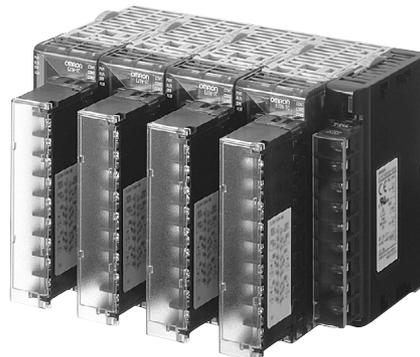


# Modular Temperature Controller EJ1

## In-panel Temperature Controller with Flexible Modular Design for Greater Integration with Host Devices

- The compact modular structure enables construction of temperature systems optimally suited to the application.
- Connection can be made to a Programmable Controller without any programming required, reducing the number of steps required in ladder programming design.
- One fully multi-input Unit includes a thermocouple, platinum-resistance thermometer, and analog input for easy selection and reduced inventory requirements.
- One-touch terminal attachment and removal simplify setup and maintenance.
- Connect directly to the G3ZA Multi-channel Power Controller using optimum cycle control for high-accuracy regulation with minimal noise.



Refer to the "Safety Precautions" on page 17.

## 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) (See note 1.)	24 VDC supplied from the End Unit	2	Voltage output: 2 points (for SSR drive) (See note 2.)	Transistor output: 2 points (sourcing)	None	2 (See note 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
						None	None			Screw-less clamp	EJ1N-TC2B-QNHB
										M3 terminal	EJ1N-TC4A-QQ
						Screw-less clamp	EJ1N-TC4B-QQ				
HFU (See note 1.)	24 VDC	None	None	None	Transistor output: 4 points (sourcing)	4 (See note 4.)	None	From End Unit: Port A: RS-485 Port C: RS-485 or RS-232C selectable.  From End Unit: Port A: RS-485 Port C: RS-422	No input	M3 terminal	EJ1N-HFUA-NFLK
										Screw-less clamp	EJ1N-HFUB-NFLK
										M3 terminal	EJ1N-HFUA-NFL2
										Screw-less clamp	EJ1N-HFUB-NFL2
End Unit (See note 1.)	24 VDC				Transistor output: 2 points (sourcing)	None			M3 terminal	EJ1C-EDUA-NFLK	

- Note:**
1. An End Unit is always required for connection to a Basic Unit or an HFU. An HFU cannot operate without a Basic Unit. External communications cannot be performed when using a Basic Unit only.
  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 or E54-CT3) separately.
  4. There are three operation instructions that can be sent to Basic Units connected to an HFU.

Refer to the following manual for precautionary information and other information necessary to use the EJ1:  
EJ1 Modular Temperature Controller Operation Manual (Cat. No. H142)

## ■ Accessories (Order Separately)

### Current Transformer (CT)

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

### G3ZA Connecting Cable

Cable length	Model
5 m	EJ1C-CBLA050

### Rail Mounting Equipment

Name	Model
Mounting Rail	PPF-100N
	PPF-50N

### CX-Thermo Support Software Ver. 3.0

Model
EST2-2C-MV3

### 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		5 W max. (at maximum load)	4 W max. (at maximum load)
Input (See note.)		Thermocouple: K, J, T, E, L, U, N, R, S, B, 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 V, max. load current: 100 mA
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.
	---	---	Short-circuit 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)	
Other functions		Two-point input shift, digital input filter, remote SP, SP ramp, manual 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, Stored: -25°C to 65°C (with no icing or condensation)	
Ambient humidity range		Operating: 25% to 85% (with no condensation)	

**Note:** Inputs are fully multi-input. Therefore, platinum resistance thermometer, thermocouple, infrared thermosensor, and analog input can be selected.

## ■ Characteristics

<b>Indication accuracy</b>	Thermocouple input/platinum resistance thermometer input: (±0.5% of indication value (PV) or ±1°C, whichever is greater) ±1 digit max. (See note 1.) Analog input: ±0.5% FS ±1 digit max. CT input: ±5% FS ±1 digit max.	
<b>Temperature variation influence (See note 2.)</b>	Thermocouple input (R, S, B): (±1% of indication value (PV) or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: (±1% of indication value (PV) or ±4°C, whichever is greater) ±1 digit max. K thermocouple at -100°C max: ±10°C max.	
<b>Voltage variation influence (See note 2.)</b>	Platinum resistance thermometer: (±1% of indication value (PV) or ±2°C, whichever is greater) ±1 digit max. Analog input: ±1% FS ±1 digit max.	
<b>Hysteresis</b>	0.1 to 999.9 EU (in units of 0.1 EU) (See note 3.)	
<b>Proportional band (P)</b>	0.1 to 999.9 EU (in units of 1 EU) (See note 3.)	
<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 output 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°C (0.2°F)/Ω max. (100 Ω max per line) (See note 4.) Platinum resistance thermometer: 0.4°C (0.8°F)/Ω max. (10 Ω max per line)	
<b>Insulation resistance</b>	20 MΩ 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> max., 3 times each in 6 directions	
<b>Weight</b>	180 g	
<b>Degree of protection</b>	Rear case: IP20, Terminal section: IP00	
<b>Memory protection</b>	EEPROM (non-volatile memory) (number of writes: 100,000)	
<b>Standards</b>	<b>Approved standards</b>	UL61010C-1, CSA C22.2 No.1010-1
	<b>Conformed standards</b>	EN61010-1 (IEC61010-1): Pollution level 2, overvoltage category II
<b>EMC Directive</b>	EMI: EMI Radiated: EMI Conducted: EMS: ESD Immunity: Radiated Electromagnetic Field Immunity: Burst immunity/Noise Immunity: Conducted Disturbance Immunity: Surge Immunity: Commercial Frequency Immunity: Voltage Dip/Interrupting Immunity:	EN61326 EN55011 Group1 class A EN55011 Group1 class A EN61326 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-6 EN61000-4-5 EN61000-4-8 EN61000-4-11

- Note: 1.** The indication of K thermocouples in the -200 to 1,300°C range, T and N thermocouples at a temperature of -100°C or less, and U and L thermocouples at any temperature is ±2°C ±1 digit maximum. The indication of B thermocouples at a temperature of 400°C or less is unrestricted. The indication of R and S thermocouples at a temperature of 200°C or less is ±3°C ±1 digit max.  
W = (±0.5% of indication value (PV) or ±3°C, whichever is greater) ±1 digit max. PLII = (±0.5% of indication value (PV) or ±2°C, whichever is greater) ±1 digit max.
- 2.** Ambient temperature: -10°C to 23°C to 55°C  
Voltage range: -15% to +10% of rated voltage
- 3.** "EU" stands for "Engineering Unit." For an analog input, the location of the decimal point depends on the parameter setting. If the decimal point location is set to 0 (\*\*\*\*), however, it will be treated as if it were set to 1 (\*\*.\*)
- 4.** B, R, and S sensors: 0.2°C/Ω max. (100 Ω max.)

## ■ Communications Specifications

Item	Port B (See note 1.)	Port A Terminal/ Port A Connector (See note 1.)	G3ZA Connection Port (See note 2.)
<b>Transmission path connection</b>	RS-485 (multipoint)		
<b>Communications method</b>	RS-485 (two-wire, half duplex)		
<b>Synchronization method</b>	Start-stop synchronization		
<b>Baud rate</b>	9.6, 19.2, 38.4, 57.6, or 115.2 kbps	38.4 kbps fixed	57.6 kbps fixed
<b>Transmission code</b>	ASCII		
<b>Data bit length</b>	7 or 8 bits	7 bits	
<b>Stop bit length</b>	1 or 2 bits	2 bits	
<b>Error detection</b>	Vertical parity (non, even, or odd)	Vertical parity (even)	
	Block check character (BCC): with CompoWay/F		
<b>Flow control</b>	None		
<b>Interface</b>	RS-485		
<b>Retry function</b>	None		
<b>Communications response wait time</b>	1 to 99 ms (default: 5 ms)	1 to 99 ms (default: 1 ms)	---
<b>Number of Units that can be connected in parallel (See note 3.)</b>	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)

- Note:** 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 10.

## ■ Current Transformer (CT) Rating

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

## ■ Characteristics of the Heater Burnout Alarm, Heater Short Alarm, and Heater Overcurrent Alarm (TC2 Model Only)

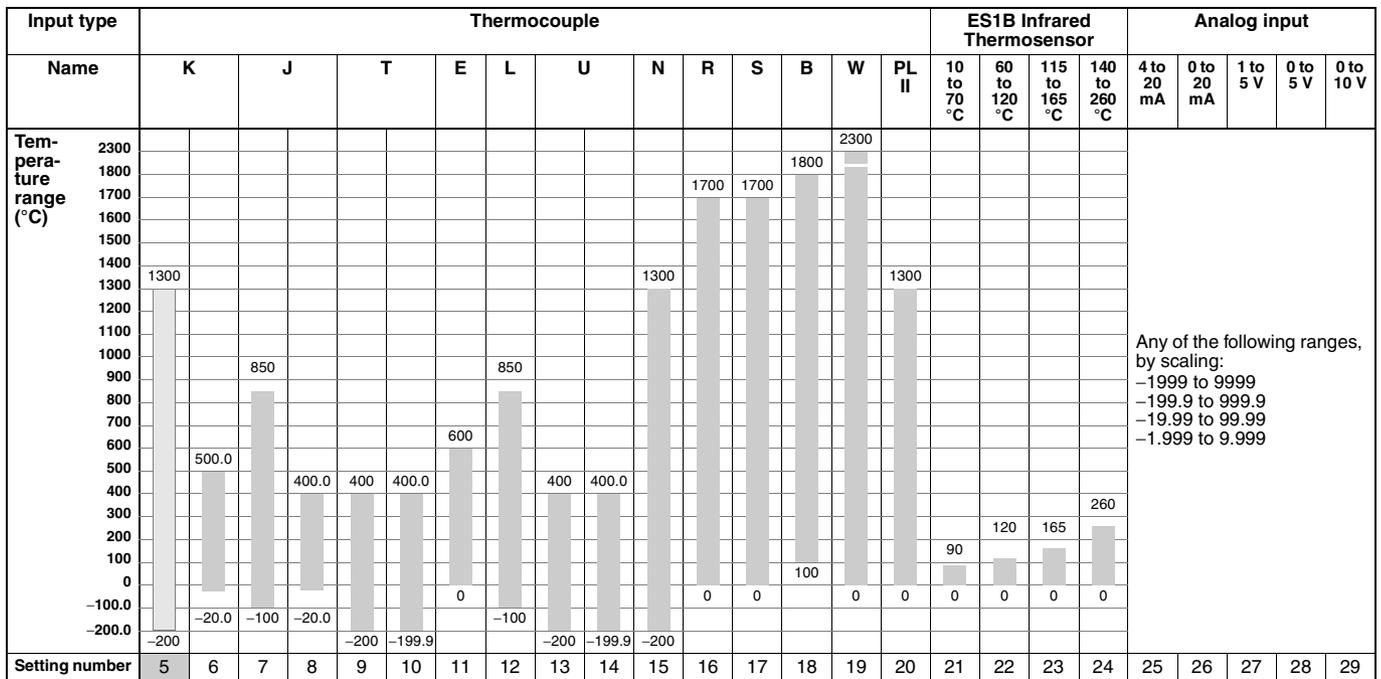
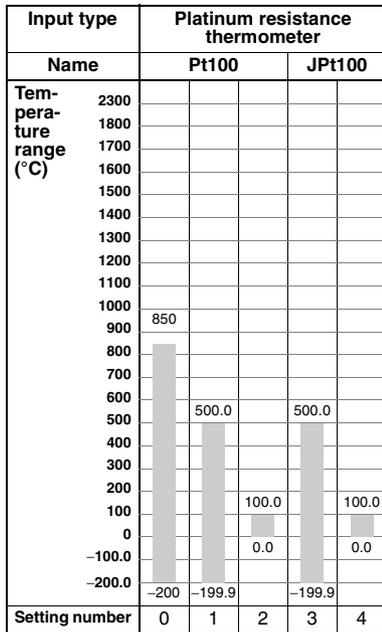
<b>Maximum heater current</b>	100 VAC
<b>Input current indication accuracy</b>	±5%FS ±1 digit max.
<b>Heater burnout alarm setting range</b>	0.1 to 99.9 A (in units of 0.1 A) 0.0 A: Heater burnout alarm output turns OFF. 100.0 A: Heater burnout alarm output turns ON. Min. detection ON time: 100 ms (See note 1.)
<b>Heater short alarm setting range</b>	0.1 to 99.9 A (in units of 0.1 A) 0.0 A: Heater short alarm output turns ON. 100.0 A: Heater short alarm output turns OFF. Min. detection OFF time: 100 ms (See note 2.)
<b>Heater overcurrent alarm setting range</b>	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 (See note 1.)

- Note:** 1. When the control output ON time is 100 ms or less, heater burnout detection and heater current measurement are not performed.  
 2. When the control output OFF time is 100 ms or less, heater short alarm and leakage current measurement are not performed.

## Input Ranges

Sensor inputs are fully multi-input. Therefore, platinum resistance thermometer, thermocouple, infrared thermosensor, and analog input can be selected.

Inputs can be set for each channel using multi-inputs.



Applicable standards by input type are as follows:  
 K, J, T, E, N, R, S, B: JIS C1602-1995, IEC584-1  
 L: Fe-CuNi, DIN 43710-1985  
 U: Cu-CuNi, DIN 43710-1985

W: W5Re/W26Re, ASTM E988-1990  
 PL II: According to Platine II Electromotive Force Table by Engelhard Corp.  
 JPt100: JIS C 1604-1989, JIS C 1606-1989  
 Pt100: JIS C 1604-1997 IEC 751

Shaded ranges indicate default settings.

EJ1N-HFU

## ■ Ratings

<b>Power supply voltage</b>		24 VDC
<b>Operating voltage range</b>		85% to 110% of rated voltage
<b>Power consumption</b>		2 W max. (at maximum load)
<b>Auxiliary outputs</b> (See note 1.)	<b>Outputs</b>	4
	<b>Transistor outputs</b>	Max. operating voltage: 30 VDC, Max. load current: 50 mA
<b>Event inputs</b> (See note 2.)	<b>Inputs</b>	4
	<b>Contact inputs</b>	ON: 1 kΩ max., OFF: 100 kΩ min.
	<b>Transistor inputs</b>	ON: residual voltage of 1.5 max., OFF: leakage current of 0.1 mA max. Short-circuit current: Approx. 4 mA (per contact)
<b>Programless connection</b>	<b>Programless downloading</b> (EJ1 writes data to a PLC)	Number of parameters that can be set: 300
	<b>Programless uploading</b> (EJ1 reads data from a PLC)	Number of parameters that can be set: 300
	<b>Applicable PLCs</b>	OMRON: SYSMAC CS/CJ Series, Mitsubishi Electric: MELSEC-Q/QnAS Series
<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)

- Note:** 1. Auxiliary outputs can be allocated using digital output allocations.  
2. Event inputs can be allocated using digital output allocations.

## ■ Characteristics

<b>Insulation resistance</b>		20 MΩ 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> max., 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>		EEPROM (non-volatile memory) (number of writes: 100,000)
<b>Standards</b>	<b>Approved standards</b>	UL61010C-1, CSA C22.2 No.1010-1
	<b>Conformed standards</b>	EN61010-1 (IEC61010-1): Pollution level 2, overvoltage category II
<b>EMC Directive</b>		Refer to page 3.

## ■ Communications Characteristics: Port C Port B on the End Unit cannot be used when an HFU is used.

<b>Transmission path connection</b>	RS-485/RS-422: Multi-point, RS-232C: Point-to-point (See note 1.)
<b>Communications method</b>	RS-485/RS-422 (two-wire, half duplex), RS-232C
<b>Synchronization method</b>	Start-stop synchronization
<b>Baud rate</b>	9.6, 19.2, 38.4, 57.6, or 115.2 kbps
<b>Transmission code</b>	Binary
<b>Data bit length</b>	8 bits
<b>Stop bit length</b>	1 bit
<b>Error detection</b>	According to the protocol selected for programless communications.
<b>Flow control</b>	None
<b>Interface</b>	RS-485, RS-422, RS-232C (See note 1.)
<b>Retry function</b>	Supported.
<b>Communications response wait time</b>	1 to 99 ms (default: 5 ms)
<b>Number of Units that can be connected in parallel</b> (See note 2.)	16 Units (model numbers with TC4: 64 channels, model numbers with TC2: 32 channels)

- Note:** 1. The communications method can be switched between RS-485 and RS-232C. Another model must be used for RS-422 communications.  
2. For the number of Units that can be connected, refer to "Connection Precautions" on page 10.

End Unit/EJ1C-EDU

**■ Ratings**

Power supply voltage		24 VDC
Operating voltage range		85% to 110% of rated voltage
Auxiliary output (See note.)	Outputs	2
	Transistor outputs	Max. operating voltage: 30 VDC, Max. load current: 50 mA
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)

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

**■ Characteristics**

Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		600 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity
Vibration resistance		10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions
Shock resistance		150 m/s <sup>2</sup> max., 3 times each in 6 directions
Weight		70 g
Degree of protection		End Unit case: IP20, Terminal section: IP00
Standards	Approved standards	UL61010C-1, CSA C22.2 No.1010-1
	Conformed standards	EN61010-1 (IEC61010-1): Pollution level 2, overvoltage category II
EMC Directive		Same as for the Basic Unit. Refer to page 3.

**■ Communications**

Port B (See note 1.)	Basic Unit Communications (Refer to “ <i>Communications Specifications</i> ” on page 4.)
Port A	Basic Unit Communications (Refer to “ <i>Communications Specifications</i> ” on page 4.)
Port A connector (See note 2.)	E58-CIFQ1

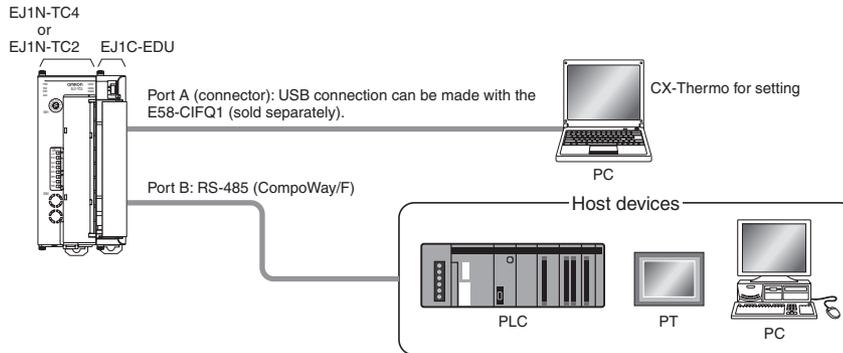
**Note:** 1. Port B communications for the End Unit cannot be used when port C communications for the HFU is used.  
 2. Port A connector communications and port A terminal communications cannot be used at the same time.

# Unit Configuration Example

## ■ Minimal Configuration

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

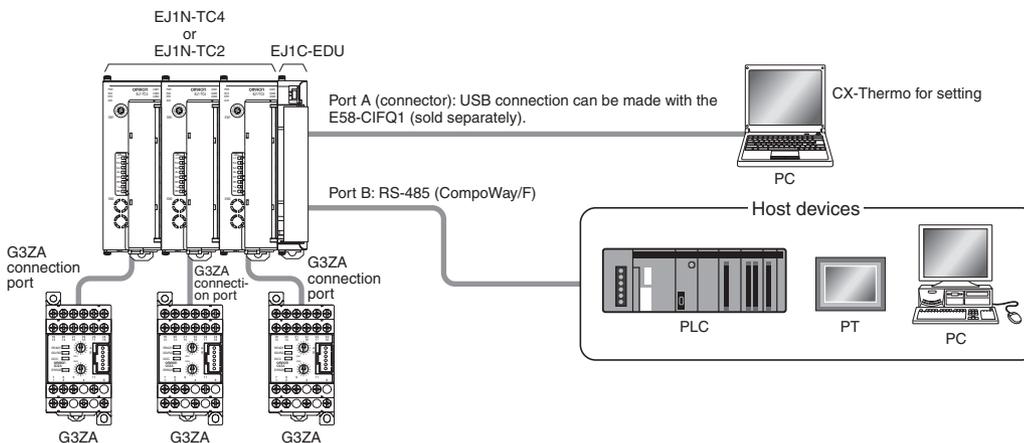
- Alarms can be allocated to the auxiliary output for the End Unit.
- G3ZA outputs can be used.



## ■ Multiple Units without an EJ1N-HFU

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

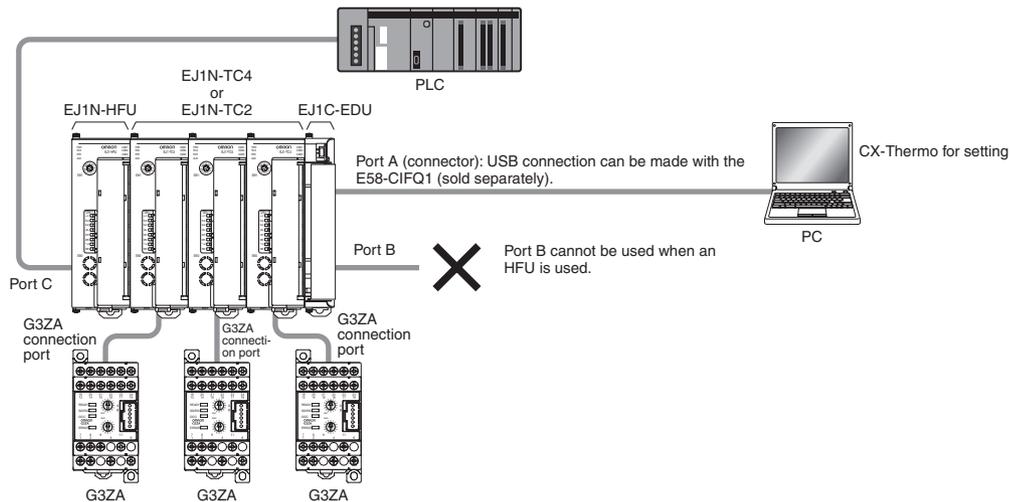
- The 2 auxiliary alarm outputs (transistor outputs) provided on the End Unit can be used for integrated alarm systems.
- G3ZA outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units.



## Multiple Units with an EJ1N-HFU

### Building Systems Communicating with PLCs Using Programless Communications

- The 2 auxiliary outputs (transistor outputs) provided on the End Unit can be used.
- In addition to the 2 auxiliary alarm outputs provided on the End Unit, the 4 event inputs/4 auxiliary outputs (transistor outputs) of the HFU can also be used.
- G3ZA outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units



## ■ Connection Precautions

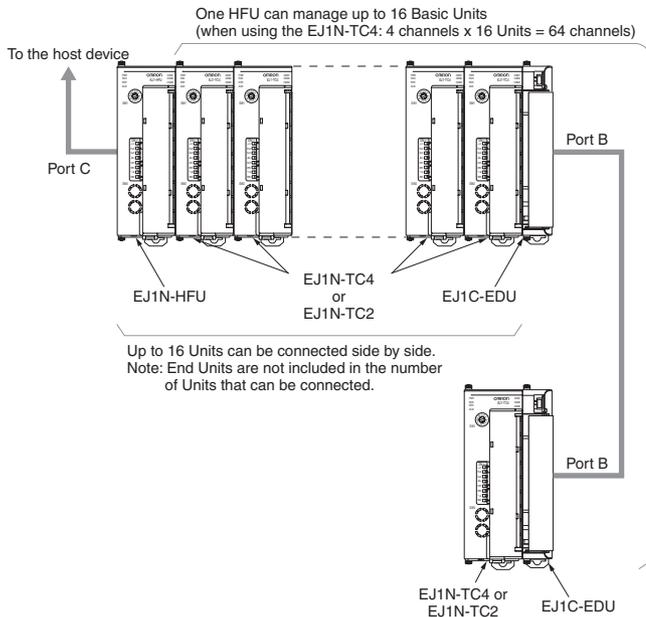
### Node Number Setting

- Nodes 1 to 16 can be used on EJ1N-HFUs. Node 0 is allocated to the host device for programless communications.
- Nodes 0 to 63 can be used on Basic Units.

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

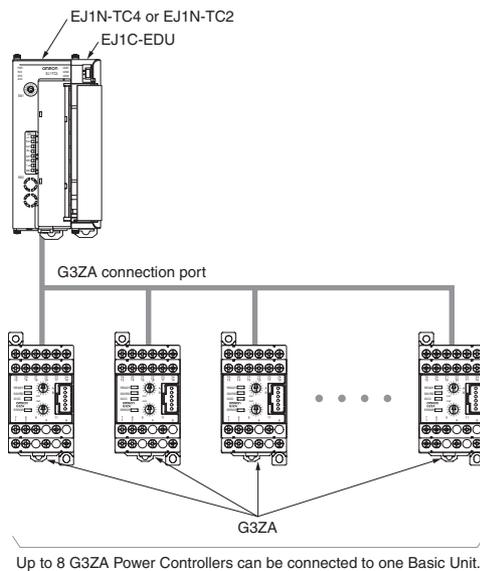
#### Restrictions for HFUs

- One EJ1N-HFU can manage up to 16 Basic Units (EJ1N-TC4/TC2).
- Up to 16 Units can be connected side by side including the EJ1N-HFU. The End Unit is not included in the 16 Units.



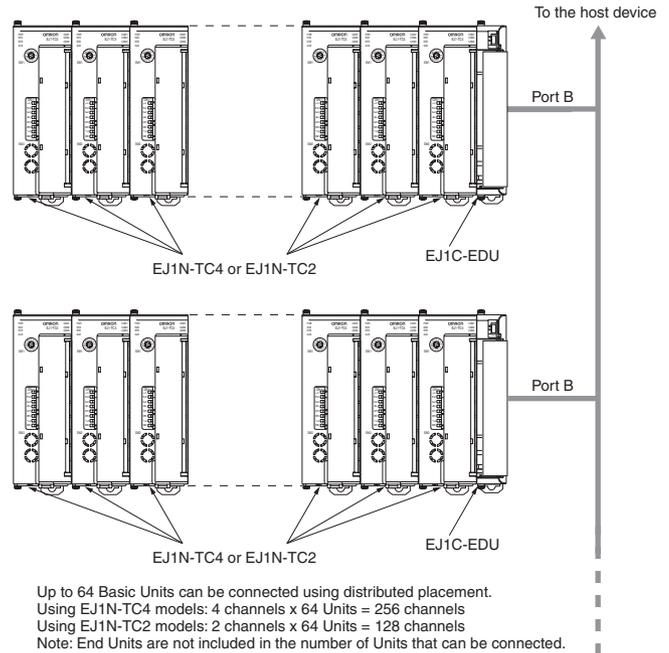
#### Restrictions When Connecting with the G3ZA

- Up to 8 G3ZA Multi-channel Power Controllers can be connected to one Basic Unit (EJ1N-TC4/TC2).

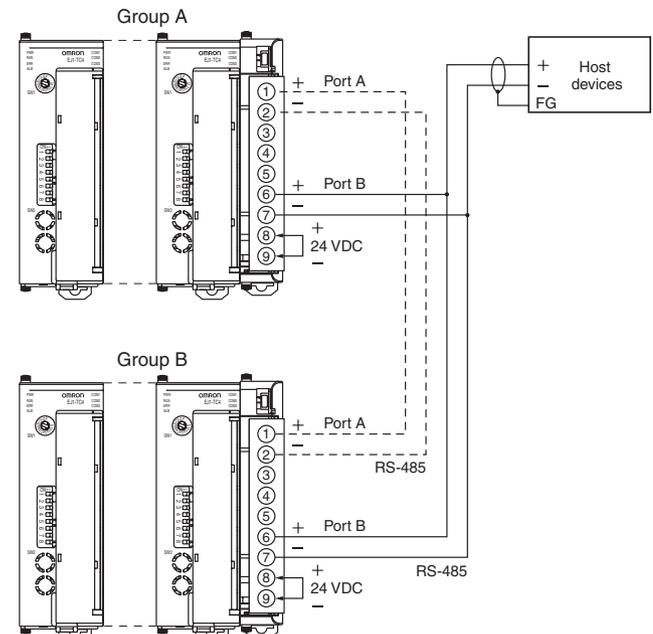


#### Restrictions for Basic Units

- 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.



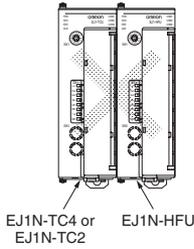
#### Wiring for Distributed Placement



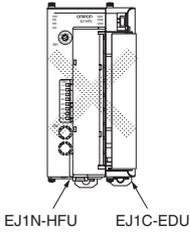
**Note:** Wire the dotted line when settings for all distributed Units are being made from one port A connector. If the dotted lines are not wired, make the settings for group A using the port A connector for group A and make the settings for group B using the port A connector for group B.

## Restrictions on Unit Placement

Always connect the HFU on the left side of the Basic Unit.



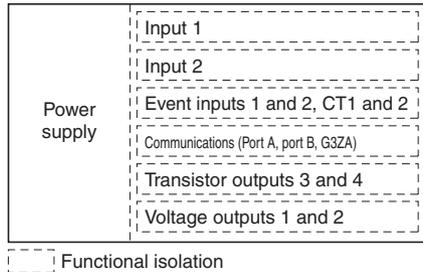
Do not connect the End Unit directly to the HFU. Always connect a Basic Unit to the End Unit.



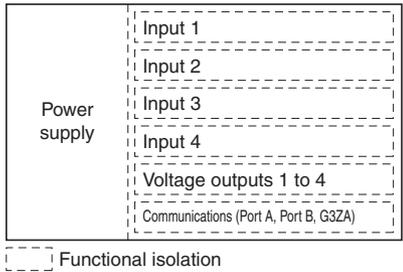
## Insulation Blocks

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.

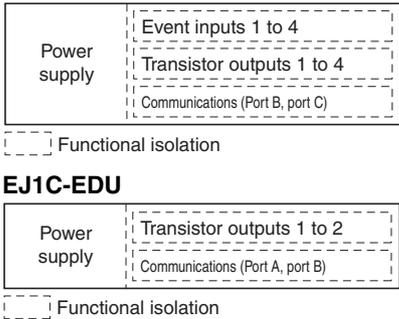
### EJ1N-TF2



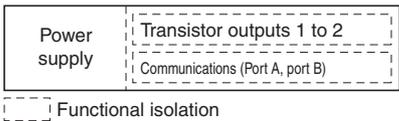
### EJ1N-TF4



### EJ1N-HFU

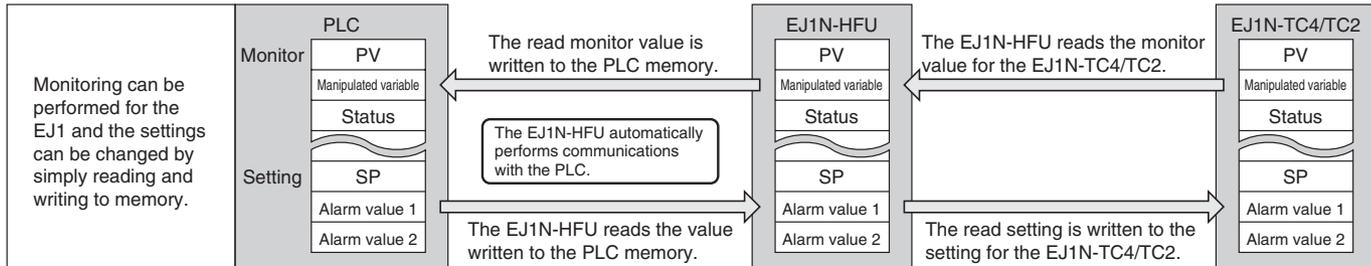


### EJ1C-EDU



## Programless Communications

Communications with PLCs from OMRON (SYSMAC CS/CJ Series) and Mitsubishi Electric (MELSEC-Q/QnAS Series) can be performed without creating ladder programming. Using programless communications enables monitoring and changing settings for the EJ1 by simply reading and writing to PLC memory. The EJ1 automatically performs communications with the PLC, which reduces work hours spent programming for communications from the PLC to the EJ1.



## Connectable Devices

### SYSMAC CS/CJ Series

Name	Model No.	Communications ports	
		Port 1	Port 2
Serial Communications Unit	CJ1W-SCU21-V1	RS-232C	RS-232C
	CJ1W-SCU41-V1	RS-422A/485	RS-232C
	CS1W-SCU21-V1 (See note.)	RS-232C	RS-232C
Serial Communications Board	CS1W-SCB21-V1 (See note.)	RS-232C	RS-232C
	CS1W-SCB41-V1 (See note.)	RS-232C	RS-422A/485
CPU Unit	CJ1 Series	---	RS-232C
	CS1 Series	---	RS-232C

**Note:** Use only products manufactured on or after December 20, 1999. For details, refer to the CS/CJ Series, Serial Communications Boards/Units Operation Manual (Cat. No. W336).

### MELSEC-Q/QnAS Series

Name	Model No.	Communications ports	
		Channel 1	Channel 2
Q-compatible Serial Communications Unit	QJ71C24N	RS-232C	RS-422/485
	QJ71C24	RS-232C	RS-232C
	QJ71C24N-R2	RS-232C	RS-232C
	QJ71C24-R2	RS-422/485	RS-422/485
QnAS-compatible Serial Communications Unit	A1SJ71QC24N	RS-232C	RS-422/485
	A1SJ71QC24N-R2	RS-232C	RS-232C

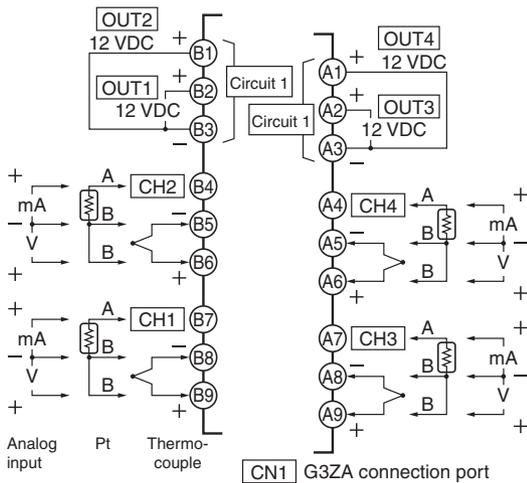
**Note:** 1. Refer to the Mitsubishi Electric manual for the MELSEC.  
 2. Direct connections to the EJ1 are possible with RS-232C and RS-422.  
 3. Even if RS-422 is used, connection is possible to only one PLC. Connection to the above Mitsubishi Electric controllers has been verified, but design changes or other factors unforeseeable to OMRON may make connection impossible. Confirm connectability in advance.

# Connection

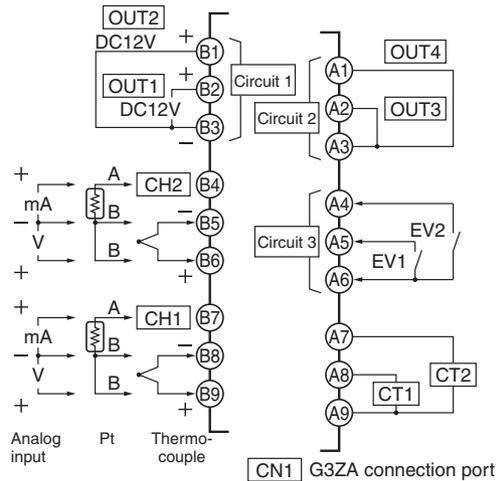
## External Connection

- 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 (Densei Lamda MXB-1206-33 or the equivalent) to the DC power line as close as possible to the Temperature Controller.
- Use a SELV power supply. An SELV circuit is one separated from the power supply with double insulation or reinforced insulation, that does exceed an output voltage of 30 V r.m.s. and 42.4 V peak or 60 VDC max. The OMRON S8VS Series is recommended for the power supply.

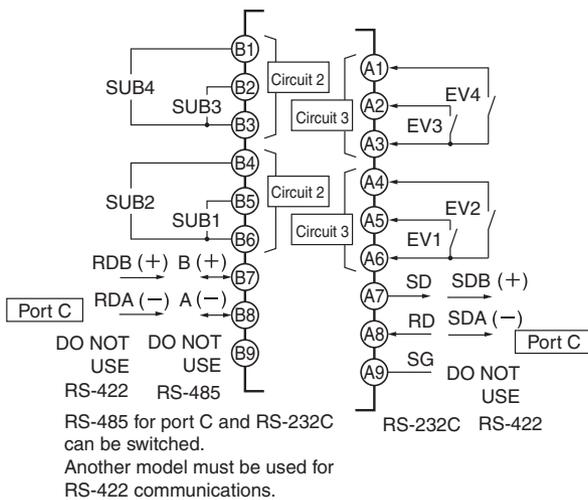
### EJ1N-TC4



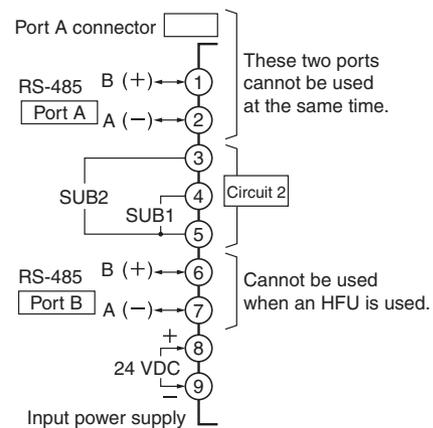
### EJ1N-TC2



### EJ1N-HFU



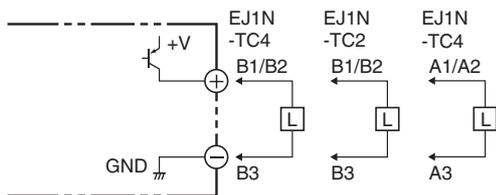
### EJ1C-EDU



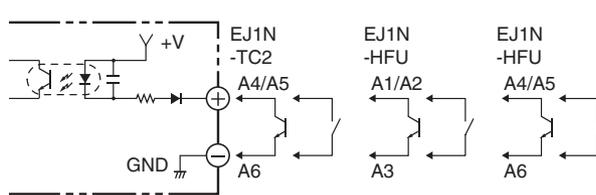
- Note:**
1. To connect to the G3ZA, separately purchase a G3ZA Connecting Cable (EJ1C-CBLA050) and connect it to the G3ZA connection port (CN1) on the EJ1.
  2. To connect to a computer using the port A connector, use a separately sold E58-CIFQ1 USB-Serial Conversion Cable. The Temperature Controller can be connected to a computer using USB.
  3. Terminals A10 and B10 are not used on models with screw-less clamp terminals. Do not connect anything to these terminals.

## Internal Wiring

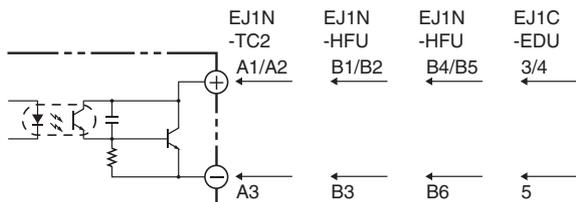
### Circuit 1



### Circuit 3

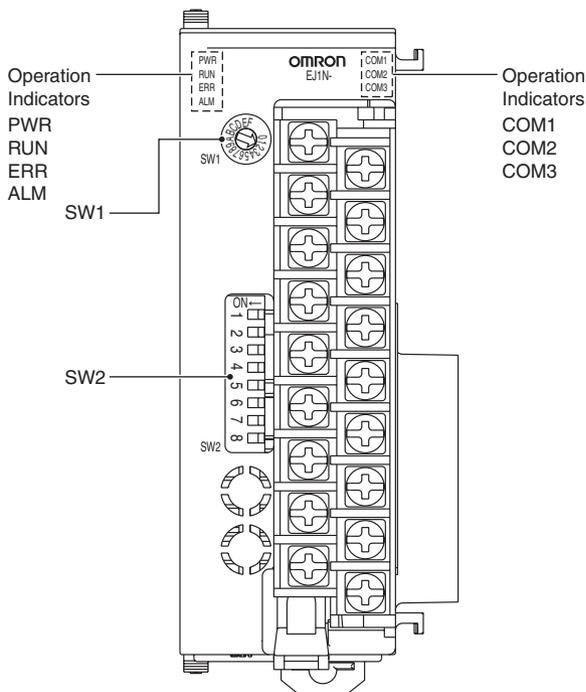


### Circuit 2



## Nomenclature and Specification Settings

### Nomenclature



### Operation Indicators

#### EJ1N-TC2/TC4

Operation Indicators	Meaning
<b>PWR (green)</b>	Lights when the power is ON.
<b>RUN (green)</b>	Lights during operation.
<b>ERR (red)</b>	Flashes or lights when an error occurs.
<b>ALM (red)</b>	Lights when an alarm is activated.
<b>COM 1 (orange)</b>	Flashes during communications via port A on the End Unit.
<b>COM 2 (orange)</b>	Flashes during communications via port B on the End Unit.
<b>COM 3 (orange)</b>	Flashes during communications with the G3ZA.

#### EJ1N-HFU

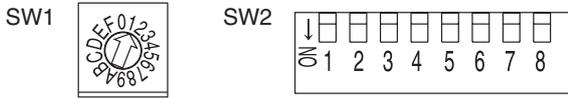
Operation Indicators	Meaning
<b>PWR (green)</b>	Lights when the power is ON. (See note.)
<b>RUN (green)</b>	---
<b>ERR (red)</b>	Flashes or lights when an error occurs.
<b>ALM (red)</b>	Lights when an alarm is activated.
<b>COM 1 (orange)</b>	Flashes during communications via port A on the End Unit.
<b>COM 2 (orange)</b>	Flashes when the EJ1 system is in operation.
<b>COM 3 (orange)</b>	Flashes during communications via port C.

**Note:** Some time is required for the indicators to light after the power is turned ON.

## ■ Specification Settings

### Switch Operation

- Check that the EJ1 is turned OFF before operating the switches. 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-TC2/TC4

SW2	Meaning
3 to 6	Not used (OFF)
7	ON: G3ZA in operation
8	Use when an HFU is used and Units are distributed. (Refer to the operation manual for details.)

#### EJ1N-HFU

SW2	Meaning
3 to 7	Not used (OFF)
8	<ul style="list-style-type: none"> <li>• EJ1N-HFU□-NFLK OFF: RS-485 is selected. ON: RS-232C is selected.</li> <li>• EJ1N-HFU□-NFL2 Not used (OFF).</li> </ul>

## Dimensions

Note: All units are in millimeters unless otherwise indicated.

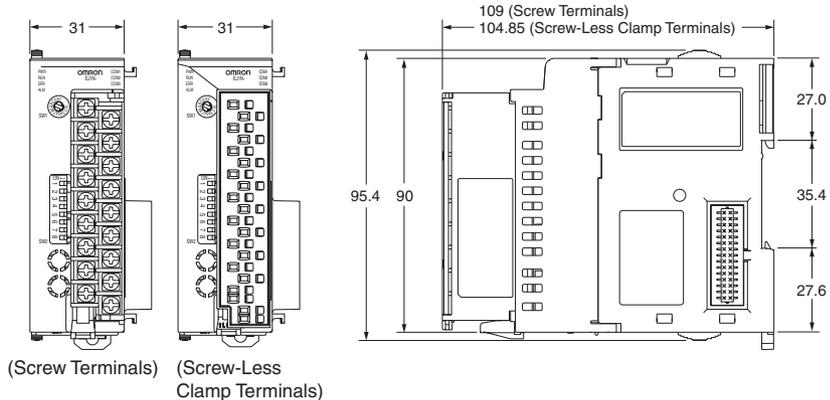
## ■ Temperature Controller

### Basic Units

#### EJ1N-TC

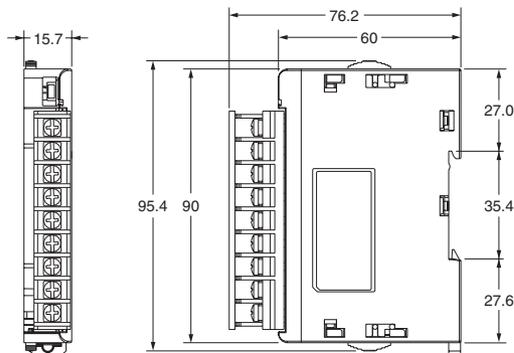
#### HFUs

#### EJ1N-HFU



### End Units

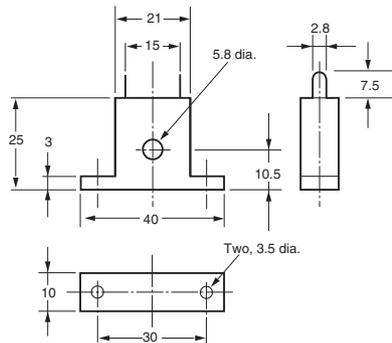
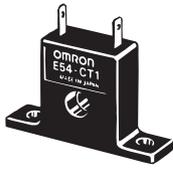
#### EJ1C-EDU



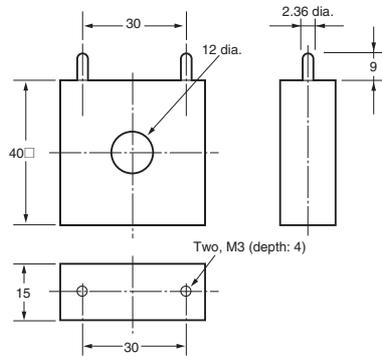
## Options

### Current Transformer (Sold Separately)

#### E54-CT1

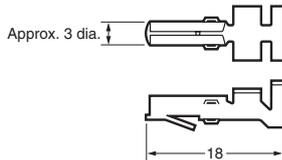


#### E54-CT3

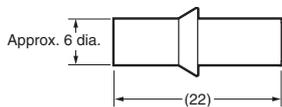


#### E54-CT3 Accessory

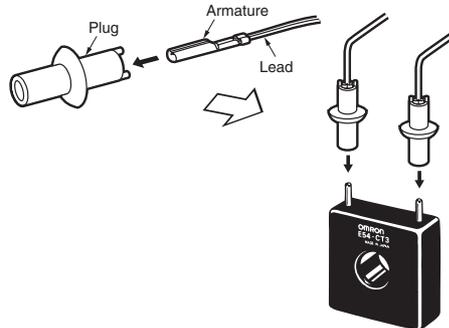
##### • Armature



##### • Plug

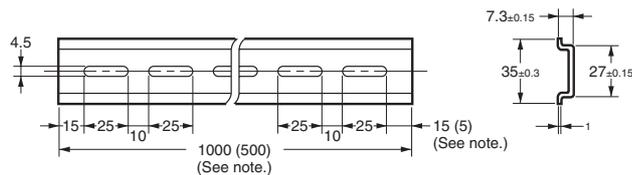
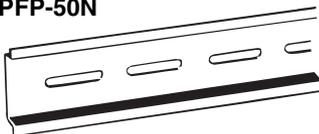


#### Connection Example



### Rail Mounting Equipment (Order Separately)

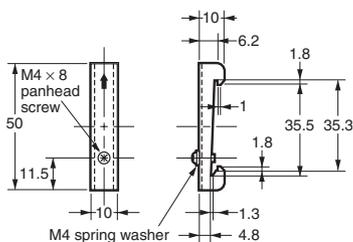
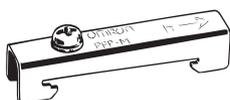
#### DIN Rail PFP-100N PFP-50N



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

#### End Plate

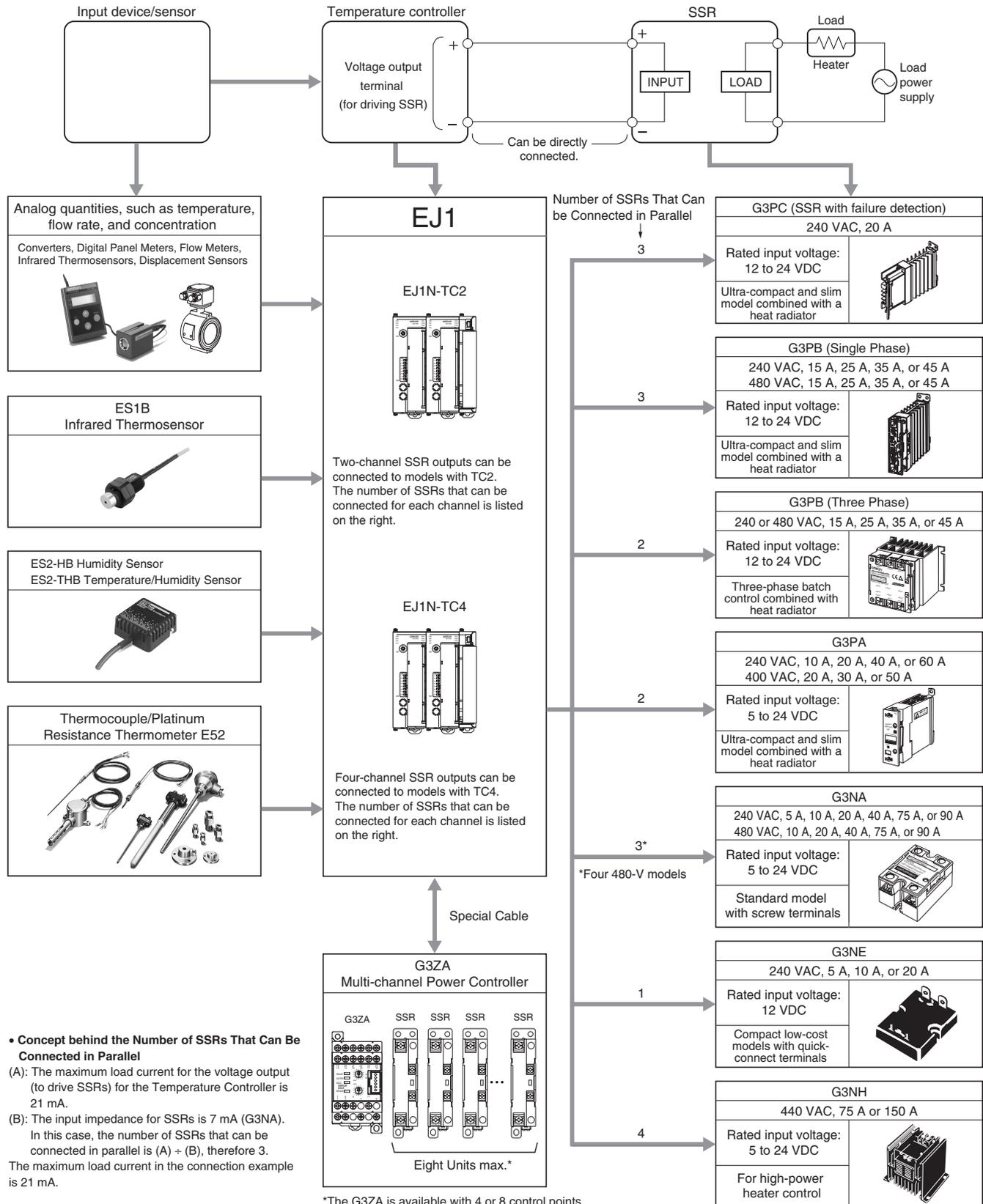
##### PFP-M



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

# I/O Devices

## Examples of EJ1-series Temperature Controllers Connected with Temperature Sensors and SSRs



# Safety Precautions

## ⚠ CAUTION

Do not touch the terminals while power is being supplied. Doing so may occasionally result in minor injury due to electric shock.



Use a power supply that complies with the reinforced insulation specified in IEC 60664 for the EJ1 external power supply or the power supply connected to the EJ1. If non-compliant power supplies are used, electric shock may occasionally result in minor injury.



Do not allow pieces of metal, wire clippings, or fine metallic shavings or filings from installation to enter the product. Doing so may occasionally result in electric shock, fire, or malfunction.



Do not use the product where subject to flammable or explosive gas. Otherwise, minor injury from explosion may occasionally occur.



Never disassemble, modify, or repair the product or touch any of the internal parts. Minor electric shock, fire, or malfunction may occasionally occur.



Tighten the terminal screws to between 0.40 and 0.56 N·m. Loose screws may occasionally result in fire.



Set the parameters of the product so that they are suitable for the system being controlled. If they are not suitable, unexpected operation may occasionally result in property damage or accidents.



A malfunction in the product may occasionally make control operations impossible or prevent alarm outputs, resulting in property damage. To maintain safety in the event of malfunction of the product, take appropriate safety measures, such as installing a monitoring device on a separate line.



## ■ Precautions for Safe Use

Observe the following points to ensure safe operation.

- The product is designed for indoor use only. Do not use the product outdoors or in any of the following locations.
  - Places directly subject to heat radiated from heating equipment
  - Places subject to splashing liquid or oil atmosphere
  - Places subject to direct sunlight
  - Places subject to dust or corrosive gas (in particular, sulfide gas or ammonia gas)
  - Places subject to intense temperature change
  - Places subject to icing or condensation
  - Places subject to vibration or strong shocks
- Use and store the product within the rated temperature and humidity ranges. Provide forced-cooling if required.
- To allow heat to escape, do not block the area around the product. Do not block the ventilation holes on the product.
- Be sure to wire properly with correct polarity of terminals.
- Use specified size (M3, width 5.8 mm or less) crimped terminals for wiring. To connect bare wires to the terminal block, use copper braided or solid wires with a gage of AWG22 to AWG14 (equal to cross-sectional area of 0.326 to 2.081 mm<sup>2</sup>) for power supply lines and a gage of AWG28 to AWG16 (equal to cross-sectional area of 0.081 to 1.309 mm<sup>2</sup>). (The stripping length is 6 to 8 mm.) Up to two wires of same size and type, or two crimped terminals can be inserted into a single terminal.
- Do not wire terminals that do not have an identified use.

- Allow as much space as possible between the product and devices that generate a powerful high-frequency or surge. Separate the high-voltage or large-current power lines from other lines, and avoid parallel or common wiring with the power lines when you are wiring to the terminals.
- Use the product within the rated load and power supply.
- Make sure that the rated voltage is attained within two seconds of turning ON the power.
- Make sure that the product has 30 minutes or more to warm up after turning ON the power before starting actual control operations to ensure the correct temperature display.
- The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
- Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
- Design the system (e.g., the control panel) allowing leeway for the delay required before product outputs are valid after turning ON power to the product.
- Never touch the electronic components, connectors, or patterns on product boards with your bare hands. Always hold the product by the case. Inappropriately handling the product may occasionally damage internal components due to static electricity.
- Use a switch, relay, or other device with contacts to turn OFF the power supply quickly. Gradually lowering the voltage of the power supply may result in incorrect outputs or memory errors.
- Do not touch the electronic components with your hands or subject them to shock when removing the terminal block.
- Connect only the specified number of products in only a specified configuration.
- Mount the product to a DIN Rail mounted vertically to the ground.
- Always turn OFF the power supply before wiring the product, replacing the product, or changing the product configuration.
- Attach the enclosed cover seal to the connector opening on the left end product during installation.
- Do not use port B on the end product when using port C on HFUs.
- Install the product only after reading the manual provided with the End Unit.

## ■ Precautions for Correct Use

### Service Life

1. Use the product within the following temperature and humidity ranges:  
 Temperature:  $-10^{\circ}\text{C}$  to  $55^{\circ}\text{C}$  (with no condensation or icing)  
 Humidity: 25% to 85%  
 When the Temperature Controller is incorporated in a control panel, make sure that the controller's ambient temperature and not the panel's ambient temperature does not exceed  $55^{\circ}\text{C}$ .
2. The service life of electronic devices like Temperature Controllers is determined not only by the number of times the relay is switched but also by the service life of internal electronic components. Component service life is affected by the ambient temperature: the higher the temperature, the shorter the service life and the lower the temperature, the longer the service life. Therefore, the service life can be extended by lowering the temperature of the Temperature Controller.
3. Mounting two or more Temperature Controllers side by side, or mounting Temperature Controllers above each other may cause heat to build up inside the Temperature Controllers, which will shorten their service life. If the Temperature Controllers are mounted above each other or side by side, use forced cooling by fans or other means of air ventilation to cool down the Temperature Controllers.  
 However, be sure not to cool only the terminals. Doing so will result in measurement errors.

### Ensuring Measurement Accuracy

1. When extending or connecting the thermocouple lead wire, be sure to use compensating wires that match the thermocouple types.
2. When extending or connecting the lead wire of the platinum resistance thermometer, be sure to use wires that have low resistance and keep the resistance of the three lead wires the same.
3. Mount the Temperature Controller so that it is horizontally level.
4. If the measurement accuracy is low, check to see if input shift has been set correctly.

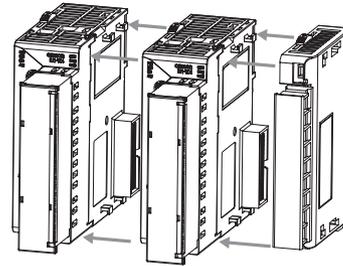
### Precautions for Operation

1. A certain amount of time is required for the outputs to turn ON from the time the power supply is turned ON. Due consideration must be given to this time when incorporating Temperature Controllers in a sequence circuit.
2. It takes 30 minutes from the time the product is turned ON until the correct temperature is indicated. Always turn ON the power supply at least 30 minutes before starting temperature control.
3. Avoid using the Temperature Controller near a radio, television set, or other wireless device. Its use would result in reception disturbance.

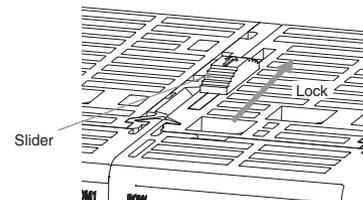
## Installation

### Connecting Units

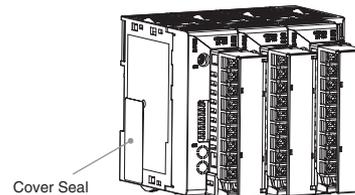
1. Align the connectors and connect the Units to each other.  
 Connect an End Unit to the Unit on the right end. (Up to 16 Units can be connected side by side.)



- Note:**
1. Do not connect an End Unit directly to an HFU.  
 2. Always connect an End Unit to the right side of a Basic Unit.
  2. Slide the yellow sliders on the top and bottom of the Units until they click into place.

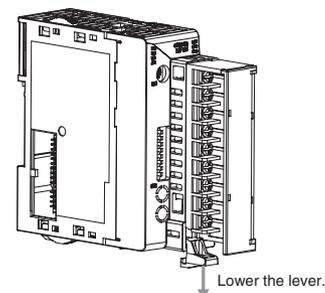


3. Attach the cover seal to the connector on the Unit on the left end of the EJ1.

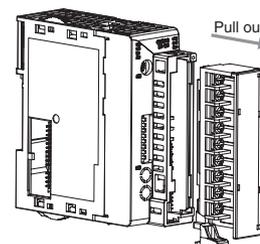


### Removing the Terminal Block

1. Press down the terminal block lever.



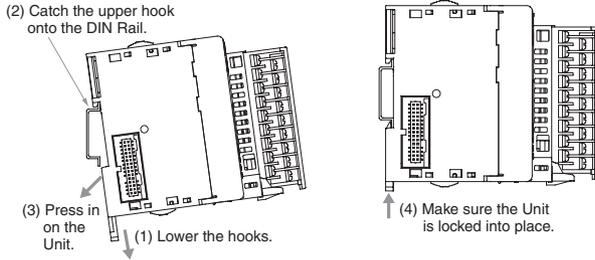
2. Pull out the terminal block.



## Mounting to the DIN Rail

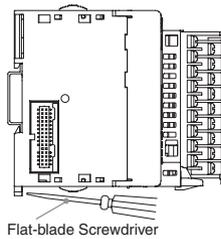
### Mounting

Catch the hook located on the top of the Unit onto the DIN Rail and press the Unit until the Unit locks into place.

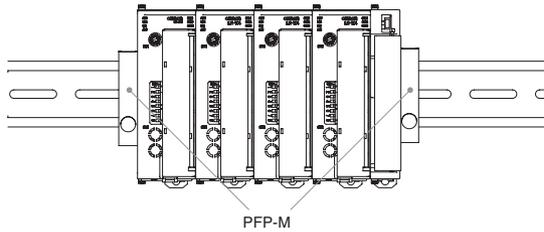


### Dismounting

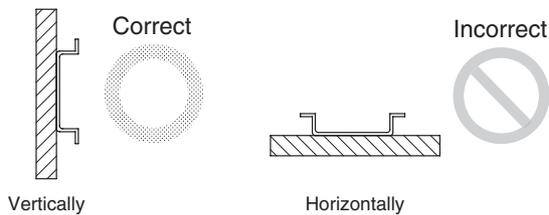
Pull down on the hook with a flat-blade screwdriver and lift up on the Unit.



Mount one End Plate to each side of the EJ1C-EDU (PFP-M End Plates are included with the End Unit).



Install the DIN Rail vertically to the ground.



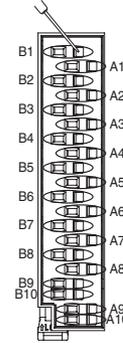
Applicable DIN Rail (sold separately): PFP-100N (100 cm), PFP-50N (50 cm)

## Wiring Procedure for Screw-Less Clamp Terminals

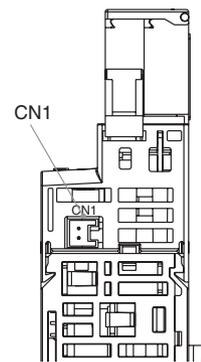
There are two holes for each terminal. The hole on the right is the operating hole; the hole on the left is the wire hole. Insert a flat-blade screwdriver with a width of 2.5 mm into the operating hold and then insert the wiring into the wire hole. The wire will be clamped when the screwdriver is removed.

Use crimp terminals for wiring that match the cross-sectional area of the wiring material.

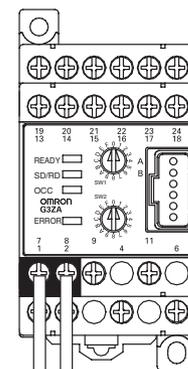
We recommend the following crimp terminals: Weidmuller H-sleeve series



## Connecting to the G3ZA (EJ1N-TC)

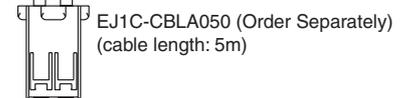


Connect the G3ZA Connecting Cable to the CN1 connector on the bottom of the TC Unit.



G3ZA

Connect the black line with a white stripe to terminal 7 on the G3ZA and the black line with no stripe to terminal 8.



EJ1C-CBLA050 (Order Separately) (cable length: 5m)

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

Refer to the following manual for precautionary information and other information necessary to use the EJ1:  
EJ1 Modular Temperature Controller Operation Manual (Cat. No. H142)

# Warranty and Application Considerations

## 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.

## Warranty and Limitations of Liability

### WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

### LIMITATIONS OF LIABILITY

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

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS 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 OR REPAIR.

## Application Considerations

### SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

## Disclaimers

### PERFORMANCE DATA

Performance data given in this catalog 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 users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability*.

### CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

### DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

### ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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**In the interest of product improvement, specifications are subject to change without notice.**

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