FA Goods

Programmable Controller Analog Terminal

FA1-TBS40ADGN, FA1-TBS40DAG, FA1-TBS40ADDG,

FA-LTB40ADGN, FA-LTB40DAG, FA-LTB40ADDG,

FA-LTB40TDG, FA-LTB40RD3G, FA-TB20TD, FA-TB20TC,

Programmable Controller High-speed Counter Terminal

FA-LTB40D63P6V5, FA-LTB40D63P6V12, FA-LTB40D63P6V24

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.

EMC and Low Voltage Directives

Compliance with the EMC Directive, which is one of the EU directives, has been mandatory for products sold within EU member states since 1996 as well as compliance with the Low Voltage Directive since 1997.
For products compliant to the EMC and Low Voltage Directives, their manufacturers are required to declare compliance and affix the CE marking.

(1) Sales representative in EU member states
The sales representative in EU member states is:
Company: MITSUBISHI ELECTRIC EUROPE B.V.
Address: Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany

(2) Method of ensuring compliance
To ensure that FA Goods products maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to "EMC and Low Voltage Directives Compliant Manual" (50D-FA9010-108).

REVISIONS

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

Print Date	*Manual Number	Revision
March, 2018	50D-FG0234	First edition
September, 2019	50D-FG0234-A	Modified parts 7. EXTERNAL CONNECTION EXAMPLE
April, 2022	50D-FG0234-B	Modified parts Added R60AD6-DG

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1. INTRODUCTION

This manual describes the specifications and handling of the terminal block conversion module used in combination with Mitsubishi Electric analog modules or high-speed counter modules.

2. GENERAL SPECIFICATIONS

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55°C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">-25 to 75°C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">5 to 95%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="5">5 to 95%RH, non-condensing</td></tr>
<tr><td rowspan="6">Vibration resistance</td><td>Applicable standard</td><td colspan="4">JIS B 3502, IEC 61131-2</td></tr>
<tr><td></td><td>Frequency</td><td>Constant acceleration</td><td>Half amplitude</td><td>Sweep count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 8.4Hz</td><td>—</td><td>3.5mm</td><td rowspan="2">10 times each in X, Y, and Z directions</td></tr>
<tr><td>8.4 to 150Hz</td><td>9.8m/s^2 (1G)</td><td>—</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 8.4Hz</td><td>—</td><td>1.75mm</td><td rowspan="2">—</td></tr>
<tr><td>8.4 to 150Hz</td><td>4.9m/s^2 (0.5G)</td><td>—</td></tr>
<tr><td>Shock resistance</td><td colspan="5">Compliant with JIS B 3502 and IEC 61131-2 (147m/s2 (15G), 3 times each in X, Y, and Z bidirections)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="5">No corrosive gases</td></tr>
<tr><td>Operating altitude*1</td><td colspan="5">2000m or lower</td></tr>
<tr><td>Installation location</td><td colspan="5">Inside a control panel</td></tr>
<tr><td>Overvoltage category*2</td><td colspan="5">II or less</td></tr>
<tr><td>Pollution degree*3</td><td colspan="5">2 or less</td></tr>
</table>

*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. FA1-TBS40ADGN/ADDG/DAG

Item \ Model		FA1-TBS40ADGN	FA1-TBS40ADDG	FA1-TBS40DAG
Connectable module		Q68AD-G, R60AD8-G, R60AD16-G	Q66AD-DG R60AD6-DG	Q66DA-G, R60DA8-G, R60DA16-G
Terminal block	Terminal block screw	M3 screw, Number of terminals:40P, 7mm pitch, with screw retention/drop prevention mechanism		
		Tightening torque range: 43 to 58N·cm(4.4 to 5.9kgf·cm, 3.81 to 5.13lbf·in), UL standard conformity tightening torque： 50N·cm, 4.43lbf·in		
	Applicable wire	22 to 16 AWG: 0.3 to 1.25mm^2(when solderless terminals are used)		
Installation method	Screw	M4 × 0.7mm × 25mm 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		Between CHs: 1000VAC for 1 minute, Other: 500VAC for 1 minute		
Insulation resistance (initial)		10MΩ or more (measured with 500VDC insulation resistance tester)		
Accessory		-	-	Marking strip for the R60DA8-G/R60DA16-G*1
Weight		Approx. 190g		

*1: When connecting the R60DA8-G or R60DA16-G, replace the marking strip of the conversion module with the provided marking strip.

3-2. FA-LTB40ADGN/ADDG/DAG

Item \ Model		FA-LTB40ADGN	FA-LTB40ADDG	FA-LTB40DAG
Connectable module		Q68AD-G, R60AD8-G, R60AD16-G	Q66AD-DG R60AD6-DG	Q66DA-G, R60DA8-G, R60DA16-G
Terminal block	Terminal block screw	M3 screw, Number of terminals:40P, 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^2(when solderless terminals are used)		
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		Between CHs: 1000VAC for 1 minute, Other: 500VAC for 1 minute		
Insulation resistance (Initial)		10MΩ or more (measured with 500VDC insulation resistance tester)		
Accessory		-	-	Marking strip for the R60DA8-G/R60DA16-G*1
Weight		Approx. 200g		

*1: When connecting the R60DA8-G or R60DA16-G, replace the marking strip of the conversion module with the provided marking strip.

3-3. FA-LTB40TDG

Item \ Model		FA-LTB40TDG
Connectable module		Q68TD-G-H01, Q68TD-G-H02, R60TD8-G
Terminal block	Terminal block screw	M3 screw, Number of terminals:40P, 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^2(when solderless terminals are used)
Installation method	Screw	M4 x 0.7mm x 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		Between analog input CHs: 1000VAC for 1 minute; Other: 500VAC for 1 minute
Insulation resistance (Initial)		10MΩ or more (measured with 500VDC insulation resistance tester)
Weight		Approx. 200g

3-4. FA-LTB40RD3G

Item \ Model		FA-LTB40RD3G
Connectable module		Q68RD3-G, R60RD8-G
Terminal block	Terminal block screw	M3 screw, Number of terminals:40P, 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^2(when solderless terminals are used)
Installation method	Screw	M4 x 0.7mm x 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		Between analog input CHs: 1000VAC for 1 minute, Other: 500VAC for 1 minute
Insulation resistance (Initial)		10MΩ or more (measured with 500VDC insulation resistance tester)
Weight		Approx. 200g

3-5. FA-TB20TD

Item \ Model		FA-TB20TD
Connectable module		Q64TD, Q64TDV-GH
Terminal block	Terminal block screw	M3 screw, Number of terminals:20P, 7.62mm pitch, Spring-up screw with finger protection cover
		Tightening torque range: 58.8 to 88.2N·cm (6 to 9kgf·cm, 5.22 to 7.5lbf·in), UL standard conformity tightening torque：59N·cm, 5.22lbf·in
	Applicable wire	22 to 14 AWG: 0.3 to 2.0mm^2 (when solderless terminals are used)
Installation method	Screw	M4 x 0.7mm x 22mm 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)
Cold junction compensation resistor		Supplied with the module
Withstand voltage		1500VAC (50/60Hz) for 1 minute
Insulation resistance (Initial)		100MΩ or more (measured with 500VDC insulation resistance tester)
Weight		125g

3-6. FA-TB20TC

Item \ Model		FA-TB20TC
Connectable module		Q64TCTTN, Q64TCTTBWN,
Terminal block	Terminal block screw	M3 screw, Number of terminals:20P, 7.62mm pitch, Spring-up screw with finger protection cover
		Tightening torque range: 58.8 to 88.2N·cm (6 to 9kgf·cm, 5.22 to 7.5lbf·in), UL standard conformity tightening torque： 59N·cm, 5.22lbf·in
	Applicable wire	22 to 14 AWG: 0.3 to 2.0mm^2 (when solderless terminals are used)
Installation method	Screw	M4 x 0.7mm x 22mm 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)
Cold junction compensation resistor		Built in the module
Withstand voltage		1500VAC (50/60Hz) for 1 minute
Insulation resistance (Initial)		100MΩ or more (measured with 500VDC insulation resistance tester)
Weight		125g

3-7. FA-LTB40D63P6V5/V12/V24

Item \ Model		FA-LTB40D63P6V5	FA-LTB40D63P6V12	FA-LTB40D63P6V24
Connectable module		QD63P6		
Counter input signal	Voltage	5V±10%	12V±10%	24V±10%
	Current	6.4 to 11.5mA	10.8 to 15.9mA	10.5 to 14.9mA
	Pulse width	Compliant with the performance specifications of QD63P6		
Connectable encoder		Open collector output, CMOS voltage output	Open collector output	
Terminal block	Terminal block screw	M3 screw, Number of terminals:40P, 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^2(when solderless terminals are used)		
Installation method	Screw	M4 x 0.7mm x 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		500VAC for 1 minute		
Insulation resistance (Initial)		10MΩ or more (measured with 500VDC insulation resistance tester)		
Weight		Approx. 200g		

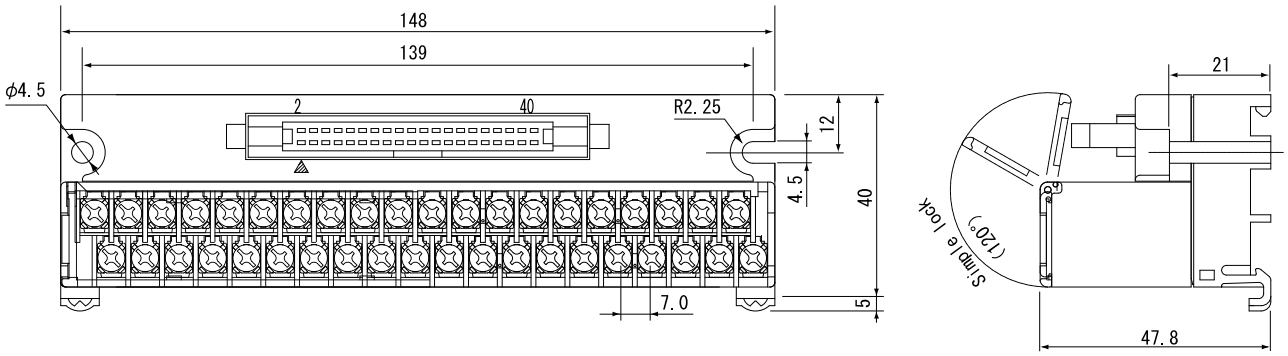
4. CONNECTABLE MODULES AND CABLES

Module model for a programmable controller			Cable model	Module model
Channel Isolated Analog Input Module	Q68AD-G R60AD8-G R60AD16-G		FA-CBL**Q68ADGN	FA1-TBS40ADGN FA-LTB40ADGN
	Q66AD-DG R60AD6-DG		FA-CBL**Q66ADDG	FA1-TBS40ADDG FA-LTB40ADDG
Channel Isolated Analog Output Module	Q66DA-G		FA-CBL**Q66DAG	FA1-TBS40DAG FA-LTB40DAG
	R60DA8-G R60DA16-G		FA1-CBL**R60DA8G	FA1-TBS40DAG FA-LTB40DAG
Channel Isolated Thermocouple Input Module	Q68TD-G-H01 Q68TD-G-H02 R60TD8-G		FA-CBL**Q68TDG	FA-LTB40TDG
Thermocouple Input Module	Q64TD Q64TDV-GH		FA-CBLQ64TD**	FA-TB20TD
Channel Isolated RTD Input Module	Q68RD3-G R60RD8-G		FA-CBL**Q68RD3G	FA-LTB40RD3G
Temperature Control Module	Q64TCTTN Q64TCTTBWN		FA-CBLQ64TC**	FA-TB20TC
Multichannel High-Speed Counter Module	QD63P6	5Vinput signal	FA-CBL**QD63P6	FA-LTB40D63P6V5
		12Vinput signal	FA-CBL**QD63P6	FA-LTB40D63P6V12
		24Vinput signal	FA-CBL**QD63P6	FA-LTB40D63P6V24

5. EXTERNAL DIMENSIONS

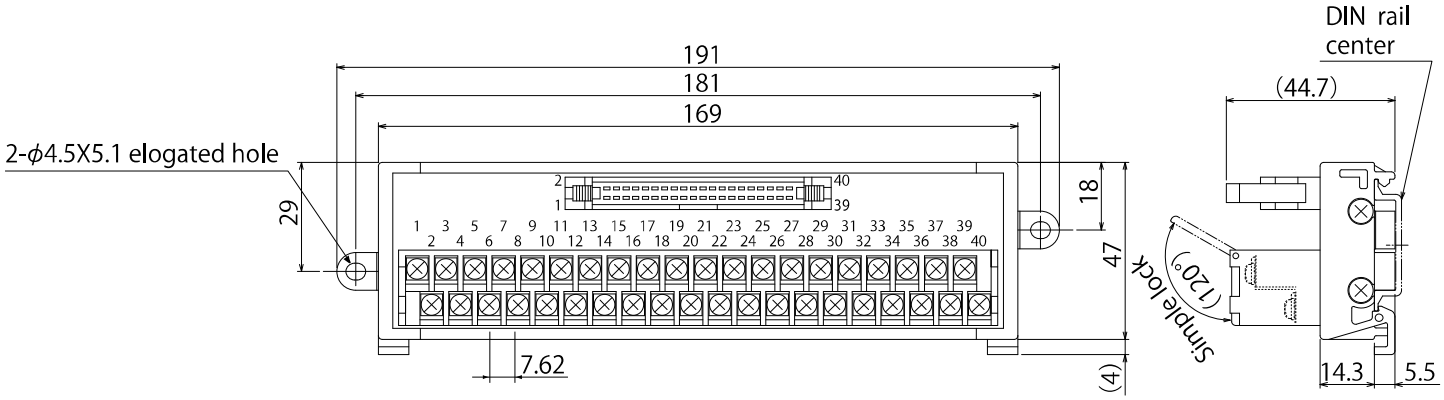
5-1. FA1-TBS40ADGN/ADDG/DAG

[Unit : mm]



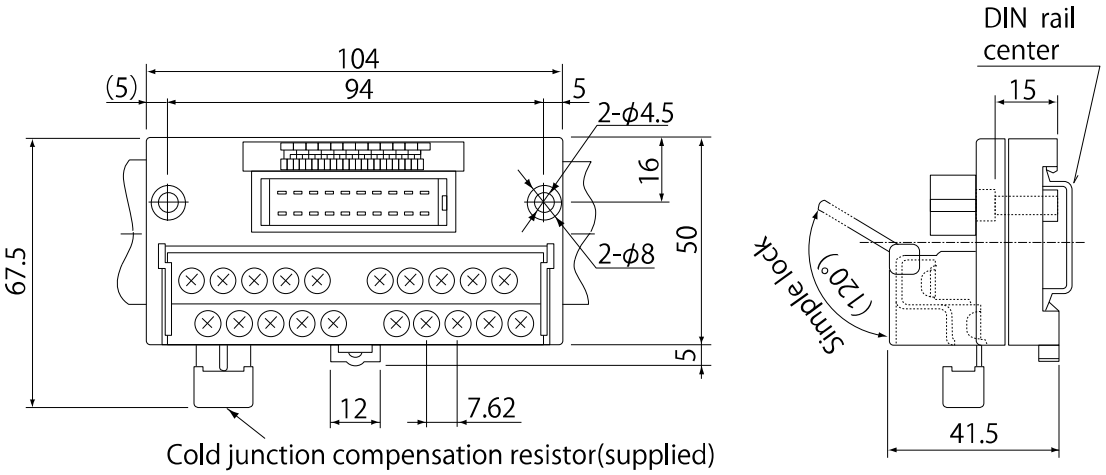
5-2. FA-LTB40ADGN/ADDG/DAG/TDG/RD3G, FA-LTB40D63P6V5/V12/V24

[Unit : mm]



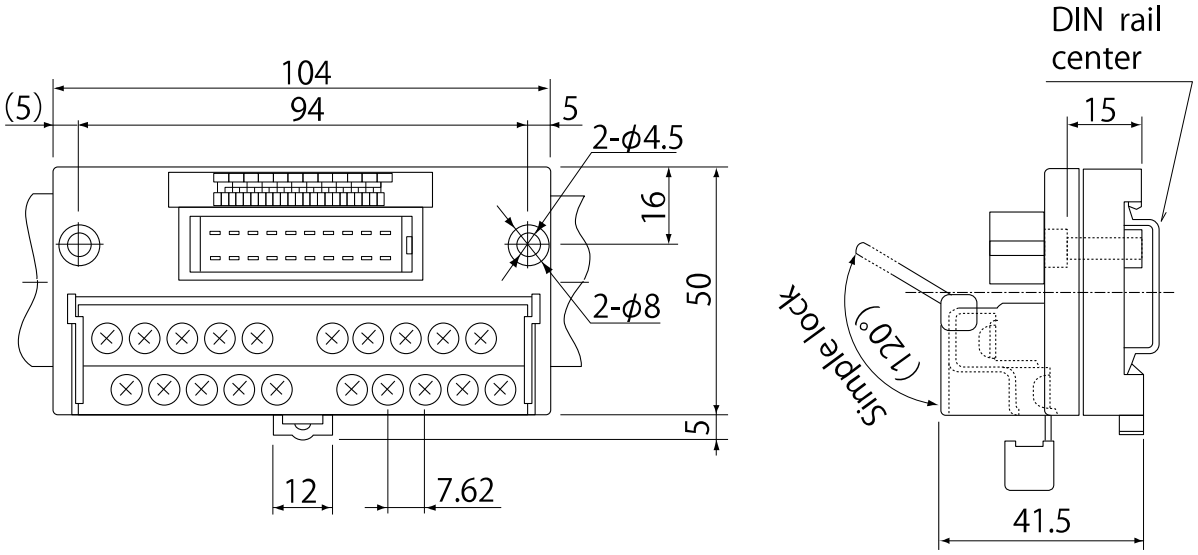
5-3. FA-TB20TD

[Unit : mm]



5-4. FA-TB20TC

[Unit : mm]

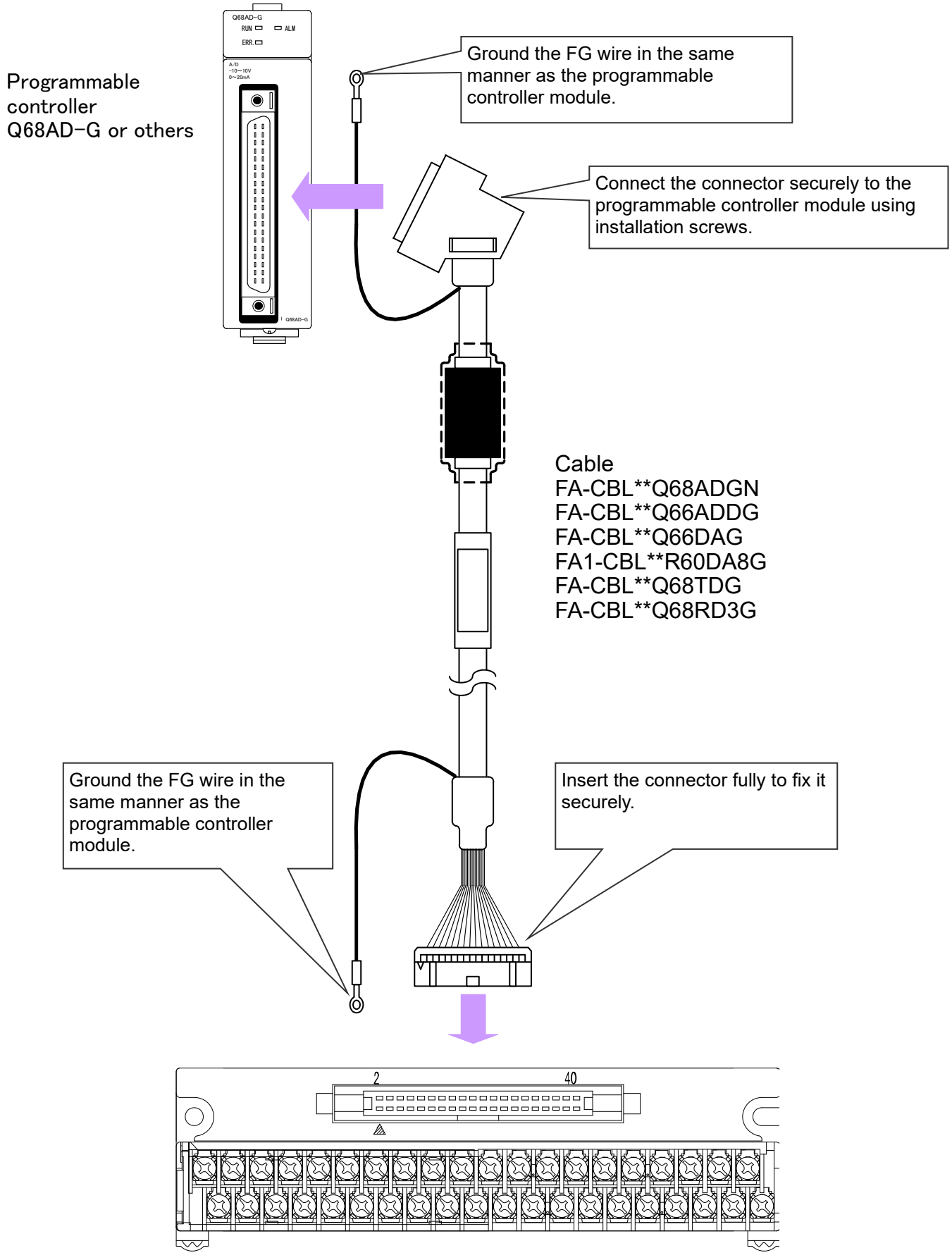


6. CONNECTING METHOD

6-1. Connection example with a connector module of a programmable controller

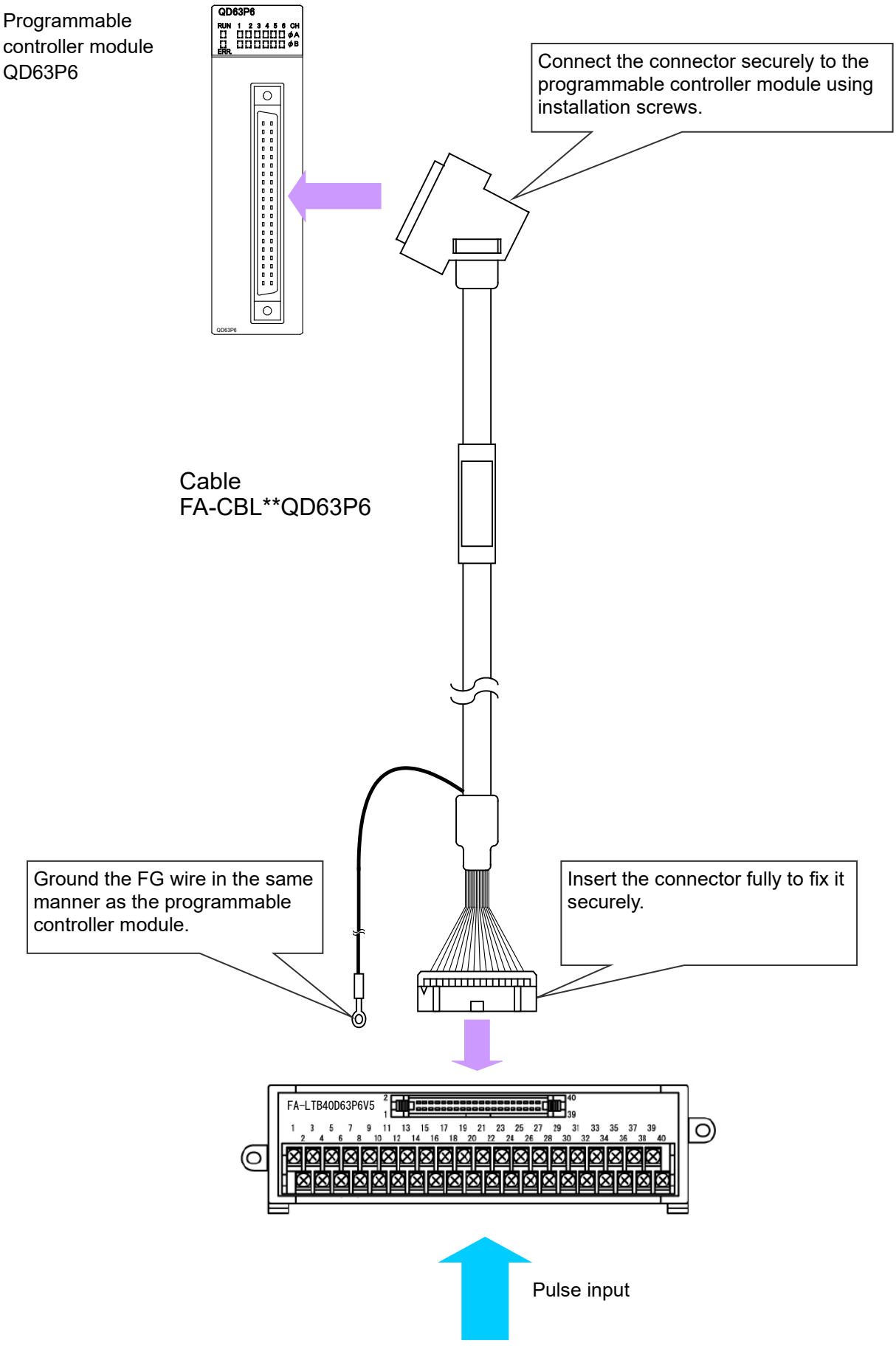
6-1-1. When a connector cable with FG wire on both ends is used

FA1-TBS40ADGN, FA1-TBS40DAG, FA1-TBS40ADDG, FA-LTB40ADGN, FA-LTB40ADDG, FA-LTB40DAG, FA-LTB40TDG, FA-LTB40RD3G



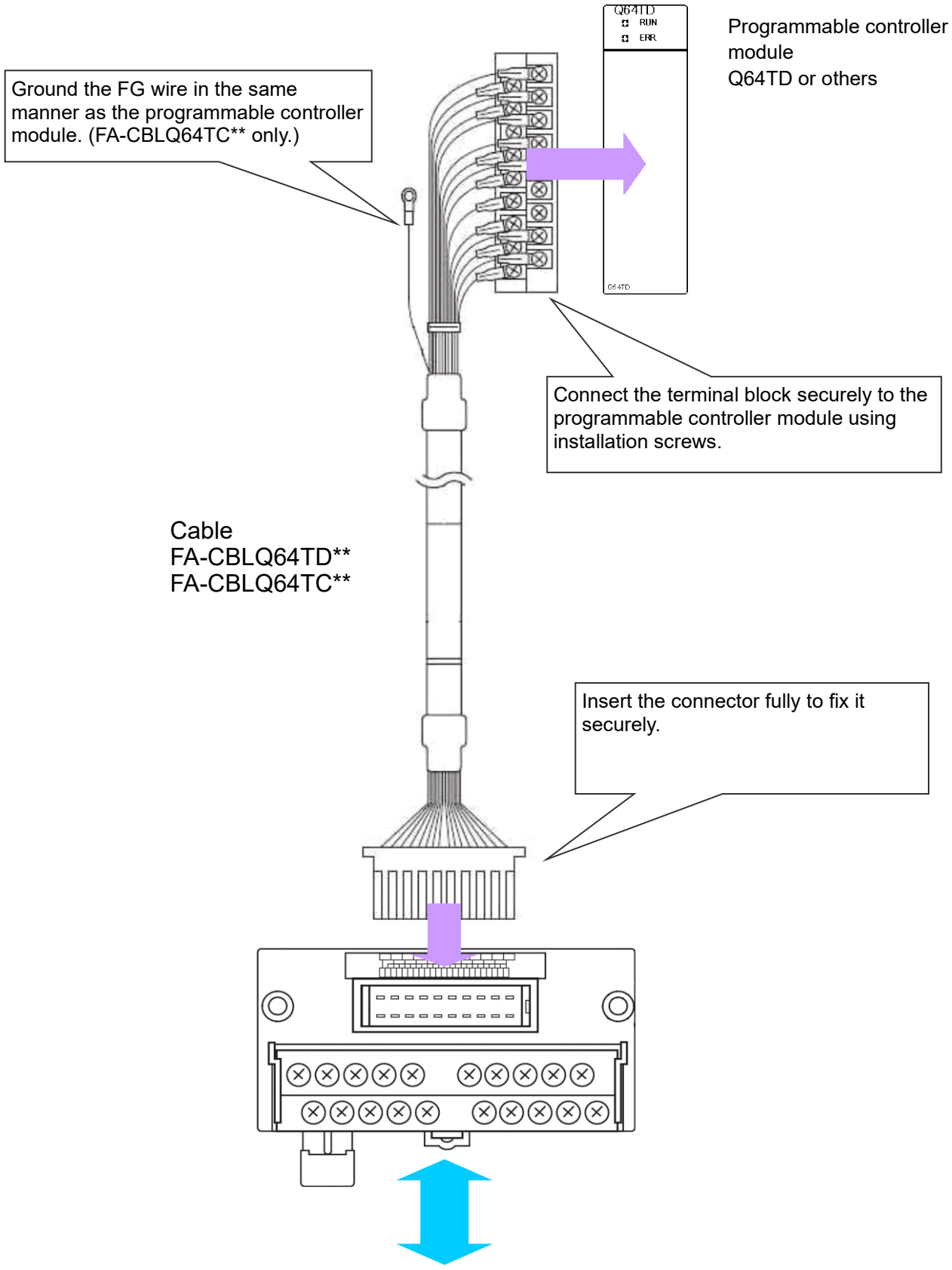
6-1-2. When a connector cable with FG wire on one end is used

FA-LTB40D63P6V5, FA-LTB40D63P6V12, FA-LTB40D63P6V24



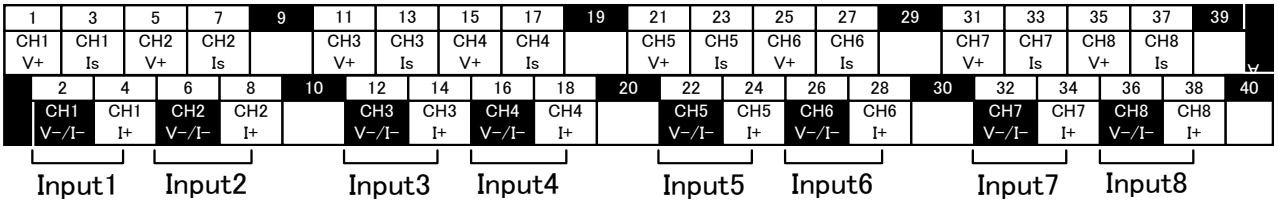
6-2. Connection example with a terminal block module of a programmable controller

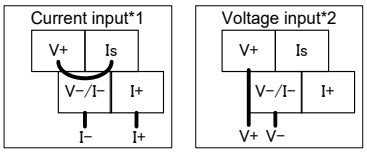
FA-TB20TD, FA-TB20TC



7. EXTERNAL CONNECTION EXAMPLE

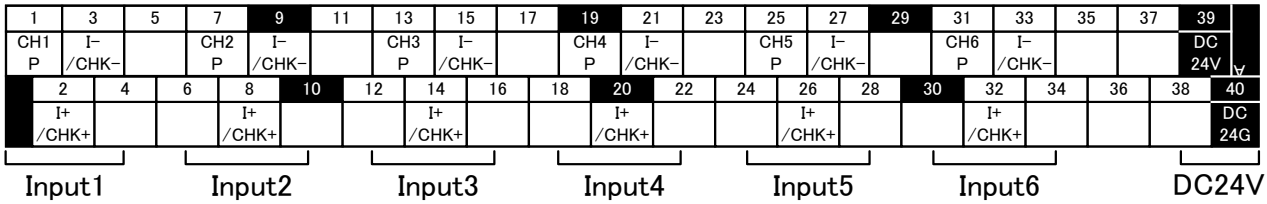
7-1. FA1-TBS40ADGN, FA-LTB40ADGN

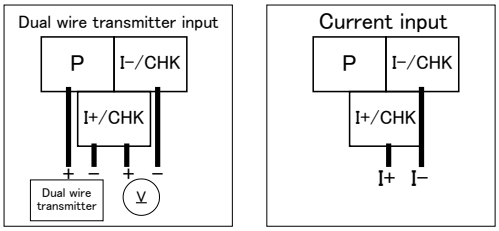




*1: For current input, connect the (V+) and (Is) terminals.
*2: For voltage input, set the (Is) and (I+) terminals as NC, and do not connect external wiring.

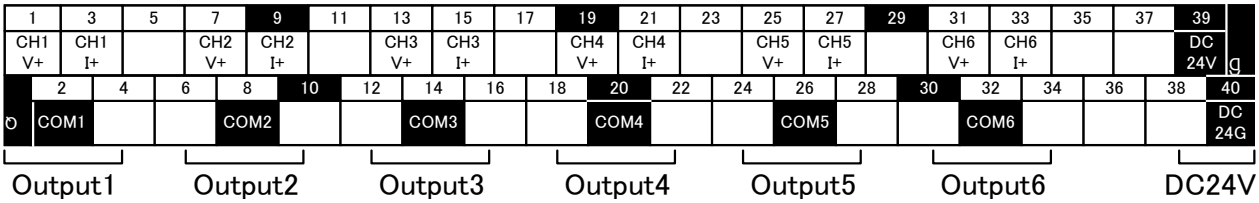
7-2. FA1-TBS40ADDG, FA-LTB40ADDG

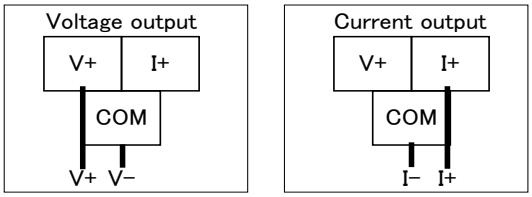




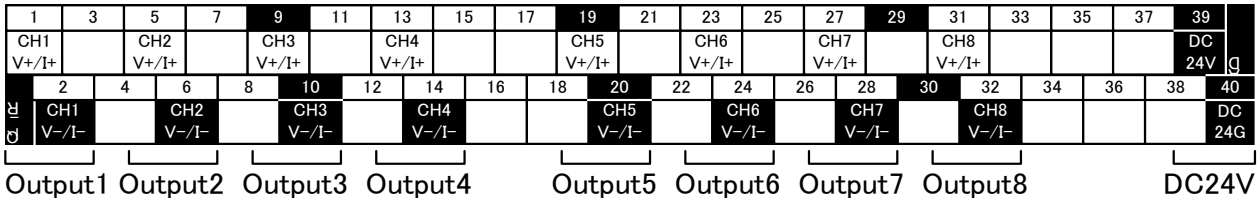
7-3. FA1-TBS40DAG, FA-LTB40DAG

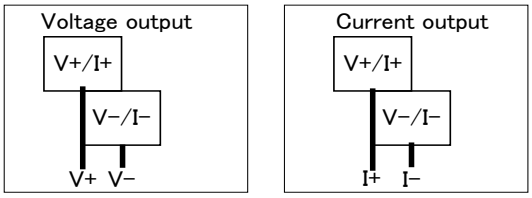
<With Q66DA-G connection>





<With R60DA8-G, R60DA16-G connection>*1





*1: When connecting the R60DA8-G or R60DA16-G, replace the marking strip of the conversion module with the provided marking strip.

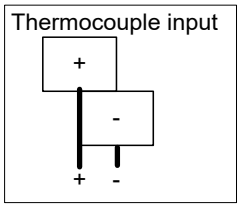
7-4. FA-LTB40TDG

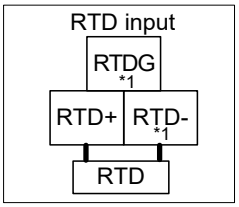
1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
CH1 +		CH2 +		CH3 +		CH4 +		CH5 +		CH6 +		CH7 +		CH8 +					RTD G

2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
CH1 -		CH2 -		CH3 -		CH4 -		CH5 -		CH6 -		CH7 -		CH8 -				RTD +	RTD -

Input1 Input2 Input3 Input4 Input5 Input6 Input7 Input8

RTD





· Install the module in a location having a constant ambient temperature.
· Connect a thermocouple or compensation lead wire directly to the terminal block.

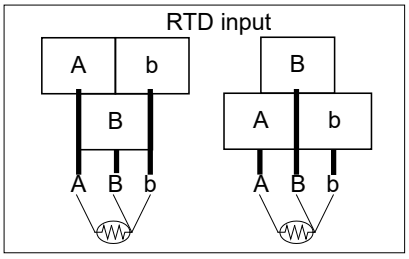
*1: For the cold junction compensation resistor (RTD), connect the Q68TD-G-H01/H02 accessory between the terminal numbers 38 and 40 as illustrated above. The terminal number 39 (RTD G) and terminal number 40 (RTD -) are connected inside the conversion module, and therefore do not require external wiring.

7-5. FA-LTB40RD3G

1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31	33	35	37	39
CH1 A1	CH1 b1		CH2 B2		CH3 A3	CH3 b3		CH4 B4		CH5 A5	CH5 b5		CH6 B6		CH7 A7	CH7 b7		CH8 B8	

2	4	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40
CH1 B1		CH2 A2	CH2 b2		CH3 B3		CH4 A4	CH4 b4		CH5 B5		CH6 A6	CH6 b6		CH7 B7		CH8 A8	CH8 b8	

Input1 Input2 Input3 Input4 Input5 Input6 Input7 Input8



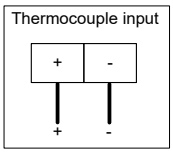
7-6. FA-TB20TD

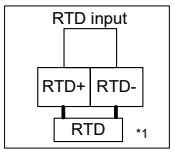
Input2 Input4

1	3	5	7	9	11	13	15	17	19
			SLD	CH2 +	CH2 -	CH4 +	CH4 -	SLD	

2	4	6	8	10	12	14	16	18	20
RTD +	RTD -	SLD	CH1 +	CH1 -	CH3 +	CH3 -	SLD		

RTD Input1 Input3

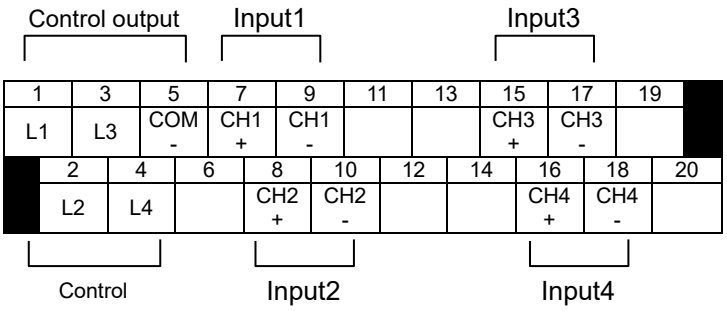


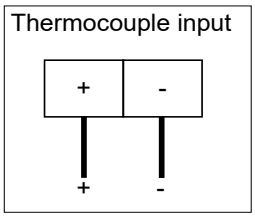


· Install the module in a location having a constant ambient temperature.
· Connect a thermocouple or compensation lead wire directly to the terminal block.
· Since the FA-CBLQ64TD** does not have a ground wire, grounding with the FA-TB20TD is not possible.
For the Q64TD, ground the terminal number 18 on the terminal block (programmable controller side) of the FA-CBLQ64TD**.

*1: The cold junction compensation resistor (RTD) is supplied with the FA-TB20TD.

7-7. FA-TB20TC

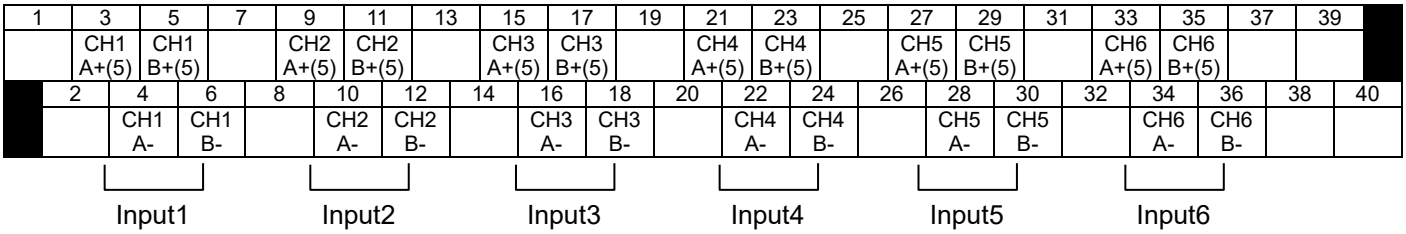




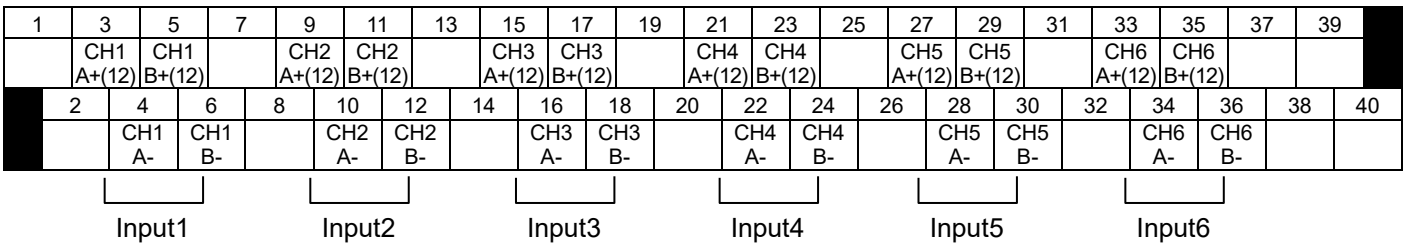
- Install the module in a location having a constant ambient temperature.
- Connect a thermocouple or compensation lead wire directly to the terminal block.
- The cold junction compensation resistor (RTD) is built into the FA-TB20TC.

7-8. FA-LTB40D63P6V5/V12/V24

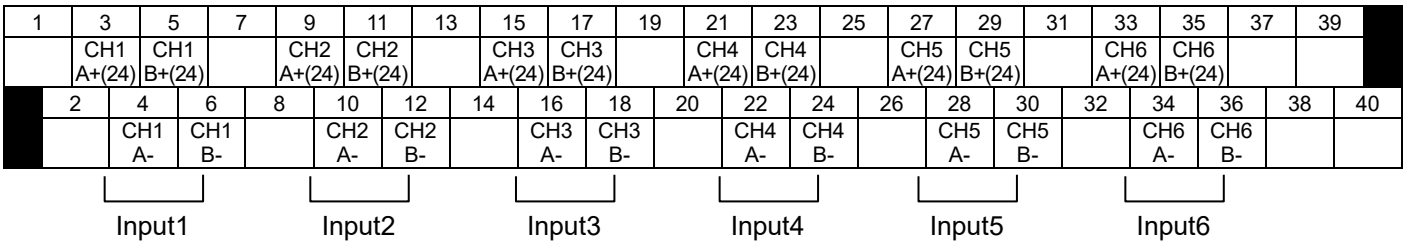
<FA-LTB40D63P6V5 (For 5V signal)>

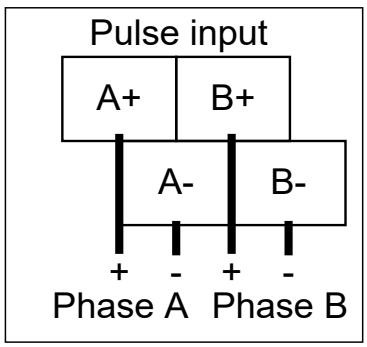


<FA-LTB40D63P6V12 (For 12V signal)>



<FA-LTB40D63P6V24 (For 24V signal)>





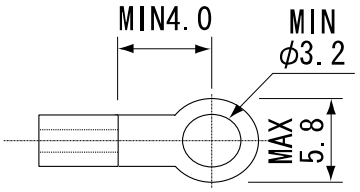
8. APPLICABLE SOLDERLESS TERMINALS

8-1. FA1-TBS40ADGN, FA1-TBS40ADDG, FA1-TBS40DAG

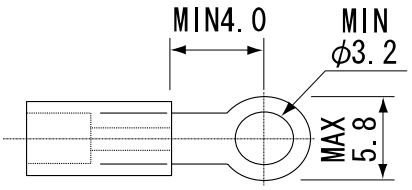
Type		Round		Y-shaped	
Manufacture	Applicable wire size	Non-insulated solderless terminal	Insulated solderless terminal	Non-insulated solderless terminal	Insulated solderless terminal
Nichifu Co., Ltd. NTM	0.3 to 1.25mm^2	R1.25-3N R1.25-3.5N	TMEV1.25-3 TMEV1.25-3N TMEV1.25-3.5N TG $^{V}_{N}$1.25-3N TG $^{V}_{N}$1.25-3.5N	1.25Y-3 1.25Y-3N 1.25Y-3.5	TMEV1.25Y-3 TMEV1.25Y-3K TMEV1.25Y-3.5 TMEV1.25Y-3.5K TG $^{V}_{N}$1.25Y-3 TG $^{V}_{N}$1.25Y-3N TG $^{V}_{N}$1.25Y-3.5
Japan Solderless Terminal Mfg. Co., Ltd. JST	0.3 to 1.25mm^2	1.25-MS3	V1.25-MS3	1.25-B3A 1.25-C3A 1.25-C3.5A	V1.25-B3A
Nippon Tanshi Co.,Ltd. NTK	0.3 to 1.25mm^2	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

● Solderless terminal dimensions [Unit : mm]

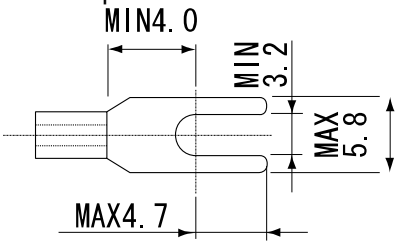
Round non-insulated solderless terminal



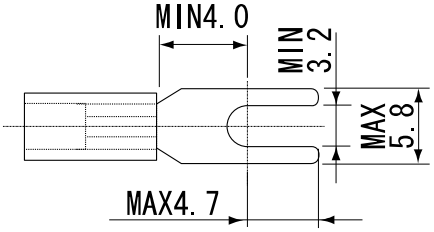
Round insulated solderless terminal



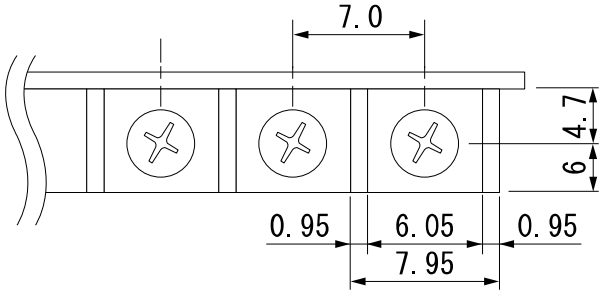
Y-shaped non-insulated solderless terminal



Y-shaped insulated solderless terminal



● Terminal block shape [Unit : mm]

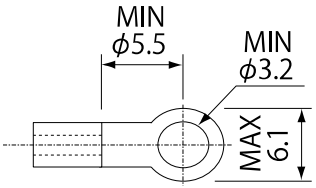


8-2. FA-LTB40ADGN/ADDG/DAG/TDG/RD3G, FA-LTB40D63P6V5/V12/V24

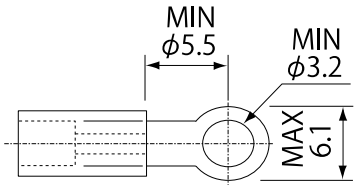
Type		Round		Y-shaped	
Manufacture	Applicable wire size	Non-insulated solderless terminal	Insulated solderless terminal	Non-insulated solderless terminal	Insulated solderless terminal
Nichifu Co., Ltd. NTM	0.3 to 1.25mm^2	R1.25-3N R1.25-3.5N	TG$^{V}_{N}$1.25-3N TG$^{V}_{N}$1.25-3.5N	1.25Y-3 1.25Y-3N 1.25Y-3.5	TG$^{V}_{N}$1.25Y-3 TG$^{V}_{N}$1.25Y-3N TG$^{V}_{N}$1.25Y-3.5
	1.25 to 2.0mm^2	R2-3N	TG$^{V}_{N}$2-3N	2Y-3 2Y-3.5S	TG$^{V}_{N}$2Y-3 TG$^{V}_{N}$2Y-3.5S
Japan Solderless Terminal Mfg. Co., Ltd. JST	0.3 to 1.25mm^2	1.25-MS3	V1.25-MS3	1.25-B3A 1.25-C3A 1.25-C3.5A	V1.25-B3A
	1.25 to 2.0mm^2	2-MS3	V2-MS3	2-N3A	V2-N3A
Nippon Tanshi Co.,Ltd. NTK	0.3 to 1.25mm^2	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^2	R2-3SL	RAV2-3SL RAP2-3SL	VD2-3S VD2-3.5SS	VDAV2-3.5SS

● Solderless terminal dimensions [Unit : mm]

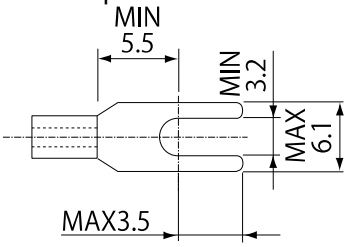
Round non-insulated solderless terminal



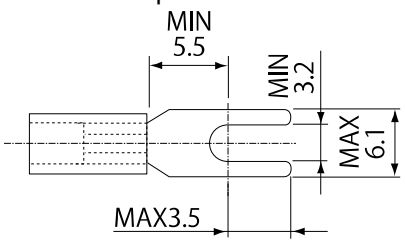
Round insulated solderless terminal



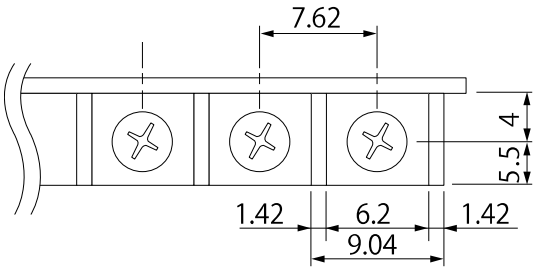
Y-shaped non-insulated solderless terminal



Y-shaped insulated solderless terminal



● Terminal block shape [Unit : mm]

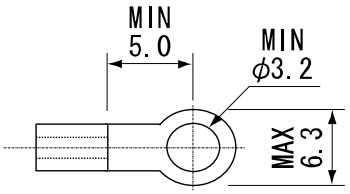


8-3. FA-TB20TD, FA-TB20TC

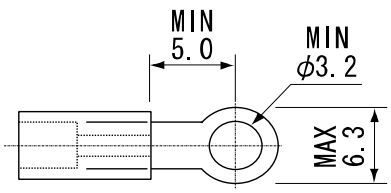
Type		Round		Y-shaped	
Manufacture	Applicable wire size	Non-insulated solderless terminal	Insulated solderless terminal	Non-insulated solderless terminal	Insulated solderless terminal
Nichifu Co., Ltd. NTM	0.3 to 1.25mm^2	R1.25-3N R1.25-3.5N	TG$^{V}_{N}$1.25-3N TG$^{V}_{N}$1.25-3.5N	1.25Y-3 1.25Y-3N 1.25Y-3L 1.25Y-3.5	TG$^{V}_{N}$1.25Y-3 TG$^{V}_{N}$1.25Y-3N TG$^{V}_{N}$1.25Y-3L TG$^{V}_{N}$1.25Y-3.5
	1.25 to 2.0mm^2	R2-3N	TG$^{V}_{N}$2-3N	2Y-3 2Y-3.5S	TG$^{V}_{N}$2Y-3 TG$^{V}_{N}$2Y-3.5S
Japan Solderless Terminal Mfg. Co., Ltd. JST	0.3 to 1.25mm^2	1.25-MS3	V1.25-MS3	1.25-B3A 1.25-C3A 1.25-N3A 1.25-C3.5A	V1.25-B3A V1.25-N3A
	1.25 to 2.0mm^2	2-MS3	V2-MS3	2-N3A 2-M3A	V2-N3A
Nippon Tanshi Co.,Ltd. NTK	0.3 to 1.25mm^2	R1.25-3ML R1.25-3.5SL	RAV1.25-3ML RAP1.25-3ML	VD1.25-3L VD1.25-3.5SS VD1.25-3.5S	VDAV1.25-3L VDAV1.25-3.5SS VDAV1.25-3.5S
	1.25 to 2.0mm^2	R2-3SL	RAV2-3SL RAP2-3SL	VD2-3S VD2-3.5SS VD2-3.5S	VDAV2-3.5SS VDAV2-3.5S

● Solderless terminal dimensions [Unit : mm]

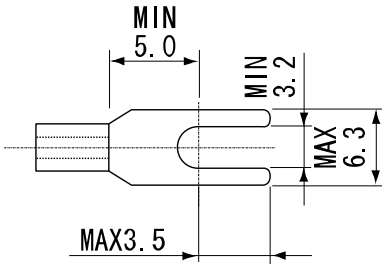
Round non-insulated solderless terminal



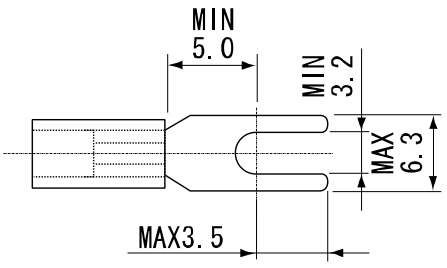
Round insulated solderless terminal



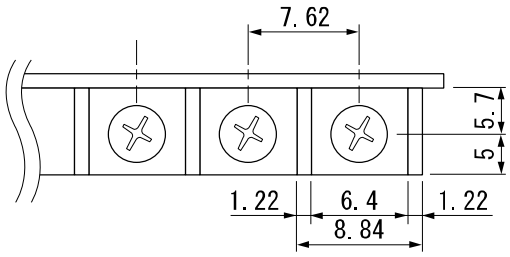
Y-shaped non-insulated solderless terminal



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 Corporation.
(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.

MITSUBISHI ELECTRIC ENGINEERING COMPANY LIMITED

1-13-5 Kudankita, Chiyoda-ku, Tokyo, Japan 102-8404

Specifications subject to change without notice.

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