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With the principle of "Quality Parts,Customers Priority,Honest Operation,and Considerate Service",our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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Digital Controllers E5AR/E5ER

New DeviceNet-compatible models offer high-speed and high-precision as general-purpose Digital Controllers with an even broader range of application.



Features

■ Easily Coordinate Control with PLCs Using Various I/O

- Up to 6 Event Inputs

Externally control bank switching (4/8 banks), RUN/STOP, auto/manual, SP mode, communications write enable/disable, and other operations with event inputs.

- Up to 2 Transfer Outputs

Externally output PVs, SPs, MVs, and ramp SP monitor values for each loop.

- Up to 4 Auxiliary Outputs

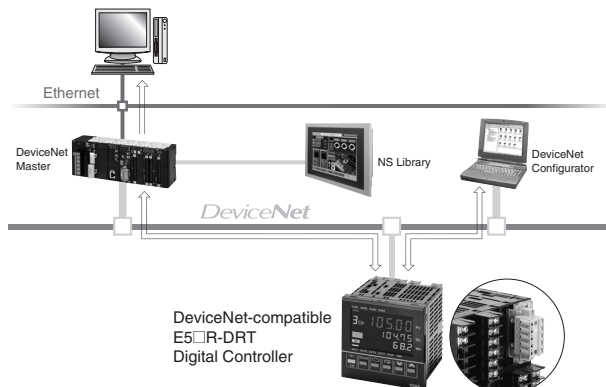
Externally output warnings for 11 alarm modes and input errors.

- RS-485 Serial Communications

Simply share data, such as PVs and SPs, with an OMRON PLC (without requiring special programming). Only settings are required.

- DeviceNet Communications

Perform high-speed data communications with the PLC without requiring special programming. Unified management of communications from a DeviceNet Configurator is also possible.

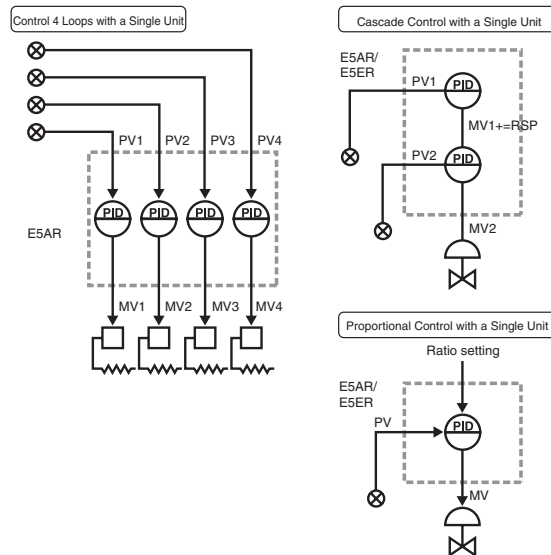


■ Control Up to 4 Loops with a Single Unit

Models with 1, 2, and 4 analog inputs are available (see note). Various control modes can also be selected in the software settings, including standard control, heating/cooling control, cascade control, position-proportional control, and remote SP control. This allows a single Unit to perform multipoint control (up to 4 loops for the E5AR, and up to 2 loops for the E5ER), cascade control, and proportional control.

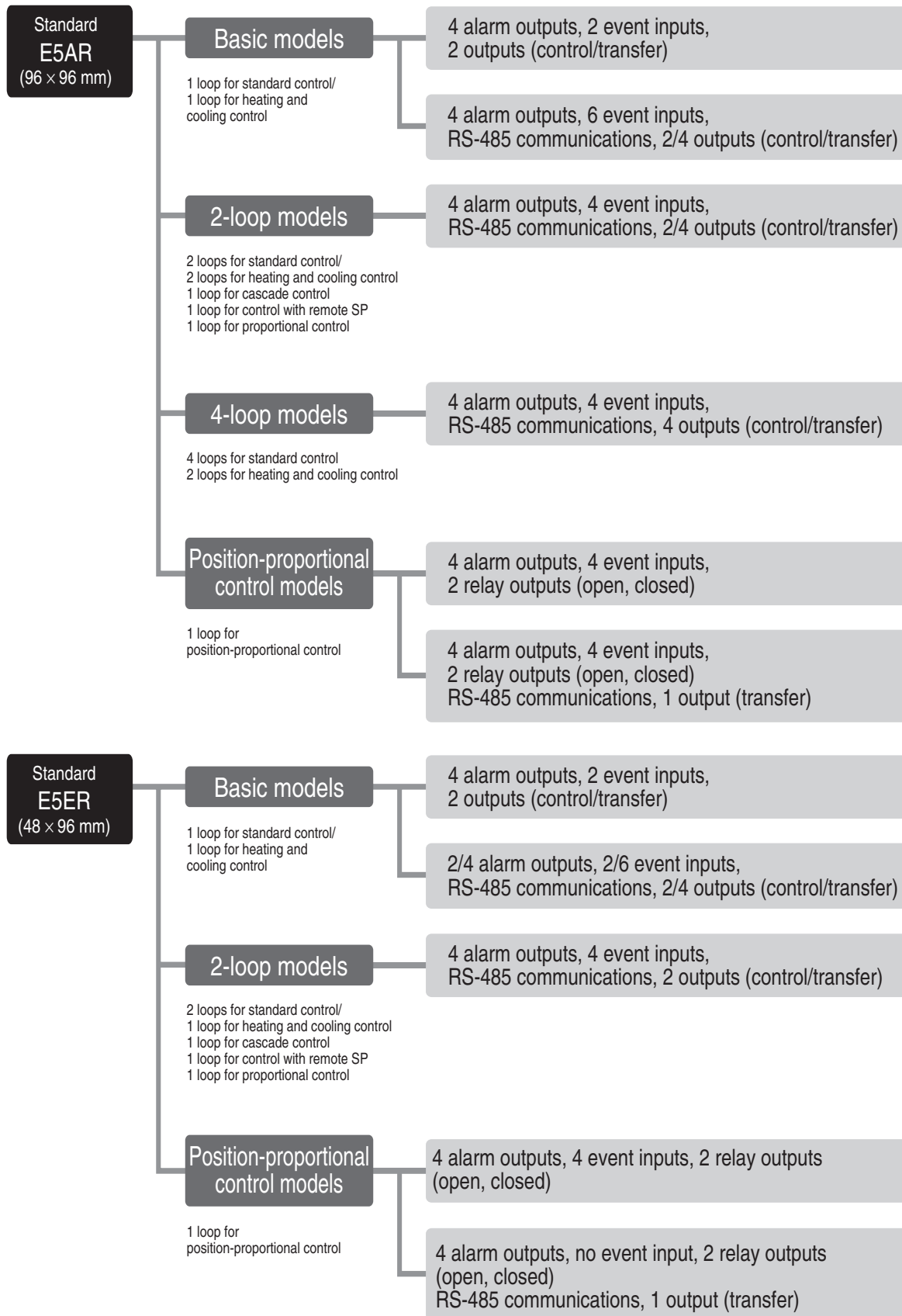
Temperature, humidity, and pressure can be controlled simultaneously for up to 4 points from a single Unit, contributing to reduced costs and smaller panels.

Note: Models with 4 analog inputs are 96 x 96 mm (E5AR only).

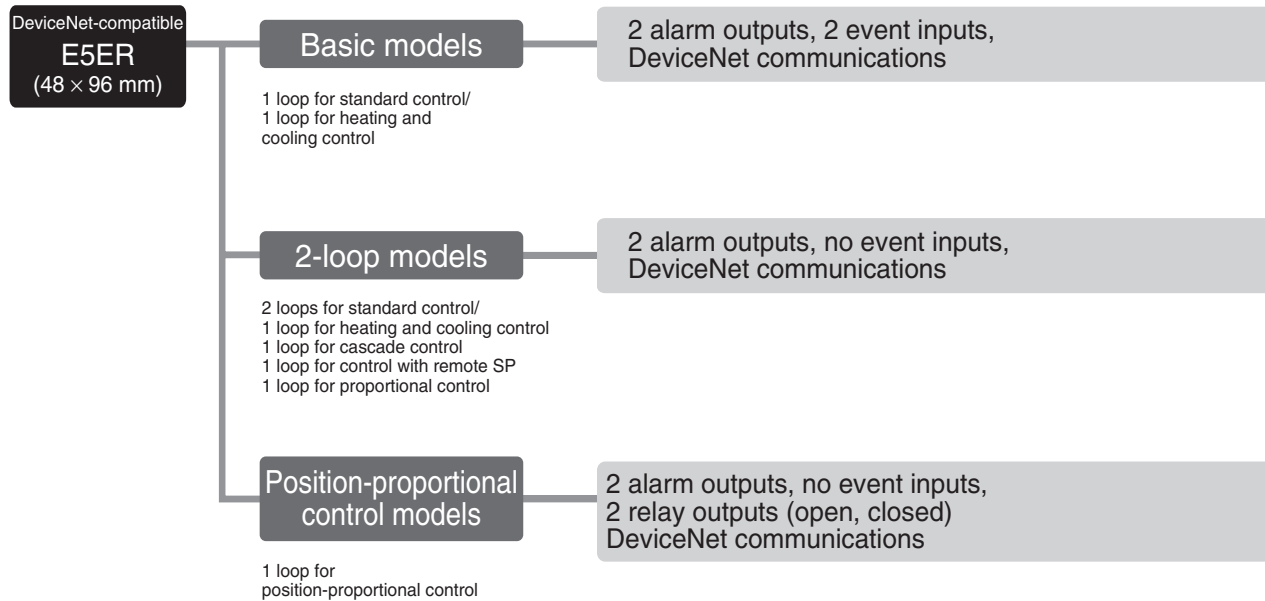
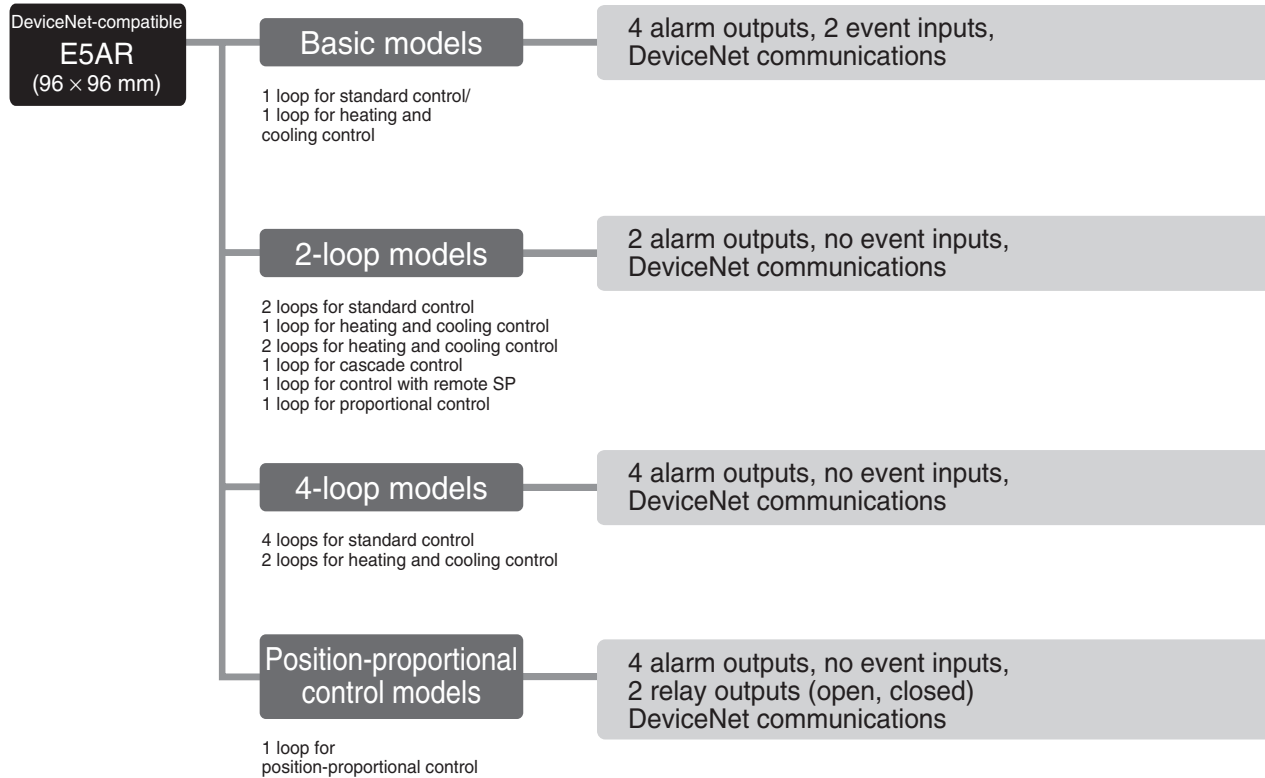


■ E5□R Selection Guide

Standard Type



DeviceNet Type



■ Applications

High-speed

Applications

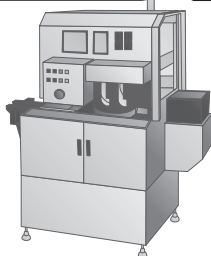
- Bonding equipment
- Evaporation equipment
- Coil winding machinery

Problem

Lack of reasonably-priced controller for devices requiring high-speed response (e.g., ceramic heaters) resulting in using expensive machinery with unnecessary functions.

Solution

- Improved control performance with high-speed sampling at 50 ms.
- Moderately priced and easily operated.



High-resolution

Applications

- Semiconductor production lines (exposure, air-conditioning)
- Environmental testing equipment
- Vacuum heating furnace
- Sterilizing equipment
- Food processing machinery

Problem

Need for high-resolution measuring and monitoring of internal temperatures of devices while handling fluctuations at high-resolution.

Solution

Greater input resolution with Pt sensor (0.01°C resolution)



E5AR Digital Controllers

E5AR Digital Controllers offer high speed, high precision, and multiple I/O and use a 5-digit, 3-row LCD display for high visual clarity.

- A short sampling period of 50 ms enables use in applications requiring high-speed response.
- PV, SP, and MV data is displayed simultaneously in a 3-row, negative LCD display with a backlight.
- Bar graph to show MV (manipulated variable), valve opening, or deviation.
- Multiloop control, cascade control, and proportional control are possible with a single Controller.
- When using models with communications functions, initial settings can be downloaded and settings can be masked using Support Software (Thermo Tools).
- Equipped with calculation functions as a standard (e.g., square root calculation and broken-line approximation).
- DeviceNet Communications
Data setting and monitoring can be performed without special programming.



Model Number Structure

■ Model Number Legend

E5AR-□□□□□□□□□□-□□□□
1 2 3 4 5 6 7 8 9 10

1. Constant values/Program

None: Constant value

2. Control method

Blank: Standard or heating/cooling control

P: Position proportional control

3. Output 1

R: DPST-NO relay outputs

Q: Pulse voltage and pulse voltage/current outputs

C: Current and current outputs

4. Output 2

Blank: None

R: Relay outputs

Q: Pulse voltage and pulse voltage/current outputs

C: Current and current outputs

5. Auxiliary Outputs

Blank: None

4: 4PST-NO relay outputs

T: 2 transistor outputs

6. Optional Function 1

Blank: None

3: RS-485 communications

7. Optional Function 2

Blank: None

D: 4 event inputs

8. Input 1

B: Multi-input and 2 event inputs

F: Multi-input and FB (Potentiometer input)

W: Multi-input and multi-input

9. Input 2

Blank: None

W: Multi-input and multi-input

10. Communications Method

Blank: None

FLK: RS-485 (CompoWay F/MODBUS)

DRT: DeviceNet

Ordering Information

■ Digital Controllers

Standard Controllers

Stock Note: Shaded models are normally stocked.

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions			Model	
				Auxiliary outputs (SUB)	Event inputs	Serial communications		
96 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	No	E5AR-Q4B (See note 3.)	
			2 points: Current and Current				E5AR-C4B	
			2 points: Pulse voltage and Pulse voltage/current				RS-485	E5AR-Q43B-FLK (See note 2.)
			2 points: Current and Current					E5AR-C43B-FLK (See note 2.)
			2 points: Pulse voltage and Pulse voltage/current				6	E5AR-Q43DB-FLK (See note 2.)
			2 points: Current and Current					E5AR-C43DB-FLK (See note 2.)
			4 points: Pulse voltage and Pulse voltage/current and Current (2 points)					E5AR-QC43DB-FLK (See note 3.)
2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	2 points: Pulse voltage and Pulse voltage/current	4	4	RS-485	E5AR-Q43DW-FLK (See note 2.)		
		2 points: Current and Current				E5AR-C43DW-FLK (See note 2.)		
		4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)				E5AR-QQ43DW-FLK		
4-loop control	4-loop standard control 2-loop heating and cooling control	4 points: Current output (4 points)	4	4	RS-485	E5AR-CC43DWW-FLK		
		4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)				E5AR-QQ43DWW-FLK (See note 2.)		
Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 close)	4	4	No	E5AR-PR4DF		
		Relay output (1 open, 1 close) and 1 current (transfer) output			RS-485	E5AR-PRQ43DF-FLK		

- Note:**
1. Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.
 2. These models are for 100 to 240 VAC only.
 3. Only 100 to 240 VAC models are stocked.

DeviceNet-compatible Controllers

Stock Note: Shaded models are normally stocked.

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	DeviceNet communications	
96 × 96 mm	Basic control (1 loop)	1 loop for standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	Yes	E5AR-Q4B-DRT
			2 points: Current and Current				E5AR-C4B-DRT
			4 points: Pulse voltage and Pulse voltage/current and Current (2 points)				E5AR-QC4B-DRT
	2-loop control	2-loop standard control 2-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	4 points: Pulse voltage (2 points) and Pulse voltage/current (2 points)	4	None	Yes	E5AR-QQ4W-DRT
	4-loop control	4-loop standard control 2-loop heating and cooling control	4 points: Current (4 points)	4	None	Yes	E5AR-CC4WW-DRT
Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 close)	4	None	Yes	E5AR-PR4F-DRT	
		Relay output (1 open, 1 close) and Current (transfer) output (1 point)				E5AR-PRQ4F-DRT	

Note: Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.

Inspection Results

The Inspection Report can be ordered at the same time as the Digital Controller using the following model number.

Inspection Report (Sold Separately)

Descriptions	Model
Inspection Report for E5AR	E5AR-K

Terminal Cover (Sold Separately)

Stock Note: Shaded models are normally stocked.

Descriptions	Model
Terminal Cover for E5AR	E53-COV14

Specifications

■ Ratings

Item	Supply voltage (See note 1.)	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		22 VA max. (with maximum load)	15 VA/10 W max. (with maximum load)
Sensor input (See note 2.)		Thermocouple: K, J, T, E, L, U, N, R, S, B, W Platinum resistance thermometer: Pt100 Current input: 4 to 20 mA DC, 0 to 20 mA DC (including remote SP input) Voltage input: 1 to 5 VDC, 0 to 5 VDC, 0 to 10 VDC (including remote SP input) (Input impedance: 150 Ω for current input, approx. 1 MΩ for voltage input)	
Control output	Voltage (pulse) output	12 VDC, 40 mA max. with short-circuit protection circuit (E5AR-QQ□WW-□: 21 mA max.)	
	Current output	0 to 20 mA DC, 4 to 20 mA DC; load: 500 Ω max. (including transfer output) (Resolution: Approx. 54,000 for 0 to 20 mA DC; Approx. 43,000 for 4 to 20 mA DC)	
	Relay output	Position-proportional control type (open, closed) N.O., 250 VAC, 1 A (including inrush current)	
Auxiliary output		<u>Relay Output</u> N.O., 250 VAC, 1 A (resistive load) <u>Transistor Output</u> Maximum load voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.	
Potentiometer input		100 Ω to 2.5 kΩ	
Event input	Contact	Input ON: 1 kΩ max.; OFF: 100 kΩ min.	
	No-contact	Input ON: Residual voltage of 1.5 V max.; OFF: Leakage current of 0.1 mA max. Short-circuit: Approx. 4 mA	
Remote SP input		Refer to the information on sensor input.	
Transfer output		Refer to the information on control output.	
Control method		2-PID or ON/OFF control	
Setting method		Digital setting using front panel keys or setting using serial communications	
Indication method		7-segment digital display and single-lighting indicator Character Height No. 1 display: 12.8 mm; No. 2 display: 7.7 mm; No. 3 display: 7.7 mm	
Other functions		Depends on model.	
Ambient operating temperature		-10 to 55°C (with no icing or condensation) For 3 years of assured use: -10 to 50°C (with no icing or condensation)	
Ambient operating humidity		25% to 85%	
Storage temperature		-25 to 65°C (with no icing or condensation)	


- Note:** 1. The supply voltage (i.e., 100 to 240 VAC or 24 VAC/VDC) depends on the model. Be sure to specify the required type when ordering.
2. The Controller is equipped with multiple sensor input. Temperature input or analog input can be selected with the input type setting switch. There is basic insulation between power supply and input terminals, power supply and output terminals, and input and output terminals.

Input Ranges

The E5AR has multi-inputs. The default setting is 2 (K-type thermocouple, -200.0 to 1300.0°C or -300.0 to 2300.0°F).


Platinum Resistance Thermometer Input

Input		Pt100	
Range	°C	-200.0 to 850.0	-150.00 to 150.00
	°F	-300.0 to 1500.0	-199.99 to 300.00
Setting		0	1
Minimum setting unit (SP and alarm)		0.1	0.01
Input type setting switch		Set to TC.PT.	




Thermocouple Input

Input	K		J		T	E	L	U	N	R	S	B	W
Range	°C	-200.0 to 1300.0	-20.0 to 500.0	-100.0 to 850.0	-20.0 to 400.0	-200.0 to 600.0	-100.0 to 850.0	-200.0 to 400.0	-200.0 to 1300.0	0.0 to 1700.0	0.0 to 1700.0	100.0 to 1800.0	0.0 to 2300.0
	°F	-300.0 to 2300.0	0.0 to 900.0	-100.0 to 1500.0	0.0 to 750.0	-300.0 to 700.0	0.0 to 1100.0	-100.0 to 1500.0	-300.0 to 700.0	-300.0 to 2300.0	0.0 to 3000.0	0.0 to 3000.0	300.0 to 3200.0
Setting	2	3	4	5	6	7	8	9	10	11	12	13	14
Minimum setting unit (SP and alarm)	0.1												
Input type setting switch	Set to TC.PT.												



Current/Voltage Input

Input	Current		Voltage		
	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Range	Depending on the scaling settings, one of the following ranges will be displayed. -19999 to 99999 -1999.9 to 9999.9 -199.99 to 999.99 -19.999 to 99.999 -1.9999 to 9.9999				
Setting	15	16	17	18	19
Input type setting switch	Set to ANALOG.				



■ Characteristics

Indication accuracy	Thermocouple input with cold junction compensation: ($\pm 0.1\%$ of PV or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. (See note 1.) Thermocouple input without cold junction compensation: ($\pm 0.1\%$ FS or $\pm 1^\circ\text{C}$, whichever is smaller) ± 1 digit (See note 2.) Analog input: $\pm 0.1\%$ FS ± 1 digit max. Platinum resistance thermometer input: ($\pm 0.1\%$ of PV or $\pm 0.5^\circ\text{C}$, whichever is greater) ± 1 digit max. Position-proportional potentiometer input: $\pm 5\%$ FS ± 1 digit max.
Control mode	Standard control (heating or cooling control), heating/cooling control, standard control with remote SP (2-input models only), heating/cooling control with remote SP (2-input models only), cascade standard control (2-input models only), cascade heating/cooling control (2-input models only), proportional control (2-input models only), position-proportional control (control-valve control models only)
Control period	0.2 to 99.0 s (in units of 0.1 s) for time-proportioning control output
Proportional band (P)	0.00% to 999.99% FS (in units of 0.01% FS)
Integral time (I)	0.0 to 3,999.9 s (in units of 0.1 s)
Derivative time (D)	0.0 to 3,999.9 s (in units of 0.1 s)
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Manual reset value	0.0% to 100.0% (in units of 0.1% FS)
Alarm setting range	-19,999 to 99,999 EU (See note 3.) (The decimal point position depends on the input type and the decimal point position setting.)
Input sampling period	50 ms
Insulation resistance	20 M Ω min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between charged terminals of different polarities)
Vibration resistance	10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions
Shock resistance	100 m/s ² , 3 times each in X, Y, and Z directions
Inrush current	100 to 240-VAC models: 50 A max. 24 VAC/VDC models: 30 A max.
Weight	E5AR: Controller only: Approx. 450 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 30 g E5ER: Controller only: Approx. 330 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 16 g
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66); Rear case: IP20; Terminals: IP00
Memory protection	Non-volatile memory (number of writes: 100,000)
Applicable standards	UL61010C-1, CSA C22.2 No. 1010.1 EN61010-1 (IEC61010-1): Pollution degree 2/overvoltage category II
EMC	EMI: EN61326 Radiated Interference Electromagnetic Field Strength: EN55011 Group 1 Class A Noise Terminal Voltage: EN55011 Group 1 Class A EMS: EN61326 ESD Immunity: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Electromagnetic Immunity: EN61000-4-3: 10V/m (amplitude-modulated, 80 MHz to 1000, 1.4 GHz to 2 GHz) (level 3) Burst Noise Immunity: EN61000-4-4: 2 kV power line (level 3) 2 kV output line (relay output) (level 4) 1 kV measurement line, I/O signal line (level 4) 1 kV communications line (level 3) Conducted Disturbance Immunity: EN61000-4-6: 3 V (0.15 to 80 MHz) (level 3) Surge Immunity: EN61000-4-5 1 kV line to line (power line, output line (relay output)) (level 2) Power Frequency Magnetic Field Immunity: EN61000-4-8: 30 A/m (50 Hz) continuous field Voltage Dip/Interrupting Immunity: EN61000-4-11: 0.5 cycle, 100% (rated voltage)

- Note: 1.** K-, T-, or N-type thermocouple at -100°C max.: $\pm 2^\circ\text{C} \pm 1$ digit max.
U- or L-type thermocouple: $\pm 2^\circ\text{C} \pm 1$ digit max.
B-type thermocouple at 400°C max.: No accuracy specification.
R- or S-type thermocouple at 200°C max.: $\pm 3^\circ\text{C} \pm 1$ digit max.
W-type thermocouple: ($\pm 0.3\%$ of PV or $\pm 3^\circ\text{C}$, whichever is greater) ± 1 digit max.
- 2.** U- or L-type thermocouple: $\pm 1^\circ\text{C} \pm 1$ digit
R- or S-type thermocouple at 200°C max.: $\pm 1.5^\circ\text{C} \pm 1$ digit
- 3.** "EU" (Engineering Unit) represents the unit after scaling. If a temperature sensor is used it is either $^\circ\text{C}$ or $^\circ\text{F}$.

■ Communications Specifications

RS-485 Serial Communications

Transmission path connection	Multiple points
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	9,600, 19,200, or 384,000 bps
Transmission code	ASCII (CompoWay/F), RTU Remote Terminal Unit (MODBUS)
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Block check character (BCC) Start-stop synchronization data format
Flow control	None
Interface	RS-485
Retry function	None

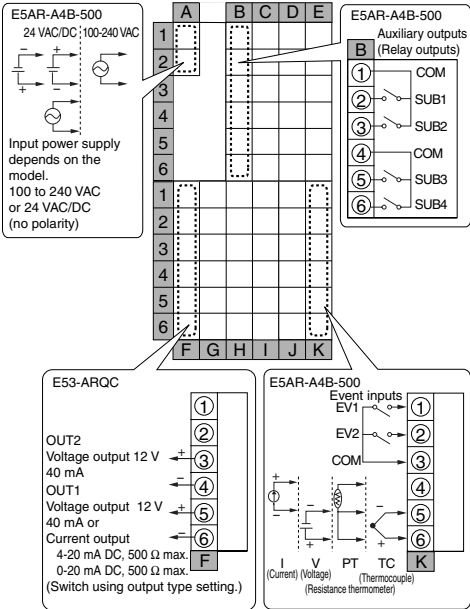
DeviceNet

Item		Specifications			
Communications protocol		Conforms to DeviceNet			
Communications functions	Remote I/O communications	<ul style="list-style-type: none"> Master-slave connections (polling, bit-strobe, COS, or cyclic) Conform to DeviceNet specifications. 			
	I/O allocations	<ul style="list-style-type: none"> Can allocate any I/O data from the Configurator. Can allocate any data, such as parameters specific to the DeviceNet and the Digital Controller variable area. Up to 2 blocks for the IN Area, up to a total of 100 words. One block for the OUT Area, up to 100 words (first word is always allocated to Output Enable Bits). 			
	Message communications	<ul style="list-style-type: none"> Explicit message communications CompoWay/F communications commands can be sent (commands are sent in explicit message format). 			
Connection format		Combination of multidrop and T-branch connections (for trunk and drop lines)			
Baud rate		DeviceNet: 500, 250, or 125 kbps, or automatic detection of master baud rate			
Communications media		Special 5-wire cable (2 signal lines, 2 power lines, and 1 shield line)			
Communications distance		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.
		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 parentheses apply when Thin Cables are used.			
Supply voltage		DeviceNet power supply: 24 VDC			
Allowable voltage range		DeviceNet power supply: 11 to 25 VDC			
Current consumption		50 mA max. (24 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			
Power supply		Power supplied from DeviceNet communications connector.			

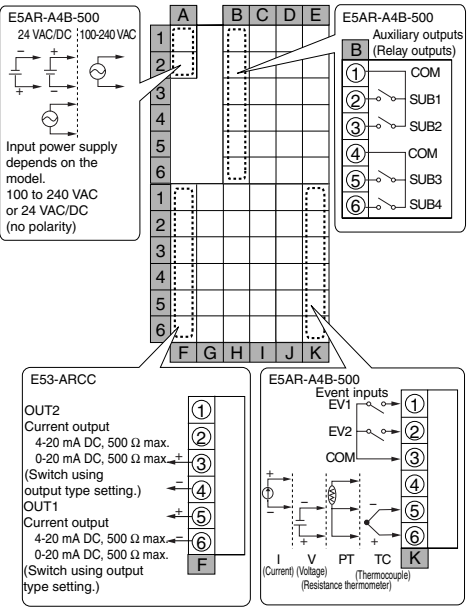
Wiring Terminals

E5AR Standard Controller Connections

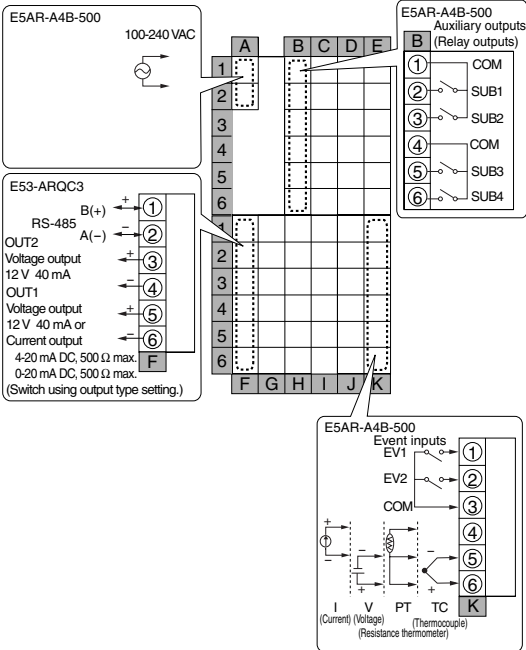
E5AR-Q4B



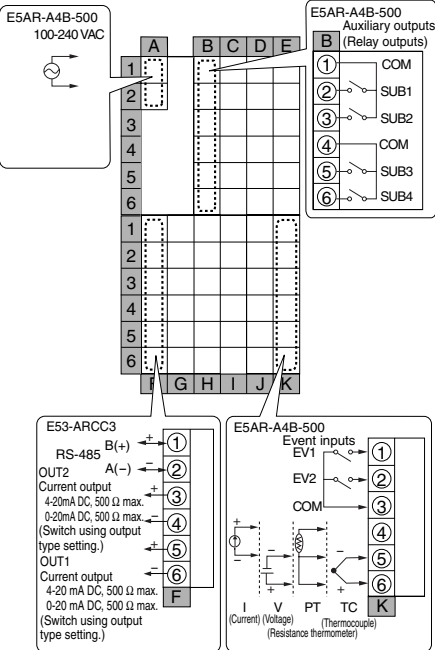
E5AR-C4B



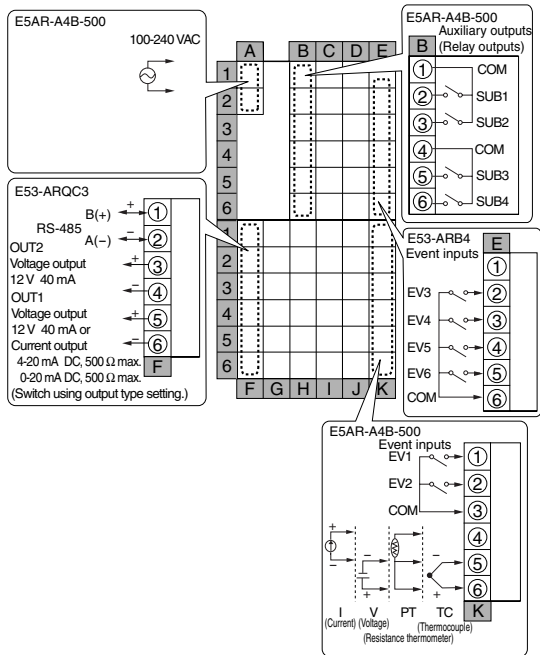
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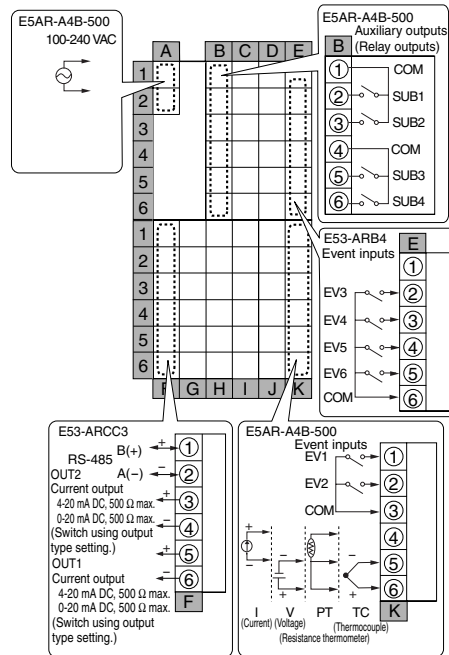
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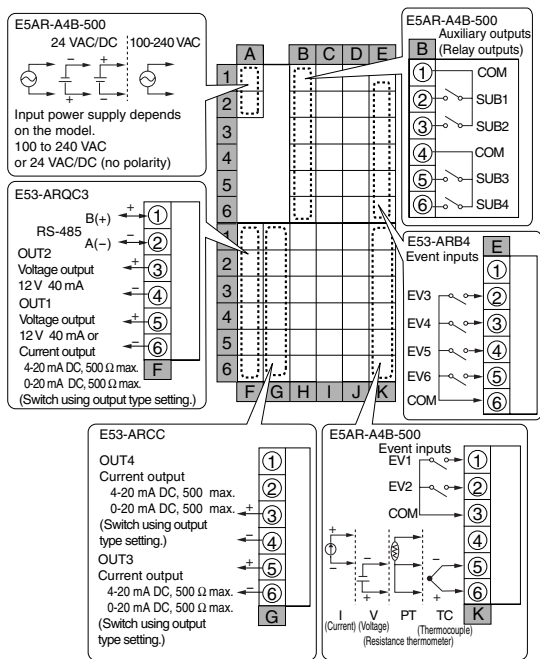
E5AR-Q43DB-FLK



E5AR-C43DB-FLK

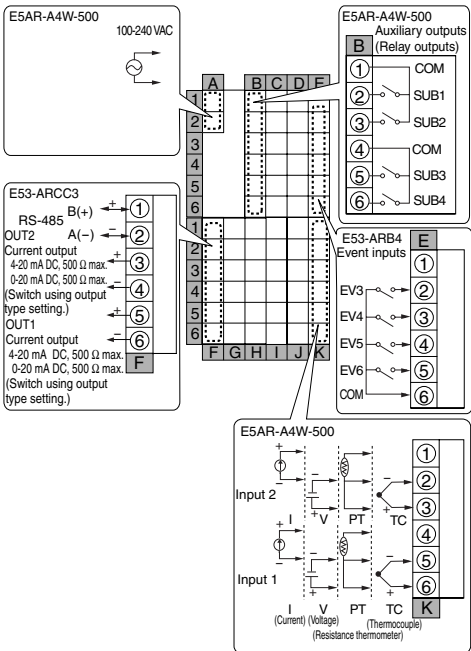
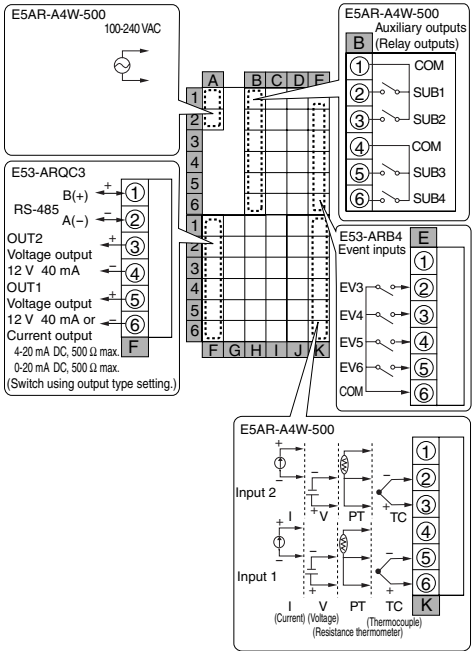


E5AR-QC43DB-FLK

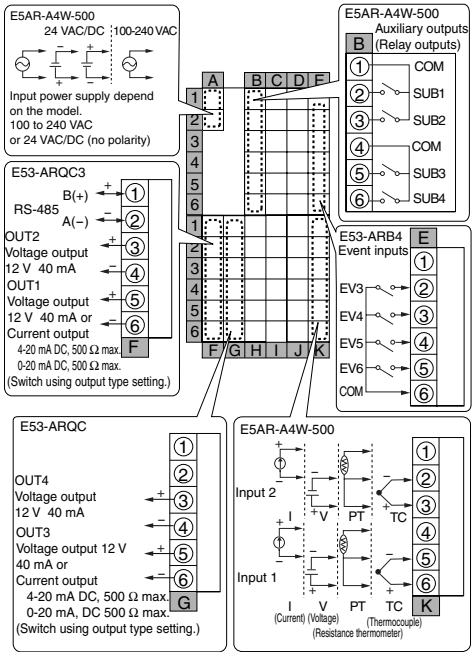


E5AR-Q43DW-FLK (2-loop Control)

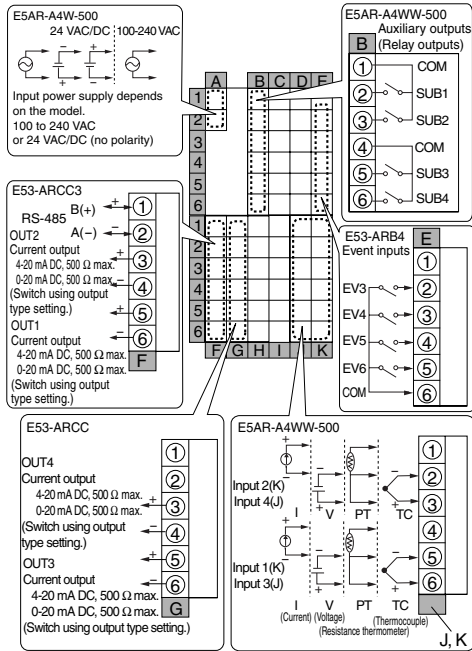
E5AR-C43DW-FLK (2-loop Control)



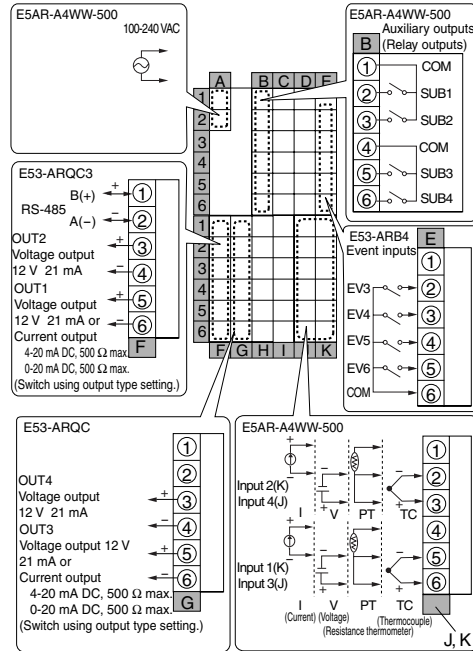
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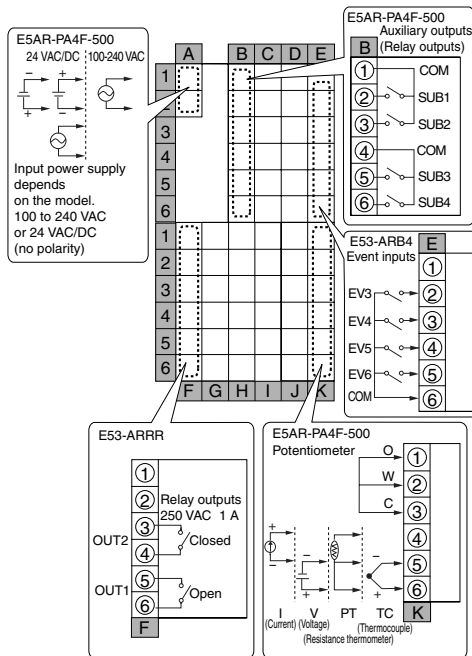
E5AR-CC43DWW-FLK (4-loop Control)



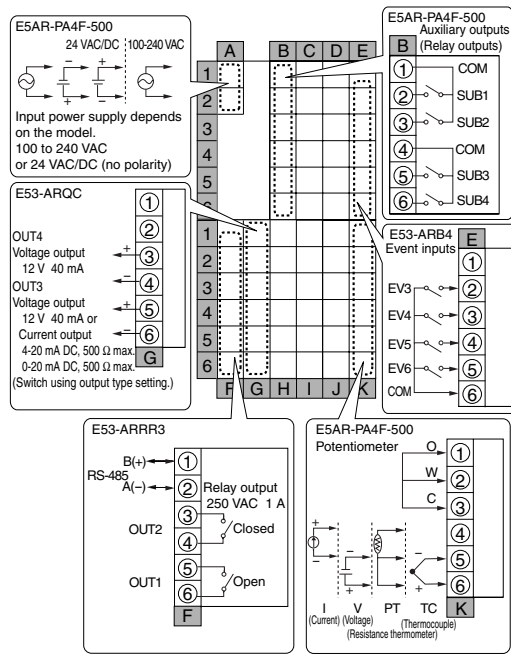
E5AR-QQ43DWW-FLK (4-loop Control)



E5AR-PR4DF

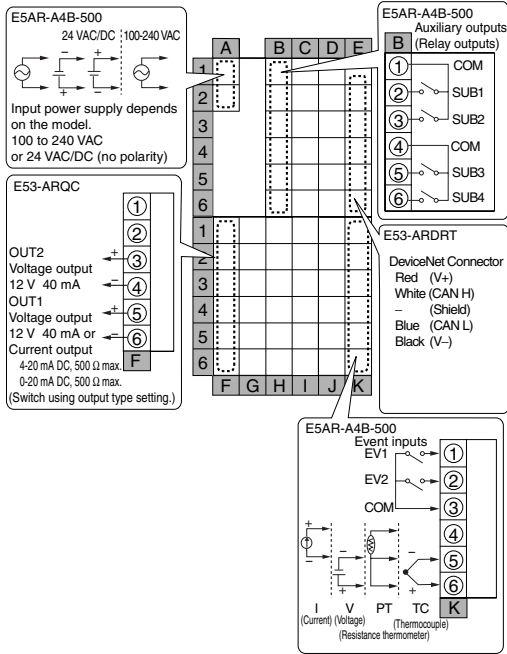


E5AR-PRQ43DF-FLK

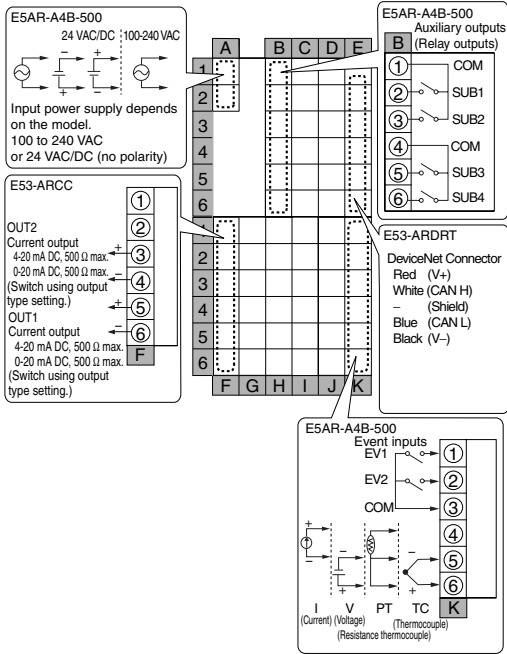


E5AR DeviceNet-compatible Controller Connections

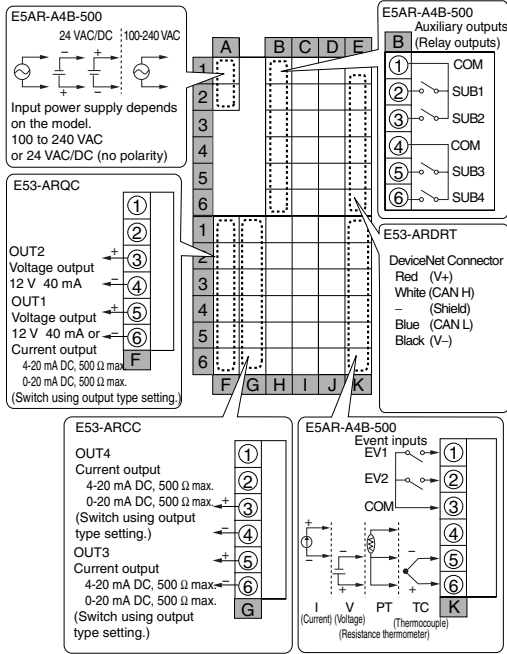
E5AR-Q4B-DRT



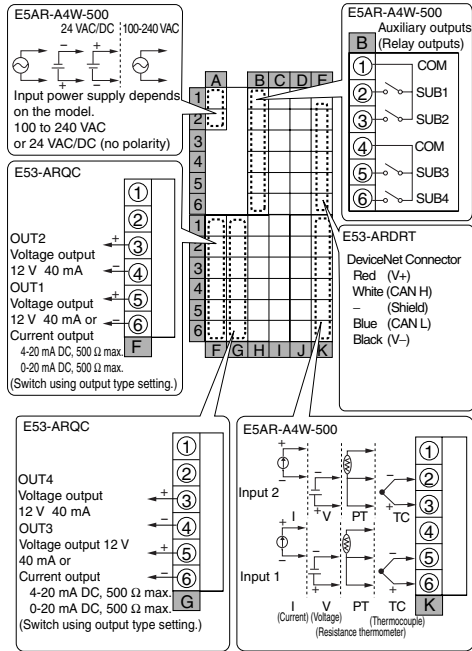
E5AR-C4B-DRT



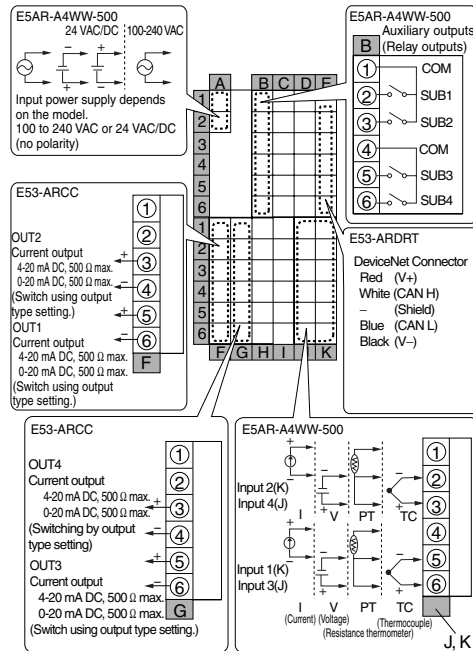
E5AR-QC4B-DRT



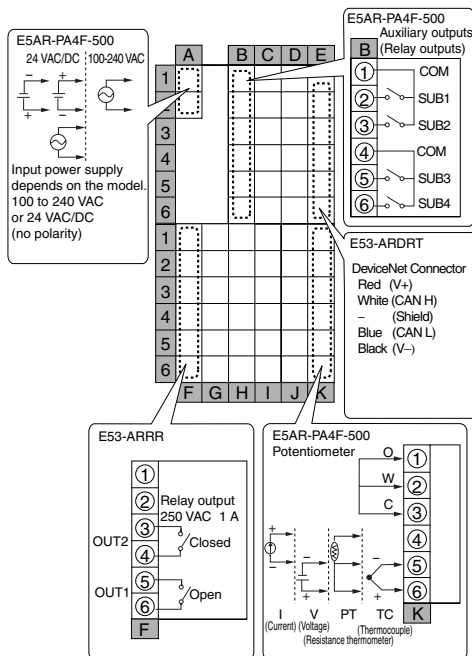
E5AR-QQ4W-DRT (2-loop Control)



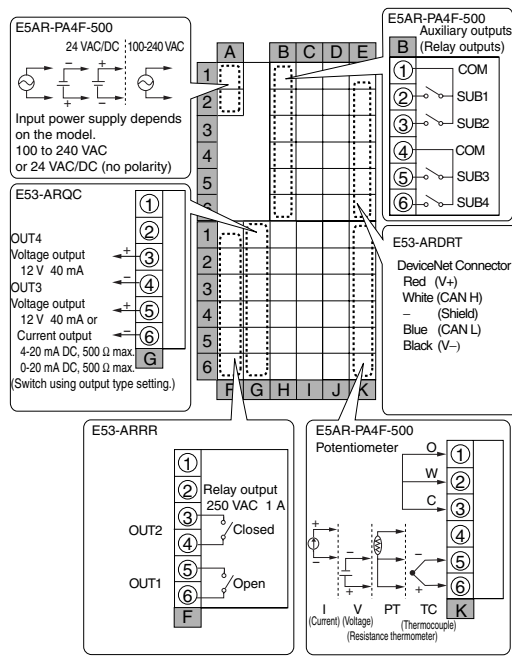
E5AR-CC4WW-DRT (4-loop Control)



E5AR-PR4F-DRT

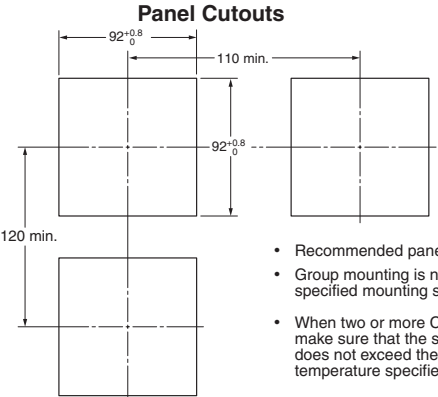
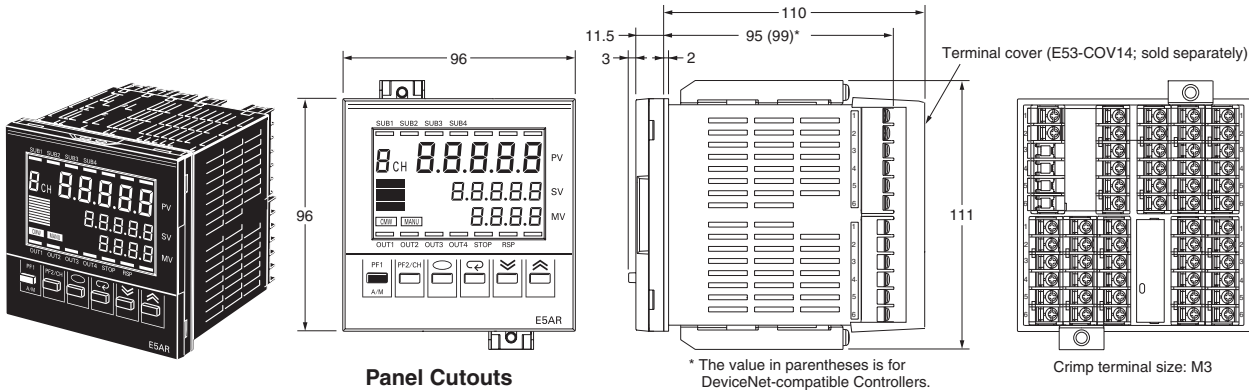


E5AR-PRQ4F-DRT

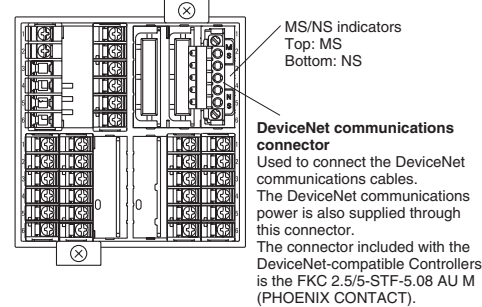


Dimensions

Unit: mm

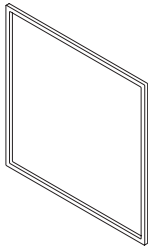


DeviceNet-compatible Controllers, Rear Panel



Rubber Packing (Sold Separately)

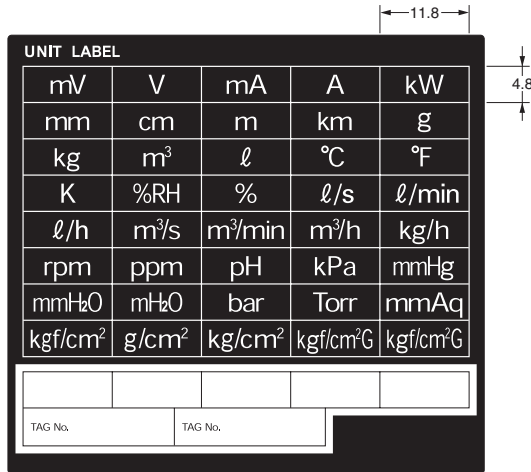
Y92S-P4 (for E5AR)



If the rubber packing is lost or damaged, it can be ordered using the following model number: Y92S-P4.
 (Depending on the operating environment, deterioration, contraction, or hardening of the rubber packing may occur and so, in order to ensure the level of waterproofing specified in NEMA4, periodic replacement is recommended.)
Note: Rubber packing is provided with the controller.

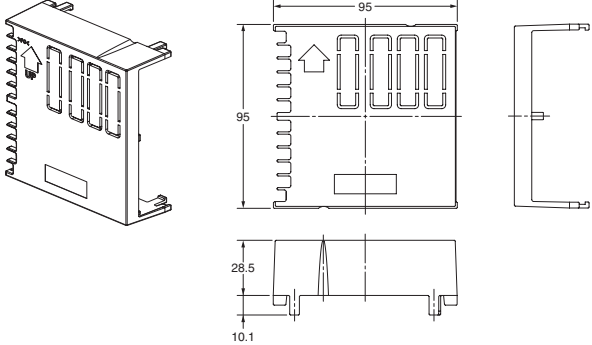
Unit Label Sheet (Sold Separately)

Y92S-L1



Terminal Cover (Sold Separately)

E53-COV14 (for E5AR)



E5ER Digital Controllers

E5ER Digital Controllers offer high speed, high precision, and multiple I/O and use a 5-digit, 3-row LCD display for high visual clarity.

- A short sampling period of 50 ms enables use in applications requiring high-speed response.
- PV, SP, and MV data is displayed simultaneously in a 3-row, negative LCD display with a backlight.
- Multipoint control, cascade control, and proportional control are possible with a single Controller.
- When using models with communications functions, initial settings can be downloaded and settings can be masked using Support Software (Thermo Tools).
- Equipped with calculation functions as a standard (e.g., square root calculation and broken-line approximation).
- DeviceNet Communications
Data setting and monitoring can be performed without any special programming.



Model Number Structure

■ Model Number Legend

E5ER-□□□□□□□□□□-□□□□
1 2 3 4 5 6 7 8 9 10

1. Constant values/Program

None: Constant values

2. Control method

Blank: Standard, or heating/cooling control

P: Position-proportional control

3. Output 1

R: DPST-NO relay outputs

Q: Pulse voltage and pulse voltage/current outputs

C: Current and current outputs

4. Output 2

Blank:None

R: Relay

Q: Pulse voltage and pulse voltage/current outputs

C: Current and current outputs

5. Auxiliary outputs

Blank:None

4: 4PST-NO relay outputs

T: 2 transistor outputs

6. Optional function 1

Blank:None

3: RS-485 communications

7. Optional function 2

Blank:None

D: 4 event inputs

8. Input 1

B: Multi-input and 2 event inputs

F: Multi-input and FB (Potentiometer input)

W: Multi-input and multi-input

9. Input 2

Blank:None

W: Multi-input and multi-input

10. Communications Method

Blank:None

FLK: RS-485 (CompoWay F/MODBUS)

DRT: DeviceNet

Ordering Information

■ Digital Controllers

Standard Controllers

Stock Note: Shaded models are normally stocked.

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	Serial communications	
48 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage and Pulse voltage/current	4	2	No	E5ER-Q4B (See note 4.)
			2 points: Current and Current				E5ER-C4B
			2 points: Pulse voltage and Pulse voltage/current	2 (See note 3.)	6	RS-485	E5ER-Q43B-FLK (See note 2.)
			2 points: Current and Current				E5ER-C43B-FLK (See note 2.)
			2 points: Pulse voltage and Pulse voltage/current	4	2		E5ER-QT3DB-FLK (See note 2.)
			2 points: Current and Current				E5EAR-CT3DB-FLK (See note 2.)
	4 points: Pulse voltage and Pulse voltage/current and Current (2 points)				E5ER-QC43B-FLK (See note 4.)		
	2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop control with remote SP Single-loop proportional control	2 points: Pulse voltage and Pulse voltage/current	2 (See note 3.)	4	RS-485	E5ER-QT3DW-FLK
			2 points: Current and Current				E5ER-CT3DW-FLK
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 closed)	2 (See note 3.)	4	No	E5ER-PRTDF
Relay output (1 open, 1 closed) and Current (transfer) output (1 point)			4	No	RS-485	E5ER-PRQ43F-FLK	

- Note:**
1. Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.
 2. These models are for 100 to 240 VAC only.
 3. The auxiliary outputs are transistor outputs.
 4. Only 100 to 240 VAC models are stocked.

DeviceNet-compatible Controllers

Stock Note: Shaded models are normally stocked.

Size	Control type	Control mode	Outputs (control/transfer)	Optional functions			Model
				Auxiliary outputs (SUB)	Event inputs	DeviceNet communications	
48 × 96 mm	Basic control (1 loop)	Single-loop standard control Single-loop heating and cooling control	2 points: Pulse voltage Pulse voltage/current	2 (See note 2.)	2	Yes	E5ER-QTB-DRT
			2 points: Current Current				E5ER-CTB-DRT
	2-loop control	2-loop standard control Single-loop heating and cooling control Single-loop cascade control Single-loop standard control with remote SP Single-loop proportional control	2 points: Pulse voltage Pulse voltage/current	2 (See note 2.)	None	Yes	E5ER-QTW-DRT
2 points: Current Current			E5ER-CTW-DRT				
	Position-proportional control (1 loop)	Single-loop position-proportional control	Relay output (1 open, 1 closed)	2 (See note 2.)	None	Yes	E5ER-PRTF-DRT

Note: 1. Specify the power supply specifications when ordering. Model numbers for 100 to 240 VAC are different from those for 24 VAC/VDC.
2. The auxiliary outputs are transistor outputs.

Inspection Results

The Inspection Report can be ordered at the same time as the Digital Controller using the following model number.

Inspection Report (Sold Separately)

Descriptions	Model
Inspection Report for E5ER	E5ER-K

Terminal Cover (Sold Separately)

Stock Note: Shaded models are normally stocked.

Descriptions	Model
Terminal Cover for E5ER	E53-COV15

Specifications

■ Ratings


Item	Supply voltage (See note 1.)	100 to 240 VAC, 50/60 Hz	24 VAC, 50/60 Hz; 24 VDC
Operating voltage range		85% to 110% of rated supply voltage	
Power consumption		17 VA max. (with maximum load)	11 VA/7 W max. (with maximum load)
Sensor input (See note 2.)		Thermocouple: K, J, T, E, L, U, N, R, S, B, W Platinum resistance thermometer: Pt100 Current input: 4 to 20 mA DC, 0 to 20 mA DC (including remote SP input) Voltage input: 1 to 5 VDC, 0 to 5 VDC, 0 to 10 VDC (including remote SP input) (Input impedance: 150 Ω for current input, approx. 1 MΩ for voltage input)	
Control output	Voltage (pulse) output	12 VDC, 40 mA max. with short-circuit protection circuit (E5AR-QQ□WW-□: 21 mA max.)	
	Current output	0 to 20 mA DC, 4 to 20 mA DC; load: 500 Ω max. (including transfer output) (Resolution: Approx. 54,000 for 0 to 20 mA DC; Approx. 43,000 for 4 to 20 mA DC)	
	Relay output	Position-proportional control type (open, closed) N.O., 250 VAC, 1 A (including inrush current)	
Auxiliary output		<u>Relay Output</u> N.O., 250 VAC, 1 A (resistive load) <u>Transistor Output</u> Maximum load voltage: 30 VDC; Maximum load current: 50 mA; Residual voltage: 1.5 V max.; Leakage current: 0.4 mA max.	
Potentiometer input		100 Ω to 2.5 kΩ	
Event input	Contact	Input ON: 1 kΩ max.; OFF: 100 kΩ min.	
	No-contact	Input ON: Residual voltage of 1.5 V max.; OFF: Leakage current of 0.1 mA max. Short-circuit: Approx. 4 mA	
Remote SP input		Refer to the information on sensor input.	
Transfer output		Refer to the information on control output.	
Control method		2-PID or ON/OFF control	
Setting method		Digital setting using front panel keys or setting using serial communications	
Indication method		7-segment digital display and single-lighting indicator Character Height No. 1 display: 9.5 mm; No. 2 display: 7.2 mm; No. 3 display: 7.2 mm	
Other functions		Depends on model.	
Ambient operating temperature		-10 to 55°C (with no icing or condensation) For 3 years of assured use: -10 to 50°C (with no icing or condensation)	
Ambient operating humidity		25% to 85%	
Storage temperature		-25 to 65°C (with no icing or condensation)	

- Note:** 1. The supply voltage (i.e., 100 to 240 VAC or 24 VAC/VDC) depends on the model. Be sure to specify the required type when ordering.
2. The Controller is equipped with multiple sensor input. Temperature input or analog input can be selected with the input type setting switch. There is basic insulation between power supply and input terminals, power supply and output terminals, and input and output terminals.


Input Ranges

The E5ER has multi-inputs. The default setting is 2 (K-type thermocouple, -200.0 to 1300.0°C or -300.0 to 2300.0°F).


Platinum Resistance Thermometer Input

Input		Pt100	
Range	°C	-200.0 to 850.0	-150.0 to 150.0
	°F	-300.0 to 1500.0	-199.99 to 300.0
Setting		0	1
Minimum setting unit (SP and alarm)		0.1	0.01
Input type setting switch		Set to TC.PT. 	

Thermocouple Input

Input	K		J		T	E	L	U	N	R	S	B	W	
Range	°C	-200.0 to 1300.0	-20.0 to 500.0	-100.0 to 850.0	-20.0 to 400.0	-200.0 to 400.0	0.0 to 600.0	-100.0 to 850.0	-200.0 to 400.0	-200.0 to 1300.0	0.0 to 1700.0	0.0 to 1700.0	100.0 to 1800.0	0.0 to 2300.0
	°F	-300.0 to 2300.0	0.0 to 900.0	-100.0 to 1500.0	0.0 to 750.0	-300.0 to 700.0	0.0 to 1100.0	-100.0 to 1500.0	-300.0 to 700.0	-300.0 to 2300.0	0.0 to 3000.0	0.0 to 3000.0	300.0 to 3200.0	0.0 to 4100.0
Setting	2	3	4	5	6	7	8	9	10	11	12	13	14	
Minimum setting unit (SP and alarm)	0.1													
Input type setting switch	Set to TC.PT. 													

Current/Voltage Input

Input	Current			Voltage	
Range	4 to 20 mA	0 to 20 mA	1 to 5 V	0 to 5 V	0 to 10 V
Setting	15	16	17	18	19
Input type setting switch	Set to ANALOG. 				

■ Characteristics

Indication accuracy	Thermocouple input with cold junction compensation: ($\pm 0.1\%$ of PV or $\pm 1^\circ\text{C}$, whichever is greater) ± 1 digit max. (See note 1.) Thermocouple input without cold junction compensation: ($\pm 0.1\%$ FS or $\pm 1^\circ\text{C}$, whichever is smaller) ± 1 digit (See note 2.) Analog input: $\pm 0.1\%$ FS ± 1 digit max. Platinum resistance thermometer input: ($\pm 0.1\%$ of PV or $\pm 0.5^\circ\text{C}$, whichever is greater) ± 1 digit max. Position-proportional potentiometer input: $\pm 5\%$ FS ± 1 digit max.
Control mode	Standard control (heating or cooling control), heating/cooling control, standard control with remote SP (2-input models only), heating/cooling control with remote SP (2-input models only), cascade standard control (2-input models only), cascade heating/cooling control (2-input models only), proportional control (2-input models only), position-proportional control (control-valve control models only)
Control period	0.2 to 99.0 s (in units of 0.1 s) for time-proportioning control output
Proportional band (P)	0.00% to 999.99% FS (in units of 0.01% FS)
Integral time (I)	0.0 to 3,999.9 s (in units of 0.1 s)
Derivative time (D)	0.0 to 3,999.9 s (in units of 0.1 s)
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Manual reset value	0.0% to 100.0% (in units of 0.1% FS)
Alarm setting range	-19,999 to 99,999 EU (See note 3.) (The decimal point position depends on the input type and the decimal point position setting.)
Input sampling period	50 ms
Insulation resistance	20 M Ω min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min (between charged terminals of different polarities)
Vibration resistance	10 to 55 Hz, 20 m/s ² for 10 min each in X, Y, and Z directions
Shock resistance	100 m/s ² , 3 times each in X, Y, and Z directions
Inrush current	100 to 240-VAC models: 50 A max. 24 VAC/VDC models: 30 A max.
Weight	E5AR: Controller only: Approx. 450 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 30 g E5ER: Controller only: Approx. 330 g; Mounting bracket: Approx. 60 g; Terminal cover: Approx. 16 g
Degree of protection	Front panel: NEMA4X for indoor use (equivalent to IP66); Rear case: IP20; Terminals: IP00
Memory protection	Non-volatile memory (number of writes: 100,000)
Applicable standards	UL61010C-1, CSA C22.2 No. 1010.1 EN61010-1 (IEC61010-1): Pollution degree 2/overvoltage category II
EMC	EMI: EN61326 Radiated Interference Electromagnetic Field Strength: EN55011 Group 1 Class A Noise Terminal Voltage: EN55011 Group 1 Class A EMS: EN61326 ESD Immunity: EN61000-4-2: 4 kV contact discharge (level 2) 8 kV air discharge (level 3) Electromagnetic Immunity: EN61000-4-3: 10V/m (amplitude-modulated, 80 MHz to 1000, 1.4 GHz to 2 GHz) (level 3) Burst Noise Immunity: EN61000-4-4: 2 kV power line (level 3) 2 kV output line (relay output) (level 4) 1 kV measurement line, I/O signal line (level 4) 1 kV communications line (level 3) Conducted Disturbance Immunity: EN61000-4-6: 3 V (0.15 to 80 MHz) (level 3) Surge Immunity: EN61000-4-5: 1 kV line to line (power line, output line (relay output)) (level 2) Power Frequency Magnetic Field Immunity: EN61000-4-8: 30 A/m (50 Hz) continuous field Voltage Dip/Interrupting Immunity: EN61000-4-11: 0.5 cycle, 100% (rated voltage)

Note: 1. K-, T-, or N-type thermocouple at -100°C max.: $\pm 2^\circ\text{C} \pm 1$ digit max.
U- or L-type thermocouple: $\pm 2^\circ\text{C} \pm 1$ digit max.
B-type thermocouple at 400°C max.: No accuracy specification.
R- or S-type thermocouple at 200°C max.: $\pm 3^\circ\text{C} \pm 1$ digit max.
W-type thermocouple: ($\pm 0.3\%$ of PV or $\pm 3^\circ\text{C}$, whichever is greater) ± 1 digit max.

- 2.** U- or L-type thermocouple: $\pm 1^\circ\text{C} \pm 1$ digit
R- or S-type thermocouple at 200°C max.: $\pm 1.5^\circ\text{C} \pm 1$ digit
- 3.** "EU" (Engineering Unit) represents the unit after scaling. If a temperature sensor is used it is either $^\circ\text{C}$ or $^\circ\text{F}$.

■ Communications Specifications

RS-485 Serial Communications

Transmission path connection	Multiple points
Communications method	RS-485 (two-wire, half duplex)
Synchronization method	Start-stop synchronization
Baud rate	9,600, 19,200, or 384,000 bps
Transmission code	ASCII (CompoWay/F), RTU Remote Terminal Unit (MODBUS)
Data bit length	7 or 8 bits
Stop bit length	1 or 2 bits
Error detection	Vertical parity (none, even, odd) Block check character (BCC) Start-stop synchronization data format
Flow control	None
Interface	RS-485
Retry function	None

DeviceNet

Item		Specifications			
Communications protocol		Conforms to DeviceNet			
Communications functions	Remote I/O communications	<ul style="list-style-type: none"> Master-slave connections (polling, bit-strobe, COS, or cyclic) Conform to DeviceNet specifications. 			
	I/O allocations	<ul style="list-style-type: none"> Can allocate any I/O data from the Configurator. Can allocate any data, such as parameters specific to the Devicenet, and the Digital Controller variable area. Up to 2 blocks for the IN Area, up to a total of 100 words. One block for the OUT Area, up to 100 words (first word is always allocated to Output Enable Bits). 			
	Message communications	<ul style="list-style-type: none"> Explicit message communications CompoWay/F communications commands can be sent (commands are sent in explicit message format). 			
Connection format		Combination of multidrop and T-branch connections (for trunk and drop lines)			
Baud rate		DeviceNet: 500, 250, or 125 kbps, or automatic detection of master baud rate			
Communications media		Special 5-wire cable (2 signal lines, 2 power lines, and 1 shield line)			
Communications distance		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.
		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 parentheses apply when Thin Cables are used.			
Supply voltage		DeviceNet power supply: 24 VDC			
Allowable voltage range		DeviceNet power supply: 11 to 25 VDC			
Current consumption		50 mA max. (24 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			
Power supply		Power supplied from DeviceNet communications connector.			