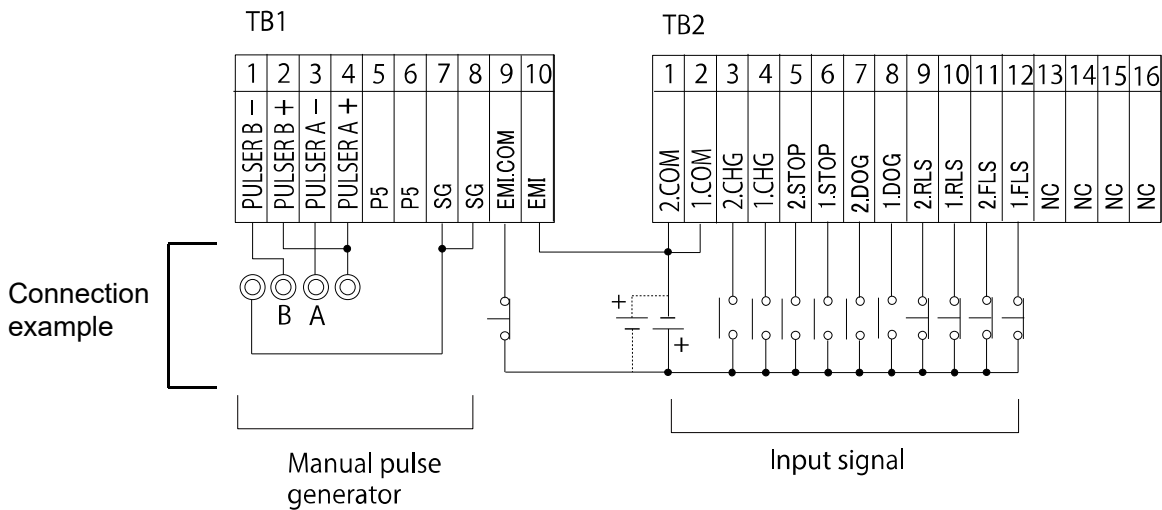
(1) When the QD75M connection



(2) When the QD75MH connection

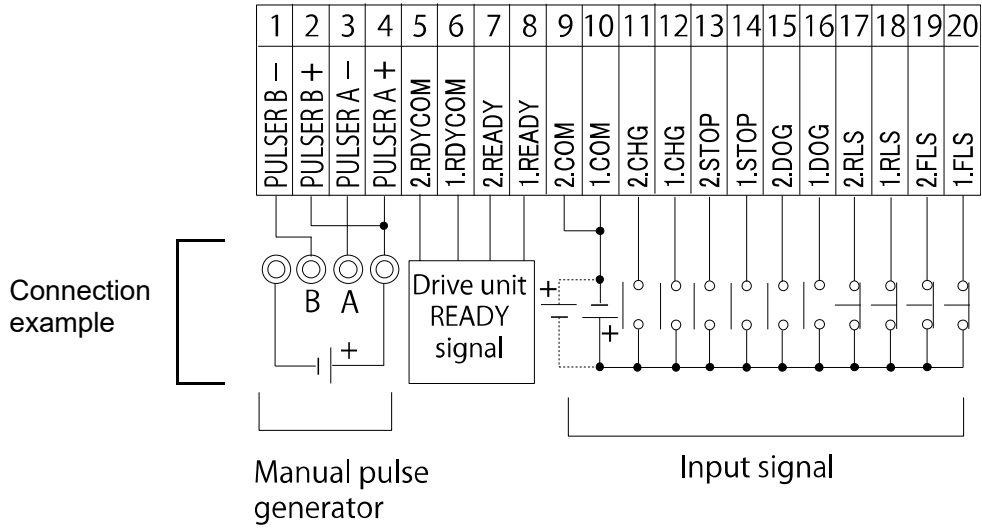


(3) When the QD77MS connection

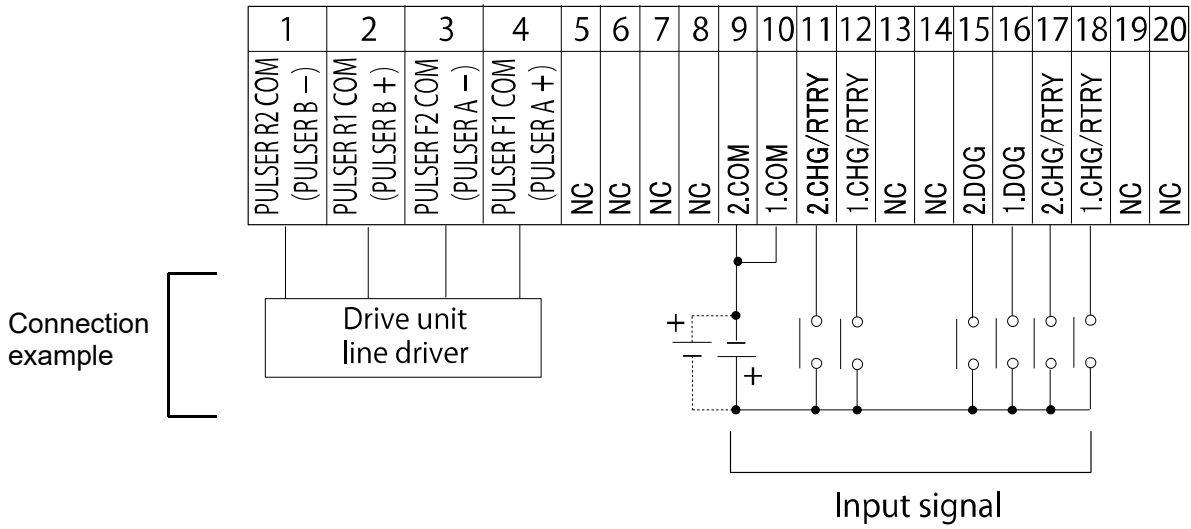


## 7-2. FA-LTBQ75DP

(1) When the RD75, QD75D/P, LD75D/P, FX5-20PG-P connection



(2) When the QD70D connection





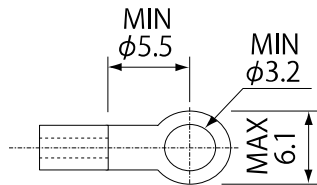
## 8. APPLICABLE SOLDERLESS TERMINALS

Type		Round		Y-shaped	
Manufacture	Applicable wire size	Non-insulated solderless terminal	Insulated solderless terminal	Non-insulated solderless terminal	Insulated solderless terminal
Nichifu Co., Ltd. NTM	0.3 to 1.25mm <sup>2</sup>	R1.25-3N R1.25-3.5N	TG <sub>N</sub> <sup>V</sup> 1.25-3N TG <sub>N</sub> <sup>V</sup> 1.25-3.5N	1.25Y-3 1.25Y-3N 1.25Y-3.5	TG <sub>N</sub> <sup>V</sup> 1.25Y-3 TG <sub>N</sub> <sup>V</sup> 1.25Y-3N TG <sub>N</sub> <sup>V</sup> 1.25Y-3.5
	1.25 to 2.0mm <sup>2</sup>	R2-3N	TG <sub>N</sub> <sup>V</sup> 2-3N	2Y-3 2Y-3.5S	TG <sub>N</sub> <sup>V</sup> 2Y-3 TG <sub>N</sub> <sup>V</sup> 2Y-3.5S
Japan Solderless Terminal Mfg. Co., Ltd. JST	0.3 to 1.25mm <sup>2</sup>	1.25-MS3	V1.25-MS3	1.25-B3A 1.25-C3A 1.25-C3.5A	V1.25-B3A
	1.25 to 2.0mm <sup>2</sup>	2-MS3	V2-MS3	2-N3A	V2-N3A
Nippon Tanshi Co., Ltd. NTK	0.3 to 1.25mm <sup>2</sup>	R1.25-3ML R1.25-3.5SL	RAV1.25-3ML RAP1.25-3ML	VD1.25-3L VD1.25-3.5SS	VDAV1.25-3L VDAV1.25-3.5SS
	1.25 to 2.0mm <sup>2</sup>	R2-3SL	RAV2-3SL RAP2-3SL	VD2-3S VD2-3.5SS	VDAV2-3.5SS

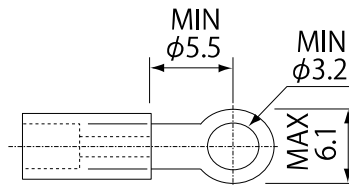
### • Solderless terminal dimensions

[Unit : mm]

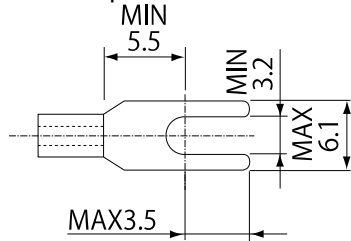
Round non-insulated solderless terminal



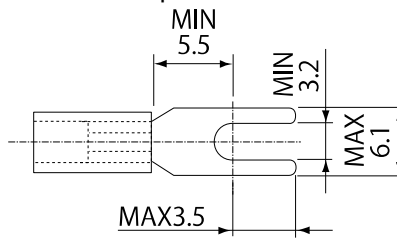
Round insulated solderless terminal



Y-shaped non-insulated solderless terminal

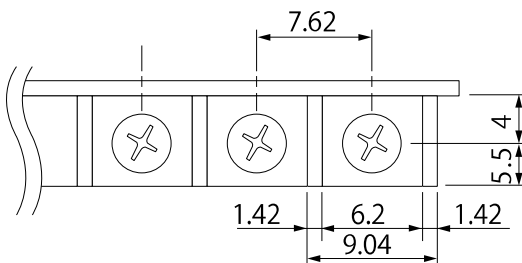


Y-shaped insulated solderless terminal



### • Terminal block shape

[Unit : mm]



## 9. PRECAUTIONS

- (1) For wiring to the terminal block, refer to the manual of the programmable controller module to be connected, published by Mitsubishi Electric.
- (2) Ground the FG wire provided with the cable in the same manner as the programmable controller module. Note that the bunched-up extra wire without grounding may act as an antenna, possibly introducing noise.

## 10. GRATIS WARRANTY TERMS AND GRATIS WARRANTY RANGE

If any fault or defect (hereinafter referred to as "Failure") attributable to Mitsubishi Electric Engineering should occur within the gratis warranty period, Mitsubishi Electric Engineering shall replace the product free of charge via the distributor from whom you made your purchase.

- Gratis warranty period

The gratis warranty period of this product shall be one (1) year from the date of purchase or delivery to the designated place.

- Gratis warranty range

- (1) The gratis warranty range shall be limited to normal use based on the usage conditions, methods and environment, etc., defined by the terms and precautions, etc., given in the instruction manual, user's manual, and caution labels on the product.
- (2) In the following cases, a repair fee shall be applied even if within the gratis warranty period.
  - 1) Failure resulting from inappropriate storage or handling, carelessness or negligence by the user, or Failure caused by the user's hardware or software design.
  - 2) Failure caused by unapproved modifications, etc., to the product by the user.
  - 3) Failure that could have been avoided if, when the Mitsubishi Electric Engineering product was assembled into the user's device, safeguards defined by legal regulations applicable to the user's device or functions or structures considered standard by the industry had been provided.
  - 4) Failure recognized as preventable if the consumed products specified in instruction manuals, etc., were normally maintained or replaced.
  - 5) Replacement of consumable parts (relays, etc.).
  - 6) Failure caused by external factors beyond anyone's control such as fires or abnormal voltage, and Failure caused by Force Majeure such as earthquakes, lightning, or wind and water damage.
  - 7) Failure caused by reasons unpredictable by scientific technology standards at the time of shipment from Mitsubishi Electric Engineering.
  - 8) Any other failure not attributable to Mitsubishi Electric Engineering or found by the user to not be attributable to Mitsubishi Electric Engineering.

## 11. EXCLUSION FROM LIABILITY FOR OPPORTUNITY LOSS AND SECONDARY LOSS

Regardless of the gratis warranty period, Mitsubishi Electric Engineering shall not be liable for compensation for damages arising from causes not attributable to Mitsubishi Electric Engineering, opportunity losses or lost profits incurred by the user due to Failures of Mitsubishi Electric Engineering products, damages or secondary damages arising from special circumstances, whether foreseen or unforeseen by Mitsubishi Electric Engineering, compensation for accidents, compensation for damages to products other than Mitsubishi Electric Engineering products, or compensation for replacement work, readjustment of onsite machinery and equipment, startup test runs or other duties carried out by the user.

## 12. TRADEMARKS

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In some cases, trademark symbols such as '™' or '®' are not specified in this manual.



## FOR SAFE OPERATIONS

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi Electric Engineering.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

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Specifications subject to change without notice.

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