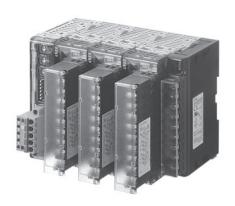
CSM\_EJ1\_DS\_E\_8\_1

# **In-panel Temperature Controller with Flexible** Modular Design and Wide 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 universal-input Unit includes a thermocouple, platinumresistance thermometer, and analog input for easy selection and reduced inventory requirements.
- Connect directly to the G3ZA Multi-channel Power Controller using optimum cycle control for high-accuracy regulation with minimal noise.
- Autotuning (AT) can be used for independent heating/cooling PID control.
- Self-tuning (ST) can be used to calculate the PID constants with the step response method.
- Up to 16 Temperature Controllers can be connected to a single DeviceNet Communications Unit.





### Supports DeviceNet Communications.

Refer to the "Safety Precautions" on page 20

# **Ordering Information**

# **Temperature Controller**

### **Standard Control Models**

	Dawa:	No. of	Control	Control		Funct	ions				
Name	Power supply voltage	control points	outputs 1 and 2	outputs 3 and 4	Auxiliary output	Heater burnout alarm	Event inputs	Communications functions	Input type	Terminal	Model
Basic Unit	24 VDC	2	Voltage	Transistor	None	2 *3	2	G3ZA connection	Thermocouple,	M3 terminal	EJ1N-TC2A-QNHB
(temperature control) *1	supplied from the End Unit		output: 2 points (for SSR	output: 2 points (sinking)				port: RS-485 From End Unit: Port A or port B:	platinum resistance thermometer.	Screw-less clamp	EJ1N-TC2B-QNHB
V1.2	Liid Ollit	4	drive) *2	Voltage output:		None	None	RS-485	analog	M3 terminal	EJ1N-TC4A-QQ
				2 points (for SSR drive) *2					voltage, and analog current selectable for	Screw-less clamp	EJ1N-TC4B-QQ
		2	Current	Transistor			2		each channel.	M3 terminal	EJ1N-TC2A-CNB
			output: 2 points	output: 2 points (sinking)						Screw-less clamp	EJ1N-TC2B-CNB
HFU with		None	None	None	Transistor		4	Port C: RS-485 or	No input	M3 terminal	EJ1N-HFUA-NFLK
Programless Communications *1 V1.2					output: 4 points (sinking)			RS-232C selectable. From End Unit: Port A: RS-485		Screw-less clamp	EJ1N-HFUB-NFLK
								Port C: RS-422		M3 terminal	EJ1N-HFUA-NFL2
								From End Unit: Port A: RS-485		Screw-less clamp	EJ1N-HFUB-NFL2
HFU with DeviceNet Communications *1					None		None	DeviceNet communications		Screw-less clamp	EJ1N-HFUB-DRT
End Unit *1	24 VDC				Transistor		None	Port A or B: RS-		M3 terminal	EJ1C-EDUA-NFLK
					output: 2 points (sinking)			485 Connector: Port A		Detachable connector	EJ1C-EDUC-NFLK

<sup>\*1.</sup> 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

### **Functional Upgrades**

Refer to page 17 for details.

Upgrade functions are supported by the indicated version ("V1.1" or "V1.2") or a higher version of the software.

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

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

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

# **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	PFP-100N
Mounting Haii	PFP-50N

## **CX-Thermo Support Software Ver. 4.1**

	Model	
EST2-2C-MV4		

### **USB-Serial Conversion Cable**

	Model	
E58-CIFQ1		

# **Specifications**

## Basic Unit/EJ1N-TC

# **Ratings**

Item	Туре	EJ1N-TC4		EJ1N-TC2						
Power sup	pply voltage	24 VDC								
Operating	voltage range	85% to 110% of rated voltage								
Power cor	nsumption	5 W max. (at maximum load)		4 W max. (at maximum load)						
Input *		Thermocouple: ES1B Infrared Thermosensor: Analog input: Platinum resistance thermometer:		N, R, S, B, W, PLII o 120°C, 115 to 165°C, 140 to 260°C 20 mA, 1 to 5 V, 0 to 5 V, 0 to 10 V						
Input impo	edance	Current input: 150 $\Omega$ max., voltage	Current input: 150 $\Omega$ max., voltage input: 1 M $\Omega$ min.							
	Voltage output	Output voltage: 12 VDC ±15%, max	x. load current: 21 m	A (PNP models with short-circuit protection circuit)						
	Transistor output			Max. operating voltage: 30 V, max. load current: 100 mA						
Power suppl Operating vo Power consult Input *  Input impeda  V T Control outputs  C  Ir Event inputs  Number of inpoints Setting meth Control meth Other function Ambient tem	Current output			Current output range: 4 to 20 mA or 0 to 20 mA DC Load: $500~\Omega$ max. (including transfer output) (Resolution: Approx. 2,800 for 4 to 20 mA DC, approx. 3,500 for 0 to 20 mA DC)						
	Input points			2						
Event	Contact input			ON: 1 k $\Omega$ max., OFF: 100 k $\Omega$ min.						
	Non-contact input			ON: Residual voltage: 1.5 V max., OFF: Leakage current: 0.1 mA max.						
		Thermocouple: K, J, T, E, L, U, I ES1B Infrared Thermosensor: 10 to 70°C, 60 to Analog input: 4 to 20 mA, 0 to Platinum resistance thermometer: Pt100, JPt100  nce Current input: 150 Ω max., voltage input: 1 MΩ min.  Output voltage: 12 VDC ±15%, max. load current: 21 ansistor output   put points  put points  put and control Input points: 4, Control points: 4  Via communications ON/OFF control or 2-PID (with autotuning, self-tuning ns Imput point input shift, digital input filter, remote SP, SF limiter, interference overshoot adjustment, loop burn		Outflow current: Approx. 4 mA per point						
	f input and control	Input points: 4, Control points: 4		Input points: 2, Control points: 2						
Setting m	ethod	Via communications								
Control m	ethod	ON/OFF control or 2-PID (with autotuning, self-tuning) V1.2								
Other fun	ctions	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 t	emperature range	Operating: -10°C to 55°C, Storage:	: -25°C to 65°C (with	h no icing or condensation)						
Ambient h	numidity range	Operating: 25% to 85% (with no col	ndensation)							

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

### **Characteristics**

Indication	accuracy	Thermocouple input/platinum resistance thermometer input:										
Hysteresis		0.1 to 999.9 EU (in units of 0.1 EU) *2	0.1 to 999.9 EU (in units of 0.1 EU) *2									
Proportion	al band (P)	0.1 to 999.9 EU (in units of 0.1 EU) *2										
Integral tin	ne (I)	0 to 3,999 s (in units of 1 s)										
Derivative	time (D)	0.0 to 999.9 s (in units of 0.1 s)	0.0 to 999.9 s (in units of 0.1 s)									
Control pe	riod	0.5 s, 1 to 99 s (in units of 1 s)										
Manual res	set value	0.0% to 100.0% (in units of 0.1%)										
Alarm setti	ing range	-1,999 to 9,999 (decimal point position dep	pends on input type)									
Sampling	period	250 ms	250 ms									
Influence o	of signal source	Thermocouple: $0.1^{\circ}\text{C} \ (0.2^{\circ}\text{F})/\Omega \ \text{max}. \ (100 \ \Omega \ \text{max per line}) \ *3$ Platinum resistance thermometer: $0.4^{\circ}\text{C} \ (0.8^{\circ}\text{F})/\Omega \ \text{max}. \ (10 \ \Omega \ \text{max per line})$										
Insulation	resistance	20 MΩ min. (at 500 VDC)										
Dielectric s	strength	600 VAC, 50/60 Hz for 1 min between current-carrying terminals of different polarity										
Vibration r	esistance	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions										
Shock resi	stance	150 m/s², 3 times each in 6 directions										
Weight		180 g										
Degree of	protection	Rear case: IP20, Terminal section: IP00										
Memory pr	otection	EEPROM (non-volatile memory) (number of writes: 100,000)										
Standards	Approved standards	UL61010C-1, CSA C22.2 No.1010-1										
Statitualus	Conformed standards	EN61010-1 (IEC61010-1): Pollution level 2	, overvoltage category II									
EMC Direc	tive	EMI: EMI Radiated: EMI Conducted: EMS: ESD Immunity: Electromagnetic Field Immunity: Burst immunity/Noise Immunity: Conducted Disturbance Immunity: Surge Immunity:	EN61326 EN55011 Group1 class A EN55011 Group1 class A EN61326 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-6 EN61000-4-6									

<sup>\*1.</sup> 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.

 $W = (\pm 0.5\% \text{ of indication value (PV) or } \pm 3^{\circ}\text{C}$ , whichever is greater)  $\pm 1$  digit max. PLII =  $(\pm 0.5\% \text{ of indication value (PV) or } \pm 2^{\circ}\text{C}$ , whichever is greater) ±1 digit max.

The indication accuracy for K thermocouples in the –199.9 to 999.9°C range v1.2 is (±0.5% of indication value (PV) or ±1°C, whichever is greater) ±10 digit maximum. However, at a temperature of -100°C or less, it is ±2°C ±10 digit maximum.

\*2. "EU" stands for Engineering Unit. The location of the 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 (\*\*\*.\*). **\*3.** B, R, S, and W sensors:  $0.2^{\circ}$ C/ $\Omega$  max. (100  $\Omega$  max.)

# **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)	S-485 (two-wire, half duplex)										
Synchronization method	Start-stop synchronization	art-stop synchronization										
Communications protocol	CompoWay/F, Modbus *4 V1.1 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)  Vertical parity (even)											
Error detection	Block check character (BCC): with CompoWay/F, CRC-16: (with Modbus)											
Flow control	None											
Interface	RS-485											
Retry function	None											
Communications response wait time	0 to 99 ms (default: 5 ms) V1.1	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. When using an HFU, port B on the End Unit can be used for distributed placement only.
- \*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 11.
- **\*4.** The Modbus protocol can be used with Basic Unit with version 1.1 or higher.

## **Current Transformer (CT) Rating**

Dielectric strength	1,000 VAC for 1 min
Vibration resistance	50 Hz, 98 m/s <sup>2</sup>
Weight	E54-CT1: Approx. 11.5 g, E54-CT3: Approx. 50 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%FS ±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	P		ım res rmom		се							Tł	nermo	coup	ole							ES1B Infrared Thermosensor			
Nan	ne		Pt100		JPt100			K J		J	т		E	L	U		N	R	s	В	w	PL II	10 to 70 °C	60 to 120 °C	115 to 165 °C	140 to 260 °C
Tempe rature range (°C)	2300 1800 1700 1600 1500 1400 1300 1200 1100 900 800 700 600 500 400 300 200 100	850	500.0	100.0	500.0	100.0	1300	500.0	850	400.0	400	400.0	600	850	400	400.0	1300	1700	1700	1800	2300	1300	90	120	165	260
	-100.0 -200.0	Ţ				2.0		-	-	-				-												<u>-</u>
Setting r	umber	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	
Nan	ne	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V	К
Tempe rature range (°C)	2300 1800 1700 1600 1500 1400 1200 1100 900 800 600 500 400 300 200 0 -100.0 -200.0	-1999 -199.9 -19.99	the follov to 9999 to 999.9 to 99.99 to 9.999		ges, by s	scaling:	-199.9 to 999.9
Setting r	number	25	26	27	28	29	30 V1.2

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 Platinel 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.

## HFU Unit/EJ1N-HFU -NFL

# **Ratings**

Power supply voltage		24 VDC	
Operating voltage range		85% to 110% of rated voltage	
Power consumption		2 W max. (at maximum load)	
Auxiliary outputs	Outputs	4	
*	Transistor outputs	Max. operating voltage: 30 VDC, Max. load current: 50 mA	
	Inputs	4	
Event inputs	Contact inputs	ON: 1 k $\Omega$ max., OFF: 100 k $\Omega$ min.	
	Transistor inputs	ON: residual voltage of 1.5 max., OFF: leakage current of 0.1 mA max.	
		Outflow current: Approx. 4 mA (per contact)	
	Downloading (EJ1 reads data from a PLC)	Number of parameters that can be set: 1200 V1.2	
Programless connection	Uploading (EJ1 writes data to a PLC)	Number of parameters that can be set: 1200 V1.2	
Connection	Applicable PLCs	OMRON: CS/CJ/NJ Series Mitsubishi Electric: MELSEC-An/AnS/FXauc Series Mitsubishi Electric: MELSEC-Q/QnA/QnAS Series	
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)	

<sup>\*</sup> Auxiliary outputs can be allocated using digital output allocations.

### **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 resistan	ce	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions
Shock resistance		150 m/s², 3 times each in 6 directions
Weight		160 g
Degree of protection		Rear case: IP20, Terminal section: IP00
Memory protectio	n	EEPROM (non-volatile memory) (number of writes: 100,000)
Standards	Approved standards	UL61010C-1, CSA C22.2 No.1010-1
Stanuarus	Conformed standards	EN61010-1 (IEC61010-1): Pollution level 2, overvoltage category II
EMC Directive		Refer to page 3.

# **Communications Characteristics: Port C**

Transmission path connection	RS-485/RS-422: Multi-point, RS-232C: Point-to-point <b>*1</b>
Communications method	RS-485/RS-422 (two-wire, half duplex), RS-232C
Synchronization method	Start-stop synchronization
Communications protocol	OMRON PLC protocol (Connectable PLCs: SYSMAC CS/CJ/CP Series)     AnA/AnU CPU common commands (Connectable PLCs: MELSEC-An/AnS/FXsuc Series)     MC protocol (form 5) (Connectable PLCs: MELSEC-Q/QnA/QnAS Series)
Baud rate	9.6, 19.2, 38.4, 57.6, or 115.2 kbps
Transmission code	Binary
Data bit length	8 bits
Stop bit length	1 bit
Error detection	Depends on protocol selected for the programless communications protocol.
Flow control	None
Interface	RS-485, RS-422, RS-232C <b>*1</b>
Retry function	Available
Communications response wait time	0 to 99 ms (default: 5 ms) V1.1
Number of Basic Units that can be connected in parallel *2	32 Units (model numbers with TC4:128 channels max., model numbers with TC2:64 channels max.)
Number of HFUs that can be connected V1.1	CS/CJ/NJ-series PLCs: 8 (EJ1-HFU□-NFLK)  MELEC Q/QnA/QnAS-series PLCs: 8 (EJ1-HFU□-NFL2)

**<sup>\*1.</sup>** The communications method can be switched between RS-485 and RS-232C. A separate model must be used for RS-422 communications. **\*2.** For the number of Units that can be connected, refer to "Connection Precautions" on page 11.

# HFU Unit/EJ1N-HFUB-DRT

# Ratings

Danier annah malana	DeviceNet power supply	24 VDC (for internal circuits)
Power supply voltage	EDU power supply	24 VDC (for RS-485 communications circuits and Temperature Controllers)
Operating voltage	DeviceNet power supply	11 to 25 VDC
range	EDU power supply	20.4 to 26.4 VDC
Power consumption (at r	naximum load)	1 W max. (at maximum load)
Main functions		Remote I/O communications, explicit message communications, CompoWay/F command feed-through function, parameter backup function, and configuration registration
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)

# **Characteristics**

Insulation resistance		20 MΩ min. (at 500 VDC)	
Dielectric strength		600 VAC, 50/60 Hz for 1 min	
Vibration resistan	ce	10 to 55 Hz, 10 m/s² for 2 hours each in X, Y, and Z directions	
Shock resistance		150m/s² max. 3 times each in 3 axes, 6 directions	
Weight		70 g max.	
Degree of protection		IP20	
Memory protection	n	EEPROM, 100,000 write operations (backup data)	
Standards	Approved standards	UL61010-1, CSA C22.2 No.1010-1	
Stanuarus	Conformed standards	EN61010-1 (IEC61010-1): Pollution level 2, overvoltage category II	
EMC Directive		Refer to page 3.	

# **Communications Characteristics**

Communications protocol		Conforms to DeviceNet.				
	Remote I/O communications		Master-slave connections (polling, COS, or cyclic) Conforms to DeviceNet specifications.			
Communications functions	I/O allocation	Input and output data can be allocated freely by user with the Configurator.  Allocations can be made to DeviceNet parameters or Temperature Controller parameters.  Two blocks for IN Area, up to 100 words  One block for OUT Area, up to 100 words (The first word is always allocated to the OUT Enable Bit.)				
	Message communications	Explicit message communications CompoWay/F communications commands can be sent (commands are sent in explicit message format).				
Connection format		Combination of multidr	op and T-branch connections	(for trunk and drop lin	nes)	
Baud rate		DeviceNet: 500, 250, c	or 125 kbps, or automatic dete	ction of master baud	rate	
Communications med	dia	Special 5-wire cable (2	signal lines, 2 power lines, a	nd 1 shield line)		
		Baud rate	Network length	Drop line length	Total drop line length	
		500 kbps	100 m max. (100 m max.)	6 m max.	39 m max.	
Communications dist	ance	250 kbps	250 m max. (100 m max.)	6 m max.	78 m max.	
		125 kbps	500 m max. (100 m max.)	6 m max.	156 m max.	
		The values in parenthe	ses apply when Thin Cables	are used.		
Communications pov	ver supply	11 to 25 VDC				
Maximum number of	nodes that can be connected	64 (includes Configurator when used.)				
Maximum number of	slaves that can be connected	63				
Error control		CRC error detection				
DeviceNet power supply		Power supplied from DeviceNet communications connector				
Applicable Temperature Controllers		EJ1 Series (excluding the EJ1G) TC4: EJ1N-TC4A-QQ and EJ1N-TC4B-QQ TC2: EJ1N-TC2A-QNHB, EJ1N-TC2B-QNHB, EJ1N-TC2B-CNB				
Maximum number of Temperature Controllers that can be connected $\boldsymbol{\ast}$		16 Units (model numbers with TC4: 64 channels max., model numbers with TC2: 32 channels max.)				

<sup>\*</sup>For the number of Units that can be connected, refer to "Connection Precautions" on page 11.

# End Unit/EJ1C-EDU

# **Ratings**

Power supply voltage		24 VDC
Operating voltage range		85% to 110% of rated voltage
Auxiliary output	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)

<sup>\*</sup> 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 resistan	ice	10 to 55 Hz, 20 m/s <sup>2</sup> for 2 hours each in X, Y, and Z directions	
Shock resistance		150 m/s², 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	
Standards	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 *1	Basic Unit Communications (Refer to "Communications Specifications" on page 4.)
Port A	Basic Unit Communications (Refer to "Communications Specifications" on page 4.)
Port A connector *2	E58-CIFQ1

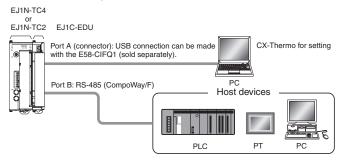
<sup>\*1.</sup> Port B communications for the End Unit cannot be used when port C communications for the HFU is used. \*2. Port A connector communications and port A terminal communications cannot be used at the same time.

# **Unit Configuration Example**

# **Minimal Configuration**

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

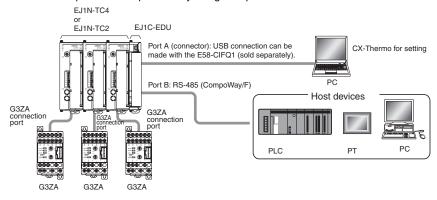
- Alarms can be allocated to the auxiliary output for the End Unit.
- G3ZA/G3PW outputs can be used.



## 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)

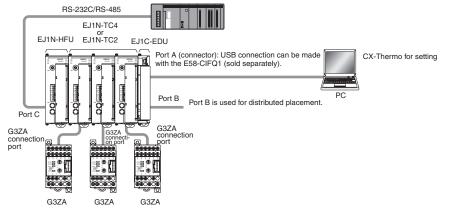
- The 2 auxiliary alarm outputs provided on the End Unit can be used for integrated alarm systems.
- G3ZA/G3PW outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units.



# Multiple Units with an EJ1N-HFU

# Using the EJ1N-HFU□-NFL□ to Build a System Communicating 1:1 with a PLC Using Programless Communications

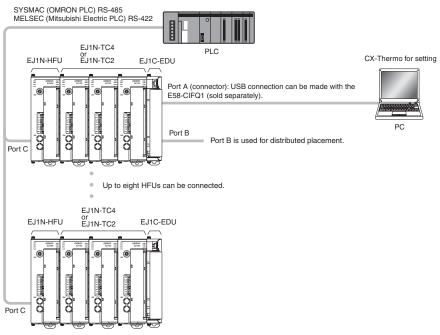
- The 2 auxiliary outputs provided on the End Unit can be used.
- The 4 event inputs and 4 auxiliary outputs of the HFU can also be used.
- G3ZA/G3PW outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units



## Multiple Units with an EJ1N-HFU

# Using the EJ1N-HFU□-NFL□ to Build Systems Communicating 1:1 with a PLC Using Programless Communications V1.1

- Up to eight HFUs can be connected to one port on a PLC.
- G3ZA/G3PW outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units.
- To connect more than one HFU, specific PLC and EJ1 models must be used.
   Refer to "Connecting EJ1 Controllers 1:N to a PLC" on page 13.

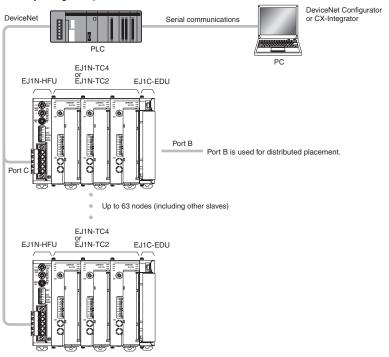


Note: Set the EJ1N-TC to a communications unit number that is not being used by the EJ1N-HFU.

# Multiple Units with an EJ1N-HFU

### Using the EJ1N-HFUB-DRT to Build a System Communicating with a PLC

- Up to 63 DeviceNet slaves can be connected to the DeviceNet Masters in one PLC.
- G3ZA/G3PW outputs can be used.
- Distributed placement is possible by using multiple EJ1C-EDU End Units.



## **Connection Precautions**

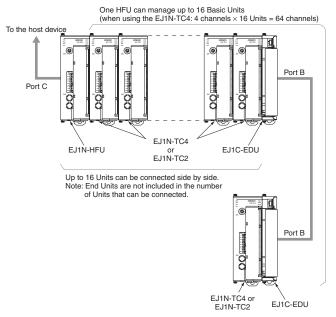
### **Communications Unit Number Setting**

 Communications unit numbers 0 to 63 can be assigned to Basic Units and HFUs.

# Restrictions on the Number of Units That Can Be Connected

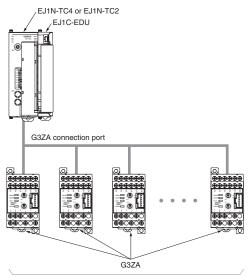
#### **Restrictions for HFUs**

- One EJ1N-HFU can manage up to 32 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.
- 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.



### **Restrictions When Connecting with the G3ZA**

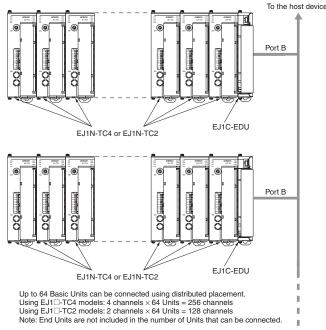
• Up to 8 G3ZA Multi-channel Power Controllers can be connected to one Basic Unit (EJ1N-TC4/TC2).



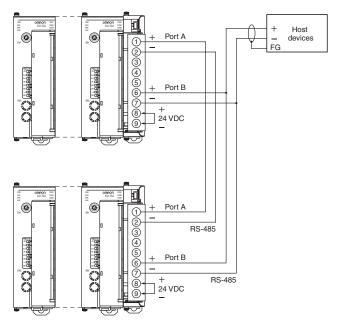
Up to 8 G3ZA Power Controllers can be connected to one Basic Unit.

### **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.



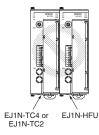
### Wiring for Distributed Placement



Note: 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.

### **Restrictions on Unit Placement**

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



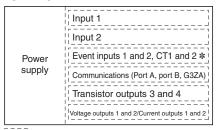
### **Insulation Blocks**

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.

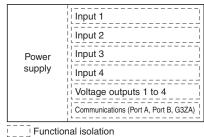
#### EJ1N-TC2



Functional isolation

\* Not provided on models with current outputs.

EJ1N-TC4





Power supply	Event inputs 1 to 4	
	Transistor outputs 1 to 4	
	Communications (Port B, port C)	
 Functional isolation		

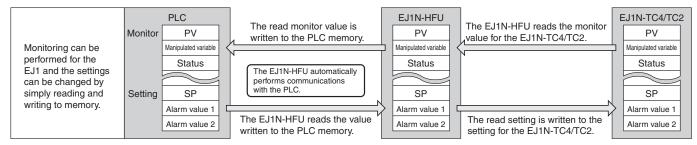
#### **EJ1C-EDU**

Power supply	Transistor outputs 1 and 2  Communications (Port A, port B)	
Functional isolation		

# **Programless Communications**

Communications with PLCs from OMRON (CS/CJ/CP/NJ Series) and Mitsubishi Electric (MELSEC-Q/QnA/QnAS/An/Ans/FX<sub>3UC</sub> 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**

# Connecting an EJ1 Controller 1:1 to a PLC CS/CJ/CP/NJ Series

Name	Model No.	Com	munications ports			
Name	wiodei No.	Port 1	Port 2			
	CJ1W-SCU21-V1	RS-232C	RS-232C			
	CJ1W-SCU22	HS-232C	NO-2320			
	CJ1W-SCU31-V1	RS-422A/485	RS-422A/485			
Serial Communications Units *1	CJ1W-SCU32	H5-422A/485				
Serial Communications Offits & I	CJ1W-SCU41-V1	RS-422A/485	RS-232C			
	CJ1W-SCU42	HS-422A/465				
	CS1W-SCU21-V1 *2	RS-232C	RS-232C			
	CS1W-SCU31-V1	RS-422A/485	RS-422A/485			
Serial Communications Boards	CS1W-SCB21-V1 *2	RS-232C	RS-232C			
Serial Communications Boards	CS1W-SCB41-V1 *2	RS-232C	RS-422A/485			
	CJ Series		RS-232C			
CPU Units	CS Series		RS-232C			
	CP Series	RS-232C or RS-422A/485 of	RS-232C or RS-422A/485 can be used by adding an Option Boa			

**<sup>\*1.</sup>** Only the CJ1W-SCU□2 Serial Communications Unit can be used to connect to an NJ-series Controller.

For details, refer to the CS/CJ Series, Serial Communications Boards/Units Operation Manual (Cat. No. W336).

<sup>\*2.</sup> Use only products manufactured on or after December 20, 1999.

### MELSEC-Q/QnA/QnAS Series

Name	Model No.	Communications ports			
Name	Model No.	Channel 1	Channel 2		
	QJ71C24N QJ71C24	RS-232C	RS-422/485		
Q-compatible Serial Communications Unit	QJ71C24N-R2 QJ71C24-R2	RS-232C	RS-232C		
	QJ71C24N-R4	RS-422/485	RS-422/485		
	AJ71QC24N	RS-232C	RS-422/485		
QnA-compatible Serial Communications Unit	AJ71QC24N-R2	RS-232C	RS-232C		
Communications offic	AJ71QC24N-R4	RS-422	RS-422/485		
QnAS-compatible Serial	A1SJ71QC24N	RS-232C	RS-422/485		
Communications Unit	A1SJ71QC24N-R2	RS-232C	RS-232C		

- Note: 1. Refer to the Mitsubishi Electric PLC documentation for information on MELSEC PLCs.
  - 2. More than one EJ1 Controller to one PLC is not possible even with RS-422 communications. Refer to *Connecting EJ1 Controllers 1:N to a PLC*, below, for product combinations that support 1:N connections.
  - 3. Connection ability has been verified for the above MELSEC models. Design changes and other factors, however, may prevent normal connection. Always confirm operation in advance.

## MELSEC-An/AnS Series V1.1

Name	Model No.	Communications ports
An-compatible Computer Link Unit	AJ71UC24	RS-232C or RS-422/485
	A1SJ71UC24-R2	RS-232C
AnS-compatible Computer Link Unit	A1SJ71UC24-R4	RS-422/485
	A1SJ71UC24-PRF	RS-232C

Note: Use a MELSEC-AnA/AnU CPU.

### MELSEC-FX3uc Series V1.1

Name	Model No.	Communications ports
Communications Adapter	FX <sub>3</sub> U-232ADP	RS-232C
Communications Adapter	FX <sub>3</sub> U-485ADP	RS-485
Function Board	FX <sub>3</sub> U-232-BD	RS-232C
Function Board	FX₃∪-485-BD	RS-485

## Connecting EJ1 Controllers 1:N to a PLC V1.1

The combinations of PLCs and HFUs that can be connected 1:N are listed below.

### CS/CJ/CP/NJ Series

Name	Model No.	Communications ports
	CJ1W-SCU31-V1	Port 1 or 2
Serial Communications Units *1	CJ1W-SCU41-V1	Port 1
	CS1W-SCU31-V1	Port 1 or 2
Serial Communications Board	CS1W-SCB41-V1 *2	Port 2
CPU Units	CP Series	RS-422A/485 can be used by adding an Option Board.
EJ1N-HFU	EJ1N-HFUA-NFLK EJ1N-HFUB-NFLK	Port C

<sup>\*1.</sup> Only the CJ1W-SCU□2 Serial Communications Unit can be used to connect to an NJ-series Controller.

For details, refer to the CS/CJ Series, Serial Communications Boards/Units Operation Manual (Cat. No. W336).

### MELSEC-Q/QnA/QnAS Series

Name	Model No.
Serial Communications Units	Channel 2 of QJ71C24N QJ71C24N-R4 Channel 2 of A1SJ71QC24N Channel 2 of AJ71QC24N AJ71QC24N-R4
EJ1N-HFU	EJ1N-HFUA-NFL2 EJ1N-HFUB-NFL2

Note: Refer to the Mitsubishi Electric PLC documentation for information on MELSEC PLCs.

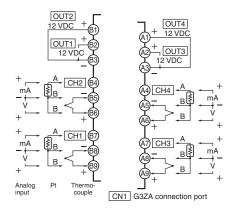
<sup>\*2.</sup> Use only products manufactured on or after December 20, 1999.

## Connection

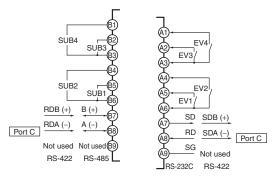
## **External Connection**

- 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 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 exceed an output voltage of 30 V r.m.s. and 42.4 V peak or 60 VDC max. The OMROM S8VM or S8VS Series is recommended for the power supply.

#### EJ1N-TC4



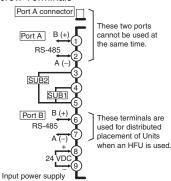
### EJ1N-HFU -NFL



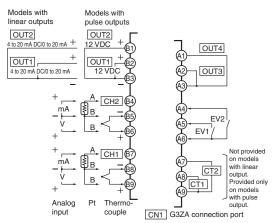
RS-485 for port C and RS-232C can be switched. A separate EJ1 model must be used for RS-422 communications.

### **EJ1C-EDUA**

### Model with Screw Terminals

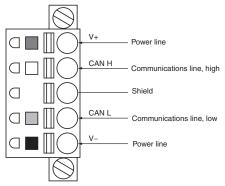


#### EJ1N-TC2



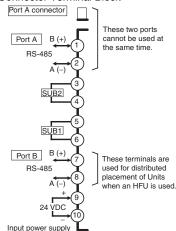
### **EJ1N-HFUB-DRT**

DeviceNet Connector



### **EJ1C-EDUC**

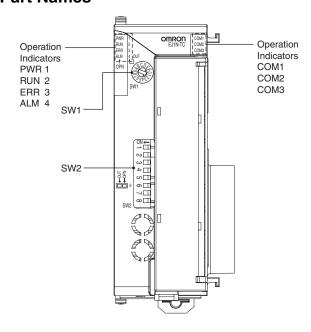
Model with Connector Terminal Block



- 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.

# **Nomenclature and Specification Settings**

## **Part Names**



# **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.

SW1



SW



### **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.

S١	N2		SW1														
1	2	0	1	2	3	4	5	6	7	8	9	Α	В	С	D	Е	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

# **Operation Indicators** EJ1N-TC2/TC4

Operation In	dicators	Meaning: When SW2 No. 6 is OFF	Meaning: When SW2 No. 6 is ON V1.2			
PWR/1 V1.2	R/1 V1.2 green Lights when the power is ON. Lit when output					
RUN/2 V1.2	green	Lights during operation.	Lit when output 2 is ON.			
ERR/3 V1.2	red	Flashes or lights when an error occurs.	Lit when output 3 is ON.			
ALM/4 V1.2	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.				

### EJ1N-HFU□-NFL□

Operation In	dicators	Meaning
PWR	green	Lit while the power is ON. *
RUN	green	
ERR	red	Flashes or lights when an error occurs.
ALM	red	Lights when an alarm is activated.
COM 1	orange	Flashes during communications via port A on the End Unit.
COM 2	orange	Flashes when the EJ1 system is in operation.
COM 3	orange	Flashes during communications via port C.

<sup>\*</sup> Some time is required for the indicators to light after the power is turned ON.

# **SW2 Settings**

### EJ1N-TC2/TC4

0)4/0	Manufacture.
SW2	Meaning
3 V1.2	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 V1.2	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 V1.2	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).  Note: 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. V1.1
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.

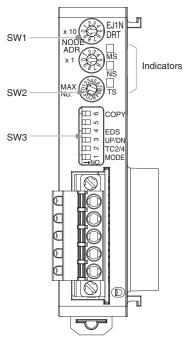
Note: Make sure power to the Unit is turned OFF before making settings for any pin other than pin 6.

Pin 6 can be turned ON or OFF while the power is ON.

### EJ1N-HFU□-NFL□

	<u>-                                    </u>
SW2	Meaning
3 to 7	Not used (OFF)
8	EJ1N-HFU□-NFLK     OFF: RS-485 is selected.     ON: RS-232C is selected.     EJ1N-HFU□-NFL2     OFF (Not used.)

# **Part Names (EJ1N-HFUB-DRT)**

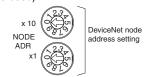


# Specification Settings Switch Operation

- Always turn OFF the DeviceNet communications power supply and EDU power supply before setting the Unit. \*
- Set the switches with a small flat-blade screwdriver. Do not set the switches midway between settings.
- The SW1 switches are set to 00, SW2 is set to 0, and SW3 pins are all set to OFF in the default settings.
- \* The setting of pin 3 on SW3 can be changed while the power is ON.

# **SW1 Settings**

Use these switches to set the node address as a slave in the DeviceNet network between 00 and 63 decimal (node addresses 64 to 99 cannot be used).



### **SW2 Settings**

Use this switch to set the highest communications unit number (0 to F: 0 to 15 decimal) of the connected Temperature Controllers. This setting is enabled only when DIP switch pin 1 is set to ON (simple I/O allocations).



# Operation Indicators EJ1N-HFUB-DRT

Operation Inc	dicators	Meaning	
MS Module	Green	ON: The Unit condition is normal. Flashing: The connection configuration has not been set.	
status	Red	ON: Fatal error Flashing: Non-fatal error	
NS Network status  TS Temperature Controller communicat ions status	Green	ON: Communications established Flashing: Communications not established	
	Red	ON: Fatal communications error Flashing: Non-fatal communications error	
	Green	ON: Communicating with the Temperature Controllers Flashing: The copy operation is being performed.	
	Red	Flashing: Communications error with a Temperature Controller Flashing: The copy operation failed.	

## **SW3 Settings**

DIP switch		Meaning	
6 (COPY)		Upload/Download OFF $\rightarrow$ ON (1 s min., 5 s max.) $\rightarrow$ OFF	
5		Not used.	
4 (EDS)	OFF	Use the OMRON Configurator.	
	ON	Use universal Configurator. (EDS files supported)	
3 (UP/DN)	OFF	Upload (from Temperature Controller to DeviceNet Communications Unit)	
	ON	Download (from DeviceNet Communications Unit to Temperature Controller)	
2 (TC2/4)	OFF	Simple allocation to TC2 Units.	
	ON	Simple allocation to TC4 Units.	
1 (MODE)	OFF	I/O Allocation from the Configurator.	
	ON	Simple I/O Allocation	



# Functional Upgrades V1.1 V1.2

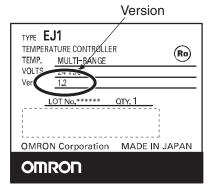
Functions depend on the version that you are using. The functional upgrades are given below. Refer to the User's Manual (Cat. No. H142) for details.

Version Applicable Unit	V1.1	V1.2
Basic Units (EJ1N-TC2/TC4)	Modbus communications can be used on port B. The corresponding parameters are those for variable types C4/84, C5/85, and D0/90 to D6/96.     Software version 2 of the G3ZA Multi-channel Power Controller can be used.  Note: 1. When more than one G3ZA Multi-channel Power Controller is connected, version 1 and version 2 can be mixed. (Up to 8 G3ZA Multi-channel Power Controllers can be connected.)  2. Software version 2 of G3ZA Multi-channel Power Controller can also be used with EJ1 version1.0.	<ul> <li>Autotuning is provided for heating/cooling control.</li> <li>Self-tuning has been added.</li> <li>A switch can be used to display the output status on the operation indicators during operation.</li> <li>Modbus communications can be used to read and write all parameters, and to execute any of the operation commands.</li> <li>A switch setting can be changed to use Modbus communications on port B.</li> <li>A switch setting can be used to set the baud rate of port B.</li> <li>A CO/80 status has been added to the variable types.</li> <li>Up to eight G3PW Power Controllers can be connected to one Basic Unit.</li> <li>Note: 1. The G3PW can be connected to EJ1 V1.1.</li> <li>2. The G3PW and G3ZA cannot be used together.</li> </ul>
Advanced Unit (EJ1N-HFU□-NFL□)	Programless communications can be used with 1: N connections.  The maximum number of parameters that can be specified for programless upload/download settings has been increased from 300 to 600 each.  Connection is now possible to MELSEC-QnA/An/AnS/FX3uc-series PLCs.  A new setting read operation has been added to programless communications: Setting Read 2.  The speed of programless communications has been increased.  Either "continue" or "stop" can be selected for when errors occur in programless communications.	<ul> <li>Bit specification operation commands have been added to the parameters that can be specified for programless download settings. This simplifies the program when operation commands are executed.</li> <li>The G3ZA or G3PW Monitor parameter has been added to the parameters that can be specified for programless upload settings. Up to four G3ZA Multichannel Power Controllers or up to four G3PW Power Controllers can be connected to one Basic Unit.</li> <li>The maximum number of parameters that can be specified for programless upload/download setting has been increased from 600 to 1200 each.</li> <li>The maximum number of Basic Units that an HFU with Programless Communications can control has been increased from 16 to 32 Units.</li> <li>Communications unit numbers 32 to 39 can be used in the HFU via programless communications. This allows the communications unit numbers of Basic Units connected to an HFU to be numbered sequentially, making it easy to copy HFU and Basic Unit settings to other HFUs and Basic Units.</li> </ul>
Support Software	CX-Thermo version 3.20 or higher	CX-Thermo version 4.1 or higher

### **Identifying Upgraded Models**

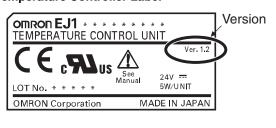
The new functionality can be used with version 1.2 (V1.2). Check the label on the Temperature Controller or the box to determine the version. Models not marked "Ver. 1.1" are version 1.0.

### **Box Label**



Note: The above example is for version 1.2.

### **Temperature Controller Label**



# **Dimensions**

Note: All units are in millimeters unless otherwise indicated.

# **Temperature Controller**

**Basic Units** EJ1N-TC **HFUs** EJ1N-HFU□-NFL□

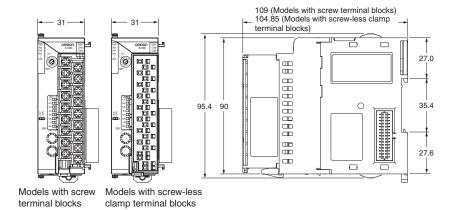


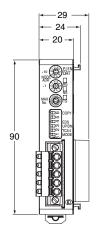
**HFUs EJ1N-HFUB-DRT** 

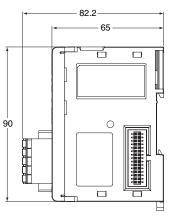


**End Units EJ1C-EDU** 

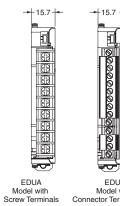




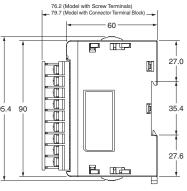










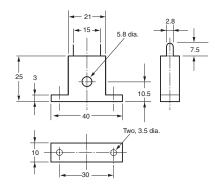


# **Options**

## **Current Transformer (Sold Separately)**

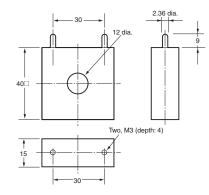
### E54-CT1





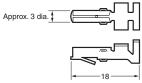
### E54-CT3





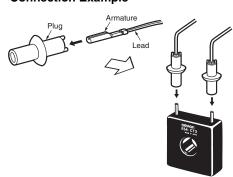
### E54-CT3 Accessory

### • Armature

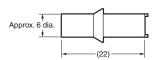




### **Connection Example**

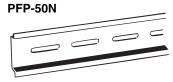


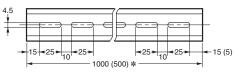
### • Plug



# **Rail Mounting Equipment (Order Separately)**

**DIN Rail PFP-100N** 



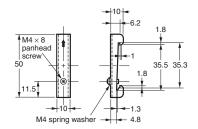




\* The figures in parentheses are dimensions for the PFP-50N.

## **End Plate** PFP-M





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

# **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
- 2. 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.
- 4. Be sure to wire properly with correct polarity of terminals.
- 5. 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 mm²) for power supply lines and a gage of AWG28 to AWG16 (equal to cross-sectional area of 0.081 to 1.309 mm²). (The stripping length is 6 to 8 mm.)
- 6. Do not wire terminals that do not have an identified use.
- 7. 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.
- 8. 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.
- 10.It takes 30 minutes from the time the Temperature Controller is turned ON until the current temperature is displayed. Always turns ON the power supply at least 30 minutes before starting temperature control.
- 11. The switch or circuit breaker must be within easy reach of the operator, and must be marked as a disconnecting means for this unit.
- **12.**Do not use paint thinner or similar chemical to clean with. Use standard grade alcohol.
- 13.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.
- 14. 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.
- 15.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.
- 16.Do not touch the electronic components with your hands or subject them to shock when removing the terminal block.
- 17.Connect only the specified number of products in only a specified configuration.
- 18. Mount the product to a DIN Rail mounted vertically to the ground.
- 19.Always turn OFF the power supply before wiring the product, replacing the product, or changing the product configuration.
- 20. Attach the enclosed cover seal to the connector opening on the left end product during installation.
- 21. Do not use port B on the end product when using port C on HFUs.
- 22.Install the product only after reading the manual provided with the End Unit.

# **Precautions for Correct Use**

### Installation

- 1. Do not connect the End Unit directly to an HFU.
- 2. Connect the End Unit to the right side of a Basic Unit.
- 3. Connect the HFU to the left side of the Basic Units.
- 4. Connection is not possible to CJ1-series PLCs.
- 5. Use the EJ1G- for gradient temperature control. When not using gradient temperature control, use the EJ1N-.
- **6.** When removing the terminal block to replace a Unit, be sure that the new Unit is the same as the Unit that is being replaced.

#### **Service Life**

 Use the product within the following temperature and humidity ranges:

Temperature: -10°C to 55°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°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.
- 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.
- If the measurement accuracy is low, check to see if input shift has been set correctly.

### **Precautions for Operation**

- 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.
- It takes 30 minutes from the time the Temperature Controller is turned ON until the current temperature is displayed. Always turns ON the power supply at least 30 minutes before starting temperature control.
- Avoid using the Temperature Controller near a radio, television set, or other wireless device. Its use would result in reception disturbance.

### Wiring Screw-Less Clamp Terminals

B1 Α1 B2 В3 А3 Α4 **B**5 A5 B6-Α6 **B7** Α7 B8 **A8** B9 B10 A9 A10

There are two holes for each terminal. The hole on the right is the operation hole and the hole on the left is the wire hole.

Insert a flat-blade screwdriver with a width of

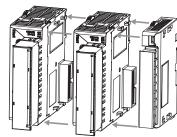
2.5 mm into the operation hole, insert the wire into the wire hole, and then remove the screwdriver. The wire will be clamped.
Use pin terminals that are suitable for the cross-sectional area of the wire.

Recommended pin terminals: Weidmuller H-sleeve series

### Installation

### **Connecting Units**

 Align the connectors and connect the Units to each other. Connect an End Unit to the Unit on the right end.

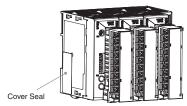


Note: 1. Do not connect the End Unit directly to an HFU.

- 2. Connect the 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.

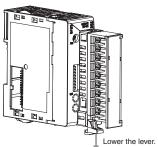


3. Attach the cover seal to the connector opening on the Unit on the left end of the EJ1.

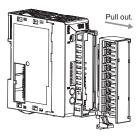


### **Removing the Terminal Block**

1. Press down the terminal block lever.

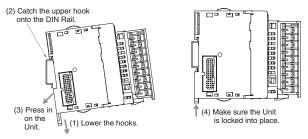


2. Pull out the terminal block.



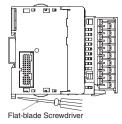
# Mounting to the DIN Rail Mounting

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

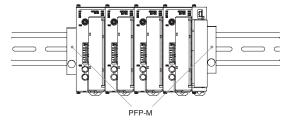


#### Dismounting

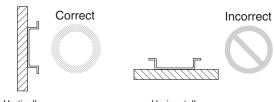
Pull down on the hook with a flat-blade screwdriver and lift up on the Unit.



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

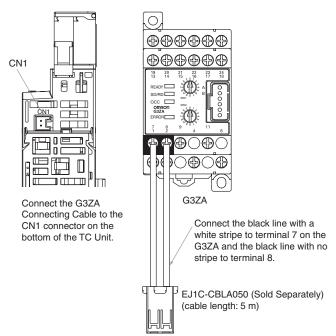


Install the DIN Rail vertically to the ground.



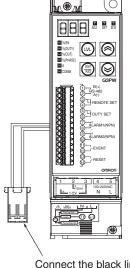
Vertically Horizontally
Applicable DIN Rail (sold separately): PFP-100N (100 cm),
PFP-50N (50 cm)

## Connecting to the G3ZA (EJ1N-TC)



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

## Connecting to the G3PW (EJ1N-TC)



Set the baud rate to 57.6 kbps (default value) using key operations. For details, refer to the G3PW Operation Manual.

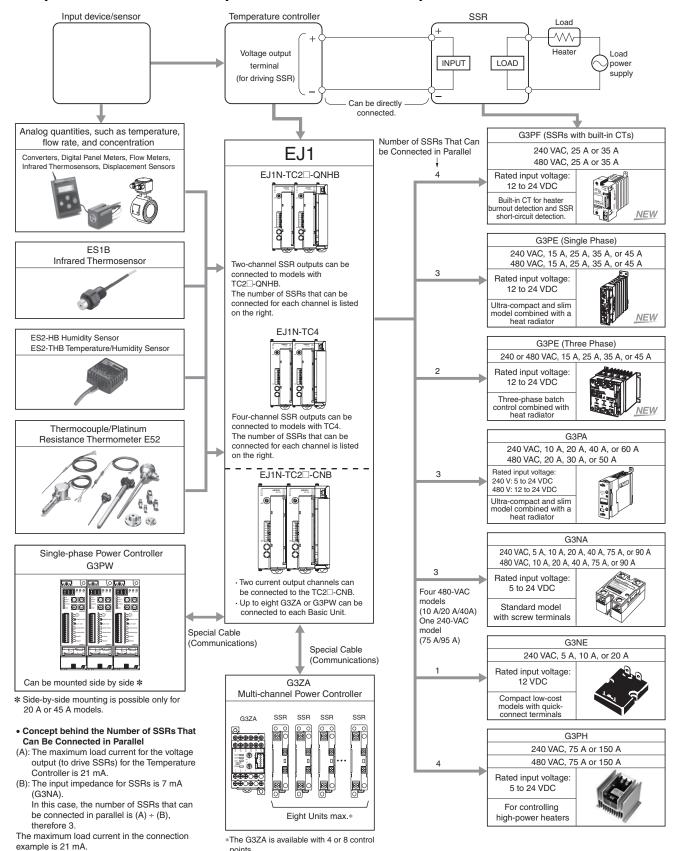
Connect the black line with a white stripe to terminal 1 on the G3PW and the black line with no stripe to terminal 2.

EJ1C-CBLA050 (order separately) (cable length: 5 m)

Refer to the G3PW 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 User's Manual (Cat. No. H142)

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



### 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

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