Mitsubishi Electric Programmable Controller

Upgrade Tool

Conversion Adapter

Model
ERNT-2AR68TD

User's Manual

50CM-D180357-A(1811)

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● SAFETY PRECAUTIONS ●
(Always read these precautions prior to use.)

Before using this product, please read this manual carefully and pay full attention to safety to ensure that the product is used correctly.

The precautions presented in this manual are concerned with this product only. For Programmable Controller system safety precautions, refer to "Safety Guidelines" for MELSEC iQ-R Series Modules.

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 ranked as "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 medium or minor injury and/or property damage.

Note that failure to observe the ⚠ CAUTION level instructions may lead to a serious consequence according to the circumstances. Always follow the precautions of both levels because they are important to personal safety.

Please keep this manual in an easy-to-access location for future reference, and be sure to provide the manual to the end user.

[Precautions before using]

⚠ CAUTION
● When replacing the MELSEC-AnS Series with the MELSEC iQ-R Series, be sure to refer to the Programmable Controller Module manuals to check the differences in performance, functionality, CPU input/output signals, buffer memory addresses and the like.

[Installation Precautions]

⚠ CAUTION
● Use the conversion adapter and conversion adapter anchor base in the environment conditions described in the general specifications in "Safety Guidelines" for MELSEC iQ-R Series Modules. Failure to do so could lead to electric shock, fire, malfunction or product failure or deterioration.
● Do not come in direct contact with the conductive area of the conversion adapter. Doing so could lead to system malfunction or failure.
● Fully secure the conversion adapter and conversion adapter anchor base using the installation screws, and tighten the installation screws securely within the specified torque range. Failure to do so could cause the conversion adapter and anchor base to fall, resulting in conversion adapter and conversion adapter anchor base damage.
● Always check for correct match between MELSEC iQ-R Series and the conversion adapter. Incorrect match can cause damage to the MELSEC iQ-R Series module.

[Wiring Precautions]

⚠ WARNING
● Be sure to shut off all phases of the external power supply before performing installation or wiring work. Failure to do so could result in electric shock or product damage.
● If you want to energize and run the unit after completing the installation and wiring work, be sure to close the terminal block cover attached to the MELSEC-AnS series terminal block. Failure to do so could result in electric shock.

⚠ CAUTION
● Properly wire the conversion adapter after verifying the specifications and terminal layout of the module to be used. Connecting a power supply with a different rating or improper wiring could lead to fire or product failure.
● Securely tighten the conversion adapter installation screws, conversion adapter anchor base installation screws and MELSEC-AnS series terminal block installation screws within the specified torque range. A loose screw may result in a short circuit, fire or malfunction. An excessively tightened screw may result in screw or conversion adapter damage, causing the conversion adapter to fall, a short circuit or product malfunction.
● Do not allow foreign matter such as cuttings or wiring shavings to enter the conversion adapter or module. Doing so could lead to fire, failure or malfunction.

[Startup and Maintenance Precautions]

⚠ WARNING
● Do not touch the terminals during energization. Doing so could result in electric shock or malfunction.
● Be sure to shut off all phases of the external power supply before cleaning and retightening the terminal screws. Failure to do so could lead to electric shock. Excessively tightened screws could result in conversion adapter or input/output module damage, causing the conversion adapter to fall, a short circuit or product malfunction.

⚠ CAUTION
● Do not disassemble or modify the conversion adapter. Doing so could lead to failure, malfunction, injury or fire.
● The conversion adapter case is made of resin. Do not drop or apply excessive impact to the case. Doing so could lead to conversion adapter damage.

[Disposal Precautions]

⚠ CAUTION
● When disposing of the product, treat it as industrial waste.

EMC AND LOW VOLTAGE DIRECTIVES

Compliance to the EMC Directive, which is one of the EU Directives, has been a legal obligation for the products sold in European countries since 1996 as well as the Low Voltage Directive since 1997.
Manufacturers who recognize their products are compliant to the EMC and Low Voltage Directives are required to declare that print a "CE mark" on their products.

Authorized representative in Europe
Authorized representative in Europe is shown below.
Name: Mitsubishi Electric Europe B.V.
Address: Mitsubishi-Electric-Platz 1, 40882 Ratingen, Germany

1. Overview

This manual describes the Mitsubishi Electric Programmable Controller Upgrade Tool conversion adapter (ERNT-2AR68TD). The conversion adapter is a product that converts the differences in MELSEC-AnS series and MELSEC iQ-R series pin assignments.
When replacing the MELSEC-AnS Series with the MELSEC iQ-R Series, be sure to refer to the Programmable Controller Module manuals to check the differences in performance, functionality, CPU input/output signals, buffer memory addresses and the like.
Once you have opened the packaging, verify that it contains the following products.

Product	Shape	Qty	Product	Shape	Qty
Conversion Adapter		1	Terminal block cover		1
This manual	–	1			

2. Specifications

2.1 General Specifications

Item	Specifications				
Operating ambient temperature	0 to 55℃ (Maximum surrounding air temperature 55℃)				
Storage ambient temperature	-25 to 75℃				
Operating ambient humidity	5 to 95%RH, non-condensing				
Storage ambient humidity					
		Frequency	Constant acceleration	Half amplitude	Sweep count
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2	Under intermittent vibration 5 to 8.4Hz	–	3.5mm	10 times each in X, Y, Z directions
		8.4 to 150Hz	9.8m/s²	–	
		Under continuous vibration 5 to 8.4Hz	–	1.75mm	–
		8.4 to 150Hz	4.9m/s²	–	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147m/s², 3 times each in 3 directions X, Y, Z)				
Operating atmosphere	No corrosive gases				
Operating altitude *1	0 to 2000m				
Installation location	Inside a control panel *2				
Overvoltage category *3	II or less				
Pollution degree *4	2				

*1: Do not use or store under pressure higher than the atmospheric pressure of altitude 0m.
*2: 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: This 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. Category II applies to equipment for which electrical power is supplied from fixed facilities.
*4: This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used. Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

2.2 Hardware Specifications

Item	Specifications
Thermoelectric power	-9.8mV to 76.4mV(max)

3. Product Specifications

For detail specifications which do not appear in the specification comparison charts contained herein, see the user's manual supplied with the iQ-R Series Module you use. Also, check that the specifications of the connected devices meet the specifications of the iQ-R Series Module.

Conversion Adapter Model	MELSEC-AnS Series Model	No of channels	MELSEC iQ-R Series Model	Conversion Adapter Weight (g)
ERNT-2AR68TD	A1S68TD	8 channels	R60TD8-G	70

Internal circuit diagram of ERNT-2AR68TD
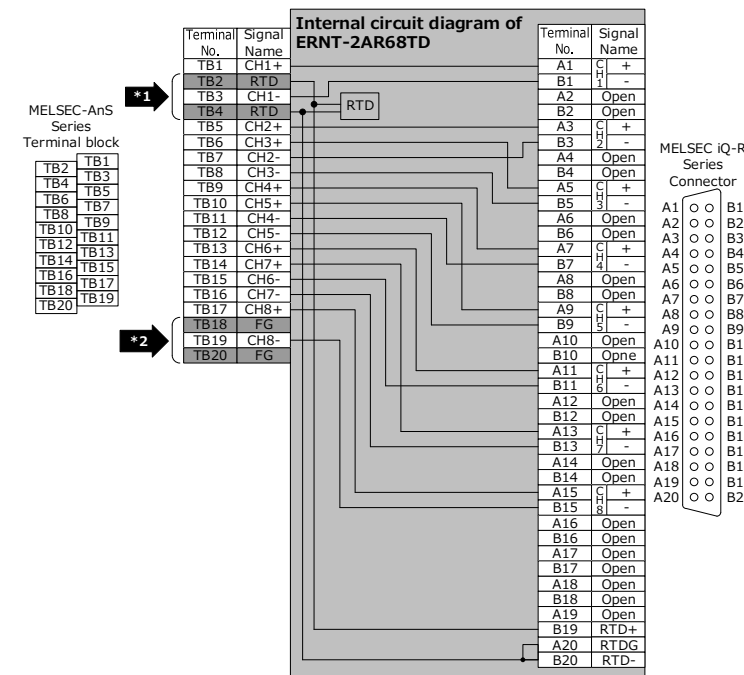
Precautions for wiring

*1 A cold junction compensating resistor (RTD) is built in the Conversion Adapter; therefore, always remove the cold junction compensating resistor (RTD) connected to the A1S68TD terminal block (TB2, TB4).

The temperature cannot be correctly measured with the wiring connected.

*2 Wiring to connect the FG terminals (TB18 and TB20) on the A1S68TD is not required because there is no FG terminals on the R60TD8-G side. Note, however, that leaving the FG terminal connected will not cause a problem because the wire is not connected inside of the Conversion Adapter.

TB18	FG
TB19	CH8-
TB20	FG

< Specification comparison >

Specification Model	MELSEC-AnS Series A1S68TD	MELSEC iQ-R Series R60TD8-G
Temperature sensor input	0 to 1700℃	-270 to 1820℃
Output — Temperature conversion value	16-bit signed binary (0 to 17000: Value to the first decimal place ×10)	16-bit signed binary: -2700 to 18200
Output — Scaling value	16-bit signed binary (0 to 2000)	16-bit signed binary
Thermocouple compliance standards	JIS C1602-1981	JIS C1602-1995, IEC 60584-1(1995), IEC 60584-2(1982)
Applicable thermocouple and conversion accuracy	Refer to the table on the back	
Cold junction compensation accuracy	±1.0℃	
Overall accuracy	(conversion accuracy) + (temperature characteristic) × (operating ambient temperature variation) + (cold junction compensation accuracy)	
Resolution	B,R,S : 0.3℃ K,E,J,T: 0.1℃	B,R,S,N: 0.3℃ K,E,J,T: 0.1℃
Conversion speed	400ms/8 channels	30ms/channel *1
Number of analog input points	8 channels + cold junction compensation channel / module	
Disconnection detection	Available	Available (each channel respectively)
Isolation Method — Between thermocouple input channel and programmable controller power supply	Transfer isolation	
Isolation Method — Between thermocouple input channels	Transfer isolation	
Isolation Method — Between cold junction compensation channel and programmable controller power supply	No isolation	
I/O occupied points	32 points	16 points
Wiring connection system	20 point terminal block	40-pin connector
Internal current consumption (5VDC)	0.32A	0.36A

*1: This conversion speed is the time required to store a measured temperature value into the buffer memory in sampling processing.

Make sure the [ ] section of the above table meets the specification of the machines and equipment connected to the MELSEC iQ-R Series module.

Precautions for the program

(1) A1S68TD and R60TD8-G differ from each other in the way input/output signals (X, Y) and buffer memory addresses are allocated. Therefore, you need make necessary changes to the sequence program that is used.
(2) R60TD8-G has a greater conversion speed as compared with A1S68TD. This can make it possible for R60TD8-G to pick up noise, which A1S68TD would not, as an analog signal. In such case, eliminate the effects of noise by using the average processing function that is provided.
(3) The thermocouple type which is set with the DIP switch for A1S68TD is set using the basic setting of an engineering tool for the R60TD8-G.

POINT
(1) When an error occurs in the measured temperature, the error can be corrected using the offset/gain setting in the R60TD8-G.

Applicable thermocouple and conversion accuracy

Thermo-couple type	A1S68TD Measured temperature range	A1S68TD Conversion accuracy (At operating ambient temperature 25±5℃)	A1S68TD Temperature characteristic (Per operating ambient temperature variation of 1℃)	R60TD8-G Measured temperature range *2	R60TD8-G Conversion accuracy (At operating ambient temperature 25±5℃)	R60TD8-G Temperature characteristic (Per operating ambient temperature variation of 1℃)	R60TD8-G Max. temperature error at ambient temperature 55℃	R60TD8-G Effect per wiring resistance 1Ω *5
B	–	–	–	0 to 600℃	*3	*3	*3	*3
	–	–	–	600 to 800℃ *4	±1.3℃	±0.3℃	±8.8℃	0.042℃/Ω
	800 to 1700℃	±2.5℃	±0.4℃	800 to 1700℃ *4	±1.0℃	±0.29℃	±8.25℃	0.036℃/Ω
	–	–	–	1700 to 1820℃	*3	*3	*3	*3
R	–	–	–	-50 to 0℃	*3	*3	*3	*3
	–	–	–	0 to 300℃ *4	±1.5℃	±0.4℃	±11.5℃	0.05℃/Ω
	300 to 1600℃	±2℃	±0.3℃	300 to 1600℃ *4	±0.8℃	±0.29℃	±8.05℃	0.028℃/Ω
	–	–	–	1600 to 1760℃	*3	*3	*3	*3

< Specification comparison (continued) >

Thermo-couple type	A1S68TD			R60TD8-G				
	Measured temperature range	Conversion accuracy (At operating ambient temperature 25±5℃)	Temperature characteristic (Per operating ambient temperature variation of 1℃)	Measured temperature range *2	Conversion accuracy (At operating ambient temperature 25±5℃)	Temperature characteristic (Per operating ambient temperature variation of 1℃)	Max. temperature error at ambient temperature 55℃	Effect per wiring resistance 1Ω *5
S	—	—	—	-50 to 0℃	*3	*3	*3	*3
	—	—	—	0 to 300℃	±1.5℃	±0.4℃	±11.5℃	0.05℃/Ω
	300 to 1600℃	±2℃	±0.3℃	300 to 1600℃ *4	±0.8℃	±0.29℃	±8.05℃	0.028℃/Ω
	—	—	—	1600 to 1760℃	*3	*3	*3	*3
K	—	—	—	-270 to -200℃	*3	*3	*3	*3
	—	—	—	-200 to 0℃ *4	±0.5℃	Larger value of ±0.06℃ or ±0.1% of measured temperature	±5.5℃	0.017℃/Ω
	0 to 1200℃	Larger value of ±0.5℃ or ±0.25% of measured temperature	Larger value of ±0.07℃ or ±0.02% of measured temperature	0 to 1200℃ *4	±0.3℃	Larger value of ±0.06℃ or ±0.02% of measured temperature	±6.3℃	0.007℃/Ω
	—	—	—	1200 to 1370℃	*3	*3	*3	*3
E	—	—	—	-270 to -200℃	*3	*3	*3	*3
	—	—	—	-200 to 0℃ *4	±0.5℃	Larger value of ±0.06℃ or ±0.15% of measured temperature	±8.0℃	0.01℃/Ω
	0 to 800℃	Larger value of ±0.5℃ or ±0.25% of measured temperature	Larger value of ±0.07℃ or ±0.02% of measured temperature	0 to 900℃ *4	±0.2℃	Larger value of ±0.06℃ or ±0.02% of measured temperature	±4.7℃	0.005℃/Ω
	—	—	—	900 to 1000℃	*3	*3	*3	*3
J	—	—	—	-210 to -40℃	*3	*3	*3	*3
	0 to 750℃	Larger value of ±0.5℃ or ±0.25% of measured temperature	Larger value of ±0.07℃ or ±0.02% of measured temperature	-40 to 750℃ *4	±0.2℃	Larger value of ±0.06℃ or ±0.02% of measured temperature	±3.95℃	0.006℃/Ω
	—	—	—	750 to 1200℃	*3	*3	*3	*3
T	—	—	—	-270 to -200℃	*3	*3	*3	*3
	—	—	—	-200 to 0℃ *4	±0.5℃	Larger value of ±0.06℃ or ±0.1% of measured temperature	±5.5℃	0.016℃/Ω
	0 to 350℃	Larger value of ±0.5℃ or ±0.25% of measured temperature	Larger value of ±0.07℃ or ±0.02% of measured temperature	0 to 350℃ *4	±0.4℃	Larger value of ±0.06℃ or ±0.02% of measured temperature	±2.15℃	0.007℃/Ω
	—	—	—	350 to 400℃	*3	*3	*3	*3
N	Unavailable			-270 to -200℃	*3	*3	*3	*3
				-200 to 0℃ *4	±0.5℃	Larger value of ±0.06℃ or ±0.2% of measured temperature	±6.2℃	0.025℃/Ω
				0 to 1250℃ *4	±0.5℃	Larger value of ±0.06℃ or ±0.02% of measured temperature	±6.75℃	0.01℃/Ω
				1250 to 1300℃	*3	*3	*3	*3

*2: If a value entered from the thermocouple is outside the measured temperature range given in the table, it is handled as the maximum/minimum value of the measured temperature range.

*3: Temperature measurement can be executed, but accuracy is guaranteed.

*4: The accuracy is applied to only the temperature range of class 1 to 3 of JIS C 1602-1995.

*5: The value indicates a temperature error generated per wiring resistance 1Ω of a thermocouple. Check the resistance value and calculate the temperature error of the system. If the error is beyond the allowable range of the system used, correct the measured temperature value with the offset/gain setting.

4. Mounting and Installation

4.1 Handling Precautions

(1) Before attempting to install the Unit or carry out the necessary wiring, make certain that the external power supply, used in the system, is shut off on all three phases. Failure to do so may result in electric shock or damage to the product.

(2) Do not touch live terminals. There is a danger of electric shock or malfunction.

(3) Do not modify the Conversion Adapter or take it apart. Doing so will cause failure, malfunction, personal injury, or fire.

(4) Do not touch the energized part of the Conversion Adapter directly. Contact will cause malfunction or failure in the system.

(5) Fasten the Conversion Adapter, securely with retaining screws, and tighten the screws by applying torque within specified limits. Loose screws can lead to the dropping of the Conversion Adapter, possibly causing breakage thereof. Excessive tightness of the screws can lead to breakage of the screws, Converter Adapter, or MELSEC-Q Series Module, possibly causing the dropping, shorting, and malfunction thereof.

(6) Use care to prevent foreign materials including cuttings and wiring debris from entering the Conversion Adapter or the MELSEC-Q Series Module. These will be cause for fire, failure or malfunction.

(7) Do not drop the Conversion Adapter or do not give a strong impact to it. This will cause damage.

(8) Conversion Adapter is intended for indoor use only.

4.2 Use Precautions

Item	Use Precautions
Width dimension of module	Because the module is reduced in width dimension (34.5mm→27.8mm) and thus in area available for wiring, check dimensional data before installing the module. <MELSEC-AnS Series> <MELSEC iQ-R Series> 34.5mm → 27.8mm
Terminal block cover	The terminal block cover for MELSEC-AnS Series is bigger than the width of the MELSEC iQ-R Series Module. Therefore, it is necessary to replace it with the terminal block cover supplied with the converter adapter. <MELSEC-AnS Series> <MELSEC iQ-R Series> Terminal block cover for the MELSEC-AnS Series → Replace the terminal block cover with the one supplied with the Conversion Adapter. 34.5mm → 27.8mm

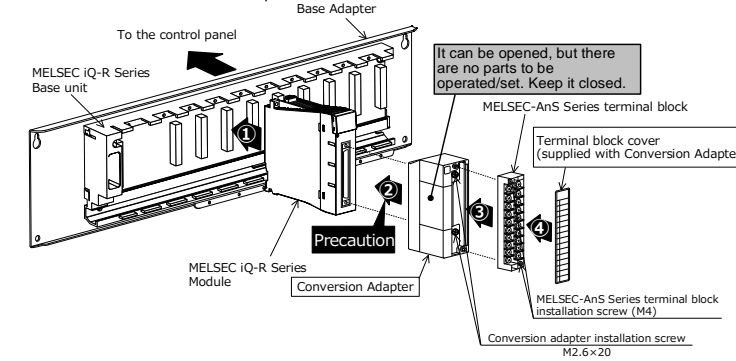| Item	Use Precautions
Depth and Height dimension	Installation with the Base Adapter — Because the module is increased in depth dimension, check dimensional data before installing the module. MELSEC-AnS Series — MELSEC iQ-R Series — Conversion adapter — Base adapter — 110mm / 6.4mm UP / 176.6mm / 66.6mm UP
	Installation with the DIN rail — Because the module is increased in depth and height dimension, check dimensional data before installing the module. MELSEC-AnS Series — MELSEC iQ-R Series — Conversion adapter — 4 / 65 / 75.4 / 106 / 10.4mm UP / 169.6 / 63.6mm UP

4.3 Installation Environment

Refer to "Safety Guidelines" for iQ-R Series Modules.
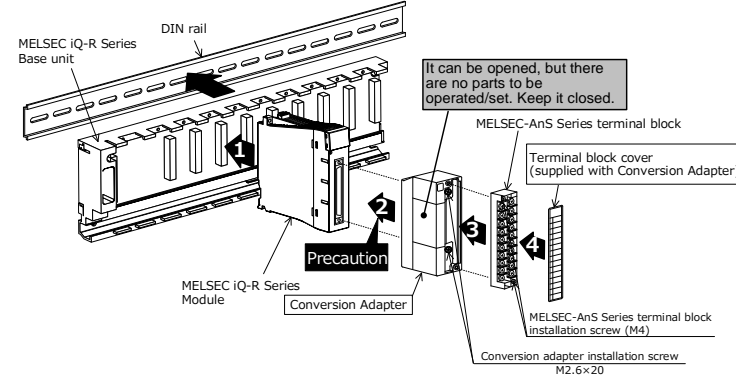
4.4 Wiring module power source

External connection to 24VDC power supply circuit of Conversion Adapter must be powered from approved source that meets of SELV/PELV, Class 2, and limited energy according to UL 61010-2-201.

5. Part Names and Installation Method

【Installation with the Base Adapter】

To the control panel — Base Adapter — MELSEC iQ-R Series Base unit — It can be opened, but there are no parts to be operated/set. Keep it closed. — MELSEC-AnS Series terminal block — Terminal block cover (supplied with Conversion Adapter) — MELSEC iQ-R Series Module — Conversion Adapter — Precaution — MELSEC-AnS Series terminal block installation screw (M4) — Conversion adapter installation screw M2.6×20

【Installation with the DIN rail】

MELSEC iQ-R Series Base unit — DIN rail — It can be opened, but there are no parts to be operated/set. Keep it closed. — MELSEC-AnS Series terminal block — Terminal block cover (supplied with Conversion Adapter) — MELSEC iQ-R Series Module — Conversion Adapter — Precaution — MELSEC-AnS Series terminal block installation screw (M4) — Conversion adapter installation screw M2.6×20

5.1 Installation Method

Installation with the Base Adapter	Installation with the DIN rail
Mount the MELSEC iQ-R Series Base Unit to the Base Adapter. Refer to the Base Adapter's manual for how to install them to the control panel.	Mount the DIN rail mounting adapter manufactured by Mitsubishi Electric to the MELSEC iQ-R Series Base Unit. For how to install the Base Unit on the DIN rail, refer to the MELSEC iQ-R Module Configuration Manual.

① Mount the MELSEC iQ-R Series module to the MELSEC iQ-R Series Base Unit.

② Install the Conversion Adapter to the MELSEC iQ-R Series module, and secure it with the Conversion Adapter installation screws (M2.6×20). (2 places)

> **Precaution**
> Before tightening the installation screws, check that the Conversion Adapter has been securely installed on the MELSEC iQ-R Series module. Tightening the screws in floating-off state or tilting state will damage the Conversion Adapter installation screws and the MELSEC iQ-R Series module.

③ Secure the MELSEC-AnS Series terminal block to the Conversion Adapter with the supplied terminal block installation screw (M4). (2 places, top and bottom.)

④ Remove the terminal block cover from the MELSEC-AnS Series terminal block and fit the terminal block cover supplied with the Conversion Adaptor in place.

5.2 Tightening Torque

Tighten the module installation screws to the specified torque below. An inappropriate tightening torque could cause the product to fall or result in a short circuit, product failure or malfunction.

Screw Location	Tightening Torque Range
Conversion Adapter installation screw (M2.6×20)	0.20 to 0.29N·m
MELSEC-AnS Series terminal block installation screw (M4 screw)	0.78 to 1.18N·m

6. External Dimensions
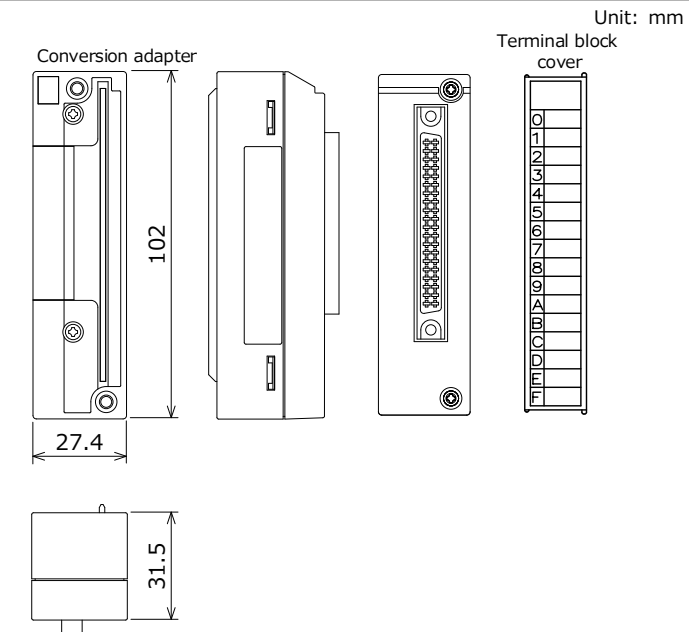
Unit: mm

Conversion adapter — Terminal block cover — 102 — 27.4 — 31.5 — 0 1 2 3 4 5 6 7 8 9 A B C D E F

Product Warranty Details

Please confirm the following product warranty details prior to product use.

Gratis Warranty Terms and Gratis Warranty Range

If any fault or defect (hereinafter referred to as "Failure") attributable to Mitsubishi Electric Engineering Company Limited (hereinafter referred to as "MEE") should occur within the gratis warranty period, MEE shall repair 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.
Note that after manufacture and shipment from MEE, the maximum distribution period shall be six (6) months, and the gratis warranty period after manufacturing shall be limited to eighteen (18) months.
In addition, the gratis warranty period for repaired products shall not exceed the gratis warranty period established prior to repair.

■ **Gratis Warranty Range**
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.

Warranty Period after Discontinuation of Production

(1) MEE shall offer product repair services (fee applied) for seven (7) years after production of the product has been discontinued. Discontinuation of production shall be reported via distributors.
(2) Product supply (including spare parts) is not possible after production has been discontinued.

Exclusion of Opportunity Loss and Secondary Loss from Warranty Liability

Regardless of the gratis warranty period, MEE shall not be liable for compensation for damages arising from causes not attributable to MEE, opportunity losses or lost profits incurred by the user due to Failures of MEE products, damages or secondary damages arising from special circumstances, whether foreseen or unforeseen by MEE, compensation for accidents, compensation for damages to products other than MEE products, or compensation for other work carried out by the user.

Changes in Product Specifications

The specifications given in the catalogs, manuals and technical documents are subject to change without notice.

This document is a new publication, effective November 2018. Specifications are subject to change without notice.