

# Modular Temperature Controller EJ1

**Implement a Multi-Point Control System Easily  
with Space Saving and Wire Saving  
by Connecting Modules  
Renewed as a Device with Low Power  
Consumption at the Industry's Top Class\*1**



- Up to 64 4-channel and 2-channel units can be connected.
- Environmentally friendly with power consumption reduced by 40%. \*2
- Includes a disturbance overshoot adjustment function capable of improving the temperature fluctuation range.
- Communication connection with highly accurate and versatile single-phase power controllers (G3PW/up to 8 units) is possible.
- Communication connection with achievement of high-precision control with low noise through multi-channel power controllers with optimal cycle control (G3ZA, up to 8 units) is possible.
- Autotuning (AT) can be used for independent heating/cooling PID control.

\*1. Based on November 2022 OMRON investigation.

\*2. Compared to the previous models produced in or before November 2022 (V1.2 or earlier)

## Ordering Information

### Temperature Controller Standard Control Models

Name	Power supply voltage	No. of control points	Control outputs 1 and 2	Control outputs 3 and 4	Auxiliary output	Functions		Communications functions	Input type	Terminal	Model
						Heater burnout alarm	Event inputs				
Basic Unit (temperature control) *1	24 VDC supplied from the End Unit	2	Voltage output: 2 points (for SSR drive) *2	Transistor output: 2 points (sinking)	None	2 *3	2	G3ZA connection port: RS-485 From End Unit: Port A or port B: RS-485	Thermocouple, platinum resistance thermometer, analog voltage, and analog current selectable for each channel.	M3 terminal	EJ1N-TC2A-QNHB
										Screw-less clamp	EJ1N-TC2B-QNHB
		4	Voltage output: 2 points (for SSR drive) *2	Transistor output: 2 points (sinking)	None	None	None			M3 terminal	EJ1N-TC4A-QQ
										Screw-less clamp	EJ1N-TC4B-QQ
		2	Current output: 2 points	Transistor output: 2 points (sinking)	None	None	2			M3 terminal	EJ1N-TC2A-CNB
Screw-less clamp	EJ1N-TC2B-CNB										
End Unit *1	24 VDC	None	None	None	Transistor output: 2 points (sinking)	None	None	Port A or B: RS-485 Connector: Port A	No input	M3 terminal	EJ1C-EDUA-NFLK
										Detachable connector	EJ1C-EDUC-NFLK

\*1. An End Unit is always required for connection to a Basic Unit.

\*2. For heating/cooling control applications, control outputs 3 and 4 on the 2-point models are used for the cooling or heating control outputs. On the 4-point models, heating/cooling control is performed for the two input points.

\*3. When using the heater burnout alarm, purchase a Current Transformer (E54-CT1, E54-CT1L, E54-CT3 or E54-CT3L) separately.

**Note:** Products for the EtherCAT master are also available. Ask your OMRON sales representative for details.

Refer to the following manual for precautionary information and other information necessary to use the EJ1:  
EJ1 Modular Temperature Controllers User's Manual (Cat. No. H142)

EtherCAT® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

---

## Accessories (Order Separately)

### Current Transformer (CT)

Diameter	Model
5.8 dia.	E54-CT1
5.8 dia.	E54-CT1L
12.0 dia.	E54-CT3
12.0 dia.	E54-CT3L

**Note:** If UL certification is required, be sure to purchase the E54-CT□L (with lead wire) for use. Note that the E54-CT□ (without lead wire) cannot be used if UL certification is required.

### G3ZA Connecting Cable

Cable length	Model
5 m	EJ1C-CBLA050

### Rail Mounting Equipment

Name	Model
DIN Track	PFP-100N
	PFP-50N

### CX-Thermo Support Software

Model
EST2-2C-MV4

### USB-Serial Conversion Cable

Model
E58-CIFQ1

## Specifications

### Basic Unit/EJ1N-TC

### Ratings

Item	Type	EJ1N-TC4	EJ1N-TC2
Power supply voltage		24 VDC	
Operating voltage range		85% to 110% of rated voltage	
Power consumption		3 W max. (at maximum load)	2.5 W max. (at maximum load)
Input *		Thermocouple: K, J, T, E, L, U, N, R, S, B, C/W, PLII ES1B Infrared Thermosensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, 140 to 260°C Analog input: 4 to 20 mA, 0 to 20 mA, 1 to 5 V, 0 to 5 V, 0 to 10 V Platinum resistance thermometer: Pt100, JPt100	
Input impedance		Current input: 150 Ω max., voltage input: 1 MΩ min.	
Control outputs	Voltage output	Output voltage: 12 VDC ±15%, max. load current: 21 mA (PNP models with short-circuit protection circuit)	
	Transistor output	---	Max. operating voltage: 30 VDC, max. load current: 100 mA
	Current output	---	Current output range: 4 to 20 mA or 0 to 20 mA DC Load: 500 Ω max. (including transfer output) (Resolution: Approx. 10,000)
Event inputs	Input points	---	2
	Contact input	---	ON: 1 kΩ max., OFF: 100 kΩ min.
	Non-contact input	---	ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.
		---	Outflow current: Approx. 4 mA per point
Number of input and control points		Input points: 4, Control points: 4	Input points: 2, Control points: 2
Setting method		Via communications	
Control method		ON/OFF control or 2-PID (with autotuning, self-tuning)	
Other functions		Two-point input shift, digital input filter, remote SP, SP ramp, manual manipulated variable, manipulated variable limiter, interference overshoot adjustment, loop burnout alarm, RUN/STOP, banks, I/O allocations, etc.	
Ambient temperature range		Operating: -10°C to 55°C, Storage: -25°C to 65°C (with no icing or condensation)	
Ambient humidity range		Operating: 25% to 85% (with no condensation)	

\* Inputs are fully universal. Therefore, platinum resistance thermometer, thermocouple, infrared thermosensor, and analog input can be selected.

## Characteristics

<b>Indication accuracy</b>	Thermocouple input: ( $\pm 0.3\%$ of indication value or $\pm 1^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. *1 Platinum resistance thermometer input: ( $\pm 0.2\%$ of indication value or $\pm 0.8^\circ\text{C}$ , whichever is greater) $\pm 1$ digit max. Analog input: $\pm 0.2\%$ FS $\pm 1$ digit max. CT input: $\pm 5\%$ FS $\pm 1$ digit max.
<b>Hysteresis</b>	0.1 to 999.9 EU (in units of 0.1 EU) *2
<b>Proportional band (P)</b>	0.1 to 999.9 EU (in units of 0.1 EU) *2
<b>Integral time (I)</b>	0 to 3,999 s (in units of 1 s)
<b>Derivative time (D)</b>	0.0 to 999.9 s (in units of 0.1 s)
<b>Control period</b>	0.5 s, 1 to 99 s (in units of 1 s)
<b>Manual reset value</b>	0.0% to 100.0% (in units of 0.1%)
<b>Alarm setting range</b>	-1,999 to 9,999 (decimal point position depends on input type)
<b>Sampling period</b>	250 ms
<b>Influence of signal source resistance</b>	Thermocouple: $0.1^\circ\text{C}$ ( $0.2^\circ\text{F}$ )/ $\Omega$ max. (100 $\Omega$ max per line) Platinum resistance thermometer: $0.1^\circ\text{C}$ ( $0.2^\circ\text{F}$ )/ $\Omega$ max. (10 $\Omega$ max per line)
<b>Insulation resistance</b>	20 M $\Omega$ min. (at 500 VDC)
<b>Dielectric strength</b>	600 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity
<b>Vibration resistance</b>	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions
<b>Shock resistance</b>	150 m/s <sup>2</sup> , 3 times each in 6 directions
<b>Weight</b>	160 g
<b>Degree of protection</b>	Rear case: IP20, Terminal section: IP00
<b>Memory protection</b>	Non-volatile memory (number of writes: 100,000)
<b>Standards</b>	<b>Approved standards</b>
	<b>Conformed standards</b>
<b>EMC Directive</b>	cURus UL61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark) RCM and UKCA EMI: EN61326 EMI Radiated: EN55011 Group1 class A EMI Conducted: EN55011 Group1 class A EMS: EN61326 ESD Immunity: EN61000-4-2 Electromagnetic Field Immunity: EN61000-4-3 Burst immunity/Noise Immunity: EN61000-4-4 Conducted Disturbance Immunity: EN61000-4-6 Surge Immunity: EN61000-4-5

\*1. The indication of K thermocouples in the  $-200$  to  $1,300^\circ\text{C}$  range, T and N thermocouples at a temperature of  $-100^\circ\text{C}$  or less, and U and L thermocouples at any temperature is  $\pm 2^\circ\text{C} \pm 1$  digit maximum. The indication of B thermocouples at a temperature of  $400^\circ\text{C}$  or less is unrestricted. The indication of R and S thermocouples at a temperature of  $200^\circ\text{C}$  or less is  $\pm 3^\circ\text{C} \pm 1$  digit max.  
C/W = ( $\pm 0.5\%$  of indication value or  $\pm 3^\circ\text{C}$ , whichever is greater)  $\pm 1$  digit max. PLII = ( $\pm 0.5\%$  of indication value or  $\pm 2^\circ\text{C}$ , whichever is greater)  $\pm 1$  digit max.

The indication accuracy for K thermocouples in the  $-199.9$  to  $999.9^\circ\text{C}$  range is ( $\pm 0.5\%$  of indication value or  $\pm 1^\circ\text{C}$ , whichever is greater)  $\pm 10$  digit maximum. However, at a temperature of  $-100^\circ\text{C}$  or less, it is  $\pm 2^\circ\text{C} \pm 10$  digit maximum.

\*2. The location of the decimal point depends on the type of sensor that is selected.

If the decimal point locations is set to 0 (\*\*\*\*), however, it will be treated as if it were set to 1 (\*\*\*.\*)

## Communications Specifications

Item	Port B *1	Port A Terminal/ Port A Connector *1	G3ZA Connection Port *2
Transmission path connection	RS-485 (multipoint)		
Communications method	RS-485 (two-wire, half duplex)		
Synchronization method	Start-stop synchronization		
Communications protocol	CompoWay/F, Modbus	CompoWay/F	
Baud rate	9.6, 19.2, 38.4, 57.6, or 115.2 kbps	38.4 kbps fixed	57.6 kbps fixed
Transmission code	CompoWay/F: ASCII, Modbus: RTU	CompoWay/F: ASCII	
Data bit length	7 or 8 bits	7 bits	
Stop bit length	1 or 2 bits	2 bits	
Error detection	Vertical parity (none, even, or odd) Block check character (BCC): with CompoWay/F, CRC-16: (with Modbus)	Vertical parity (even)	
Flow control	None		
Interface	RS-485		
Retry function	None		
Communications response wait time	0 to 99 ms (default: 5 ms)	1 to 99 ms (default: 1 ms)	---
Number of Units that can be connected in parallel *3	64 Units (model numbers with TC4: 256 channels, model numbers with TC2: 128 channels) Communications connection via port B on the End Unit	64 Units (model numbers with TC4: 256 channels, model numbers with TC2: 128 channels) Communications connection via port A on the End Unit	8 Units (Communications connection via G3ZA port on the Basic Unit)

\*1. Connection from the EJ1C-EDU.

\*2. A special cable (EJ1C-CBLA050) must be purchased separately for the G3ZA connection.

\*3. For the number of Units that can be connected, refer to *Connection Precautions* on page 9.

## Current Transformer (CT) Rating

Dielectric strength	1,000 VAC for 1 min (E54-CT1, E54-CT3) 1,500 VAC for 1 min (E54-CT1L, E54-CT3L)
Vibration resistance	50 Hz, 98 m/s <sup>2</sup>
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 g E54-CT1L: Approx. 14 g, E54-CT3L: Approx. 57 g
Accessories (E54-CT3 only)	Armatures (2), plugs (2)

## Characteristics of the Heater Burnout Alarm, SSR Failure Alarm, and Heater Overcurrent Alarm (TC2□-QNHB Model Only)

Maximum heater current	100 VAC
Input current indication accuracy	(±5.0A) ±1 digit max.
Heater burnout alarm setting range	0.1 to 99.9 A (in units of 0.1 A) 0.0 A: Heater burnout alarm output turns OFF. 100.0 A: Heater burnout alarm output turns ON. Min. detection ON time: 100 ms *1
SSR failure alarm setting range	0.1 to 99.9 A (in units of 0.1 A) 0.0 A: SSR failure alarm output turns ON. 100.0 A: SSR alarm output turns OFF. Min. detection OFF time: 100 ms *2
Heater overcurrent alarm setting range	0.1 to 99.9 A (in units of 0.1 A) 0.0 A: Heater overcurrent alarm output turns ON. 100.0 A: Heater overcurrent alarm output turns OFF. Min. detection ON time: 100 ms *1

\*1. When the control output ON time is less than 100 ms, heater burnout detection, heater overcurrent detection, and heater current measurement are not performed.

\*2. When the control output OFF time is less than 100 ms, SSR failure alarm and leakage current measurement are not performed.

## Input Ranges

Sensor inputs are fully universal. Therefore, platinum resistance thermometer, thermocouple, infrared thermosensor, and analog input can be selected. Inputs can be set for each channel using universal inputs.

Input type	Platinum resistance thermometer		Thermocouple										ES1B Infrared Thermosensor													
	Name	Pt100	JPt100	K	J	T	E	L	U	N	R	S	B	WC	PL II	10 to 70 °C	60 to 120 °C	115 to 165 °C	140 to 260 °C							
Temperature range (°C)	2300													2300												
	1800																									
	1700																									
	1600																									
	1500																									
	1400																									
	1300																									
	1200																									
	1100																									
	1000																									
	900																									
	800																									
	700																									
	600																									
	500																									
	400																									
	300																									
	200																									
	100																									
	0																									
	-100.0																									
	-200.0																									
	Setting number	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

Input type	Analog input					Thermo couple	
	Name	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V		0 to 10 V
Temperature range (°C)	2300						
	1800						
	1700						
	1600						
	1500						
	1400						
	1300						
	1200						
	1100						
	1000						
	900						
	800						
	700						
	600						
	500						
	400						
	300						
	200						
	100						
	0						
	-100.0						
	-200.0						
	Setting number	25	26	27	28	29	30

Applicable standards by input type are as follows:  
 K, J, T, E, N, R, S, B: JIS C1602-2015, IEC60584-1  
 L: Fe-CuNi, DIN 43710-1985  
 U: Cu-CuNi, DIN 43710-1985  
 W/C: W5Re/W26Re, JIS C 1602-2015, ASTM E988-1990  
 PL II: ASTM E1751-000  
 JPt100: JIS C 1604-1989, JIS C 1606-1989  
 Pt100: JIS C 1604-1997, IEC 60751

Shaded ranges indicate default settings.

<b>End Unit/EJ1C-EDU</b>
--------------------------

## Ratings

<b>Power supply voltage</b>	24 VDC	
<b>Operating voltage range</b>	85% to 110% of rated voltage	
<b>Auxiliary output *</b>	<b>Outputs</b>	2
	<b>Transistor outputs</b>	Max. operating voltage: 30 VDC, Max. load current: 50 mA
<b>Ambient temperature range</b>	Operating: -10°C to 55°C Storage: -25°C to 65°C (with no icing or condensation)	
<b>Ambient humidity range</b>	Operating: 25% to 85% (with no condensation)	

\* Auxiliary output can be allocated using the bus output allocation for each Basic Unit.

## Characteristics

<b>Insulation resistance</b>	20 M $\Omega$ min. (at 500 VDC)	
<b>Dielectric strength</b>	600 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity	
<b>Vibration resistance</b>	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions	
<b>Shock resistance</b>	150 m/s <sup>2</sup> , 3 times each in 6 directions	
<b>Weight</b>	70 g	
<b>Degree of protection</b>	End Unit case: IP20	
<b>Standards</b>	<b>Approved standards</b>	cURus UL61010-1/CSA C22.2 No.61010-1, Korean wireless regulations (Radio law: KC Mark)
	<b>Conformed standards</b>	RCM and UKCA
<b>EMC Directive</b>	Same as for the Basic Unit. Refer to page 4.	

## Communications

<b>Port B</b>	Basic Unit Communications (Refer to <i>Communications Specifications</i> on page 5.)
<b>Port A</b>	Basic Unit Communications (Refer to <i>Communications Specifications</i> on page 5.)
<b>Port A connector *</b>	E58-CIFQ1

\* Port A connector communications and port A terminal communications cannot be used at the same time.

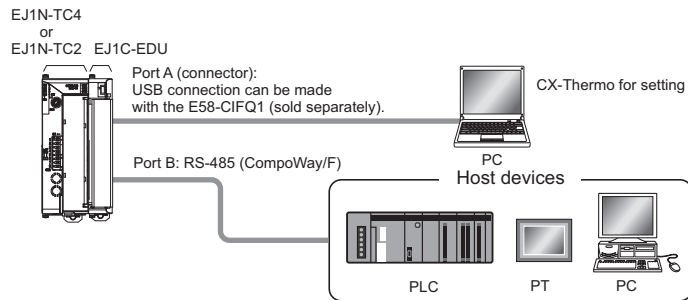
# EJ1

## Unit Configuration Example

### Minimal Configuration

#### Small Systems with 2 Channels or 4 Channels Communicating with the Host Device via RS-485 (CompoWay/F Protocol)

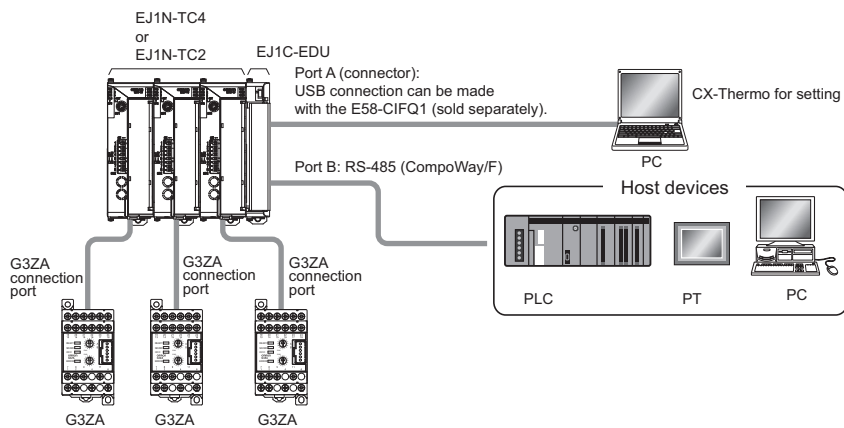
- Alarms can be allocated to the auxiliary output for the End Unit.
- G3ZA/G3PW outputs can be used.



### Multiple Units

#### Building Systems Communicating with the Host Device, such as a PLC, PT, or Computer, via RS-485 (CompoWay/F Protocol)

- The 2 auxiliary alarm outputs provided on the End Unit can be used for integrated alarm systems.
- G3ZA/G3PW outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units.





## Connection Precautions

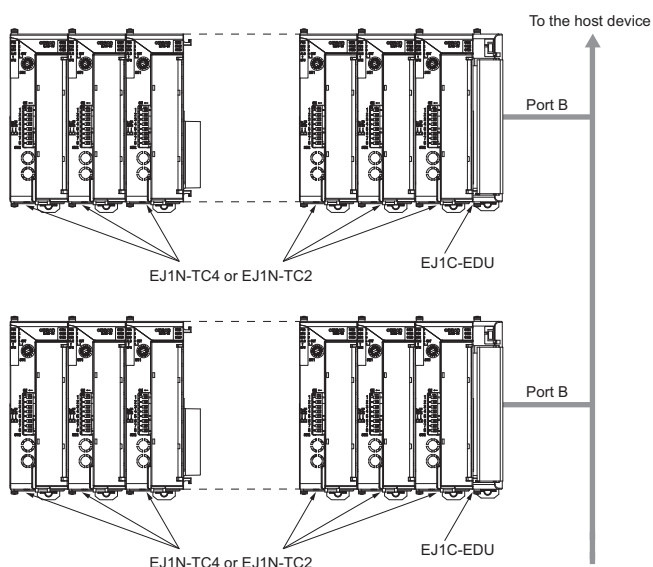
### Communications Unit Number Setting

- You can set communications unit numbers 0 to 63 for Basic Units unless connected to an HFU, in which case you can set communications unit numbers 0 to 31.

### Restrictions on the Number of Units That Can Be Connected

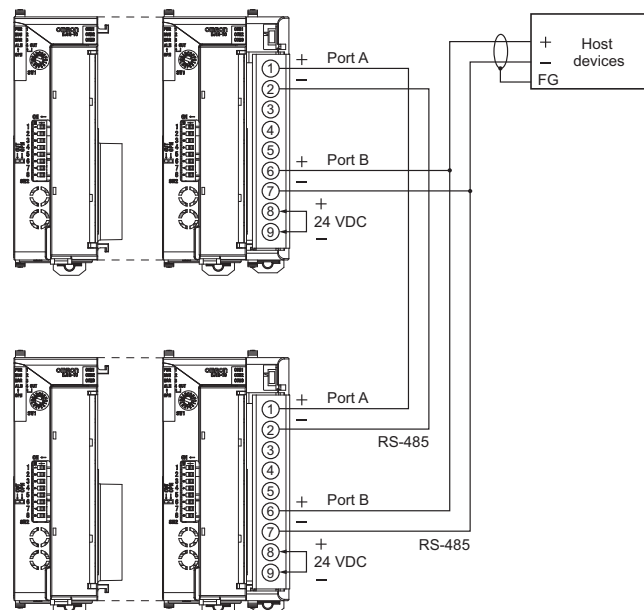
#### Restrictions for Basic Units

- When the system is configured of only Basic Units (EJ1N-TC4/TC2), up to 64 Units can be connected.
- Distributed placement is possible by using End Units (EJ1C-EDU).
- Up to 16 Units can be connected side by side. The End Unit is not included in the 16 Units.
- To use the CX-Thermo Support Software from a computer to set EJ1N-TC4/EJ1N-TC2 Basic Units that are connected with distributed placement, use a communications cable to connect port A (on the terminal block) on both Units.



Up to 64 Basic Units can be connected using distributed placement.  
 Using EJ1□-TC4 models: 4 channels × 64 Units = 256 channels  
 Using EJ1□-TC2 models: 2 channels × 64 Units = 128 channels  
 Note: End Units are not included in the number of Units that can be connected.

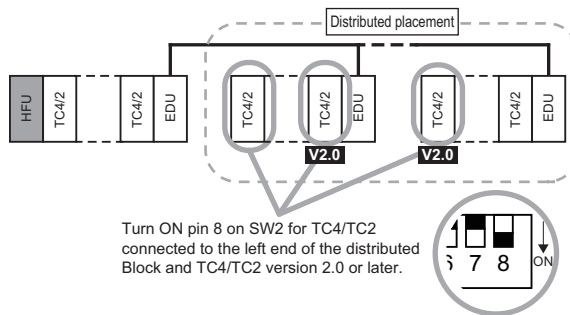
### Wiring for Distributed Placement



- Note: 1.** To use the CX-Thermo Support Software from a computer to set EJ1N-TC4/EJ1N-TC2 Basic Units that are connected with distributed placement, use a communications cable to connect port A (terminals 1 and 2 on the terminal block) on both Units.
- 2.** This wiring is for when the EJ1N-HFU is not used.

### To use an HFU programless communications with distributed placement

- Turn ON pin 8 on SW2 for TC4/TC2 connected to the left end of the distributed Block and TC4/TC2 version 2.0 or later.



Turn ON pin 8 on SW2 for TC4/TC2 connected to the left end of the distributed Block and TC4/TC2 version 2.0 or later.

- Note:** Refer to *Identifying Versions* on page 14 for more information of TC4/TC2 Units version 2.0 or later.
- Check that the EJ1 is turned OFF before operating the switches.

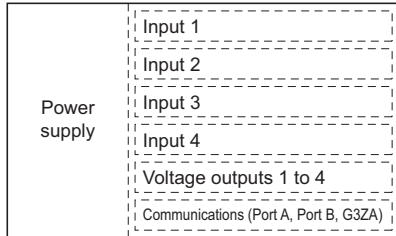
## Insulation Blocks

Each EJ1 Unit is electrically insulated for each function block as shown in the following figures.

Functional insulation is applied between the power supply, input, output, and communications terminal sections.\*

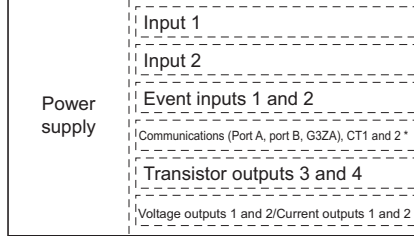
If reinforced double insulation is required, use power supplies that comply with IEC60664 for reinforced double insulation for the EJ1's external power supply and for power supplies connected to the EJ1.

**EJ1N-TC4**



Functional isolation

**EJ1N-TC2**



Functional isolation

\* Not provided on models with current outputs.

**EJ1C-EDU**



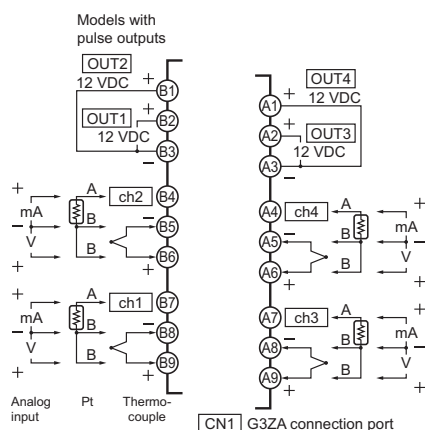
Functional isolation

## Connection

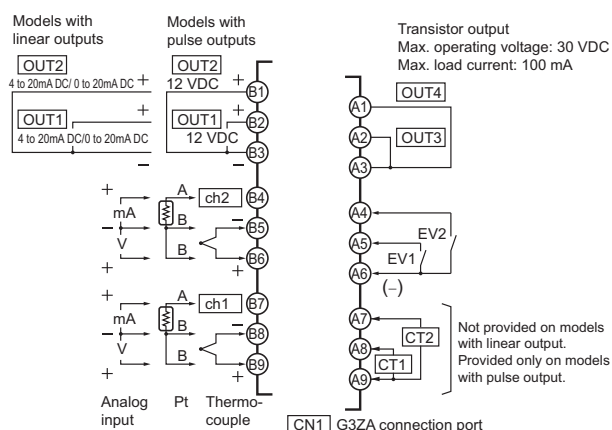
### External Connection

- Functional insulation is applied between the power supply and the I/O sections. If reinforced insulation is required, connect the input and output terminals to devices without any exposed current-carrying parts or to devices with reinforced insulation suitable for the maximum operating voltage of the power supply and I/O sections.
- To comply with the standards for noise terminal voltage for class A in EN 61326, install a noise filter (OMRON S8V-NF Series or the equivalent) to the DC power line as close as possible to the Temperature Controller.
- Use an SELV power supply that provides overcurrent protection. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does not exceed an output voltage of 30 V r.m.s. and 42.4 V peak or 60 VDC max. The OMRON S8VK Series, S8FS-G Series, S8VS Series is recommended for the power supply.
- To comply with EMC standards, the cable that connects the sensor must be 30 m or less. If the cable length exceeds 30 m, it will not be possible to comply with EMC standards.

#### EJ1N-TC4

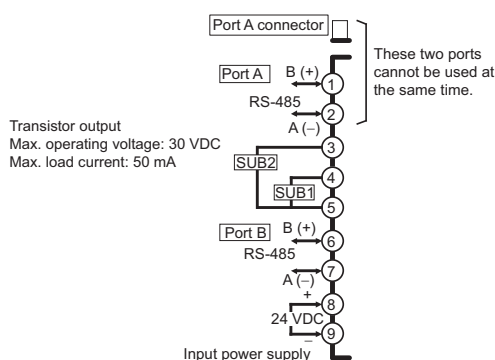


#### EJ1N-TC2



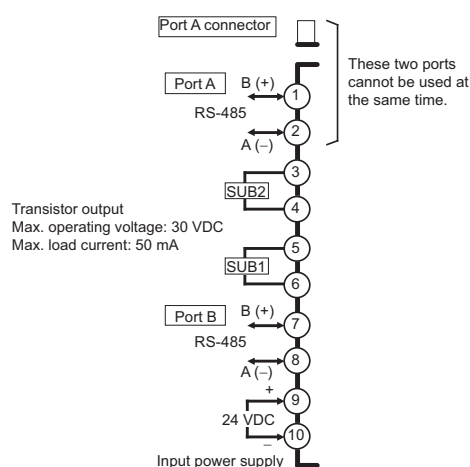
#### EJ1C-EDUA

##### Model with Screw Terminals



#### EJ1C-EDUC

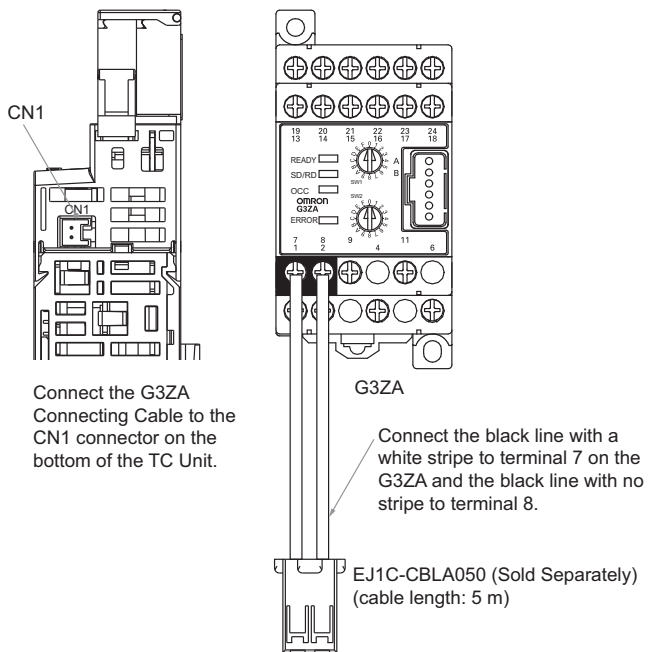
##### Model with Connector Terminal Block



**Do not use any cables that are damaged.**  
Minor electric shock or fire may occasionally occur.

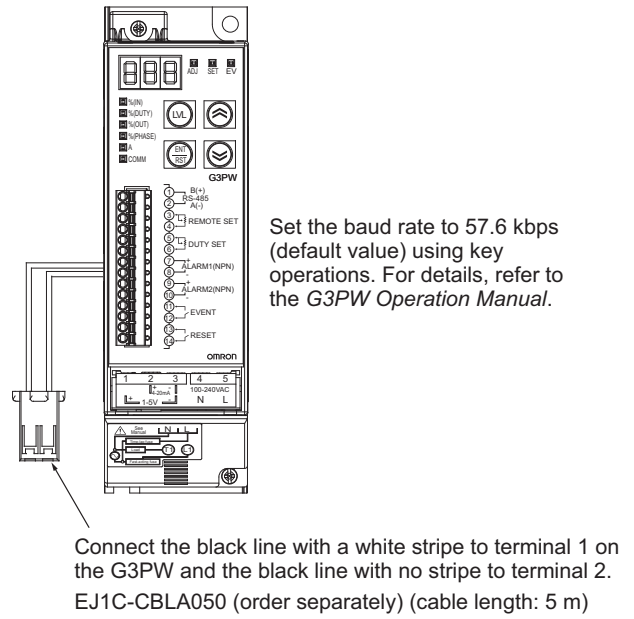
- Note:**
1. To connect to the G3ZA, separately purchase a G3ZA Connecting Cable (EJ1C-CBLA050) and connect it to the G3ZA connection port (CN1) on the EJ1.
  2. To connect to a computer using the port A connector, use a separately sold E58-CIFQ1 USB-Serial Conversion Cable. The Temperature Controller can be connected to a computer using USB.
  3. Models with screw-less clamp terminals have terminals A10 and B10, but they are not used. Do not connect anything to them.
  4. When wiring a voltage input, be sure to connect the correct terminals. Incorrect wiring may cause EJ1 failure.
  5. Use non-voltage inputs for the event inputs. The polarity for a non-contact input is indicated by “(-).”

## Connecting to the G3ZA (EJ1N-TC)



Refer to the *G3ZA Instruction Manual* for wiring methods.

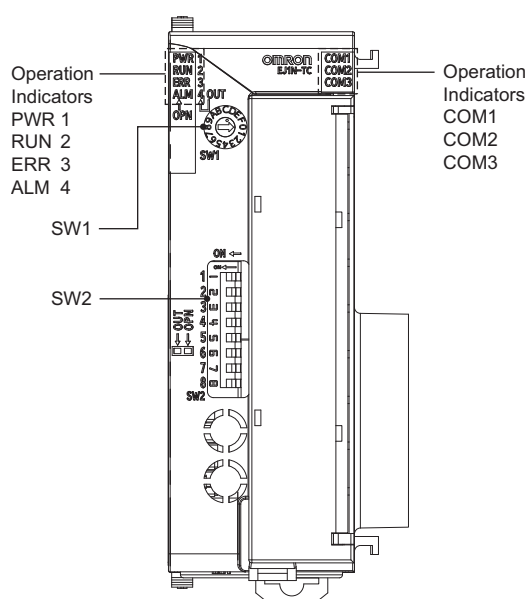
## Connecting to the G3PW (EJ1N-TC)



Refer to the *G3PW Instruction Manual* for wiring methods.

## Nomenclature and Specification Settings

### Part Names



### Operation Indicators EJ1N-TC4/TC2

Operation Indicators		Meaning: When SW2 No. 6 is OFF	Meaning: When SW2 No. 6 is ON
PWR/1	green	Lights when the power is ON.	Lit when output 1 is ON.
RUN/2	green	Lights during operation.	Lit when output 2 is ON.
ERR/3	red	Flashes or lights when an error occurs.	Lit when output 3 is ON.
ALM/4	red	Lights when an alarm is activated.	Lit when output 4 is ON.
COM 1	orange	Flashes during communications via port A on the End Unit.	
COM 2	orange	Flashes during communications via port B on the End Unit.	
COM 3	orange	Flashes during communications with the G3ZA.	

## Specification Settings

### Switch Operation

- Check that the EJ1 is turned OFF before operating any switch other than pin 6 of SW2. Settings are read only when power is turned ON.
- Set the switches with a small flat-blade screwdriver. Do not set the switches midway between settings.
- SW1 is set to 1 and SW2 pins are all set to OFF in the default settings.



### Setting the Unit Number

SW1 and SW2 are used together to set the unit number to between 00 and 63. The factory setting is unit number 01.

SW2		SW1															
1	2	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
OFF	OFF	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
ON	OFF	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
OFF	ON	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
ON	ON	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63

## SW2 Settings EJ1N-TC4/TC2

SW2	Meaning
3	Set to ON when using the Modbus communications protocol for port B. OFF: The setting value for port B communications protocol is used. (default: Compoway/F) * ON: Modbus is used.
4 to 5	Set the baud rate of port B. 4 = OFF, 5 = OFF: The setting value for port B baud rate is used. (default: 9.6 kbps) * 4 = ON, 5 = OFF: 19.2 kbps 4 = OFF, 5 = ON: 38.4 kbps 4 = ON, 5 = ON: 115.2 kbps
6	Set to ON to display the output status on the operation indicators. OFF: The operation status is displayed (PWR, RUN, ERR, and ALM). ON: The output status is displayed (outputs 1, 2, 3, and 4). <b>Note:</b> Normally keep this pin set to OFF so that the operation status can be checked.
7	ON: G3ZA Multi-channel Power Controller in operation ON when using a G3PW Power Controller.
8	Use when EJ1N-HFU HFUs with Programless Communications are used for distributed placement of Temperature Controllers. OFF: Distributed placement not used. Or, HFUs with DeviceNet Communications used for distributed placement. ON: HFUs with Programless Communications used for distributed placement.

\* Refer to the User's Manual (Cat. No. H142) for details.

**Note:** Make sure power to the Unit is turned OFF before making settings for any pin other than pin 6.  
Pin 6 can be turned ON or OFF while the power is ON.

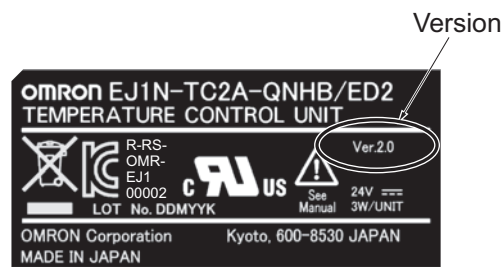
## Identifying Versions

The new functionality can be used with version 2.0 (V2.0). Check the label on the Temperature Controller or the box to determine the version.

### Box Label



### Temperature Controller Label



**Note:** The above example is for version 2.0.

**Note:** For the version of a Temperature Controller produced in or before December 2022, check the following catalog.  
EJ1 Modular Temperature Controller Datasheet

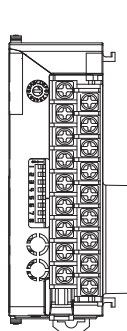
## Dimensions

Note: All units are in millimeters unless otherwise indicated.

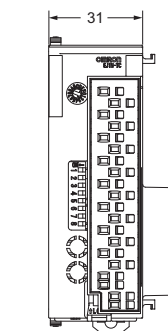
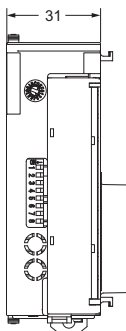
### Temperature Controller

#### Basic Units

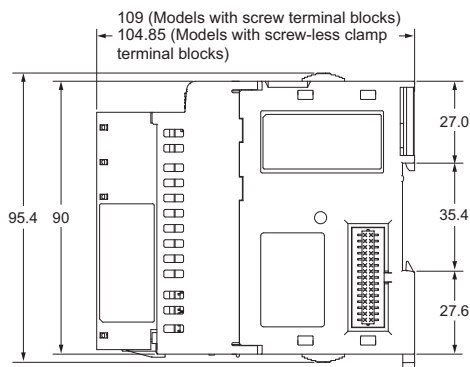
##### EJ1N-TC



Models with screw terminal blocks

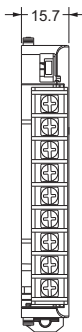


Models with screw-less clamp terminal blocks

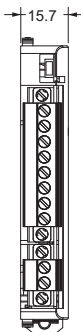


#### End Units

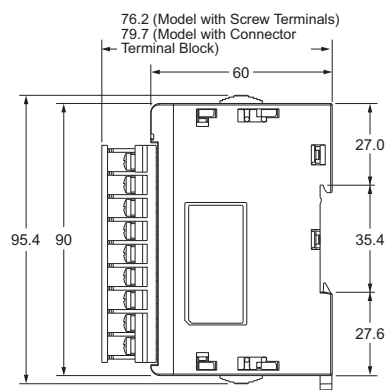
##### EJ1C-EDU



EDUA  
Model with  
Screw Terminals



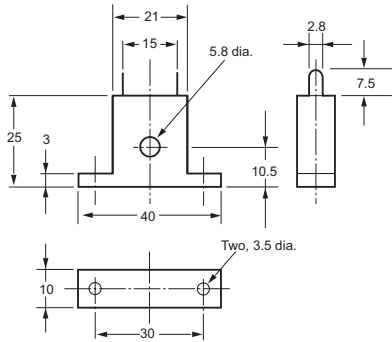
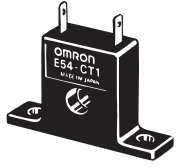
EDUC  
Model with  
Connector Terminal Block



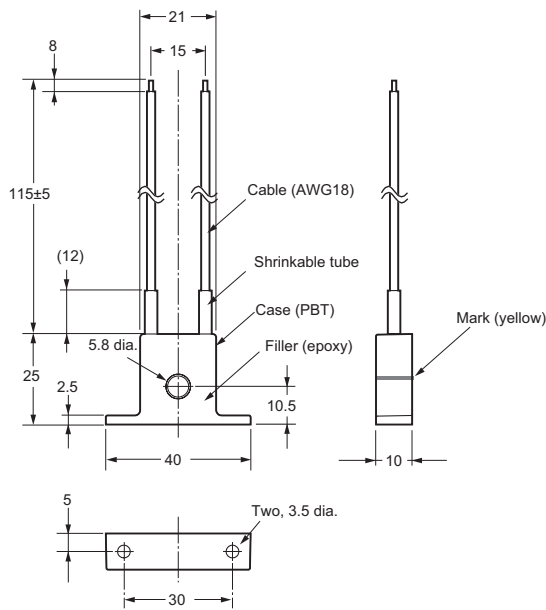
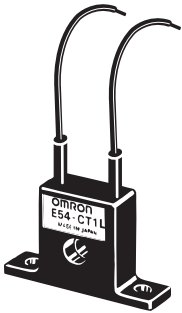
Options

Current Transformer (Sold Separately)

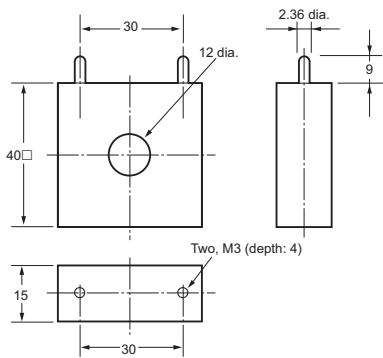
E54-CT1



E54-CT1L

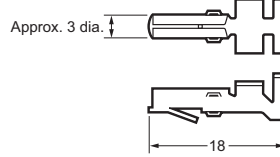


E54-CT3

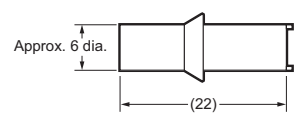


E54-CT3 Accessory

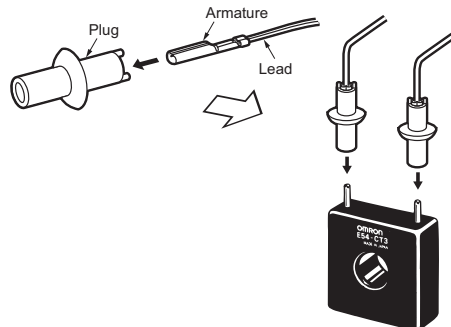
• Armature



• Plug

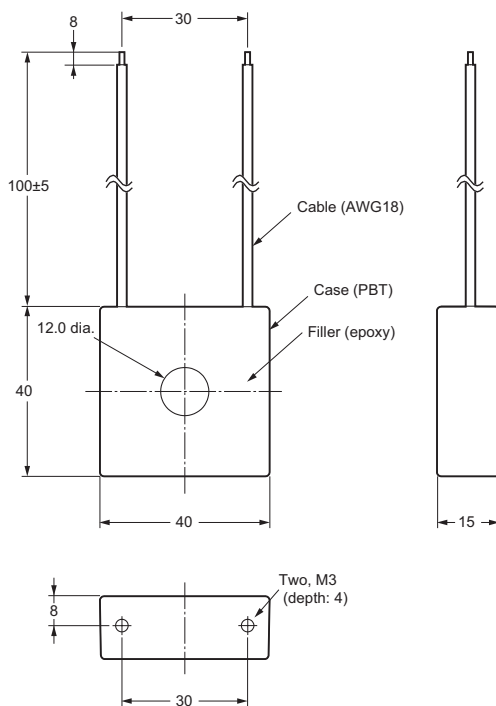
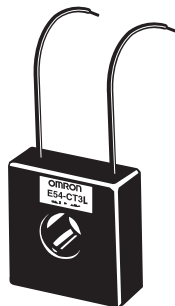


Connection Example





E54-CT3L

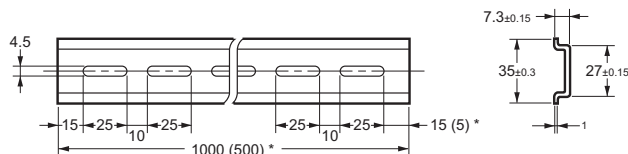
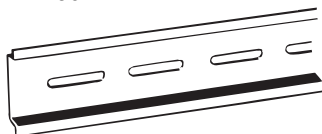


Rail Mounting Equipment (Order Separately)

DIN Track

PFP-100N

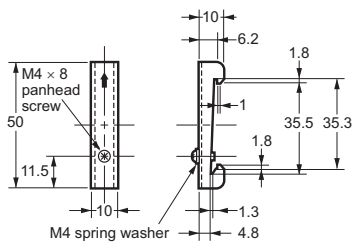
PFP-50N



\* The figures in parentheses are dimensions for the PFP-50N.

End Plate

PFP-M

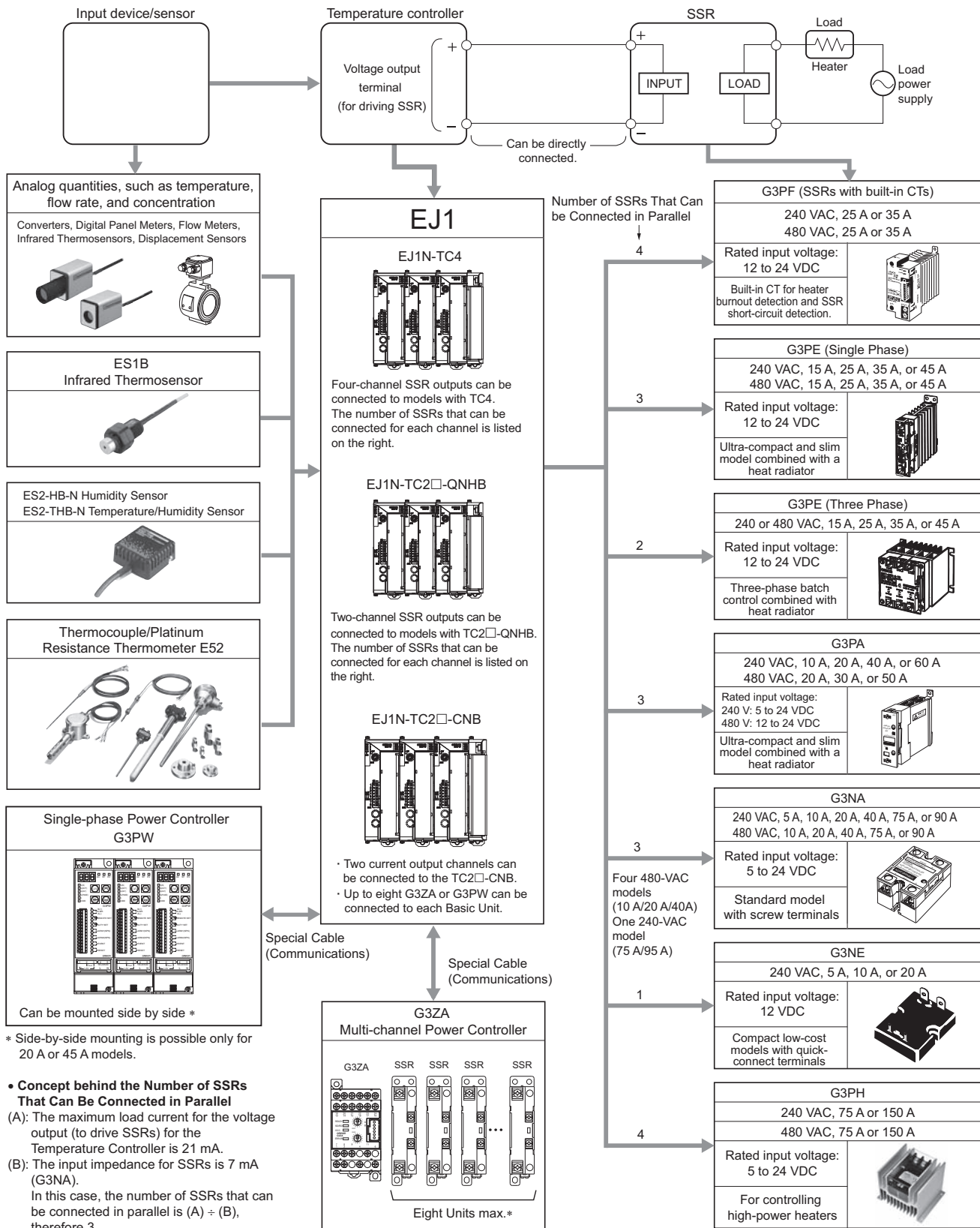


**Note:** Two screws are included with the EJ1C-EDU for the End Plate. Always attach End Plates to both sides.

# EJ1

## I/O Devices

### Examples of EJ1-series Temperature Controllers/Output Devices



**• Concept behind the Number of SSRs That Can Be Connected in Parallel**

(A): The maximum load current for the voltage output (to drive SSRs) for the Temperature Controller is 21 mA.

(B): The input impedance for SSRs is 7 mA (G3NA).

In this case, the number of SSRs that can be connected in parallel is (A) ÷ (B), therefore 3.

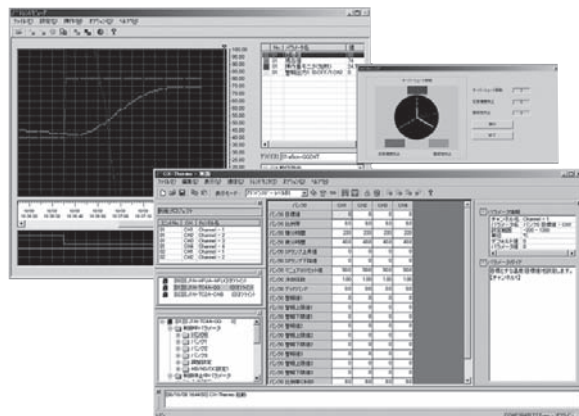
The maximum load current in the connection example is 21 mA.

\*The G3ZA is available with 4 or 8 control points.

# EST2-2C-MV4



## Monitoring/Setting Support Software for General-purpose temperature adjustment controller Temperature Controllers Enabling Faster Parameter Setup, Device Adjustment, and Maintenance



- Enables editing and batch-downloading parameters from a personal computer, reducing the work required to set parameters. Usability is improved with table-formatted parameter editing from version. 4.0.
- Supports Trend Monitoring:  
Easily monitor the data from up to 31 Controllers \*1, including PVs, SPs, MVs, PID parameters, and alarm ON/OFF status.
- Supports parameter masks to hide parameters unnecessary to display. (Supported only by the E5□N-H/□N-HT, E5□C/□C-B/□C-U/□C-T and E5□D/□D-B).
- Logic operations enable setting inputs from external inputs (event inputs) or temperature status, outputs to external outputs (control or auxiliary outputs), and changing operating status with ON/OFF delays. (Supported only by the E5□N-H/□N-HT, E5□C/□C-B/□C-U/□C-T and E5□D/□D-B).
- Easy adjustment of control performance by fine-tuning. \*2

\*1. EJ1N: Up to 64 Controllers.

\*2. Fine-tuning instructs the CX-Thermo to calculate a PID parameters by directly inputting commands to improve response.

## Ordering Information

### List of Models

Name	Model
CX-Thermo Support Software	EST2-2C-MV4

## Specifications

Compatible devices	Temperature Controllers	E5CN-H, E5EN-H, E5AN-H E5ER, E5AR *1 E5GC, E5CC, E5CC-B, E5CC-U, E5EC, E5EC-B, E5AC, E5DC, E5DC-B E5CD, E5CD-B, E5ED, E5ED-B EJ1N-TC4, EJ1N-TC2 G3ZA (only when connected to EJ1N-TC4, EJ1N-TC2) G3PW (only when connected to EJ1N-TC4, EJ1N-TC2)	E5CN-HT, E5EN-HT, E5AN-HT E5ER-T, E5AR-T *1 E5CC-T, E5EC-T, E5AC-T
		<b>Note:</b> Models with DeviceNet communications are not supported. *1. Final order entry date: The end of March, 2021	
Personal computer system requirements	OS	OS: Microsoft Windows XP (Service Pack 3 or higher), Vista, 7, 8, 10 or 11 CPU: A processor recommended by Microsoft Memory: A memory recommended by Microsoft	
	CPU	300 MHz min.	
	Memory	128 MB min.	
	Harddisk	300 MB min. available space	
	CD-ROM	One CD-ROM drive min.	
	Monitor	XGA (1024 × 768), High Color 16 bit min.	
	Communications ports	<ul style="list-style-type: none"> <li>• RS-232C port, or USB port, 1 port min.</li> </ul>	
Connection method		<ul style="list-style-type: none"> <li>• An E58-C1FQ1 USB-Serial Conversion Cable is required to connect a computer to the setup tool port the E5□N-H, E5□N-HT, or EJ1.</li> <li>• An E58-C1FQ2 USB-Serial Conversion Cable is required to connect a computer to the setup tool port the E5GC, E5CC, E5CC-B, E5CC-U, E5EC, E5EC-B, E5AC, E5DC, E5DC-B, E5CC-T, E5EC-T, E5AC-T, E5CD, E5CD-B, E5ED or E5ED-B</li> <li>• A K3SC Interface Converter is used to connect a computer to models with RS-422/RS-485 communications.</li> </ul>	

# USB-Serial Conversion Cable E58-CIFQ1

## Cable for Support Software Enables Connection Even with Temperature Controllers Not Equipped with Communications

- Easily set Temperature Controller parameters by connecting the computer's USB port and an EJ1, or an E5CN-H, E5AN-H, or E5EN-H.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Ordering Information

Model
E58-CIFQ1

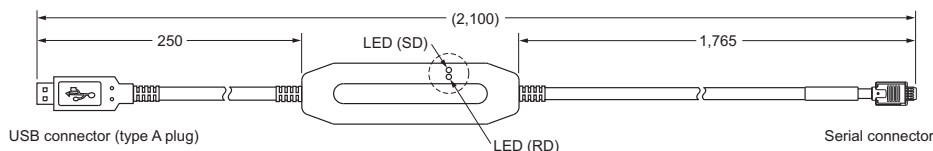
## Specifications

Applicable OS	Windows XP/Vista/7/8/8.1/10/11
Applicable software	CX-Thermo Ver. 4.3 or higher
Applicable models	EJ1, E5CN-H, E5AN-H, E5EN-H Series
USB interface standard	Conforms to USB Specification 2.0.
DTE speed	38,400 bps
Connector specifications	Computer: USB (type A plug) Temperature Controller: Serial
Power supply	Bus power (Supplied from USB host controller.)
Power supply voltage	5 VDC
Current consumption	70 mA
Ambient temperature range	Operating: 0°C to 55°C, Stored: -20°C to 60°C (with no icing or condensation)
Ambient humidity range	Operating: 10% to 80% (with no condensation)
Weight	Approx. 100 g

**Note:** A driver must be installed in the personal computer. Refer to installation information in the operation manual for the Conversion Cable.

## Dimensions

### USB-Serial Conversion Cable E58-CIFQ1



- Do not connect or disconnect the Conversion Cable connector repeatedly over a short period of time. The computer may malfunction.
- After connecting the Conversion Cable to the computer, check the COM port number before starting communications. The computer requires time to recognize the cable connection. This delay does not indicate failure.
- Do not connect the Conversion Cable through a USB hub. Doing so may damage the Conversion Cable.
- Do not use an extension cable to extend the Conversion Cable length when connecting to the computer. Doing so may damage the Conversion Cable.

# Multi-channel Power Controller G3ZA

## Optimum Cycle Control for High-precision Control with Low Noise



- Smaller than a Normal Power Controller.
- Enables low-noise power control in combination with zero-cross SSRs. \*
- One Controller can control up to 8 SSRs.
- RS-485 communications to set manipulated variables and heater burnout detection. The Smart FB Library for the G3ZA can also be used.
- CE Marking

### Main Upgraded Functions

- Soft-start function added for lamp heaters.
- Three-phase optimum cycle control added for three-phase heaters.
- Combining with special CT for 150-A current detection.

\* The G3ZA must be used in combination with an SSR without the zero cross function when the soft-start function is used.



## Features

### Comparison between the G3ZA and Normal Power Controllers

Item	Normal Power Controllers	G3ZA
Connections	<p><b>Power Controllers Controlled Using Current Output of 4 to 20 mA</b></p>	<p><b>Control Using Communications from a Host Device</b></p> <ul style="list-style-type: none"> <li>• Direct connection is possible using an EJ1 Modular Temperature Controller.</li> </ul>
	<p><b>4 to 20 mA commands</b></p>	<p><b>RS-485 commands</b></p>
Control method	<p><b>Phase Control</b></p> <ul style="list-style-type: none"> <li>• Response is fast and high-precision temperature control is possible.</li> <li>• Harmonics and noise are problems.</li> </ul>	<p><b>Optimum Cycle Control (High-precision Zero Cross Control)</b></p> <ul style="list-style-type: none"> <li>• Outputs are turned ON and OFF each half cycle.</li> <li>• Zero-cross control is performed.</li> <li>• Noise is suppressed while achieving high-speed response with high-precision temperature control.</li> </ul>

# G3ZA

## Model Number Structure

### Model Number Legend

G3ZA-                -    -     
           1 2 3 4 5       6 7

No.	Meaning	Code	Specifications
1	No. of control points	4	4 channels
		8	8 channels
2	Control method	None	Optimum cycle control
3	Heater burnout detection	H	Yes
		A	None

No.	Meaning	Code	Specifications
4	Load power supply voltage	2	100 to 240 VAC
		4	400 to 480 VAC
5	Communications specifications	03	RS-485
6	Communications protocol	FLK	CompoWay/F
7	International standards	UTU	Approved by UL, CSA.

## Ordering Information

### List of Models

Name	Number of control channels	Heater burnout detection	Load power supply voltage	Model
Multi-channel Power Controller	4	Supported	100 to 240 VAC	<b>G3ZA-4H203-FLK-UTU</b>
			400 to 480 VAC	<b>G3ZA-4H403-FLK-UTU</b>
	8	Not supported	100 to 240 VAC	<b>G3ZA-8A203-FLK-UTU</b>
			400 to 480 VAC	<b>G3ZA-8A403-FLK-UTU</b>

**Note:** When using the heater burnout detection function, CTs must be ordered separately.

### Accessories (Order Separately)

Name	Hole diameter	Detection current	Model
Current Transformer (CT)	5.8 dia.	0 to 50 A	<b>E54-CT1</b>
	12.0 dia.	0 to 50 A	<b>E54-CT3</b>
	30.0 dia.	0 to 150 A	<b>G3ZA-CT-150L</b>

Name	Model
DIN Track	<b>PFP-100N</b>
	<b>PFP-50N</b>
End Plates (stoppers)	<b>PFP-M</b>

For the information required for product selection, such as the ordering information, specifications, and dimensions, refer to the following catalog.

G3ZA Multi-channel Power Controller Datasheet (Cat. No. J147)

Be sure to read the precautions for correct use and other precautions in the following user's manual before using the Power Controller.

G3ZA Multi-channel Power Controller User's Manual (Cat. No. Z200)

## Specifications

### Ratings

Item	Load power supply voltage range	100 to 240 VAC	400 to 480 VAC
Power supply voltage		100 to 240 VAC (50/60 Hz)	
Operating voltage range		85 to 264 VAC	
Power consumption		16 VA max.	
Load power supply voltage		100 to 240 VAC	400 to 480 VAC
Load power supply voltage range		75 to 264 VAC	340 to 528 VAC
Manipulated variable input		0.0% to 100.0% (via RS-485 communications)	
Current transformer input *1		Single-phase AC, 0 to 50 A (primary current of CT) Single-phase AC, 0 to 150 A (primary current of CT)	
Trigger output		One voltage output for each channel, 12 VDC $\pm$ 15%, Max. load current: 21 mA (with built-in short-circuit protection circuit)	
Alarm output		NPN open collector, one output Max. applicable voltage: 30 VDC, Max. load current: 50 mA Residual voltage: 1.5 V max., Leakage current: 0.4 mA max.	
Indications		LED indicators	
Control method		Optimum cycle control Soft-start optimum cycle control *2 Three-phase optimum cycle control	
Ambient operating temperature		-10 to 55°C (with no icing or condensation)	
Ambient operating humidity		25% to 85%	
Storage temperature		-25 to 65°C (with no icing or condensation)	
Elevation		2,000 m max.	
Accessories		Instruction Sheet	

\*1. CT inputs are provided only on Models with heater burnout detection.

\*2. Use an SSR without the zero-cross function (G3PE-□BL) for soft-start optimum cycle control.

### Performance

Current indication accuracy	Current Range 0 to 50 A, $\pm$ 3 A 0 to 150 A, $\pm$ 9 A 0 to 100%, $\pm$ 6% * (for models with heater burnout detection)
Insulation resistance	100 M $\Omega$ min. (at 500 VDC) between primary and secondary
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between primary and secondary
Vibration resistance	Vibration frequency: 10 to 55 Hz, acceleration: 50 m/s <sup>2</sup> in X, Y, and Z directions
Shock resistance	300 m/s <sup>2</sup> three times each in six directions along three axes
Weight	Approx. 200 g (including terminal cover)
Degree of protection	IP20
Memory protection	Non-volatile memory (number of writes: 100,000)
Installation environment	Overvoltage category II, pollution degree 2 (according to EN61010-2-201)
Approved standards	UL508 (Listing), CSA22.2 No. 14 EN61010-2-201

\* When measured with percentage selected for the current monitor parameter and the maximum current measurable with the CT at 100%.

## Communications Specifications

<b>Transmission line connections</b>	Multipoint
<b>Communications method</b>	RS-485
<b>Max. transmission distance</b>	500 m
<b>No. of nodes</b>	31 (via multidrop connections)
<b>Synchronization method</b>	Stop-start synchronization
<b>Communications baud rate</b>	9.6, 19.2, 38.4 or 57.6 kbps, Default: 9.6 kbps
<b>Transmission code</b>	ASCII
<b>Communications data length</b>	7 or 8 bits, Default: 7
<b>Communications stop bits</b>	1 or 2 bits, Default: 2
<b>Communications parity</b>	Vertical parity: None, even, or odd, Default: Even
<b>Flow control</b>	None

## Current Transformer Specifications (Order Separately)

Item	Specification		
<b>Model number</b>	E54-CT1	E54-CT3	G3ZA-CT150L
<b>Max. continuous heater current</b>	50 A	120 A *	150 A
<b>Detection current with G3ZA connected</b>	50 A		150 A
<b>Dielectric strength</b>	1,000 VAC for 1 min		2,000 VAC for 1 min
<b>Vibration resistance</b>	98 m/s <sup>2</sup> , 50 Hz		
<b>Weight</b>	Approx. 11.5 g	Approx. 50 g	Approx. 130 g
<b>Accessories</b>	None	Connection terminals (2) Plugs (2)	None

\* The maximum continuous current is 50 A for the G3ZA in combination with the E54-CT3.



# Terms and Conditions Agreement

## **Read and understand this catalog.**

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

## **Warranties.**

- (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied.
- (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE.

Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.

See <http://www.omron.com/global/> or contact your Omron representative for published information.

## **Limitation on Liability; Etc.**

OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY.

Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.

## **Suitability of Use.**

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## **Programmable Products.**

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

## **Performance Data.**

Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

## **Change in Specifications.**

Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

## **Errors and Omissions.**

Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

**Note: Do not use this document to operate the Unit.**

**OMRON Corporation Industrial Automation Company**

**Kyoto, JAPAN**

**Contact : [www.ia.omron.com](http://www.ia.omron.com)**

**Regional Headquarters**

**OMRON EUROPE B.V.**

Wegalaan 67-69, 2132 JD Hoofddorp  
The Netherlands  
Tel: (31) 2356-81-300 Fax: (31) 2356-81-388

**OMRON ELECTRONICS LLC**

2895 Greenspoint Parkway, Suite 200  
Hoffman Estates, IL 60169 U.S.A.  
Tel: (1) 847-843-7900 Fax: (1) 847-843-7787

**OMRON ASIA PACIFIC PTE. LTD.**

438B Alexandra Road, #08-01/02 Alexandra  
Technopark, Singapore 119968  
Tel: (65) 6835-3011 Fax: (65) 6835-3011

**OMRON (CHINA) CO., LTD.**

Room 2211, Bank of China Tower,  
200 Yin Cheng Zhong Road,  
PuDong New Area, Shanghai, 200120, China  
Tel: (86) 21-6023-0333 Fax: (86) 21-5037-2388

**Authorized Distributor:**

©OMRON Corporation 2022-2024 All Rights Reserved.  
In the interest of product improvement,  
specifications are subject to change without notice.

**CSM\_4\_1**

**Cat. No. H236-E1-06 0624 (1122)**