Basic-type Digital Temperature Controller

E5AN/E5EN (96 x 96 mm and 48 x 96 mm)

CSM_E5AN_E5EN_DS_E_2_1

New 96 x 96-mm and 48 x 96-mm Basic Temperature Controllers with Enhanced Functions and Performance. Improved Indication Accuracy and Preventive Maintenance Function.

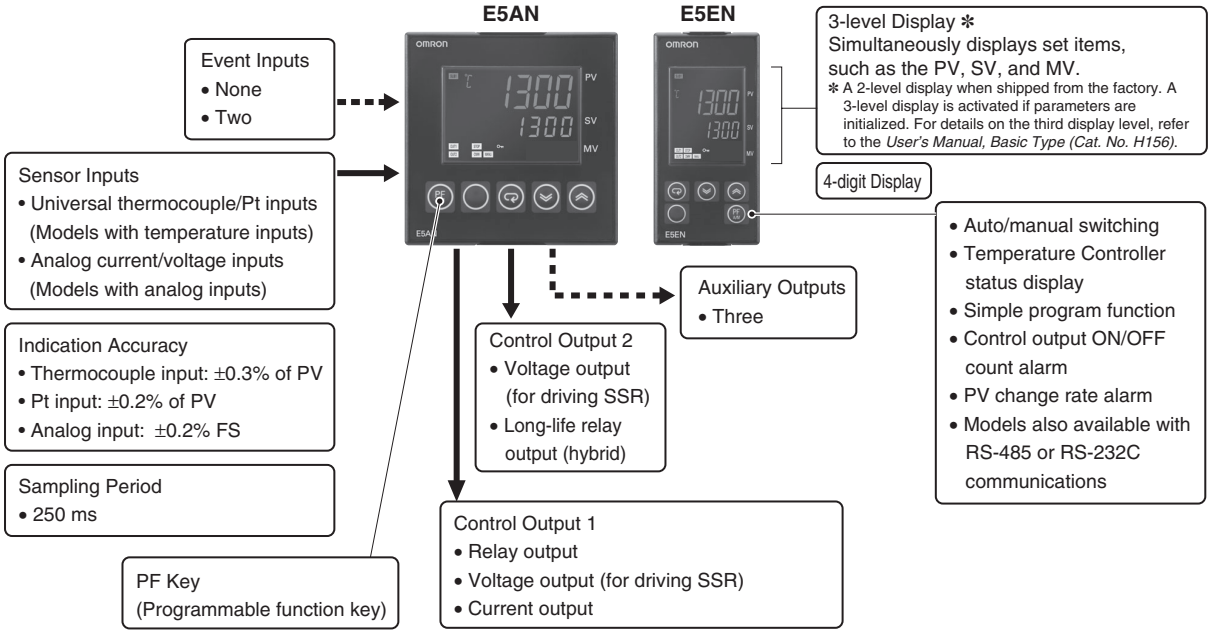
- Indication Accuracy
  Thermocouple input: ±0.3% of PV (previous models: ±0.5%)
  Pt input: ±0.2% of PV (previous models: ±0.5%)
  Analog input: ±0.2% FS (previous models: ±0.5%)
- A PV/SV-status display function can be set to automatically alternate between displaying the status of the Temperature Controller (auto/manual, RUN/STOP, and alarms) and the PV or SV.
- Preventive maintenance for relays in the Temperature Controller using a Control Output ON/OFF Counter.
- Three-level display that simultaneously displays the PV, SV, and MV.
- One-touch operation with PF Key that can be assigned to auto/manual, RUN/STOP, or other functions.

96 × 96 mm
E5AN

48 × 96 mm
E5EN

⚠ Refer to *Safety Precautions for E5□N/E5□N-H.*

Main I/O Functions



This data sheet is provided as a guideline for selecting products. Be sure to refer to the following user manuals for application precautions and other information required for operation before attempting to use the product.

E5CN/E5AN/E5EN Digital Temperature Controllers User's Manual Basic Type (Cat. No. H156)

E5CN/E5AN/E5EN Digital Temperature Controllers Communications Manual Basic Type (Cat. No. H158)

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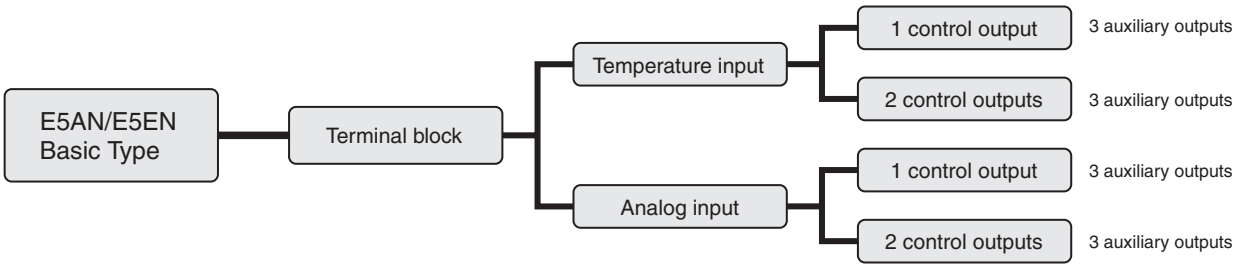
Lineup



Note: Models with one control output or two control outputs can be used for heating/cooling control.

Model Number Structure

Model Number Legend

Controllers

E5AN/E5EN-□3□M□□-□-500-N
1 2 3 4 5 6 7 8 9

1. **Control Output 1**
   R: Relay output
   Q: Voltage output (for driving SSR)
   C: Current output
2. **Auxiliary Outputs**
   3: Three outputs
3. **Heater Burnout/SSR Failure, Control Output 2, or External Power Supply for ES1B**
   Blank: None
   Q: Control output 2 (voltage output for driving SSR)
   Y: Long-life relay output (hybrid)
   H: Heater burnout/SSR failure/Heater overcurrent detection (CT1)
   HH: Heater burnout/SSR failure/Heater overcurrent detection (CT2)
   P: Power supply for sensor
4. **Option**
   M: Option Unit can be mounted.
5. **Input Type**
   T: Universal thermocouple/platinum resistance thermometer input
   L: Analog current/voltage input
6. **Power Supply Voltage**
   Blank: 100 to 240 VAC
   D: 24 VAC/VDC
7. **Case Color**
   Blank: Black
   W: Silver
8. **Terminal Cover**
   -500: With terminal cover
9. **Version**
   N: Available only to models released after January 2008.

Option Units

E53-□
1

1. **Function**
   EN01: RS-232C communications
   EN03: RS-485 communications
   AKB: Event input

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Ordering Information

E5AN
Controllers with Terminal Blocks

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Functions			Model
						Heater burnout	Power supply for Sensor	Control output 2	
1/4 DIN 96 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Thermocouple or Resistance thermometer	3	Relay output				**E5AN-R3MT-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3MT-500-N**
					Current output				**E5AN-C3MT-500-N**
					Relay output	1			**E5AN-R3HMT-500-N**
					Voltage output (for driving SSR)	1			**E5AN-Q3HMT-500-N**
					Relay output	2			**E5AN-R3HHMT-500-N**
					Voltage output (for driving SSR)	2			**E5AN-Q3HHMT-500-N**
					Relay output			Voltage output	**E5AN-R3QMT-500-N**
					Voltage output (for driving SSR)			Voltage output	**E5AN-Q3QMT-500-N**
					Current output			Voltage output	**E5AN-C3QMT-500-N**
					Relay output			Long-life relay output	**E5AN-R3YMT-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3YMT-500-N**
					Current output				**E5AN-C3YMT-500-N**
					Relay output		Sensor Power		**E5AN-R3PMT-500-N**
					Voltage output (for driving SSR)		Sensor Power		**E5AN-Q3PMT-500-N**
			Analog (current/voltage)	3	Relay output				**E5AN-R3ML-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3ML-500-N**
					Current output				**E5AN-C3ML-500-N**
					Relay output	1			**E5AN-R3HML-500-N**
					Voltage output (for driving SSR)	1			**E5AN-Q3HML-500-N**
					Voltage output (for driving SSR)			Long-life relay output	**E5AN-Q3YML-500-N**
		24 VAC/ VDC	Thermocouple or Resistance thermometer	3	Relay output				**E5AN-R3MTD-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3MTD-500-N**
					Current output				**E5AN-C3MTD-500-N**
					Relay output	1			**E5AN-R3HMTD-500-N**
					Voltage output (for driving SSR)	1			**E5AN-Q3HMTD-500-N**
					Relay output	2			**E5AN-R3HHMTD-500-N**
					Voltage output (for driving SSR)	2			**E5AN-Q3HHMTD-500-N**
	Silver	100 to 240 VAC	Thermocouple or Resistance thermometer	3	Relay output				**E5AN-R3MT-W-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3MT-W-500-N**
					Current output				**E5AN-C3MT-W-500-N**
					Relay output	1			**E5AN-R3HMT-W-500-N**
					Voltage output (for driving SSR)	1			**E5AN-Q3HMT-W-500-N**
		24 VAC/ VDC			Relay output				**E5AN-R3MTD-W-500-N**
					Voltage output (for driving SSR)				**E5AN-Q3MTD-W-500-N**
					Current output				**E5AN-C3MTD-W-500-N**

Note: Models with analog inputs do not have temperature unit indicators.

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E5EN
Controllers with Terminal Blocks

Size	Case color	Power supply voltage	Input type	Auxiliary outputs	Control output 1	Functions			Model
						Heater burnout	Power supply for Sensor	Control output 2	
1/8 DIN 48 × 96 × 78 (W × H × D)	Black	100 to 240 VAC	Thermocouple or Resistance thermometer	3	Relay output				**E5EN-R3MT-500-N**
					Voltage output (for driving SSR)				**E5EN-Q3MT-500-N**
					Current output				**E5EN-C3MT-500-N**
					Relay output	1			**E5EN-R3HMT-500-N**
					Voltage output (for driving SSR)	1			**E5EN-Q3HMT-500-N**
					Relay output	2			**E5EN-R3HHMT-500-N**
					Voltage output (for driving SSR)	2			**E5EN-Q3HHMT-500-N**
					Relay output			Voltage output	**E5EN-R3QMT-500-N**
					Voltage output (for driving SSR)			Voltage output	**E5EN-Q3QMT-500-N**
					Current output			Voltage output	**E5EN-C3QMT-500-N**
					Relay output			Long-life relay output	**E5EN-R3YMT-500-N**
					Voltage output (for driving SSR)			Long-life relay output	**E5EN-Q3YMT-500-N**
					Current output			Long-life relay output	**E5EN-C3YMT-500-N**
					Relay output		Sensor Power		**E5EN-R3PMT-500-N**
					Voltage output (for driving SSR)		Sensor Power		**E5EN-Q3PMT-500-N**
			Analog (current/voltage)	3	Relay output				**E5EN-R3ML-500-N**
					Voltage output (for driving SSR)				**E5EN-Q3ML-500-N**
					Current output				**E5EN-C3ML-500-N**
					Relay output	1			**E5EN-R3HML-500-N**
					Voltage output (for driving SSR)	1			**E5EN-Q3HML-500-N**
								Long-life relay output	**E5EN-Q3YML-500-N**
		24 VAC/ VDC	Thermocouple or Resistance thermometer	3	Relay output				**E5EN-R3MTD-500-N**
					Voltage output (for driving SSR)				**E5EN-Q3MTD-500-N**
					Current output				**E5EN-C3MTD-500-N**
					Relay output	1			**E5EN-R3HMTD-500-N**
					Voltage output (for driving SSR)	1			**E5EN-Q3HMTD-500-N**
					Relay output	2			**E5EN-R3HHMTD-500-N**
					Voltage output (for driving SSR)	2			**E5EN-Q3HHMTD-500-N**
	Silver	100 to 240 VAC	Thermocouple or Resistance thermometer	3	Relay output				**E5EN-R3MT-W-500-N**
					Voltage output (for driving SSR)				**E5EN-Q3MT-W-500-N**
					Current output				**E5EN-C3MT-W-500-N**
					Relay output	1			**E5EN-R3HMT-W-500-N**
					Voltage output (for driving SSR)	1			**E5EN-Q3HMT-W-500-N**
		24 VAC/ VDC			Relay output				**E5EN-R3MTD-W-500-N**
					Voltage output (for driving SSR)				**E5EN-Q3MTD-W-500-N**
					Current output				**E5EN-C3MTD-W-500-N**

Note: Models with analog inputs do not have temperature unit indicators.

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Specifications

Ratings

Power supply voltage		No D in model number: 100 to 240 VAC, 50/60 Hz D in model number: 24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage
Power consumption		100 to 240 VAC: 10 VA 24 VAC/VDC: 5.5 VA (24 VAC)/4 W (24 VDC)
Sensor input		Models with temperature inputs Thermocouple: K, J, T, E, L, U, N, R, S, B, W, or PL II Platinum resistance thermometer: Pt100 or JPt100 Infrared temperature sensor: 10 to 70°C, 60 to 120°C, 115 to 165°C, or 140 to 260°C Voltage input: 0 to 50 mV
		Models with analog inputs Current input: 4 to 20 mA or 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, or 0 to 10 V
Input impedance		Current input: 150 Ω max., Voltage input: 1 MΩ min. (Use a 1:1 connection when connecting the ES2-HB.)
Control method		ON/OFF control or 2-PID control (with auto-tuning)
Control output	**Relay output**	SPST-NO, 250 VAC, 5 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
	Voltage output (for driving SSR)	Output voltage: 12 VDC ±15% (PNP), max. load current: 40 mA, With short-circuit protection circuit: Max. load current of 21 mA for control output 2
	Current output	4 to 20 mA DC/0 to 20 mA DC, load: 600 Ω max., resolution: approx. 10,000
	Long-life relay output	SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 1,000,000 operations, load power supply voltage: 75 to 250 VAC (DC loads cannot be connected.), minimum applicable load: 5 V, 10 mA, leakage current: 5 mA max. (250 VAC, 60 Hz)
Auxiliary output	**Number of outputs**	3
	Output specifications	Relay output: SPST-NO, 250 VAC, 3 A (resistive load), electrical life: 100,000 operations, minimum applicable load: 5 V, 10 mA
Event input	**Number of inputs**	2
	External contact input specifications	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.
		Current flow: Approx. 7 mA per contact
External power supply for ES1B		12 VDC ±10%, 20 mA, short-circuit protection circuit provided
Setting method		Digital setting using front panel keys
Indication method		11-segment digital display and individual indicators (7-segments displays also possible) Character height: E5AN: PV: 15.8 mm, SV: 9.5 mm, MV: 6.8 mm; E5EN: PV: 11.8 mm, SV: 8.1 mm, MV: 5.8 mm Content of 3-level display: PV/SV/MV, PV/SV/multi-SP, or soak time remain ✻ Number of digits: 4 for PV, SV, and MV
Multi SP		Up to four set points (SP0 to SP3) can be saved and selected using event inputs, key operations, or serial communications.
Bank switching		Not supported.
Other functions		Manual output, heating/cooling control, loop burnout alarm, SP ramp, other alarm functions, heater burnout detection, 40% AT, 100% AT, MV limiter, input digital filter, self-tuning, temperature input shift, run/stop, protection functions, control output ON/OFF counter, extraction of square root, MV change rate limit, logic operations, PV/SV status display, simple program, automatic cooling coefficient adjustment
Ambient operating temperature		−10 to 55°C (with no condensation or icing), for 3-year warranty: −10 to 50°C
Ambient operating humidity		25% to 85%
Storage temperature		−25 to 65°C (with no condensation or icing)

✻ A 2-level display when shipped from the factory. A 3-level display is activated if parameters are initialized. For details on the third display level, refer to the *User's Manual, Basic Type* (Cat. No. H156).

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Characteristics

Indication accuracy		Thermocouple: (±0.3% of indicated value or ±1°C, whichever is greater) ±1 digit max. ✻1 Platinum resistance thermometer: (±0.2% of indicated value or ±0.8°C, whichever is greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max. CT input: ±5% FS ±1 digit max.
Transfer output accuracy		±0.3% FS max.
Influence of temperature ✻2		Thermocouple input (R, S, B, W, PL II): (±1% of PV or ±10°C, whichever is greater) ±1 digit max. Other thermocouple input: (±1% of PV or ±4°C, whichever is greater) ±1 digit max. ✻3 Platinum resistance thermometer: (±1% of PV or ±2°C, whichever is greater) ±1 digit max. Analog input: (±1%FS) ±1 digit max.
Influence of voltage ✻2		
Input sampling period		250 ms
Hysteresis		Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) ✻4 Models with analog input: 0.01 to 99.99% FS (in units of 0.01% FS)
Proportional band (P)		Models with thermocouple/platinum resistance thermometer input (universal input): 0.1 to 999.9 EU (in units of 0.1 EU) ✻4 Models with analog input: 0.1 to 999.9% FS (in units of 0.1% FS)
Integral time (I)		0 to 3999 s (in units of 1 s)
Derivative time (D)		0 to 3999 s (in units of 1 s) ✻5
Control period		0.5, 1 to 99 s (in units of 1 s)
Manual reset value		0.0 to 100.0% (in units of 0.1%)
Alarm setting range		−1999 to 9999 (decimal point position depends on input type)
Affect of signal source resistance		Thermocouple: 0.1°C/Ω max. (100 Ω max.) Platinum resistance thermometer: 0.1°C/Ω max. (10 Ω max.)
Insulation resistance		20 MΩ min. (at 500 VDC)
Dielectric strength		2,300 VAC, 50 or 60 Hz for 1 min (between terminals with different charge)
Vibration resistance	**Malfunction**	10 to 55 Hz, 20 m/s² for 10 min each in X, Y, and Z directions
	Destruction	10 to 55 Hz, 0.75-mm single amplitude for 2 hrs each in X, Y, and Z directions
Shock resistance	**Malfunction**	100 m/s², 3 times each in X, Y, and Z directions
	Destruction	300 m/s², 3 times each in X, Y, and Z directions
Weight	**E5AN**	Controller: Approx. 310 g, Mounting Bracket: Approx. 100 g
	E5EN	Controller: Approx. 260 g, Mounting Bracket: Approx. 100 g
Degree of protection		Front panel: IP66, Rear case: IP20, Terminals: IP00
Memory protection		Non-volatile memory (number of writes: 1,000,000 times)
Setup Tool		CX-Thermo version 4.0 or higher
Setup Tool port		Provided on the bottom of the E5AN and E5EN. An E58-CIFQ1 USB-Serial Conversion Cable is required to connect the computer to the E5AN and E5EN ✻6
Standards	**Approved standards**	UL 61010-1, CSA C22.2 No. 1010-1
	Conformed standards	EN 61010-1 (IEC 61010-1): Pollution level 2, overcurrent category II
EMC		EMI: EN 61326 Radiated Interference Electromagnetic Field Strength: EN 55011 Group 1, class A Noise Terminal Voltage: EN 55011 Group 1, class A EMS: EN 61326 ESD Immunity: EN 61000-4-2 Electromagnetic Field Immunity: EN 61000-4-3 Burst Noise Immunity: EN 61000-4-4 Conducted Disturbance Immunity: EN 61000-4-6 Surge Immunity: EN 61000-4-5 Power Frequency Magnetic Field Immunity: EN 61000-4-8 Voltage Dip/Interrupting Immunity: EN 61000-4-11

✻1. The indication accuracy of K thermocouples in the −200 to 1300°C range, T and N thermocouples at a temperature of −100°C max., and U and L thermocouples at any temperatures is ±2°C ±1 digit max. The indication accuracy of the B thermocouple at a temperature of 400°C max. is not specified. The indication accuracy of B thermocouples in the 400 to 800°C range is ±3°C max. The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit max. The indication accuracy of W thermocouples is ±0.3 of PV or ±3°C, whichever is greater, ±1 digit max. The indication accuracy of PL II thermocouples is ±0.3 of PV or ±2°C, whichever is greater, ±1 digit max.
✻2. Ambient temperature: −10°C to 23°C to 55°, Voltage range: −15% to 10% of rated voltage
✻3. K thermocouple at −100°C max.: ±10°C max.
✻4. "EU" stands for Engineering Unit and is used as the unit after scaling. For a temperature sensor, the EU is °C or °F.
✻5. When robust tuning (RT) is ON, the differential time is 0.0 to 999.9 (in units of 0.1 s).
✻6. External communications (RS-232C or RS-485) and cable communications for the Setup Tool can be used at the same time.

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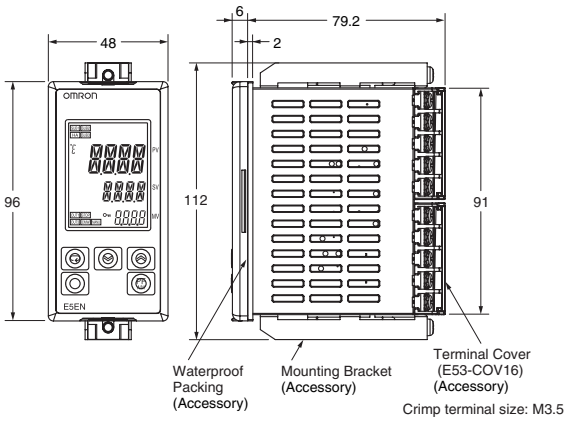
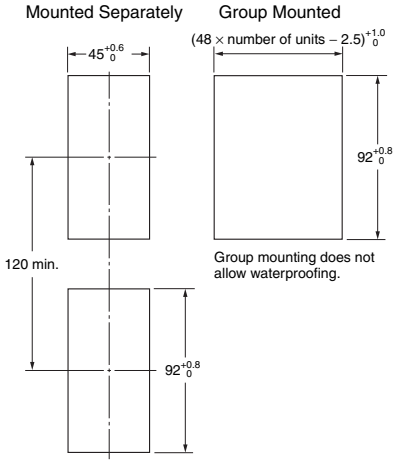
E5EN



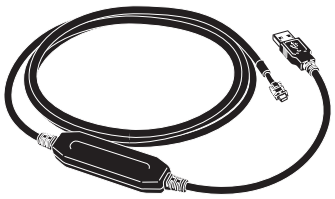


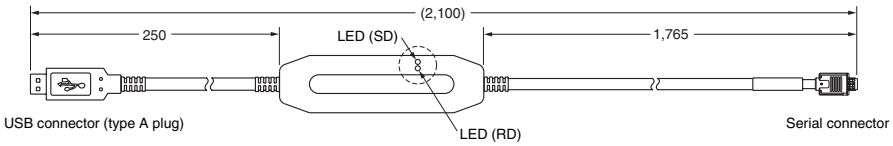
- Recommended panel thickness is 1 to 8 mm.
- Group mounting is not possible in the vertical direction. (Maintain the specified mounting space between Controllers.)
- To mount the Controller so that it is waterproof, insert the waterproof packing onto the Controller.
- When two or more Controllers are mounted, make sure that the surrounding temperature does not exceed the allowable operating temperature specified in the specifications.

Accessories (Order Separately)

USB-Serial Conversion Cable

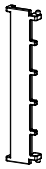
E58-CIFQ1

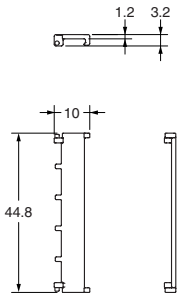




Terminal Covers

E53-COV16 (Six Covers provided.)





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