

# MITSUBISHI ELECTRIC ENGINEERING

## Analog Signal Converters for Input Signals

MODEL

<b>FA1-AT1B8X1TE</b>	<b>FA-ATSVM1X*****</b>
<b>FA-ATB8XTB</b>	<b>FA1-AT1****</b>
<b>FA1-AT1B4X1TE</b>	<b>FA-ATFTMXY</b>
<b>FA1-AT1B4X1TB</b>	<b>FA-Q6TCA</b>
<b>FA-ATKB8XTB</b>	
<b>FA-ATKAA8XM</b>	

## User's Manual

(Detailed Edition)

Time and Wire Saving Devices



## SAFETY PRECAUTIONS

(Read these precautions before using the 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 time and wire saving device only.

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

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

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 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 used for digital signal converter outputs. Configure an external circuit for monitoring output signals that could cause a serious accident.
- In an output circuit for digital signal converter outputs, 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 using a module for digital signal converter outputs, a large current (approximately 10 times greater than normal) may flow when the output is turned from off to on. Therefore, select a module for digital signal converter outputs 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 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 modules for replacing digital signal converters or signal converters modules, use them correct combination. Incorrect combination may cause failure.
- Shut off the power supply before installing/removing a module for replacing digital signal converters. Failure to do so may cause failure or malfunction.
- Securely mount a module for replacing digital signal converters and signal conversion module on a digital signal converter and 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 a module for digital signal converters or signal conversion module is mounted on a digital signal converter or installation base, hold the digital signal converter or installation base to transport them or install them to a panel. Holding the module for digital signal converters or signal conversion module may cause drop or failure of the digital signal converter 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.
- Use copper conductors only a temperature rating of 75°C or more.

## [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. Under tightening 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. Under tightening 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 modules for replacing digital signal converters or signal conversion modules, use them in the correct combination. Incorrect combination may cause failure of a programmable controller, digital signal converter, installation base, or external device.
- Securely mount modules for replacing digital signal converters and signal conversion modules on a digital signal converter and 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 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.
- The ESD susceptibility symbol shown below is placed on the products. This symbol products is susceptible static electricity passed. Before handling the connector, touch a conducting object such as a grounded metal to release the static electricity from your body. Failure to do so may cause the products to fail or malfunction. Do not touch the connector when the products is powered. Doing so may result in injury or cause the products to malfunction due to the static electricity in your body.



## [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.

In some other countries and regions, manufacturers are required to make their products compliant with applicable laws or regulations and attach a certification mark on the products as well (such as UK Conformity Assessed (UKCA) marking in the UK, and Korea Certification (KC) marking in South Korea).

### (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 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
January, 2013	50D-FA9010-122	First edition
March, 2013	50D-FA9010-122-A	<u>Added or modified parts</u> 3. PERFORMANCE SPECIFICATIONS, 5. INSTALLATION ORIENTATION
March, 2014	50D-FA9010-122-B	<u>Added or modified parts</u> Product addition: FA-ATKATB8XTB, FA-ATKAA8XM, FA-ATSVM1XTK0040/60/80, FA-ATSVM1XRPT0010/20, SAFETY PRECAUTIONS, EMC and Low Voltage Directives, Table of contents, 2. GENERAL SPECIFICATIONS, 3. PERFORMANCE SPECIFICATIONS, 10. PRECAUTIONS, 11. GRATIS WARRANTY TERMS AND GRATIS WARRANTY RANGE, 12. REPAIR PERIOD AFTER DISCONTINUATION OF PRODUCTION (FEE APPLIED), 13. EXCLUSION OF OPPORTUNITY LOSS AND SECONDARY LOSS FROM WARRANTY LIABILITY
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# CONTENTS

<b>CONTENTS</b>	8
<b>1. INTRODUCTION</b>	9
<b>2. GENERAL SPECIFICATIONS</b>	9
<b>3. PERFORMANCE SPECIFICATIONS</b>	10
3-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)	10
3-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)	11
3-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)	12
3-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)	13
3-5. Input type installation base with connector for adapter (FA-ATKB8XTB)	14
3-6. Conversion adapter current connection (two outputs) (FA-ATKAA8XM)	15
3-7. Voltage input signal conversion module (FA-ATSVM1XV****)	16
3-8. Current input signal conversion module (FA-ATSVM1XA420)	17
3-9. Distributor signal conversion module (2-wire transmitter) (FA-ATSVM1XD)	18
3-10. Thermocouple temperature input signal conversion module (FA-ATSVM1XT*)	19
3-11. RTD input signal conversion module (FA-ATSVM1XR***)	21
3-12. Pass-through module (FA-ATFTMX)	22
3-13. Terminal block ↔ connector conversion adapter (FA-Q6TCA)	22
<b>4. CONNECTABLE MODULES AND CABLES</b>	23
<b>5. EXTERNAL DIMENSIONS</b>	25
5-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)	25
5-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)	25
5-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)	26
5-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)	26
5-5. Input type installation base with connector for adapter (FA-ATKB8XTB)	27
5-6. Signal conversion module (FA-ATSVM1X****), pass-through module (FA-ATFTMX)	28
5-7. Terminal block ↔ connector conversion adapter (FA-Q6TCA)	28
<b>6. INSTALLATION ORIENTATION</b>	29
6-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)	29
6-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)	29
6-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)	30
6-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)	30
6-5. Input type installation base with connector for adapter (FA-ATKB8XTB)	31
<b>7. CONNECTING METHOD</b>	33
7-1. Connection example with a terminal block module of a programmable controller	33
7-1-1. When a cable with a terminal block is used	33
7-1-2. When a terminal block to connector conversion adapter is used	34
7-1-3. When a discrete cable is used	35
7-2. Connection example when an additional 4-channel base is used	36
7-3. Mounting/removing a signal conversion module	37
7-4. Mounting/removing a conversion adapter (FA-ATKB8XTB)	37
7-5. Wiring to a spring clamp terminal block	38
<b>8. EXTERNAL CONNECTION</b>	41
<b>9. APPLICABLE SOLDERLESS TERMINALS</b>	43
<b>10. PERCAUTIONS</b>	45
<b>11. GRATIS WARRANTY TERMS AND GRATIS WARRANTY RANGE</b>	45
<b>12. REPAIRABLE PERIOD AFTER DISCONTINUATION OF PRODUCTION</b>	45
<b>13. EXCLUSION FROM LIABILITY FOR OPPORTUNITY LOSS AND SECONDARY LOSS</b>	45
<b>14. TRADEMARKS</b>	45



## 1. INTRODUCTION

This manual describes the specifications and handling of the analog signal converter, which consists of the installation base (FA1-AT1B8X1TE, FA-ATB8XTB, FA1-AT1B4X1TE, FA1-AT1B4X1TB, FA-ATKB8XTB), the conversion adapter (FA-ATKAA8XM), the signal conversion module (FA-ATSVM1X\*\*\*\*\*) and/or the I/O signal pass-through module (FA-ATFTMX), and the terminal block ↔ connector conversion adapter for MELSEC-Q series terminal block module (FA-Q6TCA).

The analog signal converter includes the conversion adapter and the signal conversion module mounted to the installation base. The analog signal converter insulates analog input signals from a sensor or other devices between input and output terminals, and among the channels, converts them to the predefined signals, and outputs the converted signals.

## 2. GENERAL SPECIFICATIONS

Item			Specifications
Operating surrounding air 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	Compliance with standard		JIS B 3502, IEC 61131-2
	Under intermittent vibration	5 to 8.4Hz	Half amplitude: 3.5mm
		8.4 to 150Hz	Constant acceleration: 9.8m/s <sup>2</sup> (1G)
		Sweep count	10 times each in X, Y, and Z directions
	Under continuous vibration	5 to 8.4Hz	Half amplitude: 1.75mm
		8.4 to 150Hz	Constant acceleration: 4.9m/s <sup>2</sup> (0.5G)
		Sweep count	—
Shock resistance			Compliant with JIS B 3502 and IEC61131-2 (147m/s <sup>2</sup> (15G), 3 times each in X, Y, and Z directions)
Operating atmosphere			No corrosive gas
Operating altitude *1			2,000m or lower
Installation location			Inside the control panel *4, Indoor use
Overvoltage category *2			II or lower
Pollution level *3			2 or lower

\*1 : Do not use or store the module under the atmospheric pressure greater than that at an altitude of 0m.

\*2 : Indicates the section of the power supply to which the equipment is assumed to be connected, between the public power grid and the machinery within the premises.

\*3 : This is a guideline indicating the degree of the generation of conducting substances in the environment in which a device is used.

\*4 : The enclosure is suitably designed for those specific environmental conditions, as applicable, and enclosure rate meets IP20 and minimum type 1 of UL 50.

### 3. PERFORMANCE SPECIFICATIONS

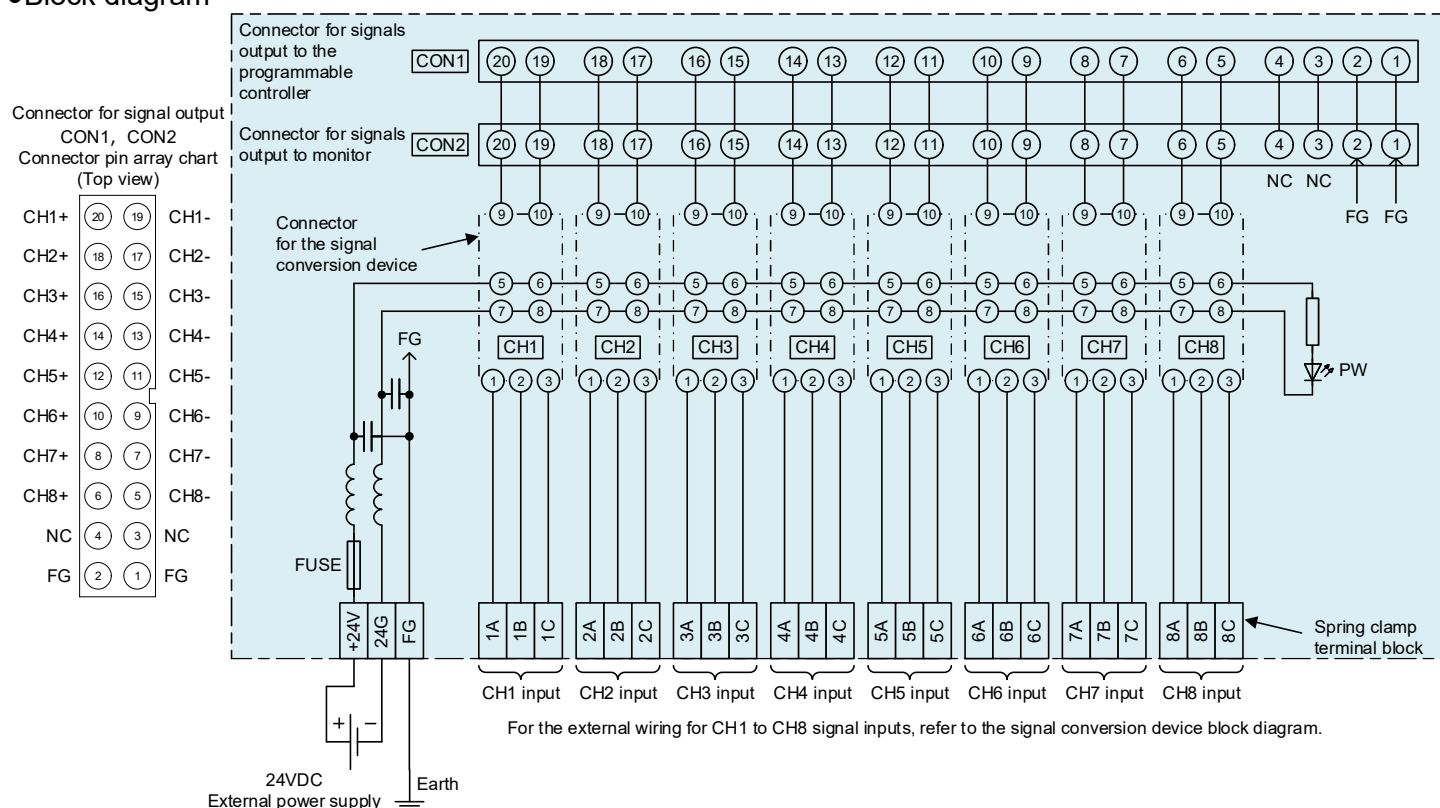
#### 3-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)

Model		FA1-AT1B8X1TE
Item		
Number of slots		8
Terminal block	Terminal block screw	M3 screw, 7.62mm pitch, spring-up screw with finger protector 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 <sup>2</sup> (when solderless terminals are used)
Installation method	Screw	M4 × 0.7mm × 27mm 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)
External power supply		24VDC±10%
Current consumption (24VDC)		12mA or less (not including current consumption of the signal conversion module)
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between input/output/power supply
Weight		Approx. 250g

\*1: Mount a dummy module (FA-ATNDM) onto an unused slot.

\*2: When connecting a cable to the installation base, push the cable connector until it is locked. Failure to do so may cause poor contact.

#### ●Block diagram



#### Notes:

- For a device connected to a monitor output, use a device with sufficiently large input resistance. (1MΩ or more is recommended.)
- The monitor output signal voltage differs depending on the output signal of the mounted module.
- Use shielded cables for external wirings.
- Use an input signal conversion device. Using an output signal conversion device incorrectly may damage the product.

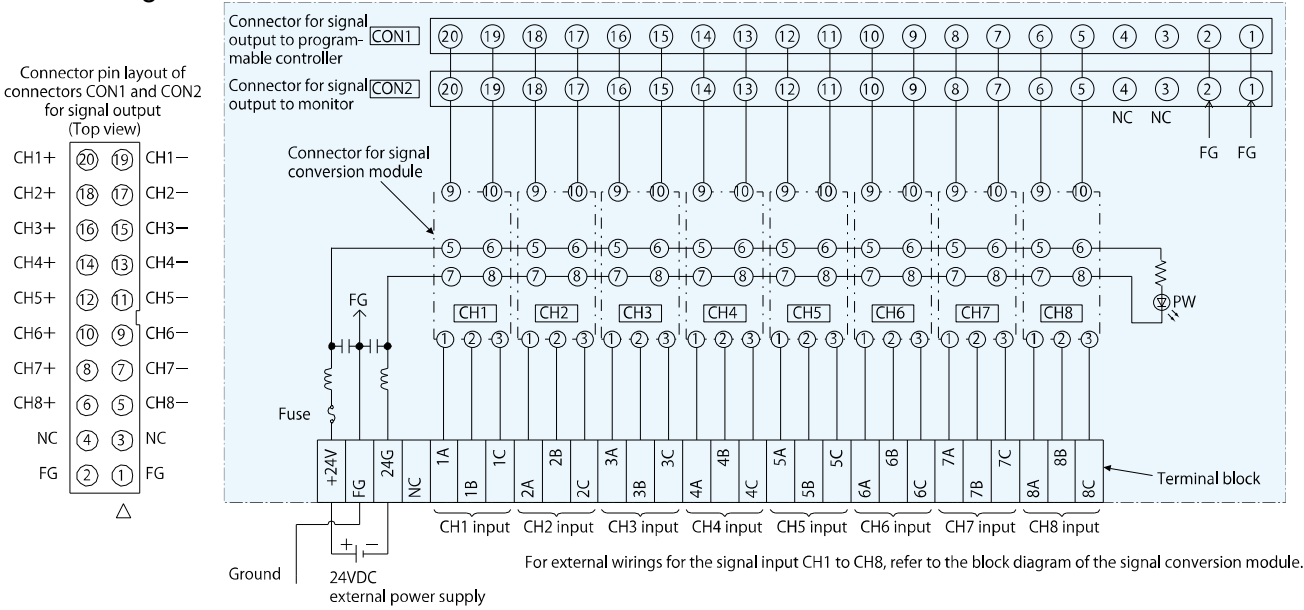
3-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)

Model		FA-ATB8XTB
Item		
Number of slots		8
Terminal block	Terminal block screw	M3 screw, 7.62mm pitch, spring-up screw with finger protector 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 <sup>2</sup> (when solderless terminals are used)
Installation method	Screw	M4 × 0.7mm × 20mm 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)
External power supply		24VDC±10%
Current consumption (24VDC)		6mA or less (not including current consumption of the signal conversion module)
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between input/output/power supply
Weight		Approx. 320g

\*1: Mount a dummy module (FA-ATNDM) onto an unused slot.

\*2: When connecting a cable to the installation base, push the cable connector until it is locked. Failure to do so may cause poor contact.

●Block diagram



Notes:

- For a device connected to a monitor output, use a device with sufficiently large input resistance. (1MΩ or more is recommended.)
- The monitor output signal voltage differs depending on the output signal of the mounted module.
- Use shielded cables for external wirings.
- Use an input signal conversion device. Using an output signal conversion device incorrectly may damage the product.

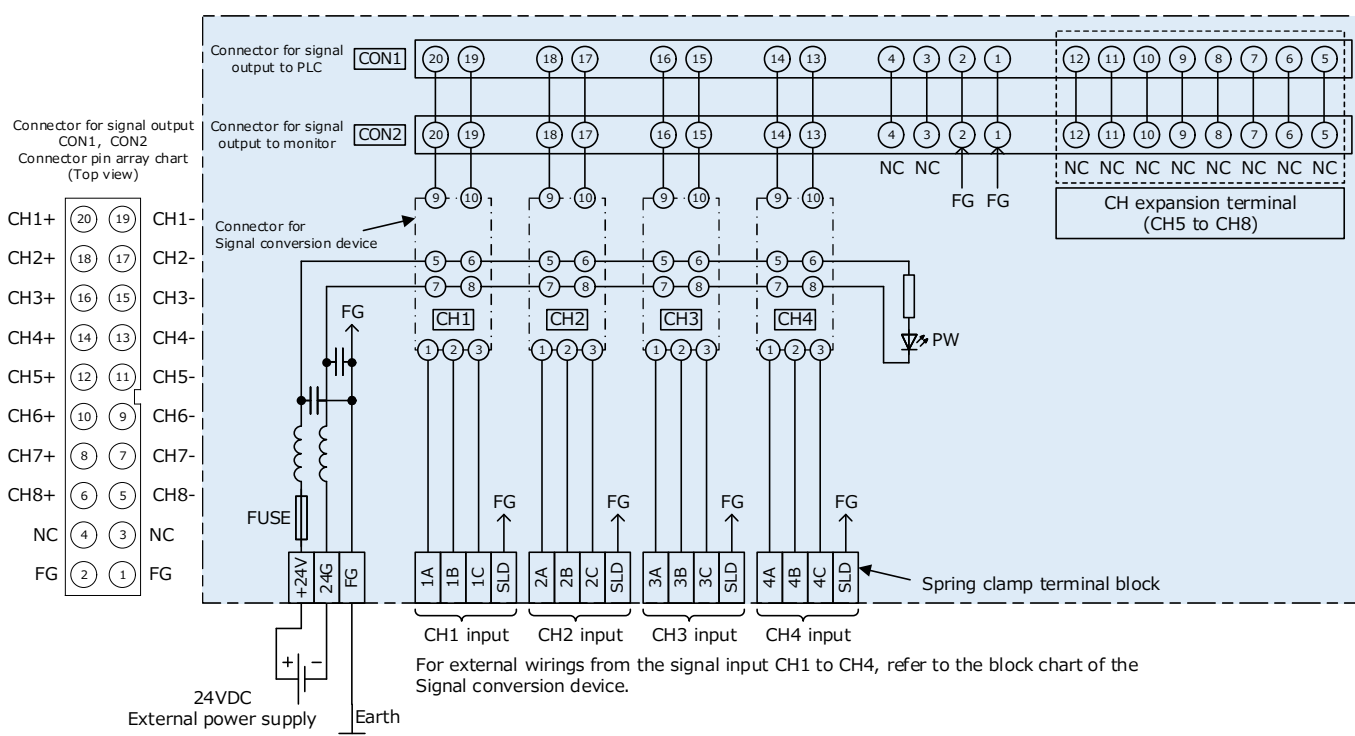
### 3-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)

Model name			FA1-AT1B4X1TE
Number of slots			4
Terminal block	Applicable wire	When a ferrule is not used (stranded wire or solid wire)	0.2 to 1.5mm <sup>2</sup> (24 to 16 AWG), Copper wire with a temperature rating of 75°C or more
		When a ferrule is used (stranded wire)	0.25 to 1.5mm <sup>2</sup> (24 to 16 AWG), Copper wire with a temperature rating of 75°C or more
	Wire strip length		10mm
Module mounting	Mounting screws		M4 × 0.7mm × 20mm or greater Tightening torque range: 78 to 118N·cm (8 to 12kgf·cm)
	DIN rail		Applicable DIN rail : TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
External supply power			24VDC±10% (ripple ratio: within 5%, SELV and LIM or CLASS 2)
Current consumption (24VDC)			6mA or less (not including current consumption by the conversion device, the Signal through device, the programmable controller, and the monitor equipment)
Withstand voltage/insulation resistance			Between input/output/power supply: 500VAC for 1 minute, 10MΩ or more
Weight			About 160g

\*1: Mount a dummy module (FA-ATNDM) onto an unused slot.

\*2: When connecting a cable to the installation base, push the cable connector until it is locked. Failure to do so may cause poor contact.

- Block diagram



Notes:

- For a device connected to a monitor output, use a device with sufficiently large input resistance. (1MΩ or more is recommended.)
- The monitor output signal voltage differs depending on the output signal of the mounted module.
- Use shielded cables for external wirings.
- Use an input signal conversion device. Using an output signal conversion device incorrectly may damage the product.

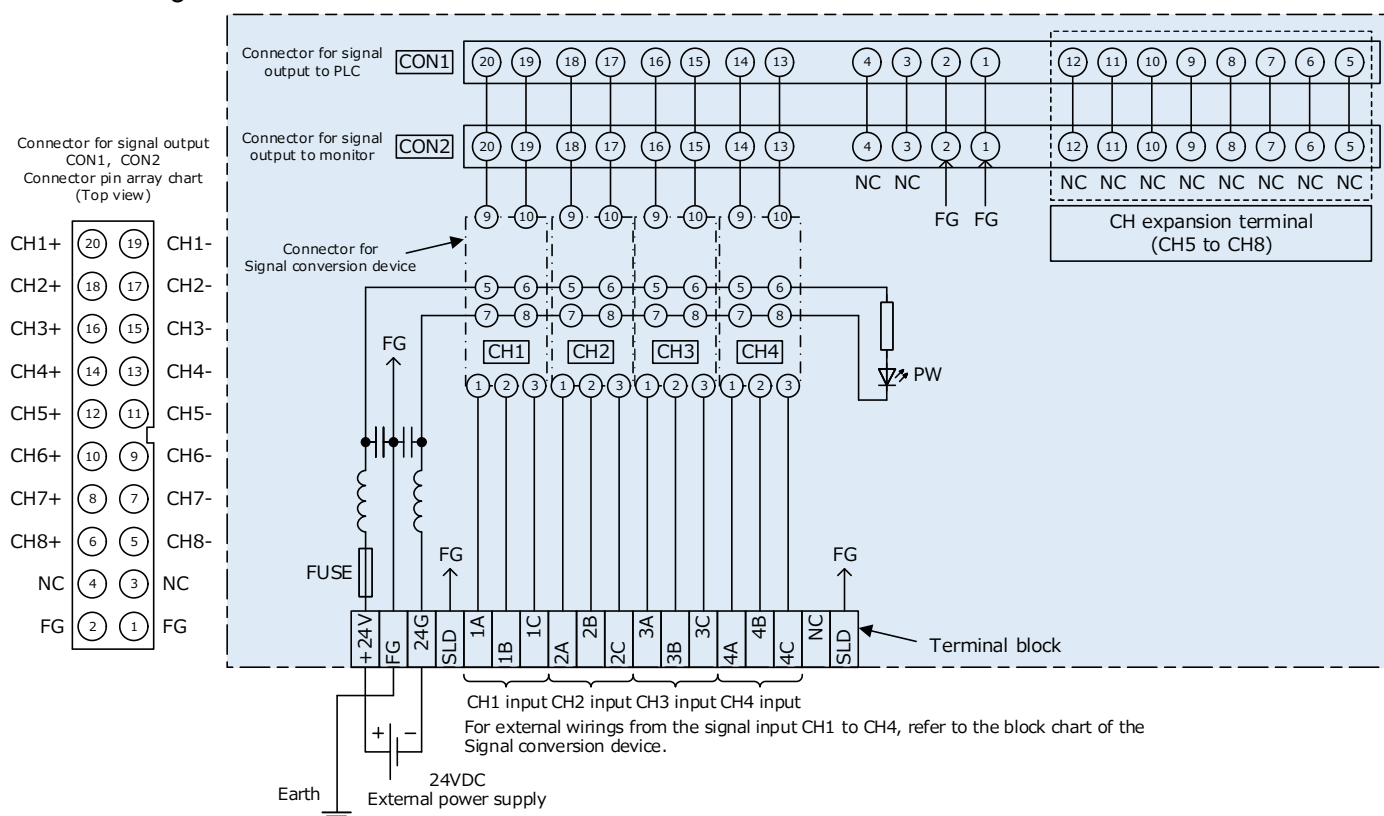
### 3-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)

Model name		FA1-AT1B4X1TB
Item		
Number of slots		4
Terminal block	Terminal screw	M3 screw, Pitch of 7.62mm, Self tightening screw with finger protector cover
	Applicable wire	0.3 to 2.0mm <sup>2</sup> (22 to 14 AWG), Copper wire with a temperature rating of 75°C or more
	Tightening torque	58.8 to 88.2N·m (6 to 9kgf·cm, 5.22 to 7.5lbf·in., UL standard conformity tightening torque : 59N·m , 5.22 lbf·in.)
Module mounting	Mounting screws	M4 × 0.7mm × 22mm or greater
	DIN rail	Tightening torque range: 78 to 118N·m (8 to 12kgf·cm) Applicable DIN rail : TH35-7.5Fe, TH35-7.5Al (compliant with IEC 60715)
External supply power		24VDC±10% (ripple ratio: within 5%, SELV and LIM or CLASS 2)
Current consumption (24VDC)		6mA or less (not including current consumption by the conversion device, the Signal through device, the programmable controller, and the monitor equipment)
Withstand voltage/insulation resistance		Between input/output/power supply: 500VAC for 1 minute, 10MΩ or more
Weight		About 220g

\*1: Mount a dummy module (FA-ATNDM) onto an unused slot.

\*2: When connecting a cable to the installation base, push the cable connector until it is locked. Failure to do so may cause poor contact.

#### ●Block diagram



#### Notes:

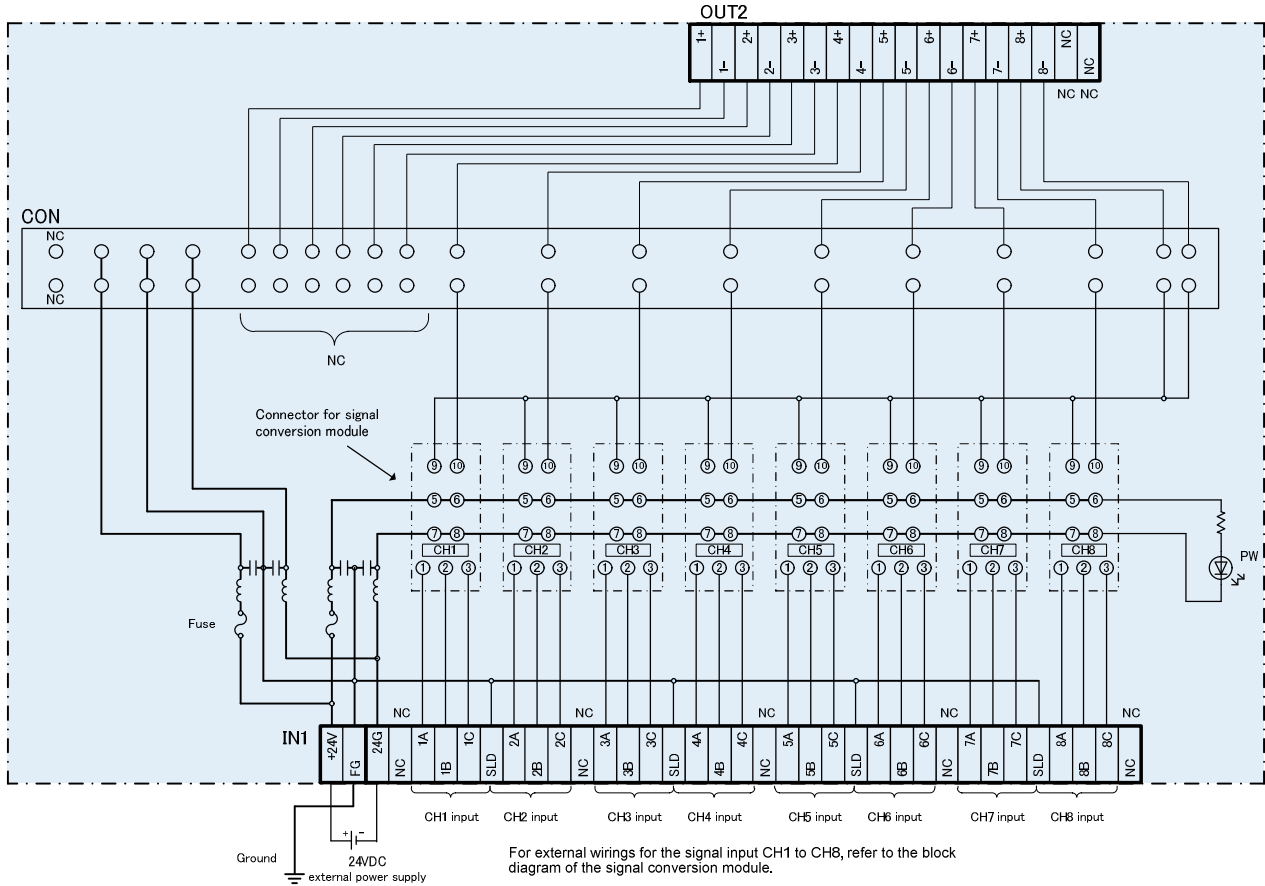
- For a device connected to a monitor output, use a device with sufficiently large input resistance. (1MΩ or more is recommended.)
- The monitor output signal voltage differs depending on the output signal of the mounted module.
- Use shielded cables for external wirings.
- Use an input signal conversion device. Using an output signal conversion device incorrectly may damage the product.

3-5. Input type installation base with connector for adapter (FA-ATKB8XTB)

Model		FA-ATKB8XTB
Number of slots		8
Terminal block (IN1, OUT2)	Terminal screw	M3 screw, 7.62mm pitch, spring-up screw with finger protector 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 <sup>2</sup> (when solderless terminals are used)
Installation method	Screw	M4 × 0.7mm × 20mm 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)
External power supply		24VDC±10%
Current consumption (24VDC)		6mA or less (not including current consumption of the conversion adapter and signal conversion module)
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between each input channels/each output channels/power supply
Weight		Approx. 370g

\*1: Mount a dummy module (FA-ATNDM) onto an unused slot.

●Block diagram



Notes:

- Use shielded cables for external wirings.
- Use an input signal conversion device. Using an output signal conversion device incorrectly may damage the product.

Points:

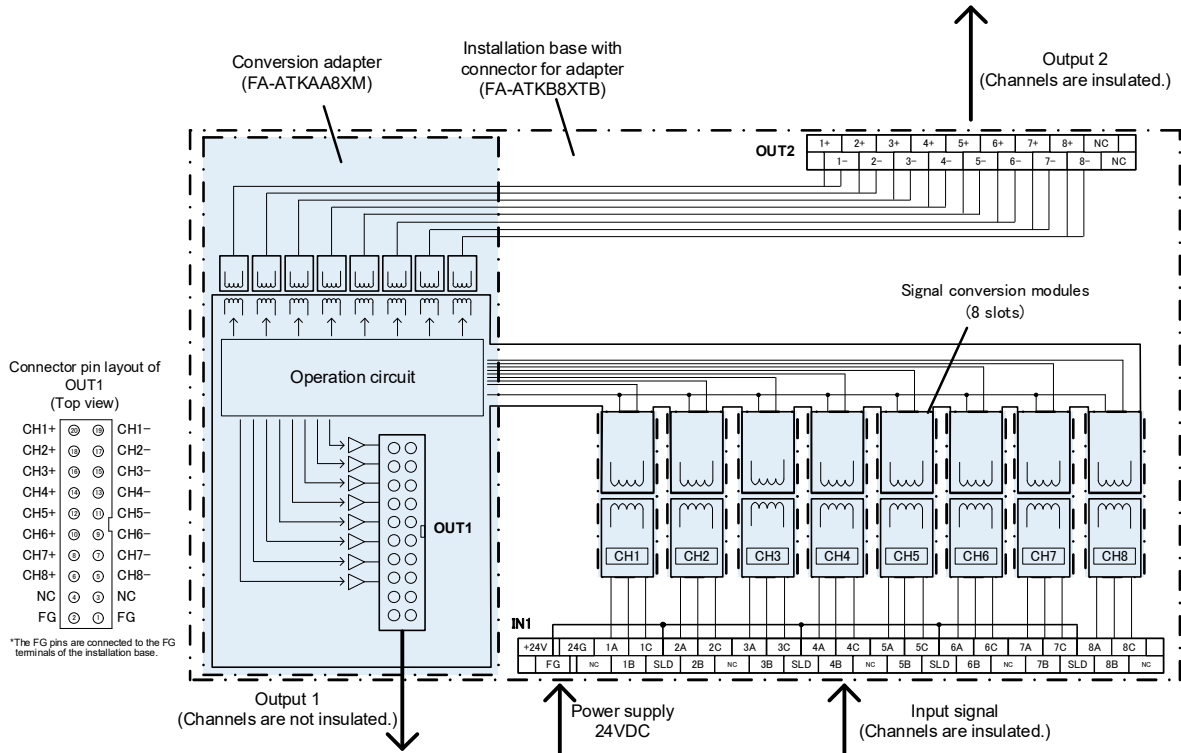
- SLD terminals of the input terminal block IN1 are internally connected to the FG terminal and can be used as relay terminals to ground the shields of the external cables.

3-6. Conversion adapter current connection (two outputs) (FA-ATKAA8XM)

Model		FA-ATKAA8XM
Number of points		8
Input signal		Depends on the output of the dedicated signal conversion module (1 to 5VDC). <sup>*1</sup>
Accuracy (to full-scale)	Reference accuracy	±0.1% or less (ambient temperature 25°C±5°C)
	Temperature characteristics	±0.015%/°C or less
Output 1 (OUT1)	Interface	20-pin MIL connector
	Output signal	4 to 20mA
	Allowable load resistance	250 to 350Ω
Output 2 (OUT2)	Interface	Depends on OUT2 of the installation base with connector for adapter.
	Output signal	4 to 20mA
	Allowable load resistance	600Ω or less
Response speed <sup>*4</sup>		10ms or less
External power supply		24VDC (via the installation base with connector for adapter)
Current consumption (24VDC)		310mA or less (via the installation base with connector for adapter)
Insulation method		IN1/OUT1 (lumped)/OUT2 (by channel): Transformer
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between IN1/OUT1 (lumped)/OUT2 (by channel)/power supply
Weight		Approx. 200g

- \*1: Current signal input of the pass-through module (FA-ATFTMX) cannot be used.
- \*2: Accuracy is actually affected by the combination of the signal conversion modules characteristics to be mounted. Calculate the total accuracy as follows:
- Example: When the FA-ATSVM1XA420 is used
- Reference accuracy: ±0.2% = ±0.1% (Conversion adapter) + ±0.1% (Signal conversion module)
- Temperature characteristics: ±0.030%/°C = ±0.015%/°C (Conversion adapter) + ±0.015%/°C (Signal conversion module)
- \*3: When connecting a cable to the installation base, push the cable connector until it is locked. Failure to do so may cause poor contact.
- \*4: A time from when a startup pulse is input until the output level reaches 90%

●Block diagram

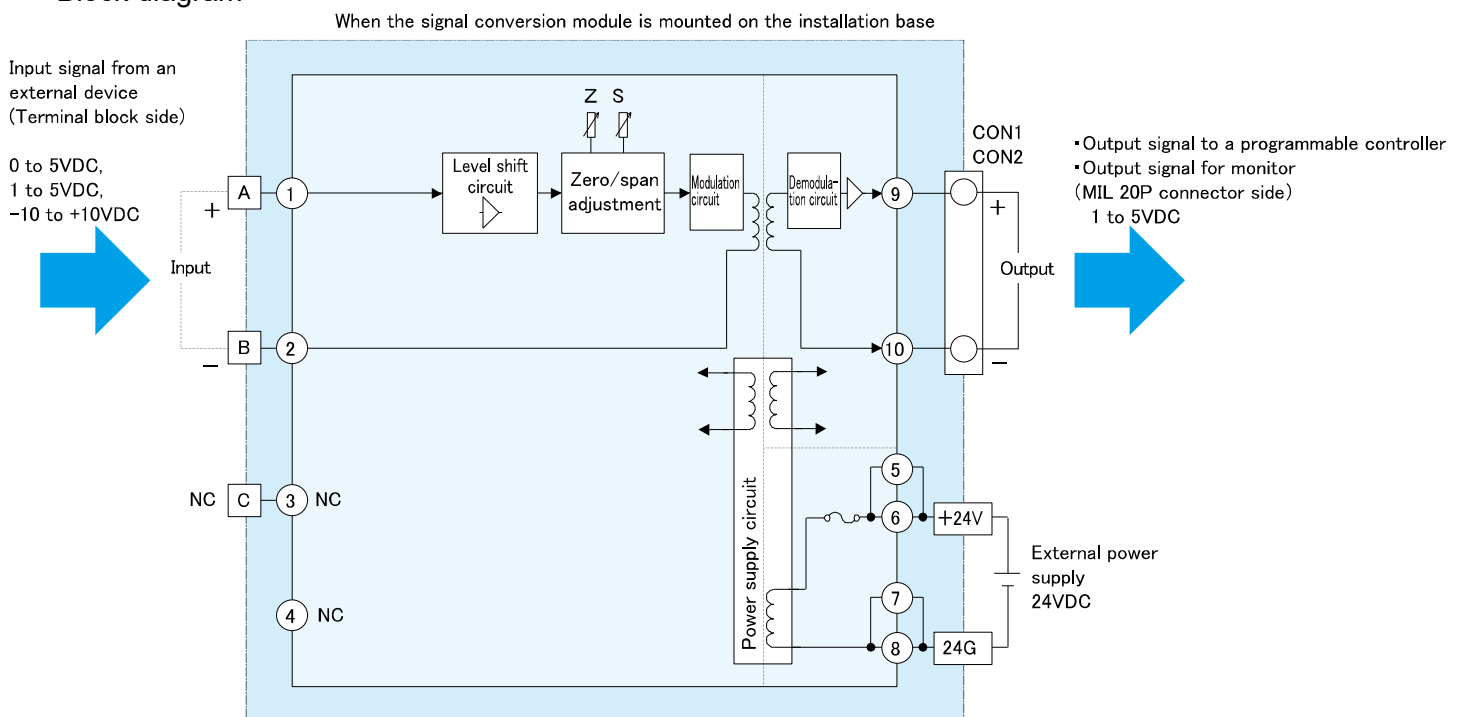


### 3-7. Voltage input signal conversion module (FA-ATSVM1XV\*\*\*\*)

Model		FA-ATSVM1XV05	FA-ATSVM1XV15	FA-ATSVM1XV1010
Item				
Number of points		1 point (1 channel)		
Input	Input signal	0 to 5V	1 to 5V	-10 to +10V
	Input resistance	1MΩ or more		
	Disconnection detection function	None		
Accuracy (to full-scale)	Reference accuracy	$\pm 0.1\%$ or less (ambient temperature $25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )		
	Temperature characteristics	$\pm 0.015\%/^{\circ}\text{C}$ or less		
Output (Programmable controller side)	Output signal	1 to 5V		
	Output allowable load resistance	10kΩ or more		
Response speed*1		15ms or less		
Zero/span adjustment		Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%		
Power supply		24VDC $\pm 10\%$ (supplied from the installation base)		
Current consumption (24VDC)		20mA or less		
Insulation method		Transformer		
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between input/output/power supply		
Weight		Approx. 30g		

\*1: A time from when a startup pulse is input until the output level reaches 90%

#### ●Block diagram



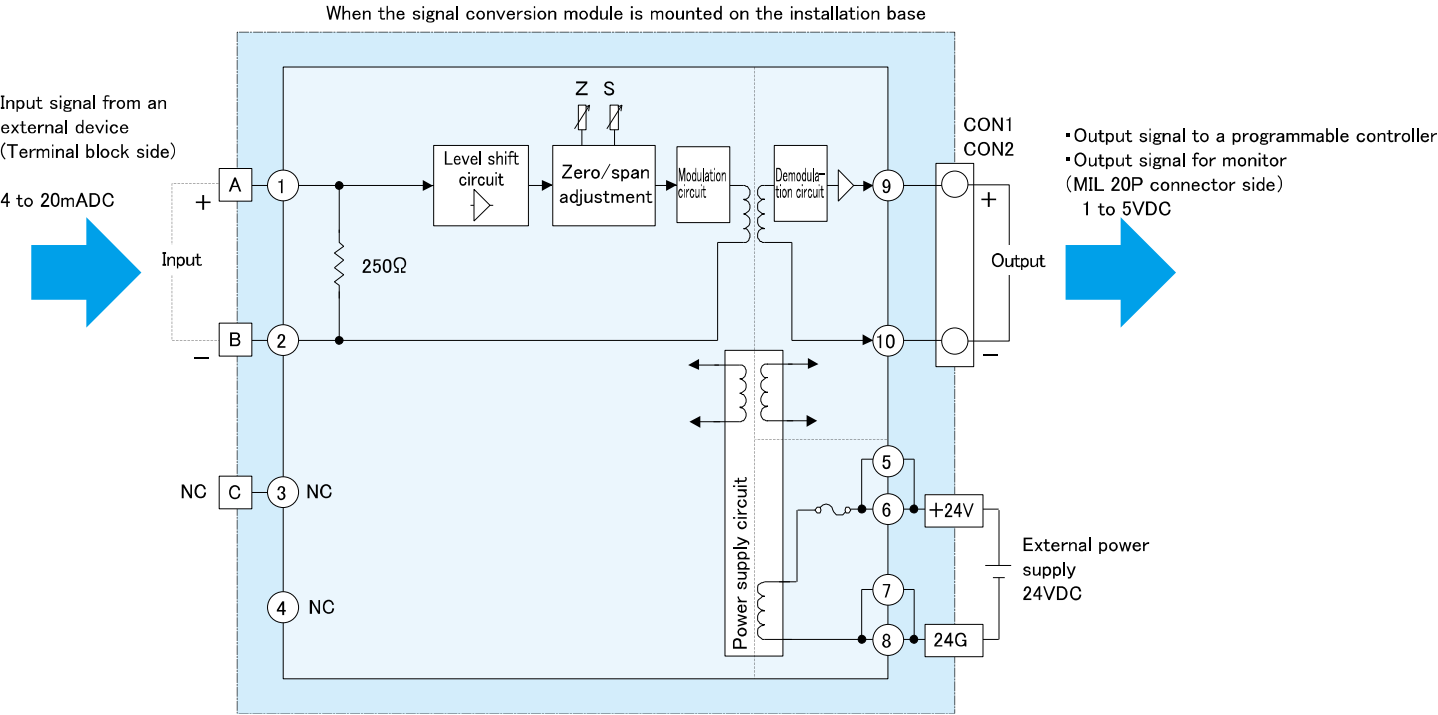


3-8. Current input signal conversion module (FA-ATSVM1XA420)

Model		FA-ATSVM1XA420
Item		
Number of points		1 point (1 channel)
Input	Input signal	4 to 20mA
	Input resistance	250Ω
	Disconnection detection function	None
Accuracy (to full-scale)	Reference accuracy	±0.1% or less (ambient temperature 25°C±5°C)
	Temperature characteristics	±0.015%/°C or less
Output (Programmable controller side)	Output signal	1 to 5V
	Output allowable load resistance	10kΩ or more
Response speed*1		15ms or less
Zero/span adjustment		Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%
Power supply		24VDC±10% (supplied from the installation base)
Current consumption (24VDC)		20mA or less
Insulation method		Transformer
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between input/output/power supply
Weight		Approx. 30g

\*1: A time from when a startup pulse is input until the output level reaches 90%

●Block diagram

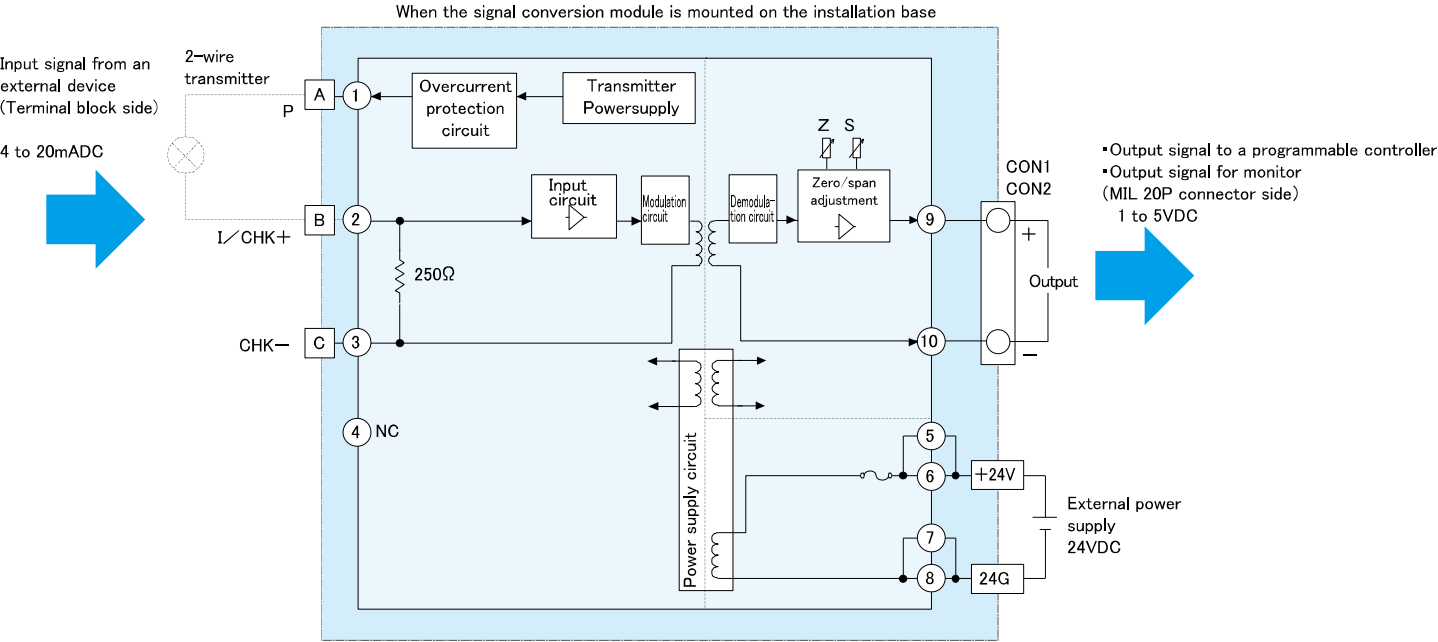


3-9. Distributor signal conversion module (2-wire transmitter) (FA-ATSV1XD)

Model		FA-ATSV1XD
Item		
Number of points		1 point (1 channel)
Input	Input signal	2-wire transmitter
	Input resistance	250Ω
	Disconnection detection function	None
Power supply for transmitter	Supply voltage	26VDC±2V
	Maximum supply current	24mA
	Short-circuit protection	Supported (Current limitation: 25 to 35mA)
Accuracy (to full-scale)	Reference accuracy	±0.1% or less (ambient temperature 25°C±5°C)
	Temperature characteristics	±0.015%/°C or less
Output (Programmable controller side)	Output signal	1 to 5V
	Output allowable load resistance	10kΩ or more
Response speed*1		15ms or less
Zero/span adjustment		Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%
Power supply		24VDC±10% (supplied from the installation base)
Current consumption (24VDC)		68mA or less
Insulation method		Transformer
Withstand voltage, insulation resistance		750VAC for 1 minute, 10MΩ or higher between input/output/power supply
Weight		Approx. 30g

\*1: A time from when a startup pulse is input until the output level reaches 90%  
\*2: Note that the installation orientation is restricted when three or more modules are mounted on the installation base.

●Block diagram



### 3-10. Thermocouple temperature input signal conversion module (FA-ATSVM1XT\*)

#### [Type K thermocouple]

Model			FA-ATSVM1XTK	FA-ATSVM1XTK0040	FA-ATSVM1XTK0060	FA-ATSVM1XTK0080
Item						
Number of points			1 point (1 channel)			
Input	Input signal	Thermocouple	Type K			
		Temperature range	-200 to 1200°C	0 to +400°C	0 to +600°C	0 to +800°C
	Input resistance		1MΩ or more			
	Disconnection detection function		Supported (upscale burnout)			
	Accuracy (to full-scale)	Reference accuracy		±0.1% or less (ambient temperature 25°C±5°C)		
Linearization error		±0.1% or less				
Temperature characteristics		±0.015%/°C or less				
Cold junction compensation accuracy		±0.5°C or less (25°C±5°C), ±1°C or less (0 to 55°C)				
Output (Programmable controller side)	Output signal		1 to 5V			
	Output allowable load resistance		10kΩ or more			
Response speed*1			100ms or less			
Zero/span adjustment			Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%			
Power supply			24VDC±10% (supplied from the installation base)			
Current consumption (24VDC)			24mA or less			
Insulation method			Transformer			
Withstand voltage, insulation resistance			750VAC for 1 minute, 10MΩ or higher between input/output/power supply			
Weight			Approx. 40g			

\*1: A time from when a startup pulse is input until the output level reaches 90%

\*2: The input range (temperature range) is fixed.

#### [Type B, S, E, T, R, J, N thermocouple]

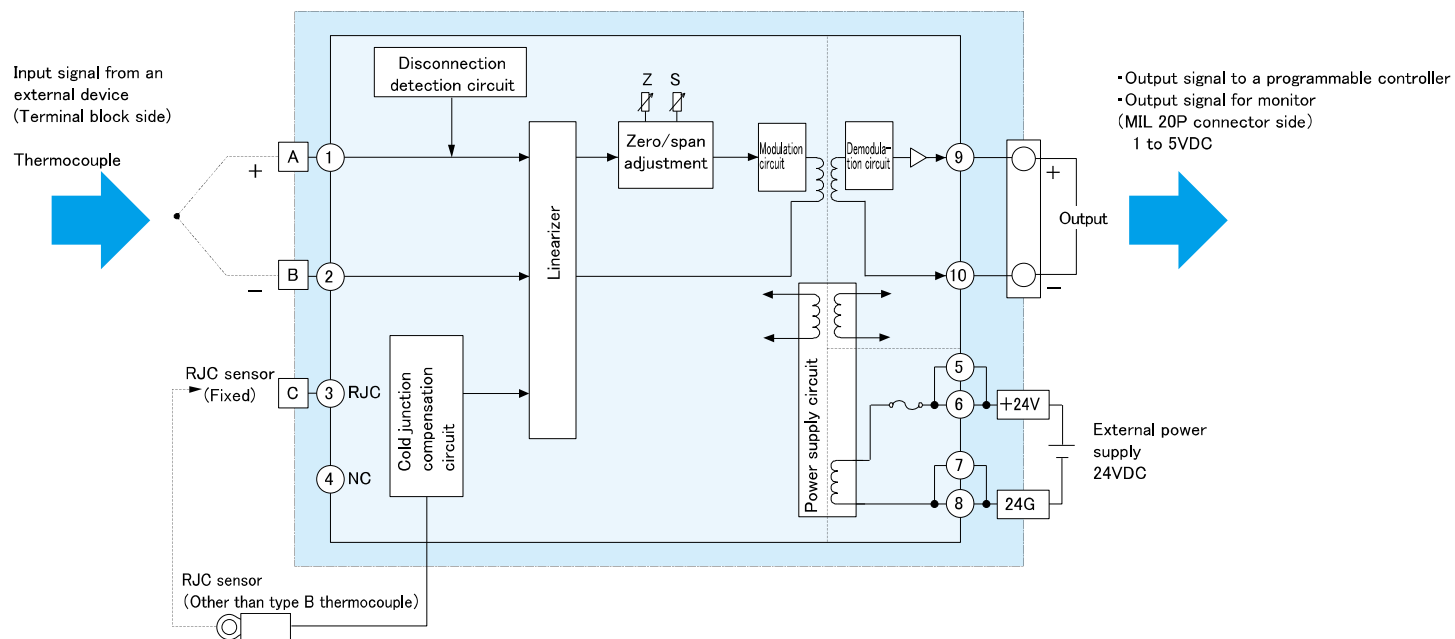
Model			FA-ATSVM1XTB	FA-ATSVM1XTS	FA-ATSVM1XTE	FA-ATSVM1XTT	FA-ATSVM1XTR	FA-ATSVM1XTJ	FA-ATSVM1XTN
Item									
Number of points			1 point (1 channel)						
Input	Input signal	Thermocouple	Type B	Type S	Type E	Type T	Type R	Type J	Type N
		Temperature range	+600 to +1700°C	0 to +1600°C	-200 to +900°C	-200 to +350°C	0 to +1600°C	-40 to +750°C	-200 to +1250°C
	Input resistance		1MΩ or more						
	Disconnection detection function		Supported (upscale burnout)						
Accuracy (to full-scale)	Reference accuracy		±0.1% or less (ambient temperature 25°C±5°C)						
	Linearization error		±0.1% or less						
	Temperature characteristics		±0.015%/°C or less						
	Cold junction compensation accuracy		±0.5°C or less (25°C±5°C), ±1°C or less (0 to 55°C)						
Output (Programmable controller side)	Output signal		1 to 5V						
	Output allowable load resistance		10kΩ or more						
Response speed <sup>*1</sup>			100ms or less						
Zero/span adjustment			Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%						
Power supply			24VDC±10% (supplied from the installation base)						
Current consumption (24VDC)			24mA or less						
Insulation method			Transformer						
Withstand voltage, insulation resistance			750VAC for 1 minute, 10MΩ or higher between input/output/power supply						
Weight			Approx. 40g						

\*1: A time from when a startup pulse is input until the output level reaches 90%

\*2: The input range (temperature range) is fixed.

## ●Block diagram <sup>\*3</sup>

When the signal conversion module is mounted on the installation base



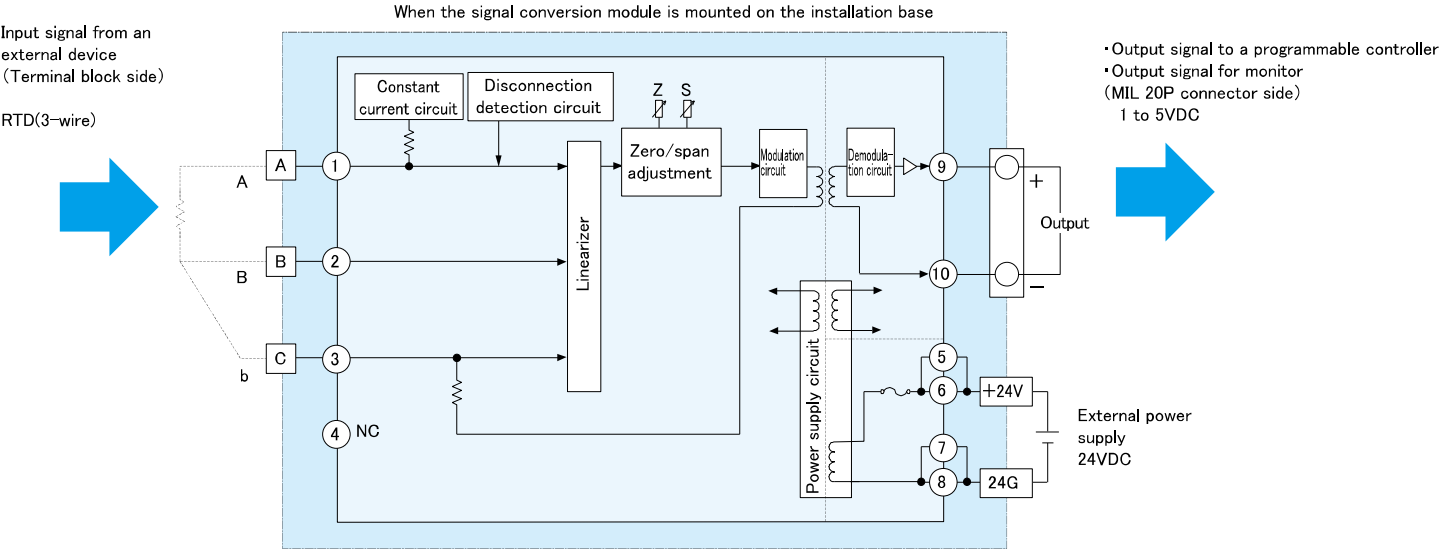
\*3: Applied to products which have "K" or later at the alphabet part in the SERIAL field.

3-11. RTD input signal conversion module (FA-ATSVM1XR\*\*\*)

Model			FA-ATSVM1XRPT	FA-ATSVM1XRPT0010	FA-ATSVM1XRPT0020	FA-ATSVM1XRJPT
Item						
Number of points			1 point (1 channel)			
Input	Input signal	RTD	Type Pt100			Type JPt100
		Temperature range	-200 to +650°C	0 to +100°C	0 to +200°C	-200 to +600°C
	Disconnection detection function		Supported (upscale burnout)			
Accuracy (to full-scale)	Reference accuracy		±0.1% or less (ambient temperature 25°C±5°C)			
	Linearization error		±0.1% or less			
	Temperature characteristics		±0.010%/°C or less			
Output (Programmable controller side)	Output signal		1 to 5V			
	Output allowable load resistance		10kΩ or more			
Response speed <sup>*1</sup>			100ms or less			
Zero/span adjustment			Zero adjustment range: -2 to 2%, span adjustment range: 98 to 102%			
Power supply			24VDC±10% (supplied from the installation base)			
Current consumption (24VDC)			25mA or less			
Insulation method			Transformer			
Withstand voltage, insulation resistance			750VAC for 1 minute, 10MΩ or higher between input/output/power supply			
Weight			Approx. 40g			

\*1: A time from when a startup pulse is input until the output level reaches 90%  
\*2: The input range (temperature range) is fixed.

●Block diagram \*3



\*3: Applied to products which have "K" or later at the alphabet part in the SERIAL field.

### 3-12. Pass-through module (FA-ATFTMX)

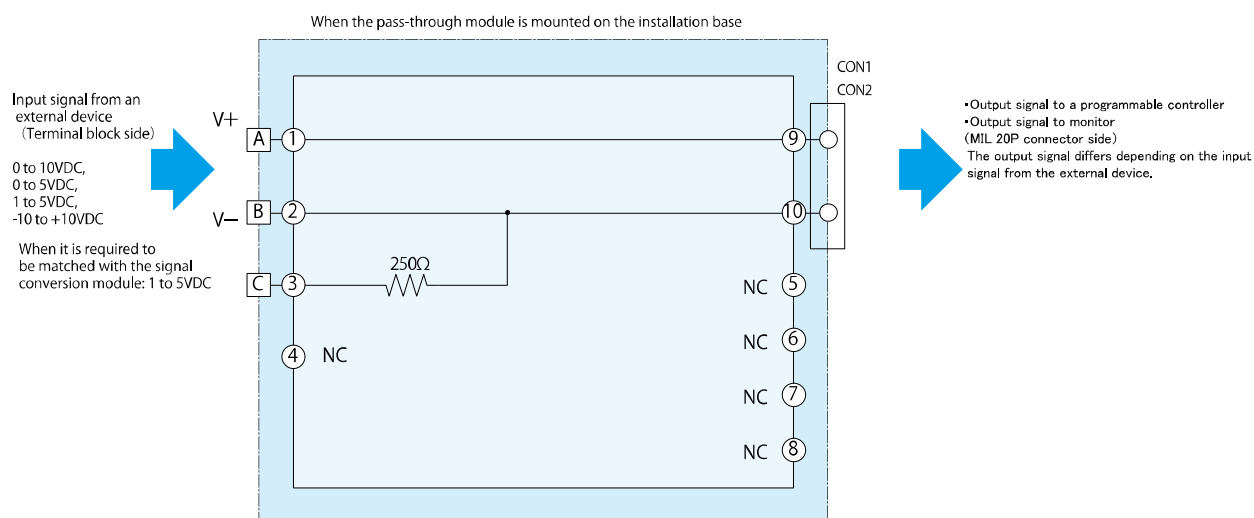
Model		FA-ATFTMX	
Item		1 point (1 channel)	
Number of points		Voltage input	
Input signal		When signals are passed through	Current input*1*2
Conversion type		When signals are passed through	When current is converted to voltage
Input	Resistance	—	250Ω
	Resistor accuracy	—	±0.1% or less
	Temperature characteristics of resistor	—	±0.0025%/°C or less
Allowable I/O signal		Voltage: 10V or less, Current: 20mA or less	
Weight		Approx. 30g	

\*1: When current is converted to voltage, short across terminals A and C of the installation base terminal block.

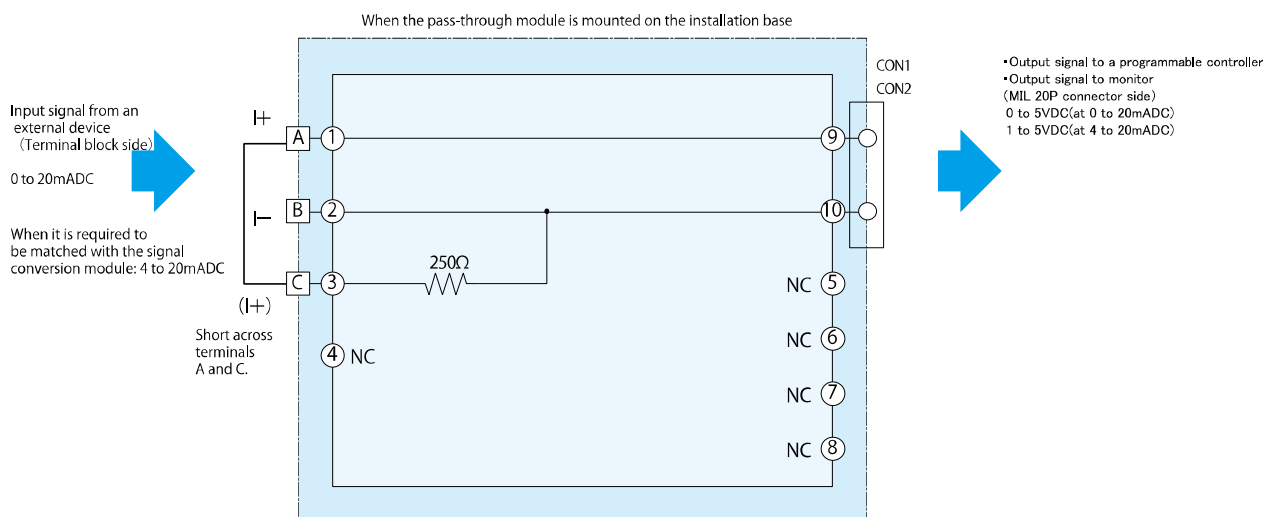
\*2: When the conversion adapter (FA-ATKAA8XM) is used, current cannot be input to the pass-through module.

#### ●Block diagram

##### Voltage input: when signals are passed through



##### Current input: when current is converted to voltage



### 3-13. Terminal block ↔ connector conversion adapter (FA-Q6TCA)

Model		FA-Q6TCA	
Item		Voltage: 121VDC / 264VAC, Current: 2A (Terminal No.1 to 16) / 8A (Terminal No.17, 18)	
Rated voltage, rated current		66 to 89N·cm (7 to 9kgf·cm, 6.08 to 7.81lbf·in)	
Tightening torque		Approx. 80g	
Weight			

## 4. CONNECTABLE MODULES AND CABLES

Module model for a programmable controller		Input range	Installation base	Signal conversion module	Cable model	
MELSEC iQ-R series	R60ADI8	4 to 20mA	FA-ATKB8XTB + FA-ATKAA8XM	Voltage input FA-ATSVM1XV05 FA-ATSVM1XV15 FA-ATSVM1XV1010 Current input FA-ATSVM1XA420 distributor FA-ATSVM1XD Thermocouple temperature input FA-ATSVM1XTB FA-ATSVM1XTR FA-ATSVM1XTS FA-ATSVM1XTK FA-ATSVM1XTK0040 FA-ATSVM1XTK0060 FA-ATSVM1XTK0080 FA-ATSVM1XTE FA-ATSVM1XTJ FA-ATSVM1XTT FA-ATSVM1XTN RTD input FA-ATSVM1XRPT FA-ATSVM1XRPT0010 FA-ATSVM1XRPT0020 FA-ATSVM1XRJPT When signals are passed through FA-ATFTMX	FA-CBL**ATQ8XVT	
MELSEC-Q series	Q68ADI	4 to 20mA			FA-CBL**ATQ8XVA *1	
	Q64AD-GH				FA-CBL**ATQ8XVT	
MELSEC-L series	L60ADIL8	4 to 20mA			FA-CBL**ATQ8XVA *1	
MELSEC iQ-F series	FX5-8AD	4 to 20mA			FA-CBL**ATF	
MELSEC-F series	FX3U-4AD	4 to 20mA			FA-CBL**ATF	FA2-CB2L**AT8XV1E
	FX3U-4AD-ADP					
	FX3UC-4AD					
	FX2N-8AD					
CC-Link IE TSN	NZ2GN2B-60AD4	4 to 20mA				FA-CBL**ATF
CC-Link IE Field	NZ2GFCE-60ADI8	4 to 20mA				
	NZ2GF2BN-60AD4					
CC-Link	AJ65SBT-64AD	4 to 20mA				
	AJ65SBT2B-64AD					
Programmable controllers from various manufacturers	General-purpose analog input module	4 to 20mA				
Computers from various manufacturers		4 to 20mA				
MELSEC iQ-R series	R60ADV8	1 to 5V	FA1-AT1B8X1TE FA-ATB8XTB	Voltage input FA-ATSVM1XV05 FA-ATSVM1XV15 FA-ATSVM1XV1010 Current input FA-ATSVM1XA420 distributor FA-ATSVM1XD Thermocouple temperature input FA-ATSVM1XTB FA-ATSVM1XTR FA-ATSVM1XTS FA-ATSVM1XTK FA-ATSVM1XTK0040 FA-ATSVM1XTK0060 FA-ATSVM1XTK0080 FA-ATSVM1XTE FA-ATSVM1XTJ FA-ATSVM1XTT FA-ATSVM1XTN RTD input FA-ATSVM1XRPT FA-ATSVM1XRPT0010 FA-ATSVM1XRPT0020 FA-ATSVM1XRJPT When signals are passed through FA-ATFTMX		FA-CBL**ATQ8XVT
MELSEC-Q series	Q68ADV	1 to 5V				FA-CBL**ATQ8XVA *1
	Q64AD-GH				FA-CBL**ATQ8XVT	
MELSEC-L series	L60ADVL8	1 to 5V			FA-CBL**ATQ8XVA *1	
MELSEC iQ-F series	FX5-8AD	1 to 5V			FA-CBL**ATF	
MELSEC-F series	FX3U-4AD	1 to 5V			FA2-CB2L**AT8XV1E	
	FX3U-4AD-ADP				FA-CBL**ATF	
	FX3UC-4AD					
	FX2N-8AD					
CC-Link IE TSN	NZ2GN2B-60AD4	1 to 5V			Use the cable that comes with the product.	
	FA3-AT1T8X-01C					
	FA3-AT1T8X					
CC-Link IE Field	NZ2GFCE-60ADV8	1 to 5V			FA3-CB2L**MM1H20	
	NZ2GF2BN-60AD4				FA-CBL**ATF	
CC-Link	AJ65SBT-64AD	1 to 5V				
	AJ65SBT2B-64AD					
	FA3-AT1C8X-01C					
	FA3-AT1C8X					
Programmable controllers from various manufacturers	General-purpose analog input module	1 to 5V			Use the cable that comes with the product.	
Computers from various manufacturers		1 to 5V			FA3-CB2L**MM1H20	
					FA-CBL**ATF	

\*1: When the FA-Q6TCA is used on the MELSEC iQ-R series / MELSEC-Q series programmable controller side.

Module model for a programmable controller		Number of channels	Input range	Cable for dispersed installation	Installation base	Signal conversion module	Connection cable
MELSEC iQ-R series	R60ADV8	8	1 to 5V	—	FA1-AT1B4X1TE, FA1-AT1B4X1TB	Voltage input FA-ATSVM1XV05 FA-ATSVM1XV15 FA-ATSVM1XV1010 Current input FA-ATSVM1XA420 distributor FA-ATSVM1XD Thermocouple temperature input FA-ATSVM1XTB FA-ATSVM1XTR FA-ATSVM1XTS FA-ATSVM1XTK FA-ATSVM1XTK0040 FA-ATSVM1XTK0060 FA-ATSVM1XTK0080 FA-ATSVM1XTE FA-ATSVM1XTJ FA-ATSVM1XTT FA-ATSVM1XTN RTD input FA-ATSVM1XRPT FA-ATSVM1XRPT0010 FA-ATSVM1XRPT0020 FA-ATSVM1XRJPT When signals are passed through FA-ATFTMX	FA-CBL**ATQ8XVT
	R60ADH4	4					FA-CBL**ATQ8XVA *1
	R60AD4						FA1-CB2L**AT4XV1T
MELSEC-Q series	Q68ADV	8	1 to 5V				FA-CBL**ATQ8XVT
	Q64ADH	4					FA-CBL**ATQ8XVA *1
	Q64AD						FA1-CB2L**AT4XV1T
	Q64AD-GH						FA-CBL**ATF
MELSEC-L series	L60ADVL8	8	1 to 5V				FA2-CB2L**AT4XV1E
MELSEC iQ-F series	FX5-4AD	4	1 to 5V				FA-CBL**ATF
MELSEC-F series	FX2N-8AD	8	1 to 5V				
	FX3U-4AD	4					
	FX3U-4AD-ADP						
	FX3UC-4AD						
CC-Link IE TSN	FA3-AT1T8X-01C	8	1 to 5V				Use the cable that comes with the product.
	FA3-AT1T8X						FA3-CB2L**MM1H20
	NZ2GN2S-60AD4	4					FA3-CB2**AT4XV1E
	NZ2GN2B-60AD4						
CC-Link IE Field	NZ2GFCE-60ADV8	8	1 to 5V				FA-CBL**ATF
	NZ2GF2BN-60AD4	4					
CC-Link	FA3-AT1C8X-01C	8	1 to 5V				Use the cable that comes with the product.
	FA3-AT1C8X						FA3-CB2L**MM1H20
	AJ65SBT-64AD	4					
	AJ65SBT2B-64AD						
Programmable controllers from various manufacturers	General-purpose analog input module	Differs depending on the module.	1 to 5V				FA-CBL**ATF
Computers from various manufacturers		Differs depending on the module.	1 to 5V				
MELSEC iQ-R series	R60ADV8	8	1 to 5V	FA1-CB2L**AT4EX	FA1-AT1B4X1TE × 2, FA1-AT1B4X1TB × 2	Voltage input FA-ATSVM1XV05 FA-ATSVM1XV15 FA-ATSVM1XV1010 Current input FA-ATSVM1XA420 distributor FA-ATSVM1XD Thermocouple temperature input FA-ATSVM1XTB FA-ATSVM1XTR FA-ATSVM1XTS FA-ATSVM1XTK FA-ATSVM1XTK0040 FA-ATSVM1XTK0060 FA-ATSVM1XTK0080 FA-ATSVM1XTE FA-ATSVM1XTJ FA-ATSVM1XTT FA-ATSVM1XTN RTD input FA-ATSVM1XRPT FA-ATSVM1XRPT0010 FA-ATSVM1XRPT0020 FA-ATSVM1XRJPT When signals are passed through FA-ATFTMX	FA-CBL**ATQ8XVT
							FA-CBL**ATQ8XVA *1
MELSEC-Q series	Q68ADV	8	1 to 5V				FA-CBL**ATQ8XVT
							FA-CBL**ATQ8XVA *1
MELSEC-L series	L60ADVL8	8	1 to 5V				FA-CBL**ATQ8XVT
MELSEC iQ-F series	FX5-8AD	8	1 to 5V				FA2-CB2L**AT8XV1E
MELSEC-F series	FX2N-8AD	8	1 to 5V				FA-CBL**ATQ8XVT
CC-Link IE TSN	FA3-AT1T8X-01C	8	1 to 5V				Use the cable that comes with the product.
	FA3-AT1T8X						FA3-CB2L**MM1H20
CC-Link IE Field	NZ2GFCE-60ADV8	8	1 to 5V				FA-CBL**ATF
CC-Link	FA3-AT1C8X-01C	8	1 to 5V				Use the cable that comes with the product.
	FA3-AT1C8X						FA3-CB2L**MM1H20
Programmable controllers from various manufacturers	General-purpose analog input module	Differs depending on the module.	1 to 5V				FA-CBL**ATF
Computers from various manufacturers		Differs depending on the module.	1 to 5V				

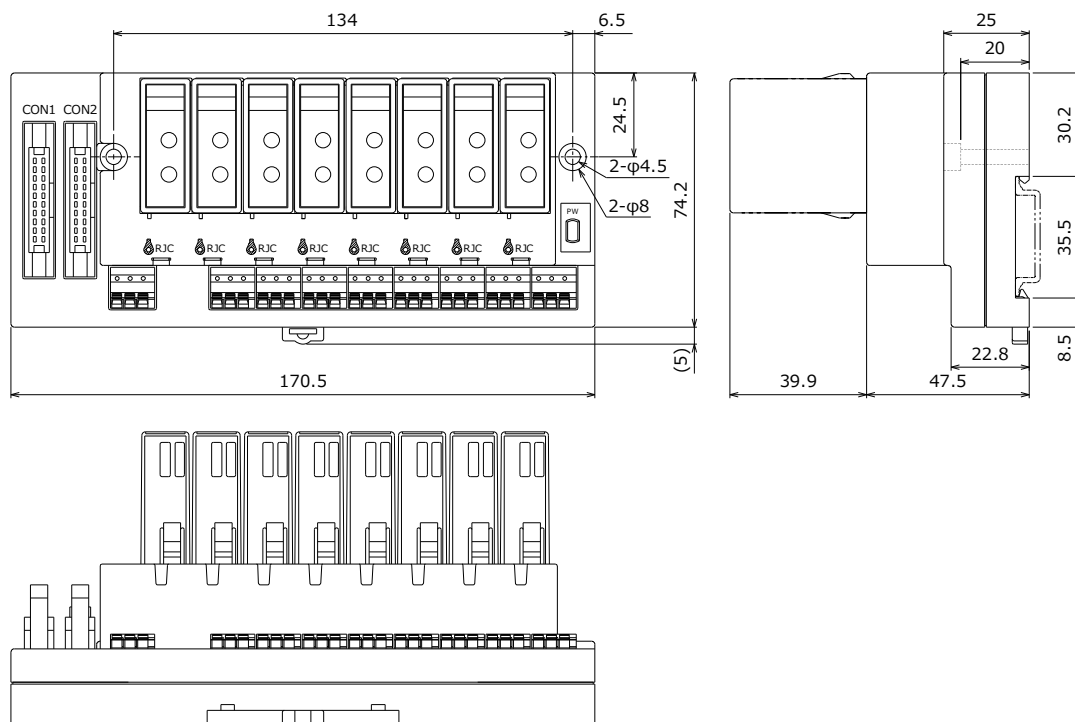
\*1: When the FA-Q6TCA is used on the MELSEC iQ-R series / MELSEC-Q series programmable controller side.



## 5. EXTERNAL DIMENSIONS

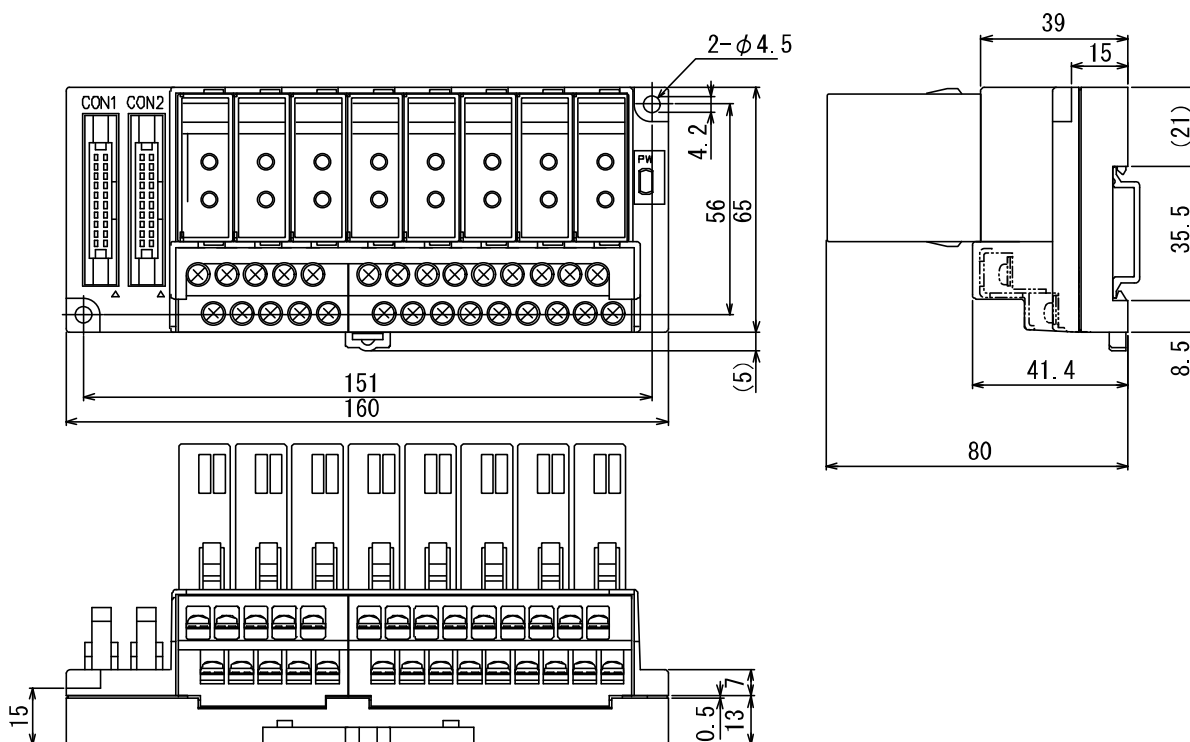
### 5-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)

[Unit : mm]



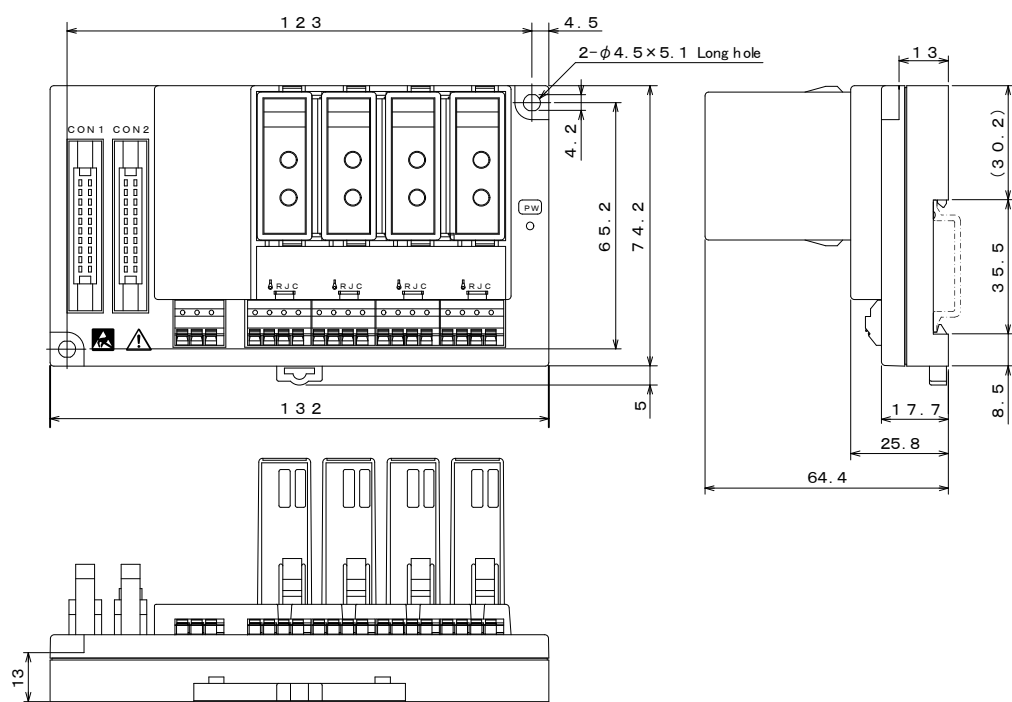
### 5-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)

[Unit : mm]



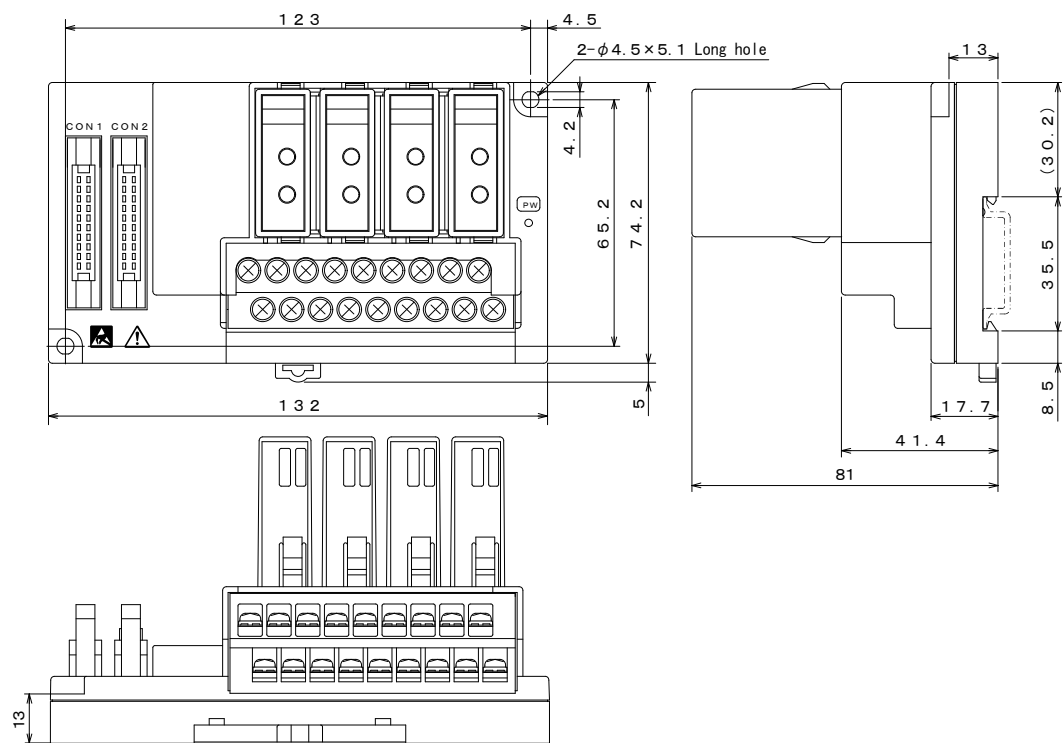
5-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)

[Unit : mm]



5-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)

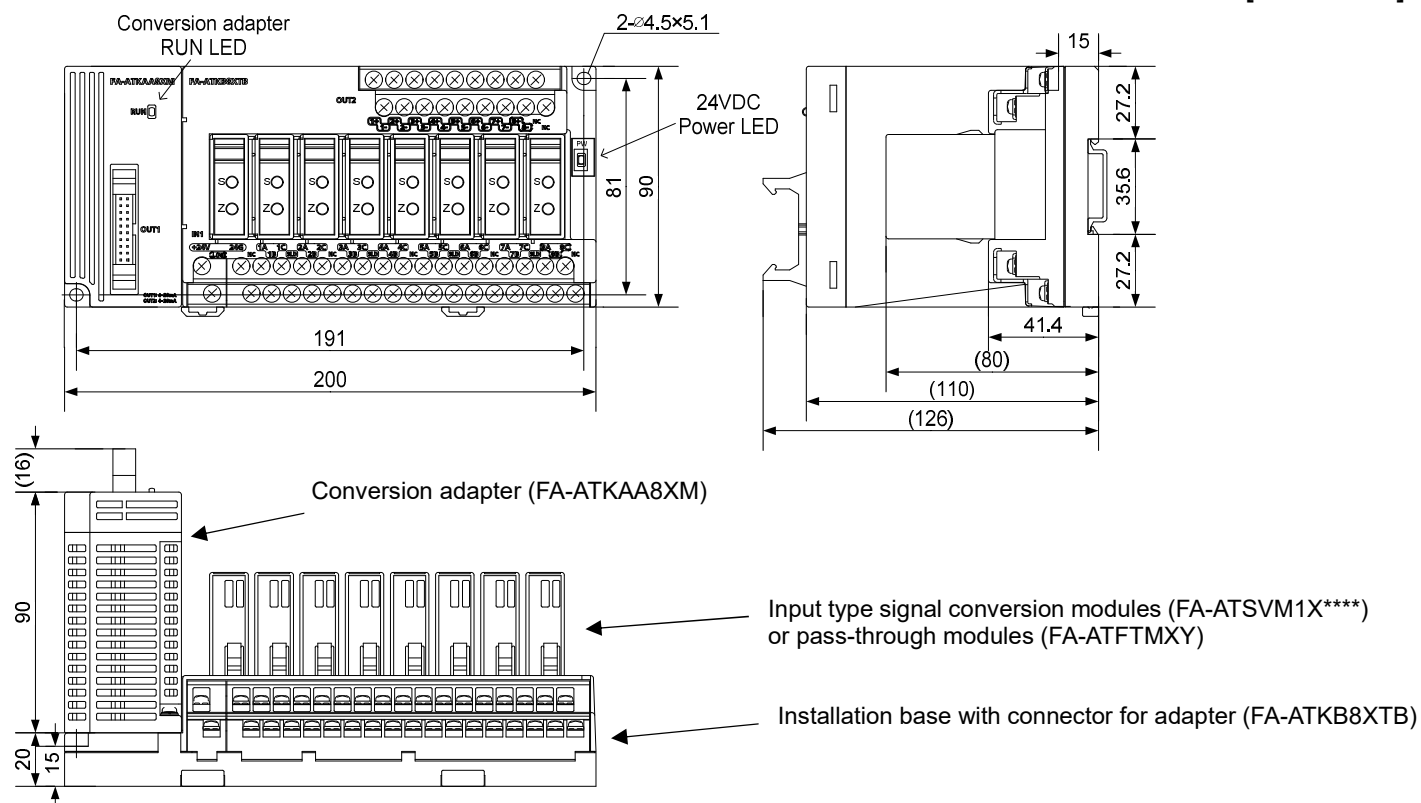
[Unit : mm]



## 5-5. Input type installation base with connector for adapter (FA-ATKB8XTB)

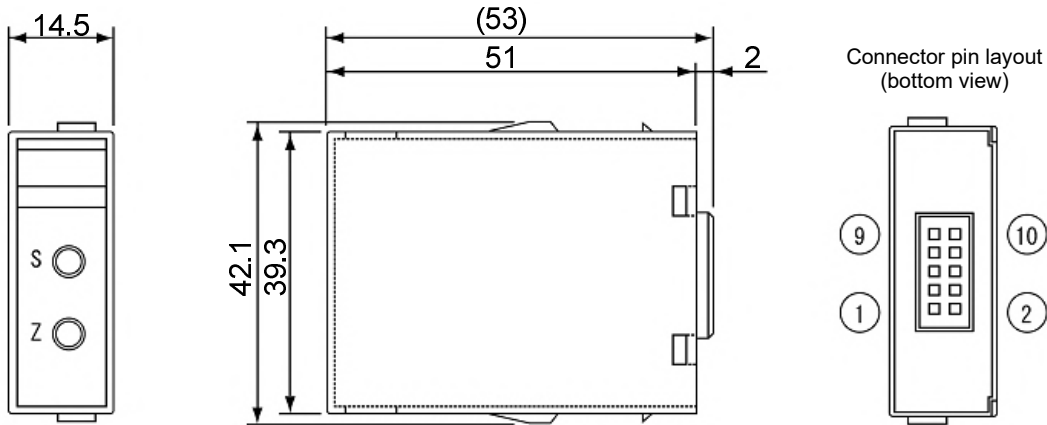
When the conversion adapter, the signal conversion modules and/or the pass-through modules are mounted on the installation base.

[Unit : mm]



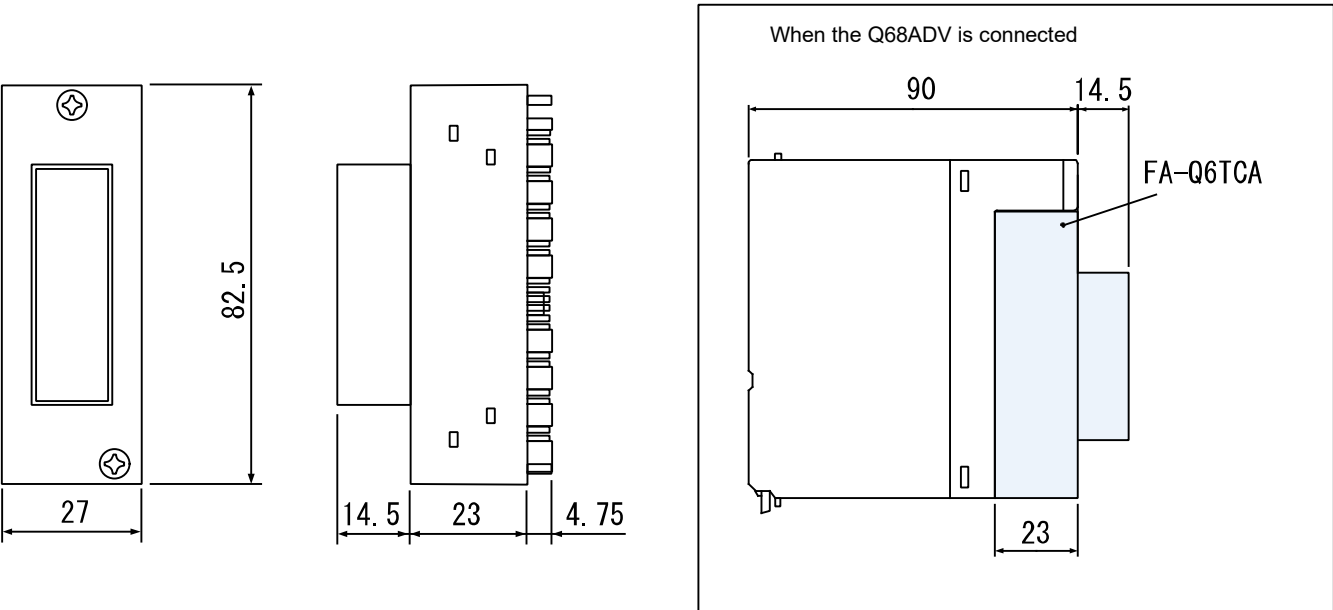
5-6. Signal conversion module (FA-ATSVM1X\*\*\*\*), pass-through module (FA-ATFTMXXY)

[Unit : mm]



5-7. Terminal block ↔ connector conversion adapter (FA-Q6TCA)

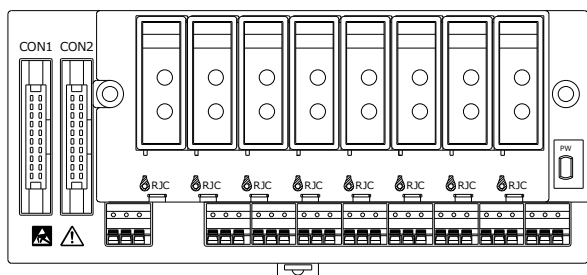
[Unit : mm]



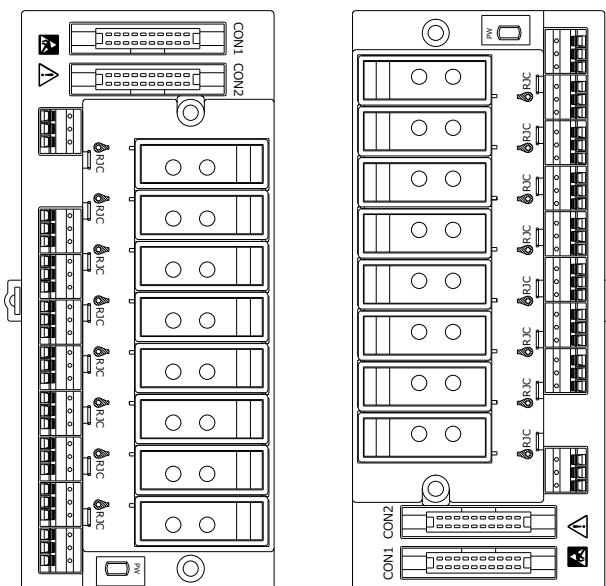
## 6. INSTALLATION ORIENTATION

### 6-1. Input type 8-channel installation base, spring clamp terminal block type (FA1-AT1B8X1TE)

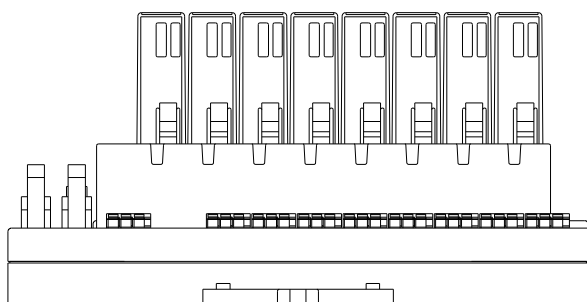
Horizontal installation



Vertical installation



Upward installation

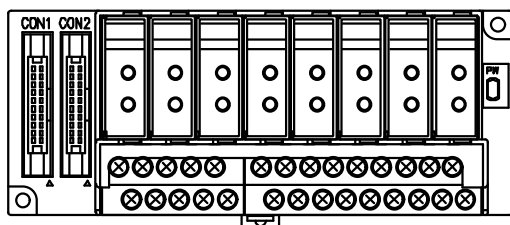


#### Restriction:

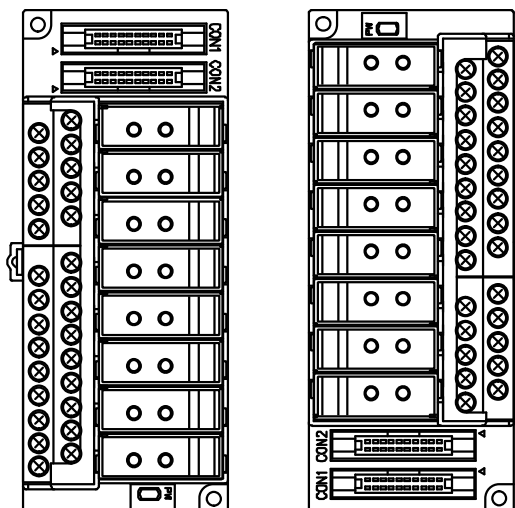
For vertical installation or upward installation, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD).

### 6-2. Input type 8-channel installation base, screw terminal block type (FA-ATB8XTB)

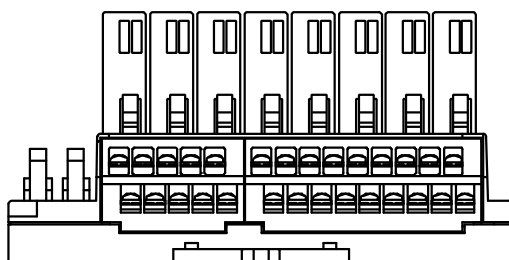
Horizontal installation



Vertical installation



Upward installation

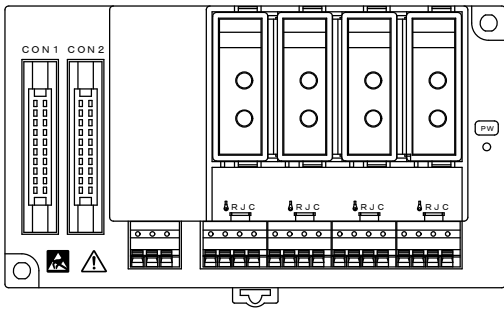


#### Restriction:

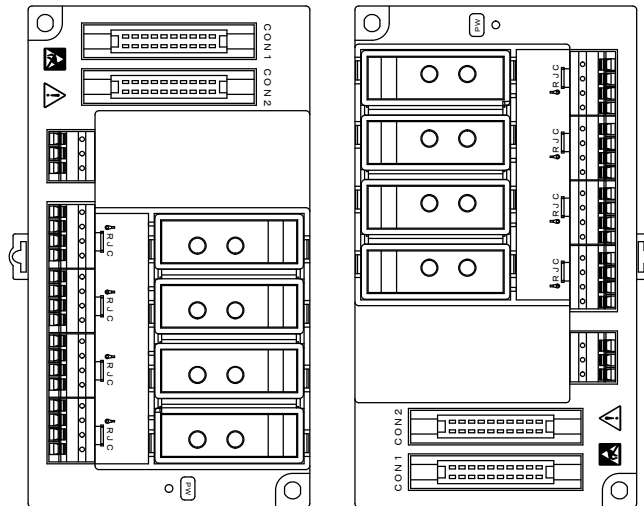
For vertical installation or upward installation, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD).

### 6-3. Input type 4-channel installation base, spring clamp terminal block type (FA1-AT1B4X1TE)

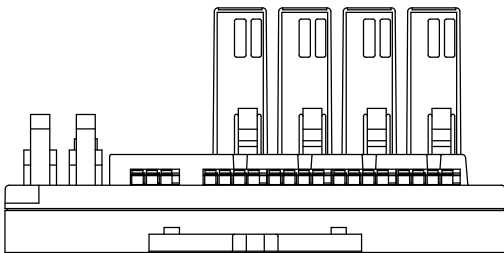
Horizontal installation



Vertical installation



Upward installation

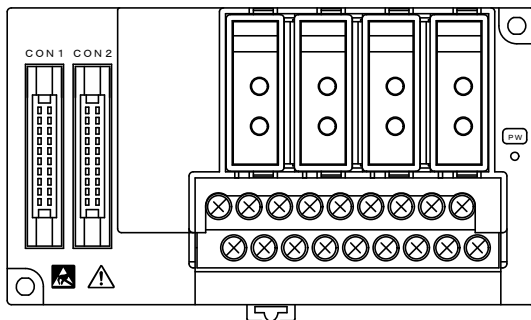


#### Restriction :

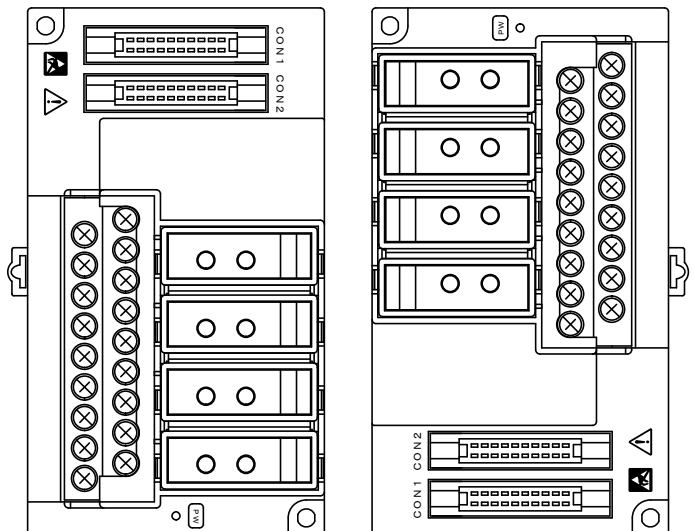
For vertical installation or upward installation, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD).

### 6-4. Input type 4-channel installation base, terminal block type (FA1-AT1B4X1TB)

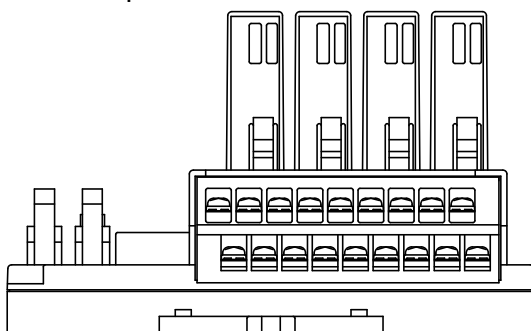
Horizontal installation



Vertical installation



Upward installation



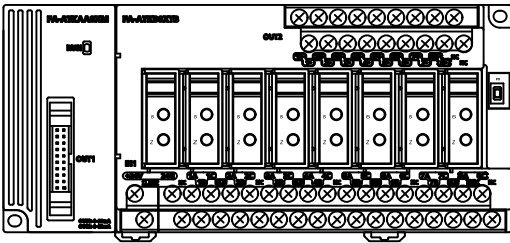
#### Restriction :

For vertical installation or upward installation, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD).

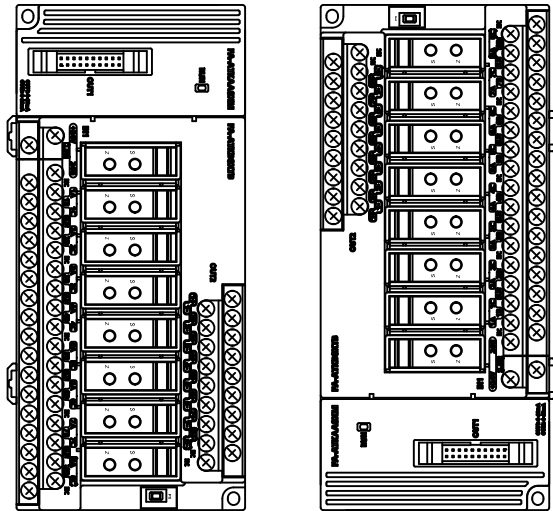
## 6-5. Input type installation base with connector for adapter (FA-ATKB8XTB)

### (1) Installation orientation

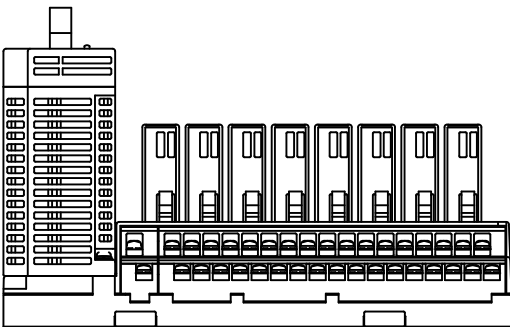
Horizontal installation



Vertical installation

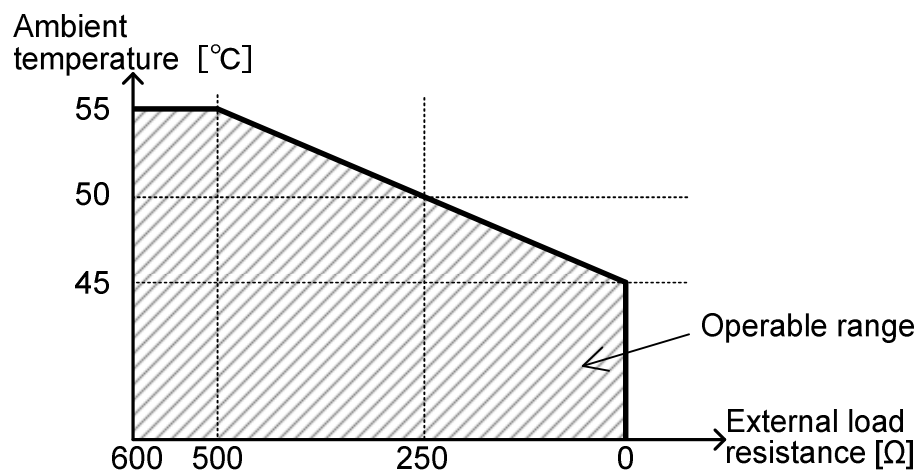


Upward installation



#### Restrictions:

- 1) For vertical installation, set the ambient temperature to 45°C or lower, or to the range shown in the graph below of the external load resistance value for output 2 and the ambient temperature. Additionally, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD), even when the external load resistance value is 250Ω or more.

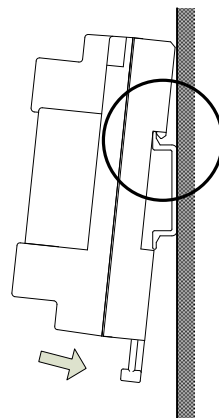
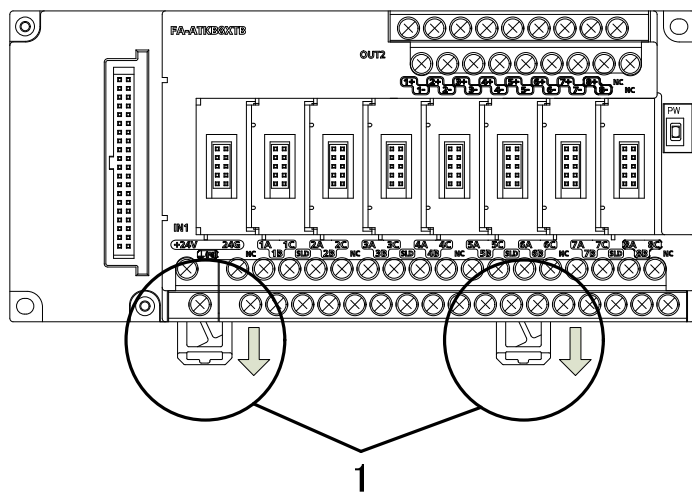


- 2) For horizontal installation, set the ambient temperature to 50°C or lower when using three or more signal conversion modules (FA-ATSVM1XD).

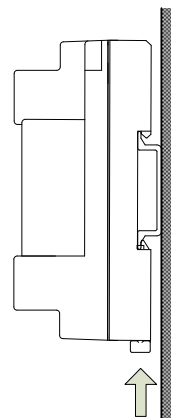
(2) How to install the installation base to a DIN rail

Follow the steps 1) to 3) below to install the installation base to a DIN rail.

- 1) Pull the DIN rail hooks downward until they click.
- 2) Hook the upper tab at the back side of the installation base onto the upper side of the DIN rail, and push the installation base toward the DIN rail.
- 3) Push the DIN rail hooks of the installation base upward until they click to be locked.



2



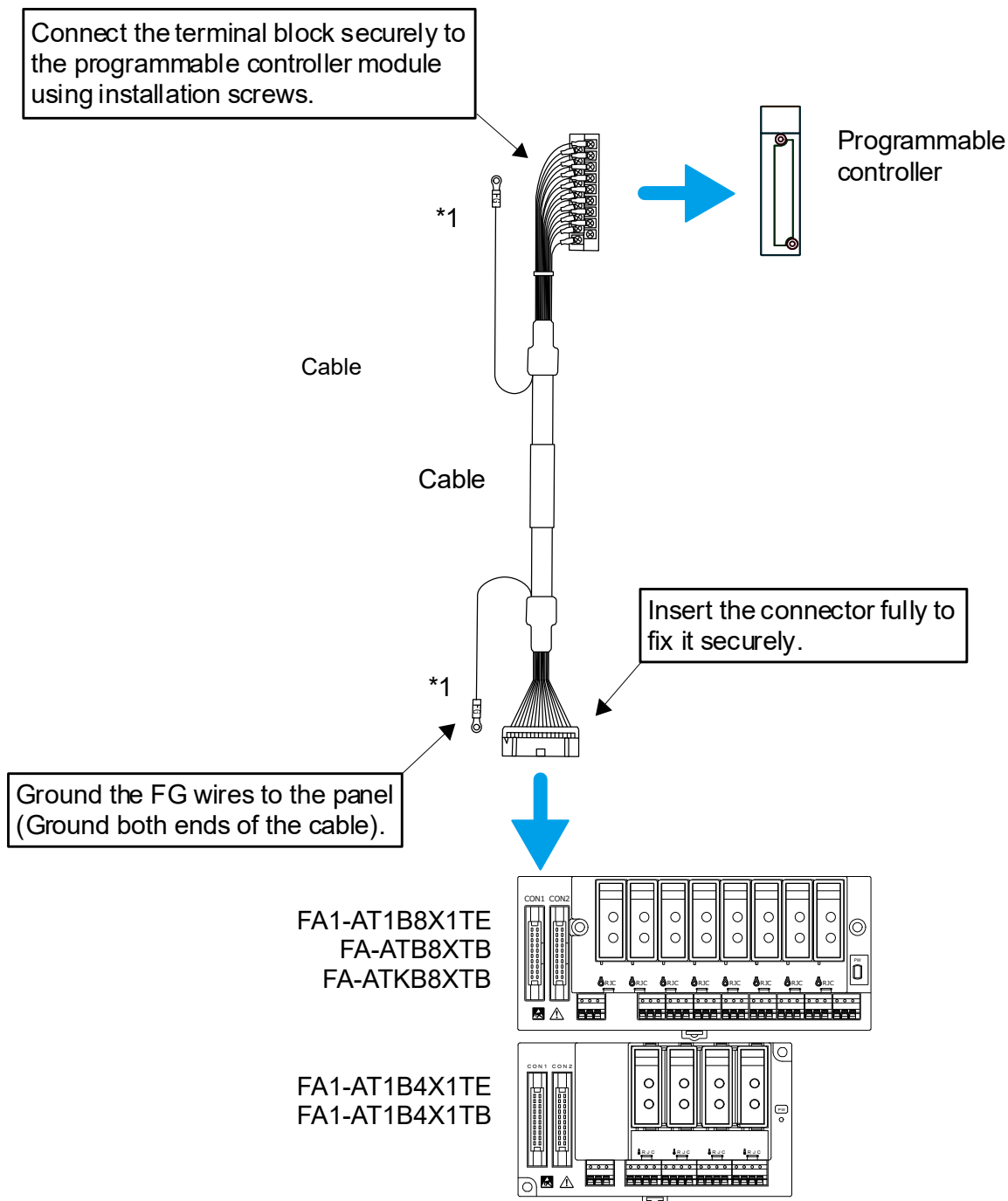
3



## 7. CONNECTING METHOD

### 7-1. Connection example with a terminal block module of a programmable controller

#### 7-1-1. When a cable with a terminal block is used

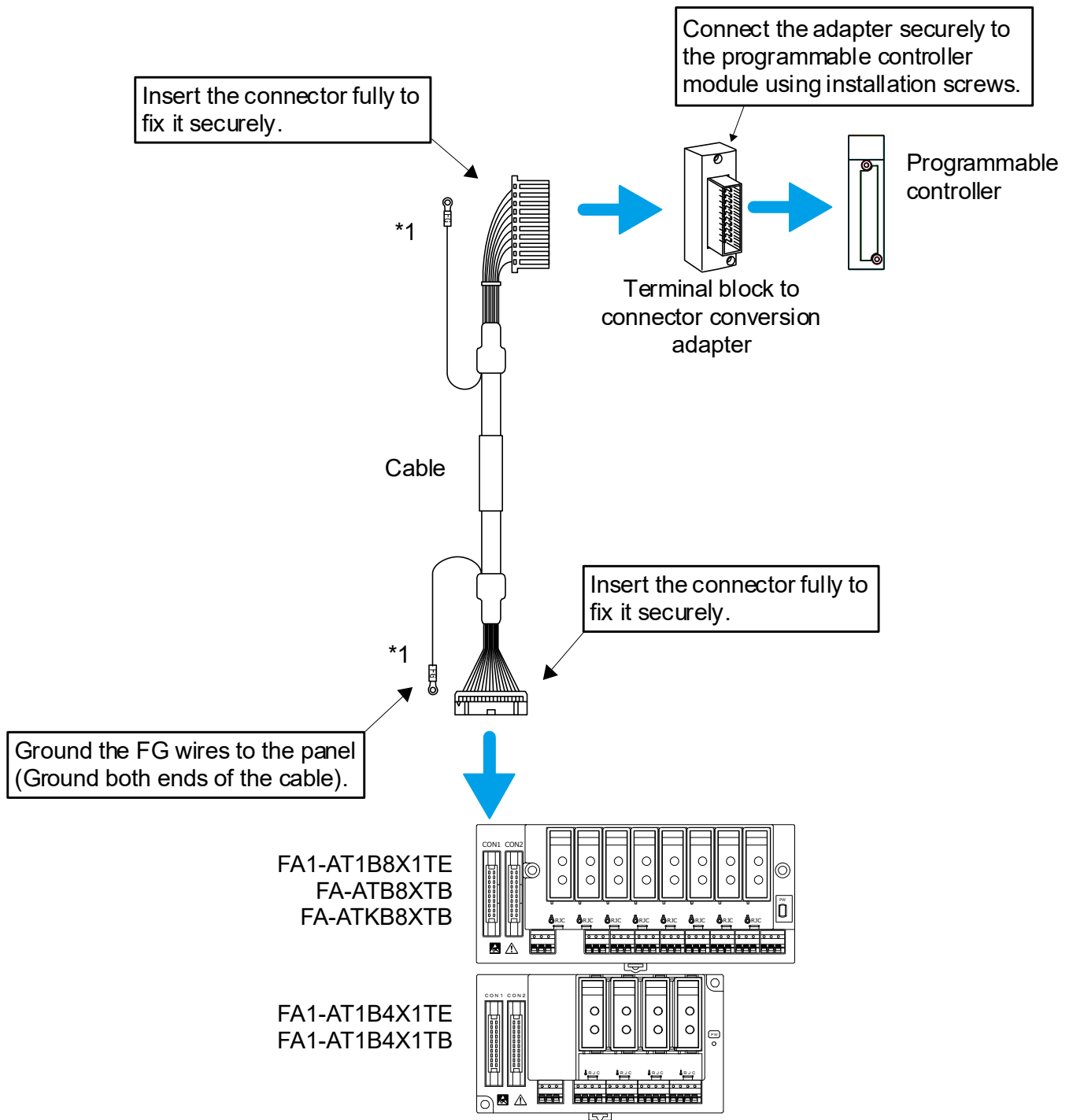


\*1: Ground the cable's FG wires on the control panel.

If the values retrieved by the programmable controller vary greatly due to noise, install a ferrite core (such as the ESD-SR-250 manufactured by TOKIN Corporation) on the unshielded part of the cable.

\*2: Instead of a 8-channel analog unit, two 4-channel bases can be used. To connect two bases, refer to 7-2.

7-1-2. When a terminal block to connector conversion adapter is used



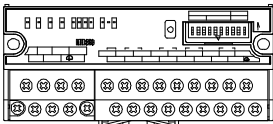
\*1: Ground the cable's FG wires on the control panel.

If the values retrieved by the programmable controller vary greatly due to noise, install a ferrite core (such as the ESD-SR-250 manufactured by TOKIN Corporation) on the unshielded part of the cable.

\*2: Instead of a 8-channel analog unit, two 4-channel bases can be used. To connect two bases, refer to 7-2.

7-1-3. When a discrete cable is used

CC-Link module, non-Mitsubishi programmable controller, or others



Wire the cable securely to the terminal block of the programmable controller module.

Cable

\*1

Ground the FG wires to the panel.

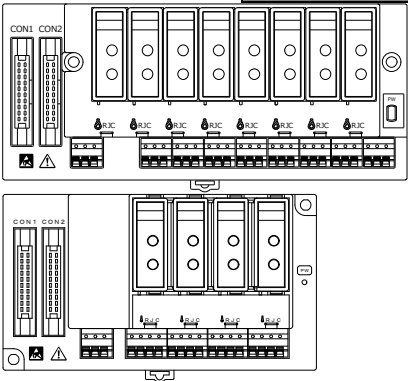
Insert the connector fully to fix it securely.

[FA-CBL\*\*ATF pin assignment]

Signal name	Cable color	Dot	Dot color
CH1+	Pink	2	Black
CH1-		2	Red
CH2+	Yellow	2	Black
CH2-		2	Red
CH3+	White	2	Black
CH3-		2	Red
CH4+	Gray	2	Black
CH4-		2	Red
CH5+	Orange	2	Black
CH5-		2	Red
CH6+	Pink	1	Black
CH6-		1	Red
CH7+	Yellow	1	Black
CH7-		1	Red
CH8+	White	1	Black
CH8-		1	Red
NC	Gray	1	Black
NC		1	Red
FG	Orange	1	Black
FG		1	Red

FA1-AT1B8X1TE  
FA-ATB8XTB  
FA-ATKB8XTB

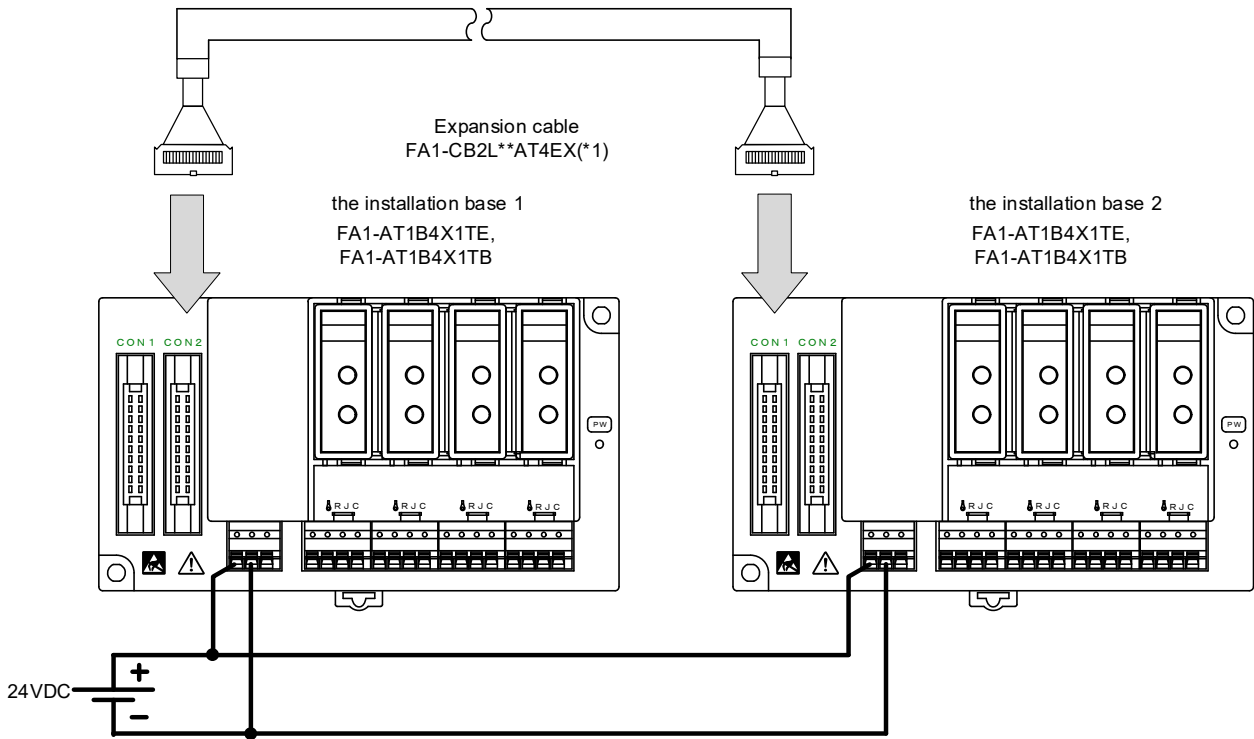
FA1-AT1B4X1TE  
FA1-AT1B4X1TB



\*1: Ground the cable's FG wires on the control panel.  
If the values retrieved by the programmable controller vary greatly due to noise, install a ferrite core (such as the ESD-SR-250 manufactured by TOKIN Corporation) on the unshielded part of the cable.  
\*2: Instead of a 8-channel analog unit, two 4-channel bases can be used. To connect two bases, refer to 7-2.

7-2. Connection example when an additional 4-channel base is used

Connect the base as shown in the figure below.



\*1: When the base is added, note that CH1 to CH4 and CH5 to CH8 change places with each other.  
(Refer to the following table.)

Monitor display

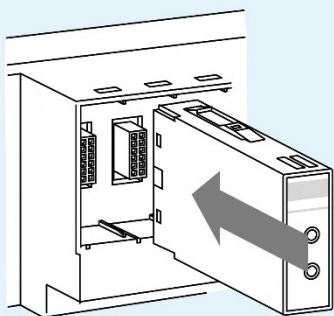
Order of channels displayed on the monitor		
When a 8-channel base is used	When a 4-channel base is used	When two 4-channel bases are used*1
CH1	CH1	CH5
CH2	CH2	CH6
CH3	CH3	CH7
CH4	CH4	CH8
CH5	—	CH1
CH6	—	CH2
CH7	—	CH3
CH8	—	CH4

\*1: When two 4-channel bases are used, channels of the added base are displayed first.

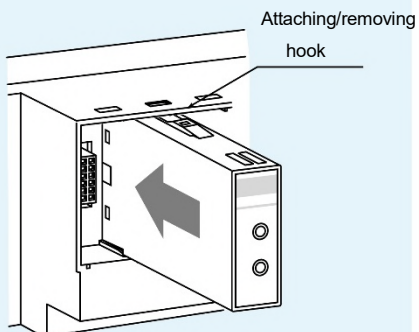
### 7-3. Mounting/removing a signal conversion module

(1) How to mount the module to the installation base

1) Align the signal conversion module with a slot of the installation base.

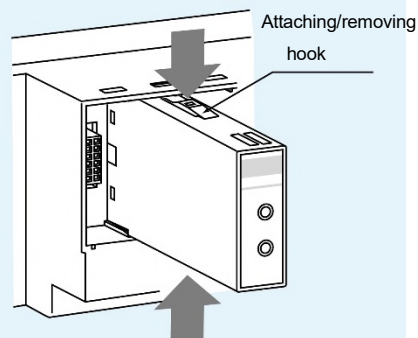


2) Insert the signal conversion module until the mounting/removing hooks are locked (until they click).

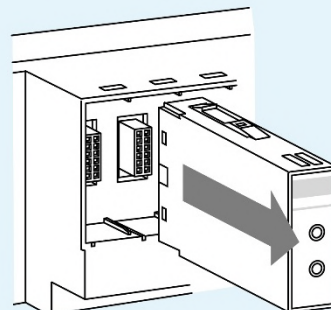


(2) How to remove the module from the installation base

1) Hold both sides of the mounting/removing hooks.



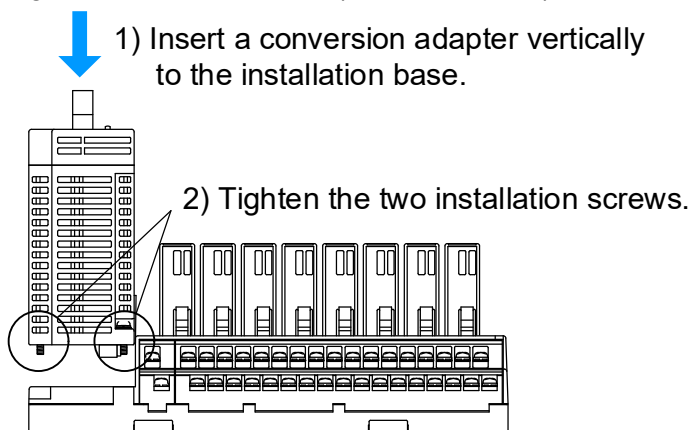
2) Pull out the signal conversion module while holding the hooks.



Note
Use an input type signal conversion module (the one with a purple line). Using an output type signal conversion module (the one with an orange line) incorrectly may cause failure of the products.

Points
(1) Hold the installation base, not the signal conversion module, when transporting the installation base with the signal conversion module mounted or when installing it to a panel.
(2) Mount a dummy module (FA-ATNDM) onto an empty slot of the installation base for dust prevention.

### 7-4. Mounting/removing a conversion adapter (FA-ATKB8XTB)



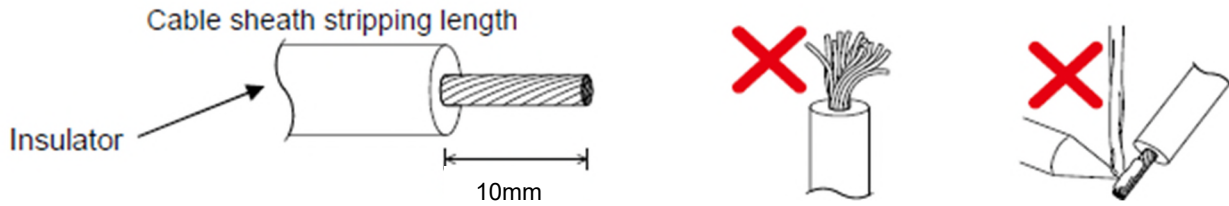
Specified tightening torque range: 36 to 48N·cm (3.7 to 4.8kgf·cm, 3.21 to 4.17lbf·in)

## 7-5. Wiring to a spring clamp terminal block

### (1) Wires routing

#### (a) Fabrication on cable insulator

Strip the wire as follows. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off. Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.



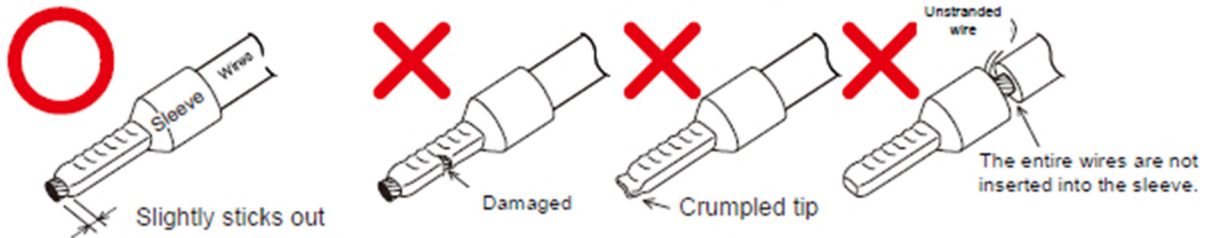
#### (b) Using a ferrule terminal

Insert wires to a ferrule terminal and crimp it. Make sure that core wire slightly comes out of the ferrule. Check the condition of the ferrule terminal after crimping. Do not use a ferrule terminal of which the crimping is inappropriate, or the face is damaged.

Refer to chapter 9 for the applicable ferrule terminal.

\* Ferrule terminals crimped onto one wire are applicable to the terminal block of this product.

If multiple wires need to be installed (such as for the power supply), provide an external common terminal.  
(For example, ABCOM of a high-speed counter module or COM of a simple motion module)



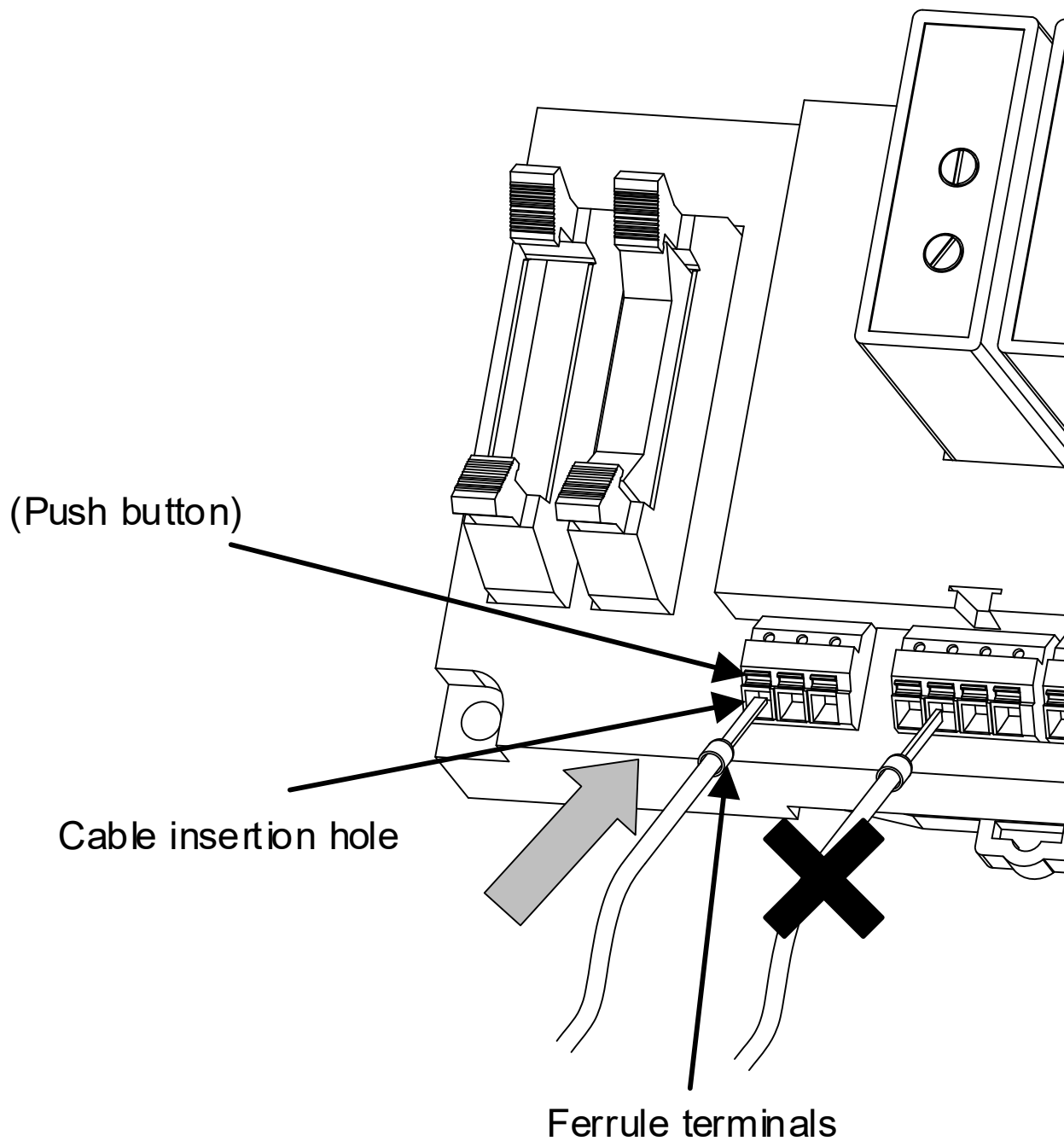
(c) Inserting wires

The wire with ferrule or solid cable can be inserted into the wire insertion hole. After inserting, pull the wire lightly to confirm that the wire is surely connected.

For the correct terminal insertion direction, refer to the figure below.

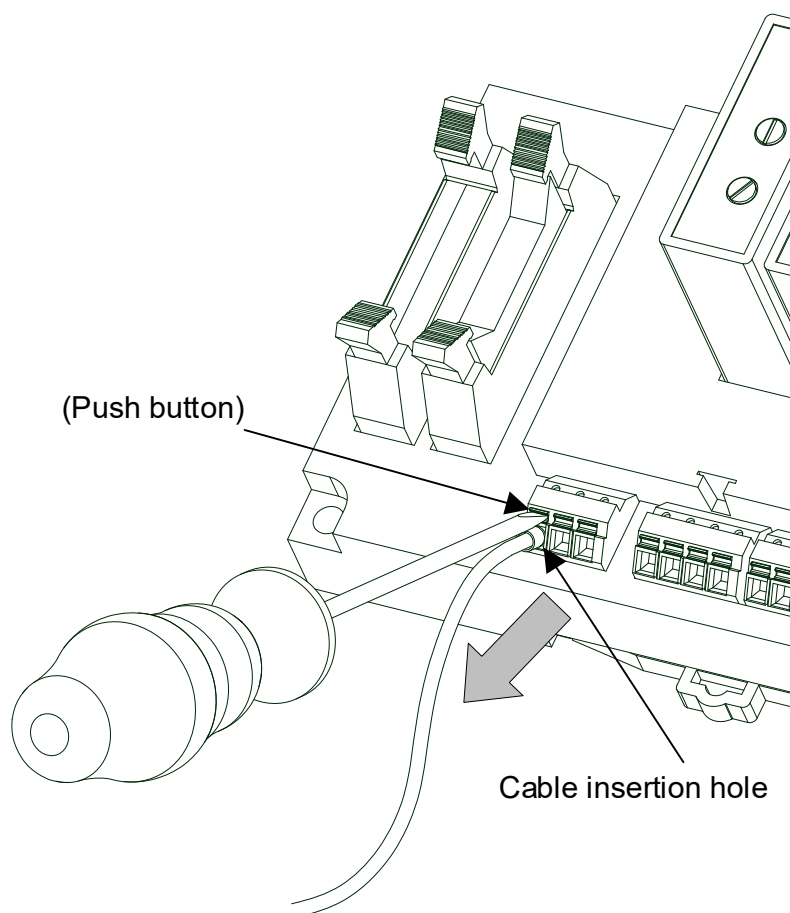
When binding twisted wires, press the push button using the screw driver, then insert the twisted wires into the wire insertion hole.

\* Make sure to insert the wire straight as far as it will go.



(2) Wires removal

Press the push button all the way using the screw driver, then pull out the wire.



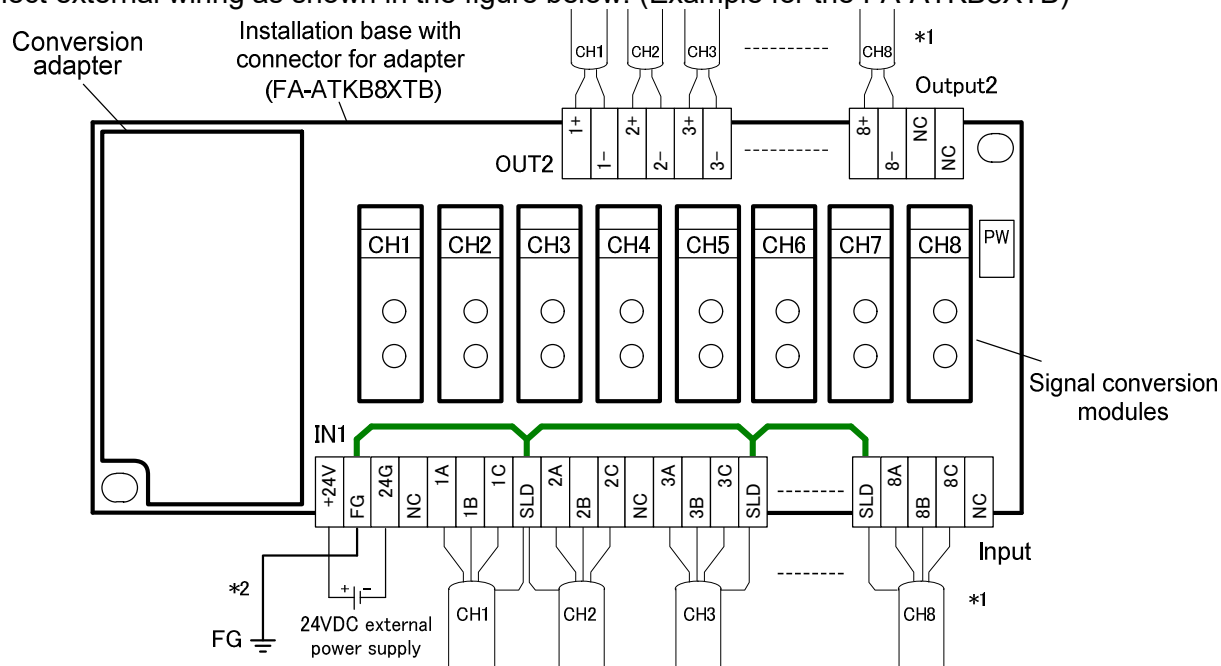
Use the screw driver shown in the table below.

Recommended tool (screw driver)		
Manufacturer	Model	Blade edge size
PHOENIX CONTACT	SZS 0,4×2,5 VDE	2.5x0.4mm



## 8. EXTERNAL CONNECTION

Connect external wiring as shown in the figure below. (Example for the FA-ATKB8XTB)

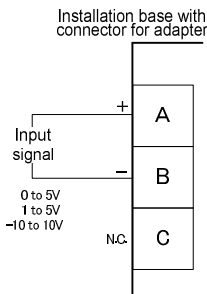
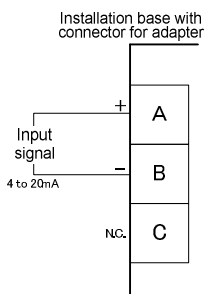
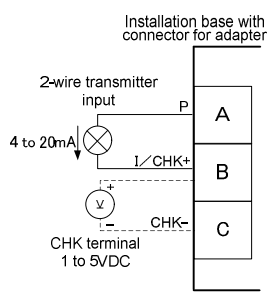
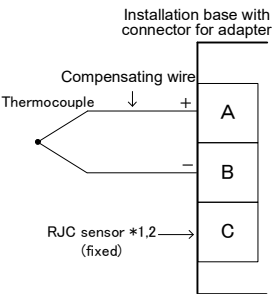
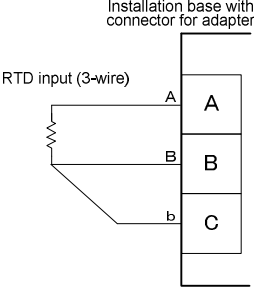
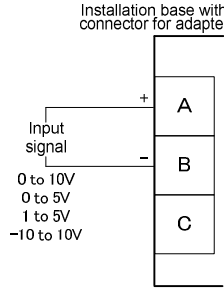
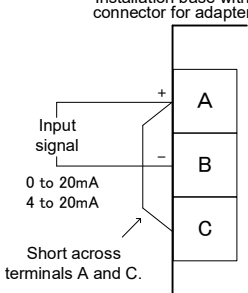


\*1: Use shielded wires, and ground the shields. SLD terminals on the input terminal block (IN1) of the FA-ATKB8XTB are internally connected to the FG terminal and can be used as relay terminals to ground the shields of the external cables.

\*2: Ground the FG terminal regardless of whether or not SLD terminals are used.

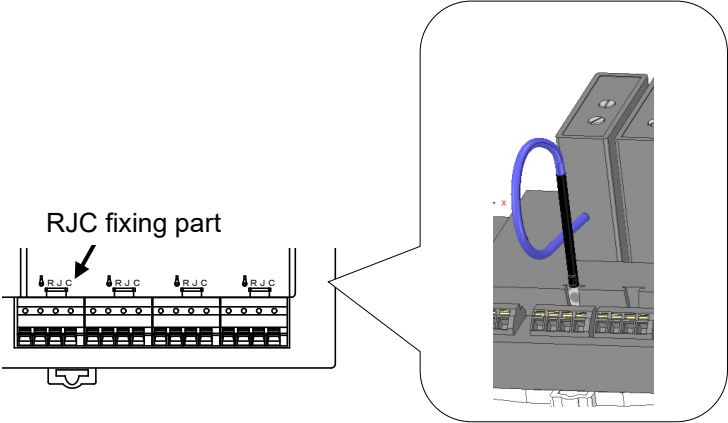
The wiring to the input terminal block (IN1) differs depending on the signal conversion modules and the pass-through modules to be mounted. The wiring between each signal conversion module or pass-through module and the installation base is as follows.

●Wiring diagrams between each signal conversion module or pass-through module and the installation base

Voltage input (FA-ATSVM1XV****)	Current input (FA-ATSVM1XA420)	2-wire transmitter input (FA-ATSVM1XD)	Thermocouple temperature input (FA-ATSVM1XT*)
<p>Installation base with connector for adapter</p> 	<p>Installation base with connector for adapter</p> 	<p>Installation base with connector for adapter</p> 	<p>Installation base with connector for adapter</p> 
RTD temperature input (FA-ATSVM1XR***)	Pass-through module (FA-ATFTMX*) *3		
	When signals are passed through	When current is converted to voltage	
<p>Installation base with connector for adapter</p> 	<p>Installation base with connector for adapter</p> 	<p>Installation base with connector for adapter</p> 	

\*1: Connect the end (round solderless terminal) of the RJC sensor of the thermocouple temperature input signal conversion module to the terminal block. The round solderless terminal and the internal circuit of the signal conversion module are electrically insulated. Do not pull strongly, twist, or bend the RJC sensor of the thermocouple temperature input signal conversion module. Doing so may cause failure of the RJC sensor.

\*2: For FA1-AT1B8X1TE or FA1-AT1B4X1TE, fix the RJC sensor to the RJC fixing part as shown in the figure below.



\*3: When the FA-ATKB8XTB is used, only voltage input (1 to 5V) can be used.

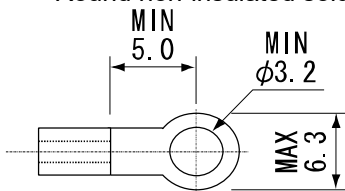
## 9. APPLICABLE SOLDERLESS TERMINALS

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-3L 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-3L 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-N3A 1.25-C3.5A	V1.25-B3A V1.25-N3A
	1.25 to 2.0mm <sup>2</sup>	2-MS3	V2-MS3	2-N3A 2-M3A	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 VD1.25-3.5S	VDAV1.25-3L VDAV1.25-3.5SS VDAV1.25-3.5S
	1.25 to 2.0mm <sup>2</sup>	R2-3SL	RAV2-3SL RAP2-3SL	VD2-3S VD2-3.5SS VD2-3.5S	VDAV2-3.5SS VDAV2-3.5S

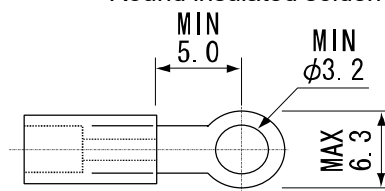
### • Solderless terminal dimensions

[Unit : mm]

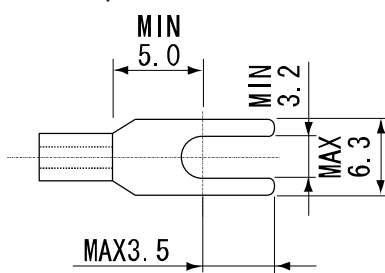
Round non-insulated solderless terminal



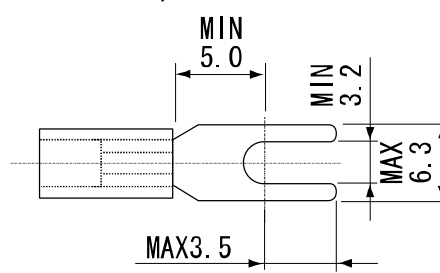
Round insulated solderless terminal



Y-shaped non-insulated solderless terminal

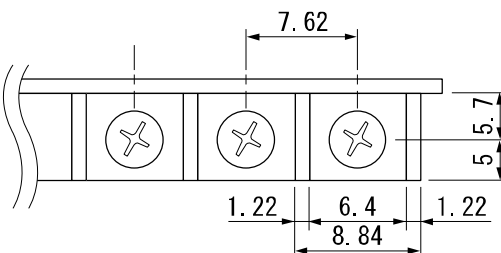


Y-shaped insulated solderless terminal



### • Terminal block shape

[Unit : mm]



- Applicable solderless terminals (ferrule)

Type		Applicable ferrule	Crimp tool
Manufacturer	Applicable wire size		
PHOENIX CONTACT	0.25 mm <sup>2</sup> (AWG24)	Al 0,25-10 YE	CRIMPFOX 6
	0.34 mm <sup>2</sup> (AWG22)	Al 0,34-10 TQ	
	0.5 mm <sup>2</sup> (AWG20)	Al 0,5-10 WH	
	0.75 mm <sup>2</sup> (AWG18)	Al 0,75-10 GY	
	1.0 mm <sup>2</sup> (AWG18)	Al 1-10 RD	
	1.5 mm <sup>2</sup> (AWG16)	Al 1,5-10 BK	

## 10. PERCAUTIONS

- (1) Allow the product to warm up for 10 minutes or more to satisfy accuracy specifications of the product.
- (2) Since the signal conversion module had been calibrated at the factory, calibration at the site is not necessary.  
However, when the calibration is required for the conformity between the signal conversion module and other connected device, make the zero/span adjustment as follows:  
(Trimmer operation ··· Turn to the right (in clockwise) for increasing a value,  
Turn to the left (in counterclockwise) for decreasing a value)
  - 1) Allow the product to warm up for 10 minutes or more after powering it on.
  - 2) Input the signal equivalent to 0% in the input range, and adjust output signal to 0% by using the zero adjustment trimmer.
  - 3) Input the signal equivalent to 100% in the input range, and adjust output signal to 100% by using the span adjustment trimmer.
  - 4) Complete the zero/span adjustment by repeating the operation in Step 2 and 3.
  - 5) Input the signal of 25%, 50%, and 75% in the input range, and check the output linearity.
- (3) Since the conversion adapter had been calibrated at the factory, it is not necessary to be calibrated.  
When the calibration is required for the conformity between the conversion adapter and other connected device, make the zero/span adjustment on the signal conversion module.

## 11. 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.

## 12. REPAIRABLE PERIOD AFTER DISCONTINUATION OF PRODUCTION

- (1) The period in which product repair (fee applied) is available is seven (7) years after product discontinuation.  
Discontinuation of production shall be reported by the distributor.
- (2) Product supply (including spare parts) is not possible after production has been discontinued.

## 13. 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.

## 14. 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**

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