Chipsmall

Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

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.

We are looking forward to setting up business relationship with you and hope to provide you with the best service and solution. Let us make a better world for our industry!

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OMRON

Digital Controller | E5□K-T

The E5□K-T Programmable Type Digital Controllers Expand the Variety of E5□K Digital Controllers and are Available in Three Sizes (1/4, 1/8, and 1/16 DIN).

This product was manufactured at OMRON Okayama. OMRON Okayama has obtained approvals from international certification bodies for its quality system and environmental management system.

E5□K-T Series

E5AK-T/E5EK-T

1/4 DIN   1/8 DIN

#### E5CK-T

1/16 DIN

Contents

Compact and Easy-to-use Controllers

■ Programming is as easy as following the steps below.

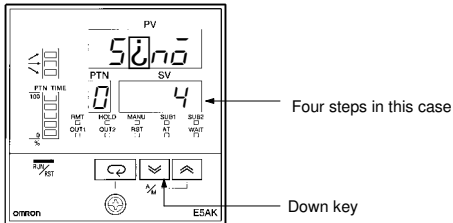Program can be set in pattern 0 according to the following procedure.

Time: hours and minutes
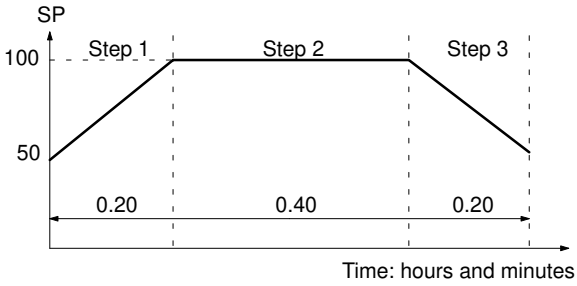
Step No.	Target value	Time (hours.minutes)
0	50	0.00
1	100	0.20
2	100	0.40
3	50	0.20

1. Press the Display Key to shift to the display for the number of steps.

Parameter for the number of steps used
Number of steps (Default setting: 8)
Pattern No.
Display key
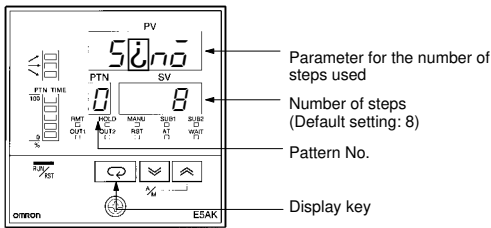
2. Press the Down Key and set the number of steps.

Four steps in this case
Down key

3. Press the Display Key to shift to the display for the target value of step 0.

Step 0
Parameter of the target value
Target value (Default setting: 0)
Display key
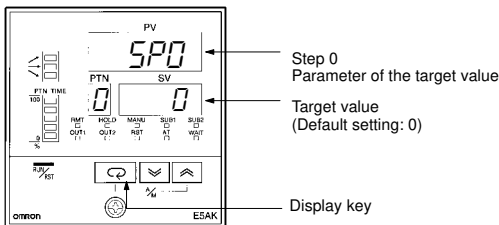
4. Set the target value to "50."
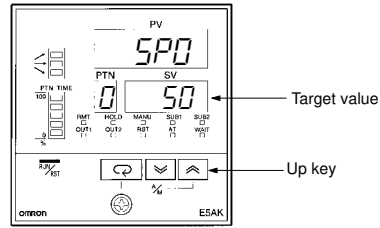
Target value
Up key

5. Press the Display Key to shift to the display for the time of step 0.

Time parameter for step 0.
Step time (Default setting: 0.00)
Pattern No.
Display key
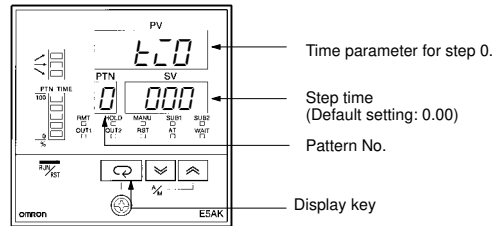
6. Press the Display Key again with the step time set at 0 minutes, and the target value parameter for step 1 will be displayed.
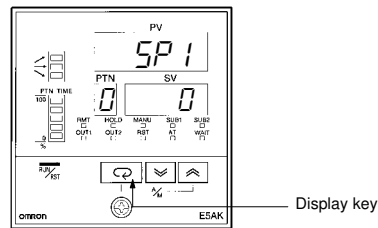
Display key

7. Press the Up Key to increment to "100."

Up key
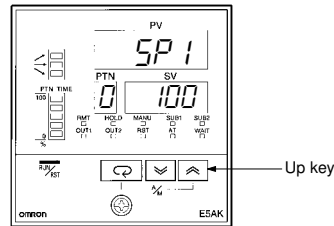
In the same manner, set the time for step 1, target value for step 2, time for step 2, etc.

When the target value and time settings are complete, press the Display Key.

OMRON

Digital Controller

E5AK-T/E5EK-T

Advanced Programmable Digital Controllers Ideal for Worldwide Use

■ Offers up to eight patterns of simple programming control (16 steps per pattern).

■ Modular structure, one-stock type

■ High-accuracy: 100-ms sampling (for analog input)

■ Conforms to international EMC and safety standards.

■ IP66/NEMA4 (indoor use) front face

■ Serial communications (RS-232C, RS-422 and RS-485) and transfer output (4 to 20 mA)

■ Position-proportional control model

■ Heat/Cool control

■ 24VAC/DC types are also available.

$C \in$ ®U ®

Ordering Information

Description	Model	Specification
Base Unit	E5AK-TAA2 AC100-240	Standard model
	E5AK-TAA2-500 AC100-240	Standard model with terminal cover
	E5AK-TAA2 AC/DC24	Standard model
	E5AK-TAA2-500 AC/DC24	Standard model with terminal cover
	E5AK-TPRR2 AC100-240	Position-proportional model
	E5AK-TPRR2-500 AC100-240	Position-proportional model with terminal cover
	E5AK-TPRR2 AC/DC24	Position-proportional model
	E5AK-TPRR2-500 AC/DC24	Position-proportional model with terminal cover
	E5EK-TAA2 AC100-240	Standard model
	E5EK-TAA2-500 AC100-240	Standard model with terminal cover
	E5EK-TAA2 AC/DC24	Standard model
	E5EK-TAA2-500 AC/DC24	Standard model with terminal cover
	E5EK-TPRR2 AC100-240	Position-proportional model
	E5EK-TPRR2-500 AC100-240	Position-proportional model with terminal cover
	E5EK-TPRR2 AC/DC24	Position-proportional model
	E5EK-TPRR2-500 AC/DC24	Position-proportional model with terminal cover

Note: 1. When using the heater burnout alarm function with a standard model, the Linear Output Unit cannot be used for the control outputs (heat).

2. Be sure to specify the Current Transformer, Output Unit, and Option Unit when ordering.

3

Description	Model	Specification
Output Unit	E53-R	Relay
	E53-S	SSR
	E53-Q	Pulse (NPN) 12 VDC at 40 mA max.
	E53-Q3	Pulse (NPN) 24 VDC at 20 mA max.
	E53-Q4	Pulse (PNP) 24 VDC at 20 mA max.
	E53-C3	Linear (4 to 20 mA) under a load of 600 Ω max.
	E53-C3D	Linear (0 to 20 mA) under a load of 600 Ω max.
	E53-V34	Linear (0 to 10 V) under a load of 1 kΩ min.
	E53-V35	Linear (0 to 5 V) under a load of 1 kΩ min.

Note: The Digital Controller uses a dedicated, high-resolution Output Unit. The E53-C Current Output Unit for the E5□X cannot be used with the Digital Controller.

Description	Model	Specification
Option Unit	E53-AKB	Event input
	E53-AK01	Communication (RS-232C)
	E53-AK02	Communication (RS-422)
	E53-AK03	Communication (RS-485)
	E53-AKF	Transfer output

Note: 1. The Option Unit can be used either by the E5AK or E5EK.

2. The E5AK allows a maximum of three Option Units to be mounted. Refer to page 13 for mounting combinations.
The E5EK allows only one Option Unit to be mounted.

Inspection Report

The Digital Controller can be provided together with an inspection report.

Refer to the following legend with the suffix "K" when ordering a model provided together with an inspection report.
E5□K-TAA2-K, E5□K-TPRR2-K

■ Accessories (Order Separately)

Name	Model	Hole diameter
Current Transformer	E54-CT1	5.8 dia.
	E54-CT3	12.0 dia.

Note: No CT is required unless the heater burnout alarm function is used.

Name	Model	Connectable models
Terminal Cover	E53-COV0809	E5AK
	E53-COV08	E5EK

Unit Label

Model	Y92S-L1

■ Ranges

Platinum Resistance Thermometer

Input (switch selectable)		JPt100	Pt100
Range	°C	−199.9 to 650.0	−199.9 to 650.0
	°F	−199.9 to 999.9	−199.9 to 999.9
Setting		0	1

Thermocouple

Input (switch selectable) (see note)		K1	K2	J1	J2	T	E	L1	L2	U	N	R	S	B	W	PLⅡ
Range	°C	−200 to 1,300	0.0 to 500.0	−100 to 850	0.0 to 400.0	−199.9 to 400.0	0 to 600	−100 to 850	0.0 to 400.0	−199.9 to 400.0	−200 to 1,300	0 to 1,700	0 to 1,700	100 to 1,800	0 to 2,300	0 to 1,300
	°F	−300 to 2,300	0.0 to 900.0	−100 to 1,500	0.0 to 750.0	−199.9 to 700.0	0 to 1,100	−100 to 1,500	0.0 to 750.0	−199.9 to 700.0	−300 to 2,300	0 to 3,000	0 to 3,000	300 to 3,200	0 to 4,100	0 to 2,300
Setting		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Note: Setting number is factory-set to 2 (K1).

Current/Voltage

Input (switch selectable)	Current input		Voltage input		
	4 to 20 mA	**0 to 20 mA**	**1 to 5 V**	**0 to 5 V**	**0 to 10 V**
Range	One of following ranges depending on results of scaling −1999 to 9999 −199.9 to 999.9 −19.99 to 99.99 −1.999 to 9.999				
Setting	17	18	19	20	21

Specifications —————————————————————————

■ Ratings

Item	100- to 240-VAC type	24-VAC/VDC type
Supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC/VDC, 50/60 Hz
Power consumption	E5AK: 16 VA E5EK: 15 VA	12 VA, 8 W
Operating voltage range	85% to 110% of rated supply voltage	
Sensor input	Thermocouple: K, J, T, E, L, U, N, R, S, B, W, PLⅡ Platinum resistance thermometer: JPt100, Pt100 Current input: 4 to 20 mA, 0 to 20 mA (Input impedance: 150 Ω) Voltage input: 1 to 5 V, 0 to 5 V, 0 to 10 V (Input impedance: 1 MΩ)	
Control output	According to Output Unit (see *Output Unit Ratings and Characteristics*)	
Auxiliary output	SPST-NO, 3 A at 250 VAC (resistive load)	
Control method	ON/OFF or 2-PID control (with auto-tuning)	
Setting method	Digital setting using front panel keys	
Indication method	7-segment digital display and LEDs	
Event input	Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. No-contact input: ON: residual voltage: 1.5 V max., OFF: leakage current: 0.1 mA max.	
Transfer output	4 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600	
Current Transformer input	Connect an exclusive Current Transformer (E54-CT1 or E54-CT3)	
Other functions	<u>Standard</u> Manual output, heating/cooling control, SP limiter, loop burnout alarm, MV limiter, MV change rate limiter, input digital filter, input shift, run/reset, protect functions, scaling function	

■ Characteristics

Indication accuracy (see note)	Thermocouple: (±0.3% of indication value or ±1°C, whichever greater) ±1 digit max. Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max.
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Proportional band (P)	0.1% to 999.9% FS (in units of 0.1% FS)
Integral (reset) time (I)	0 to 3,999 s (in units of 1 s)
Derivative (rate) time (D)	0 to 3,999 s (in units of 1 s)
Control period	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	−1,999 to 9,999 or −199.9 or 999.9 (decimal point position dependent on input type or result of scaling)
Set time	0 to 99 hrs 59 min or 0 to 99 min 59 s
Program capacity	8 patterns (E5AK) or 4 patterns (E5EK), 16 steps
Programming method	Time or ramp setting method
Time accuracy	±0.2% (±500 ms) of the set value
Sampling period	Temperature input: 250 ms Analog input: 100 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between terminals of different polarities
Vibration resistance	Malfunction: 10 to 55 Hz, 10 m/s^2 (approx. 1G) for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 20 m/s^2 (approx. 2G) for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 200 m/s^2 min. (approx. 20G), 3 times each in 6 directions (100 m/s^2 (approx. 10G) applied to the relay) Destruction: 300 m/s^2 min. (approx. 30G), 3 times each in 6 directions
Ambient temperature	Operating: −10°C to 55°C (with no icing)/3-year warranty period: −10°C to 50°C Storage: −25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Enclosure ratings	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (number of writings: 100,000 operations)
Weight	E5AK: approx. 450 g E5EK: approx. 320 g Mounting bracket: approx. 65 g

EMC	Emission Enclosure: EN55011 Group 1 class A
	Emission AC Mains: EN55011 Group 1 class A
	Immunity ESD: EN61000-4-2: 4 kV contact discharge (level 2)
	                                                                          8 kV air discharge (level 3)
	Immunity RF-interference: ENV50140: 10 V/m (amplitude modulated,
	                                                                          80 MHz to 1 GHz) (level 3)
	                                                                          10 V/m (pulse modulated, 900 MHz)
	Immunity Conducted Disturbance: ENV50141: 3 V (47 to 68 MHz)
	                                                                          10 V (0.15 to 47 MHz, 68 to 80 MHz)
	                                                                          (level 3)
	Immunity Burst: EN61000-4-4: 2 kV power-line (level 3)
	                                                                          2 kV I/O signal-line (level 4)

Approved standards	UL1092, CSA22.2 No. 14, CSA C22.2 No. 142 Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC1010-1) Conforms to VDE0106/part 100 (Finger Protection), when the separately-ordered terminal cover is mounted.

Note: The indication accuracy of the K1, T, and N thermocouples at a temperature of -100°C max. The indication accuracy of the U, L1, and L2 thermocouples at any temperature is ±2°C ±1 digit maximum.
The indication accuracy of the B thermocouple at a temperature of 400°C max. is unrestricted.
The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit maximum.
The indication accuracy of the W thermocouple at any temperature is (±0.3% of the indicated value or ±2°C, whichever is greater) ±1 digit maximum.
The indication accuracy of the PLⅡ thermocouple at any temperature is (±0.3% of the indicated value or ±2°C, whichever is greater) ±1 digit maximum.

■ Output Unit Ratings and Characteristics

Model		Specifications
E53-R	Relay output	5 A at 250 VAC (resistive load)
E53-S	SSR output	1 A at 75 to 250 VAC (resistive load)
E53-Q	Voltage output	NPN: 40 mA at 12 VDC (with short-circuit protection)
E53-Q3		NPN: 20 mA at 24 VDC (with short-circuit protection)
E53-Q4		PNP: 20 mA at 24 VDC (with short-circuit protection)
E53-C3	Linear current output	4 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600
E53-C3D		0 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600
E53-V34	Linear voltage output	0 to 10 VDC, permissible load impedance: 1 kΩ min., resolution: approx. 2,600
E53-V35		0 to 5 VDC, permissible load impedance: 1 kΩ min., resolution: approx. 2,600

Note: An output relay (1 A at 250 VAC) is mounted on the position-proportional model. (When replacing, use the E53-R.)

■ Option Unit Ratings and Characteristics

Model			Specifications
E53-AKB	Event input		Contact input: ON: 1 kΩ max., OFF: 100 kΩ min. No-contact input: ON: residual voltage 1.5 V max., OFF: leakage current 0.1 mA max.
E53-AK01	Communications	RS-232C	Transmission method: Half-duplex
E53-AK02		RS-422	Synchronization method: Start-stop synchronization (asynchronous method) Baud rate: 1.2/2.4/4.8/9.6/19.2 kbps
E53-AK03		RS-485	
E53-AKF	Transfer output		4 to 20 mA: Permissible load impedance: 600 Ω max. Resolution: approx. 2,600

Note: Event input is used for switching the target value, run or stop command, or automatic and manual mode with an external signal input.

■ Current Transformer Ratings

Dielectric strength	1,000 VAC (for 1 min)
Vibration resistance	50 Hz, 98 m/s^2 (10G)
Weight	E54-CT1: approx. 11.5 g; E54-CT3: approx. 50 g
Accessories (E54-CT3 only)	Armature: 2; Plug: 2

■ Heater Burnout Alarm

Max. heater current	Single-phase 50 A VAC (see note 1)
Heater current value display accuracy	±5% FS±1 digit max.
Heater burnout alarm setting range	0.1 to 49.9 A (in units of 0.1 A) (see note 2)
Min. detection ON time	190 ms (see note 3)

Note: 1. Use the K2CU-F□□A-□GS (with gate input terminals) for the detection of three-phase heater burnout.

2. The heater burnout alarm is always OFF if the alarm is set to 0.0 A and always ON if the alarm is set to 50.0 A.

3. No heater burnout detection or heater current value measurement is possible if the control output (heat) is ON for less than 190 ms.

Nomenclature

E5AK

Pattern Number

Indicates the pattern number.

Program Status Indicators

The top indicator indicates the rising step, the middle indicator indicates the constant step, and the bottom indicator indicates the falling step.

Bar Graph

Indicates the rate of pattern elapsing time at the rate of 20% (5 levels) per one segment.

Operation Indicators

- OUT1
  Lit when the pulse output function assigned to control output 1 turns ON.
- OUT2
  Lit when the pulse output function assigned to control output 2 turns ON.
- SUB1
  Lit when the output function assigned to auxiliary output 1 turns ON.
- SUB2
  Lit when the output function assigned to auxiliary output 2 turns ON.
- MANU
  Lit when the manual operation mode.
- RST
  Lit when the operation is reset.
- RMT
  Lit during remote operation.
- AT
  Flashes during auto-tuning.
- HOLD
  Lit when the program is on hold.
- WAIT
  Lit when the program is waiting.
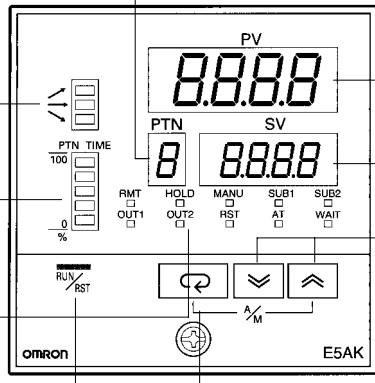
Display 1

Displays the process value or parameter code.

Display 2

Displays the present SP, manipulated variable, or parameter settings.

Up Key/Down Key

Press to increase or decrease the value on the No.2 display.

Display Key

Press to shift the display to the next parameter.

RUN/RST Key

Switches between RUN and RESET mode.

E5EK

Pattern Number

Operation indicators

Display Key

RUN/RST Key

Display 1

Display 2

Up Key/Down Key

OMRON

Digital Controller | E5CK-T
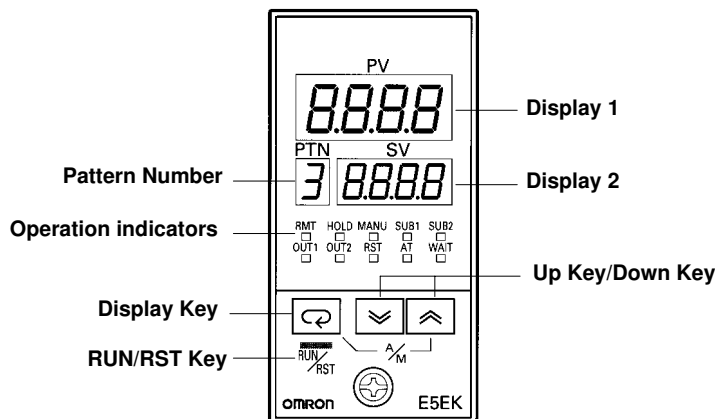
Advanced, Compact Programmable Digital Controllers Ideal for Worldwide Use

- Offers up to four patterns of simple programming control (16 steps per pattern).
- IP66/NEMA4 (indoor use) front face.
- Modular structure, one-stock type.
- Heat/Cool control.
- Serial communications (RS-232C and RS-485).
- Temperature and analog inputs.
- High-accuracy: 100-ms sampling (for analog input).
- Conforms to international EMC and safety standards.
- 24 VAC/DC types are also available.

Ordering Information

Description	Model	Specification
Base Unit	E5CK-TAA1 AC100-240	Standard model
	E5CK-TAA1-500 AC100-240	Standard model with terminal cover
	E5CK-TAA1 AC/DC24	Standard model
	E5CK-TAA1-500 AC/DC24	Standard model with terminal cover

Note: A single Output Unit and Option Unit can be mounted to each Base Unit.

Description	Model	Specification
Output Unit	E53-R4R4	Relay/Relay
	E53-Q4R4	Pulse (NPN)/Relay
	E53-Q4HR4	Pulse (PNP)/Relay
	E53-C4R4	Linear (4 to 20 mA)/Relay
	E53-C4DR4	Linear (0 to 20 mA)/Relay
	E53-V44R4	Linear (0 to 10 V)/Relay
	E53-Q4Q4	Pulse (NPN)/Pulse (NPN)
	E53-Q4HQ4H	Pulse (PNP)/Pulse (PNP)

Description	Model	Specification
Option Unit	E53-CK01	RS-232C
	E53-CK03	RS-485
	E53-CKB	Event input: 1 point
	E53-CKF	Transfer output (4 to 20 mA)

Inspection Report

The Digital Controller can be provided together with an inspection report.

Refer to the following legend with the suffix "K" when ordering a model provided together with an inspection report.
E5CK-TAA1-K

■ Accessories (Order Separately)

Name	Model
Terminal Cover	E53-COV07

■ Temperature Ranges

Platinum Resistance Thermometer

Input (switch selectable)		JPt100	Pt100
Range	°C	−199.9 to 650.0	−199.9 to 650.0
	°F	−199.9 to 999.9	−199.9 to 999.9
Resolution (°C/°F) (main setting and alarm)		0	1

Thermocouple

Input (switch selectable) (see note)		K1	K2	J1	J2	T	E	L1	L2	U	N	R	S	B	W	PLII
Range	°C	−200 to 1,300	0.0 to 500.0	−100 to 850	0.0 to 400.0	−199.9 to 400.0	0 to 600	−100 to 850	0.0 to 400.0	−199.9 to 400.0	−200 to 1,300	0 to 1,700	0 to 1,700	100 to 1,800	0 to 2,300	0 to 1,300
	°F	−300 to 2,300	0.0 to 900.0	−100 to 1,500	0.0 to 750.0	−199.9 to 700.0	0 to 1,100	−100 to 1,500	0.0 to 750.0	−199.9 to 700.0	−300 to 2,300	0 to 3,000	0 to 3,000	300 to 3,200	0 to 4,100	0 to 2,300
Resolution (°C/°F) (main setting and alarm)		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16

Note: Setting number is factory-set to 2 (K1).

Current/Voltage

Input (switch selectable)	Current input		Voltage input		
	4 to 20 mA	**0 to 20 mA**	**1 to 5 V**	**0 to 5 V**	**0 to 10 V**
Range	One of following ranges depending on results of scaling −1999 to 9999 −199.9 to 999.9 −19.99 to 99.99 −1.999 to 9.999				
Resolution (°C/°F) (main setting and alarm)	17	18	19	20	21

Specifications ———————————————

■ Ratings

Item	100- to 240-VAC type	24-VAC/VDC type
Supply voltage	100 to 240 VAC, 50/60 Hz	24 VAC/VDC, 50/60 Hz
Power consumption	15 VA	6 VA, 3.5 W
Operating voltage range	85% to 110% of rated supply voltage	
Sensor input	Thermocouple: K, J, T, E, L, U, N, R, S, B, W, PLII Platinum resistance thermometer: JPt100, Pt100 Current input: 4 to 20 mA, 0 to 20 mA Voltage input: 1 to 5 V, 0 to 5 V, 1 to 10 V	
Input impedance	Current input: 150 Ω Voltage input: 1 MΩ min.	
Control output	According to Output Unit (see *Output Unit Ratings and Characteristics*)	
Auxiliary output	SPST-NO, 3 A at 250 VAC (resistive load)	
Control method	ON/OFF or 2-PID control	
Setting method	Digital setting using front panel keys	
Indication method	7-segment digital display and LEDs	
Other functions	Standard Manual output, heating/cooling control, SP limiter, loop burnout alarm, MV limiter, MV change rate limiter, input digital filter, input shift, run/reset, protect functions, scaling function	

■ Characteristics

Indication accuracy (see note 1)	Thermocouple: (±0.3% of indication value or ±1°C, whichever greater) ±1 digit max. Platinum resistance thermometer: (±0.2% of indication value or ±0.8°C, whichever greater) ±1 digit max. Analog input: ±0.2% FS ±1 digit max.
Hysteresis	0.01% to 99.99% FS (in units of 0.01% FS)
Proportional band (P)	0.1% to 999.9% FS (in units of 0.1% FS)
Integral (reset) time (I)	0 to 3,999 s (in units of 1 s)
Derivative (rate) time (D)	0 to 3,999 s (in units of 1 s)
Control period	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	−1,999 to 9,999 or −199.9 or 999.9 (decimal point position dependent on input type)
Program capacity	4 patterns, 16 steps (possible to use up to 4 patterns with the communications function.)
Programming method	Time or ramp setting method
Time accuracy	±0.2% (±500 ms) of the set value
Sampling period (see note 2)	Temperature input: 250 ms Analog input: 100 ms
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	2,000 VAC, 50/60 Hz for 1 min between terminals of different polarities
Vibration resistance	Malfunction: 10 to 55 Hz, 10 m/s^2 (approx. 1G) for 10 min each in X, Y, and Z directions Destruction: 10 to 55 Hz, 20 m/s^2 (approx. 2G) for 2 hrs each in X, Y, and Z directions
Shock resistance	Malfunction: 200 m/s^2 min. (approx. 20G), 3 times each in 6 directions (100 m/s^2 (approx. 10G) applied to the relay) Destruction: 300 m/s^2 min. (30G), 3 times each in 6 directions
Ambient temperature	Operating: −10°C to 55°C (with no icing)/3-year warranty period: −10°C to 50°C Storage: −25°C to 65°C (with no icing)
Ambient humidity	Operating: 35% to 85%
Enclosure ratings	Front panel: NEMA4 for indoor use (equivalent to IP66) Rear case: IEC standard IP20 Terminals: IEC standard IP00
Memory protection	Non-volatile memory (number of writings: 100,000 operations)
Weight	Approx. 170 g; Adapter: approx. 10 g

EMC	Emission Enclosure: EN55011 Group 1 class A
	Emission AC Mains: EN55011 Group 1 class A
	Immunity ESD: EN61000-4-2:4kV contact discharge (level 2)
	                                                            8kV air discharge (level 3)
	Immunity RF-interference: ENV50140: 10V/m (amplitude modulated, 80 MHz to
	                                                            1 GHz) (level 3)
	                                                            10 V/m (pulse modulated, 900 MHz)
	Immunity Conducted Disturbance: ENV50141: 3 V (47 to 68 MHz)
	                                                            10 V (0.15 to 47 MHz, 68 to 80 MHz)
	                                                            (level 3)
	Immunity Burst: EN61000-4-4:2kV power-line (level 3)
	                                                            2kV I/O signal-line (level 4)

Approved standards	UL1092, CSA22.2 No. 14, CSA C22.2 No. 142 Conforms to EN50081-2, EN50082-2, EN61010-1 (IEC1010-1) Conforms to VDE0106/ part 100 (Finger Protection), when the separately-ordered terminal cover is mounted.

Note: The indication accuracy of the K1, T, and N thermocouples at a temperature of -100°C max. The indication accuracy of the U, L1, and L2 thermocouples at any temperature is ±2°C ±1 digit maximum.
The indication accuracy of the B thermocouple at a temperature of 400°C max. is unrestricted.
The indication accuracy of the R and S thermocouples at a temperature of 200°C max. is ±3°C ±1 digit maximum.
The indication accuracy of the W thermocouple at any temperature is (±0.3% of the indicated value or ±3°C, whichever is greater) ±1 digit maximum.
The indication accuracy of the PLⅡ thermocouple at any temperature is (±0.3% or ±2°C, whichever is greater) ±1 digit maximum.

■ Output Unit Ratings and Characteristics

Model	Control output 1/Control output 2
E53-R4R4	Relay / Relay
E53-Q4R4	Voltage (NPN) / Relay
E53-Q4HR4	Voltage (PNP) / Relay
E53-C4R4	4 to 20 mA / Relay
E53-C4DR4	0 to 20 mA / Relay
E53-V44R4	0 to 10 mA / Relay
E53-Q4Q4	Voltage (NPN) / Voltage (NPN)
E53-Q4HQ4H	Voltage (PNP) / Voltage (PNP)

Output Type	Specifications
Relay	250 VAC. 3 A
Voltage (NPN)	12 VDC, 20 mA (with short-circuit protection)
Voltage (PNP)	12 VDC, 20 mA (with short-circuit protection)
0 to 10 V	0 to 10 VDC, Permissible load impedance: 1 kΩ min., Resolution: Approx. 2600
4 to 20 mA	4 to 20 mA, Permissible load impedance: 500 Ω max., Resolution: Approx. 2600

■ Option Unit Ratings and Characteristics

Model			Specifications
E53-CKB	Event input		Contact input: ON: 1 kΩ max., OFF: 100 kΩ min.
			No-contact input: ON: residual voltage 1.5 V max., OFF: leakage current 0.1 mA max.
E53-CK01	Communications	RS-232C	Transmission method: Half-duplex
E53-CK03		RS-485	Synchronization method: Start-stop synchronization (asynchronous method)
			Baud rate: 1.2/2.4/4.8/9.6/19.2 kbps
E53-CKF	Transfer output		4 to 20 mA DC: Permissible load impedance: 600 Ω max. Resolution: approx. 2,600

Note: Event input is used for switching the target value, run or stop command, or automatic and manual mode with an external signal input.

Nomenclature ————————————————————————————

Display 1

Display 2

Operation Indicators

Up Key/Down Key

Display Key

RUN/RST Key
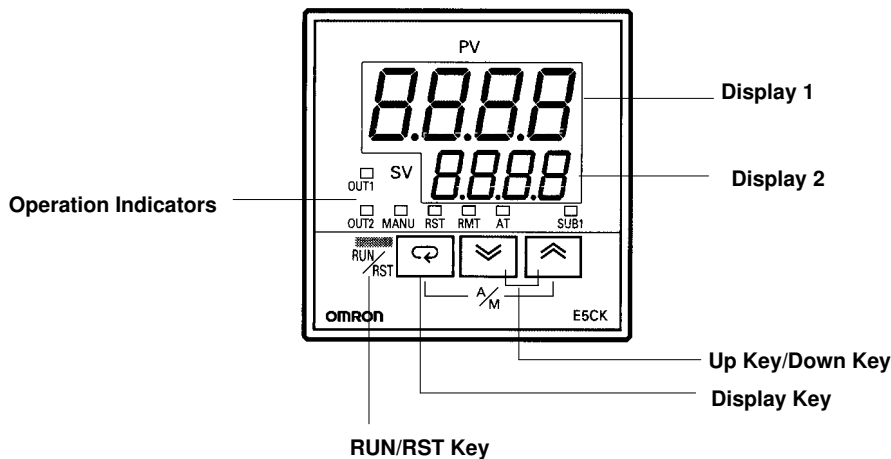
Setup ———————————————————————————————————————

Note: Always turn OFF the power supply to the Digital Controller before changing any switch settings.

■ Settings (E5AK/E5EK)

On a standard model, set up the Output Units for control outputs 1 and 2 before mounting the Controller.

On a position-proportional model, the Relay Output Unit is already set. Therefore, this setup operation is unnecessary. (Do not replace with other Output Units.)

When setting up the Output Units, draw out the internal mechanism from the housing and insert the Output Units into the sockets for control outputs 1 and 2.

E5AK

Draw-out

When drawing out the internal mechanism from the housing, prepare a Phillips screwdriver matched to the size of the screw on the lower part of the front panel.

1. Press down on the hook on the top of the front panel, and turn the Phillips screwdriver to the left to loosen the screw on the lower part of the front panel.

Hook
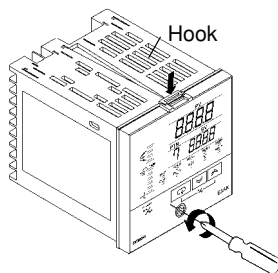
2. Draw out the internal mechanism towards you holding both sides of the front panel.

Setting Up the Output Unit

- **Before Setup**

Check the type of the Output Unit you are about to set up.

- **Procedure**

1. Check the positions of the sockets you are about to insert the Output Units into as shown in the following diagram.
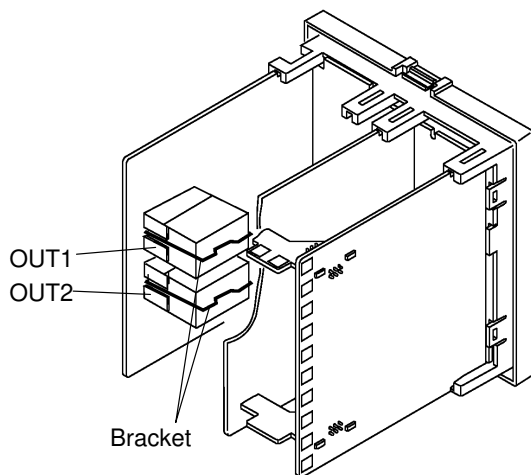
OUT1
OUT2

Bracket

2. Insert the Output Unit for control output 1 into the socket "OUT1" and the Output Unit for control output 2 into the socket "OUT2."

3. Fasten the Output Units with the bracket (accessory).

Setting Up the Option Unit

- **Before Setup**

Check the type of the Option Unit you are about to set up.

- **Procedure**

1. Remove the power board and option boards in the order shown in the following diagram.
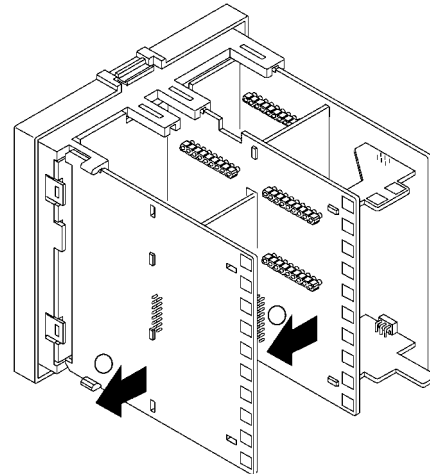
2. Insert the Option Units into the sockets for options 1 to 3. The following diagram shows the relationship between the Option Units and mounting positions.

Option 1
E53–AKB: Event inputs 1/2
E53–AK01: RS–232C
E53–AK02: RS–422
E53–AK03: RS–485

Option 2
E53–AKF: Transfer output

Option 3
E53–AKB: Event inputs 3/4
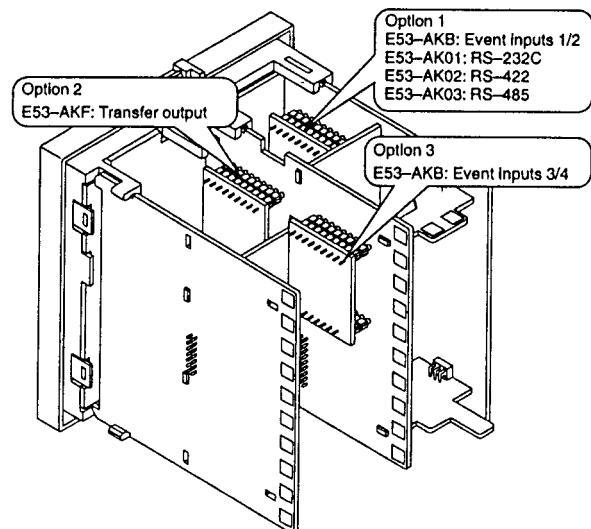
3. Mount the Option Boards and the power board in the order shown.

Mounting

1. Insert the E5AK-T Controller into the mounting hole in the panel.

2. Fit the mounting bracket (accessory) into the fixing slots on the top and bottom of the rear case.


3. Tighten the mounting bracket screws alternately a little at a time until the ratchet starts to slide.

Setting Up the Terminal Cover

Fasten the Terminal Covers (E53-COV0809) to protect terminals.

E5AK-VV2-500 Controller is provided with Terminal Covers.

Use E53-COV09 for terminals 1 to 10, and E53-COV08 for terminals 11 to 33.

Fasten the Terminal Covers as follows by using the snap pins.

E5AK-T
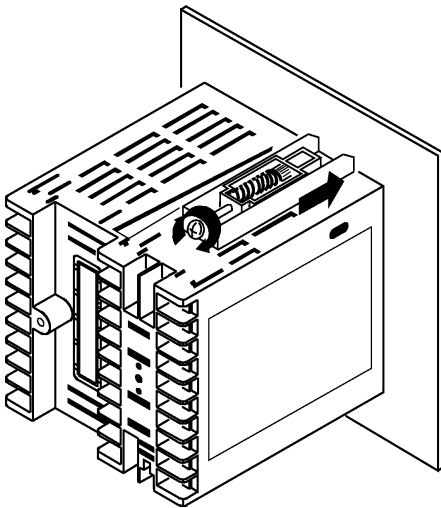
E53-COV0809
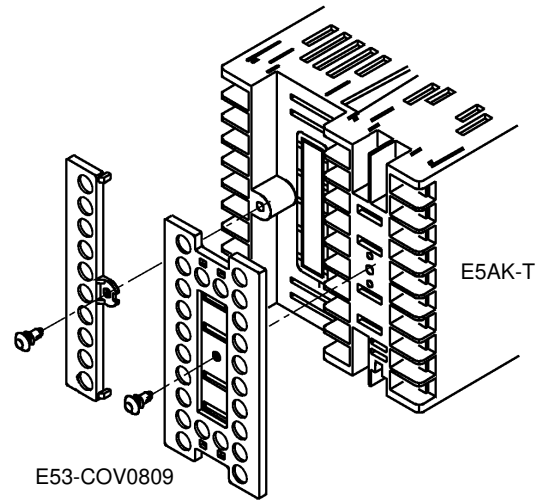
E5EK

Draw-out

When drawing out the internal mechanism from the housing, prepare a Phillips screwdriver matched to the size of the screw on the lower part of the front panel.

1. Press down on the hook on the top of the front panel, and turn the Phillips screwdriver to the left to loosen the screw on the lower part of the front panel.

2. Draw out the internal mechanism towards you holding both sides of the front panel.

Setting Up the Output Unit

- **Before Setup**

Check the type of the Option Unit you are about to set up.

- **Procedure**

1. Check the positions of the sockets you are about to insert the Output Units into as shown in the following diagram.
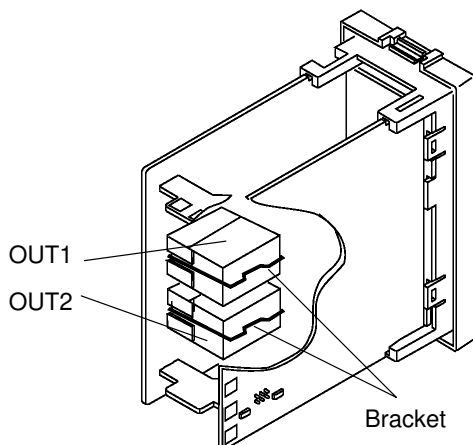
2. Remove the power board in the direction of the arrow in the figure below. The power board is connected to the control board by a connector at the center of the board.
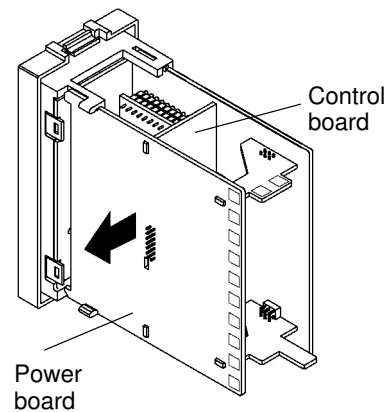
3. Insert the Output Unit for control output 1 into the socket "OUT1" and the Output Unit for control output 2 into the socket "OUT2."

4. Fasten the Output Units with the bracket (accessory).

5. Mount the power board at its original position.

Setting Up the Option Unit

- **Before Setup**

Check the type of the Option Unit you are about to set up.

- **Procedure**

1. Remove the power board and Option Boards in the order shown in the following diagram.
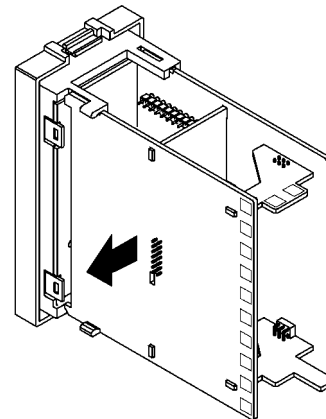
2. Insert the Option Unit into the socket for option 1. The following diagram shows the relationship between Option Unit and mounting position.
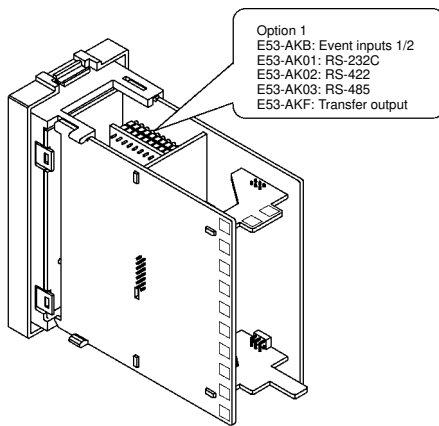
Option 1
E53-AKB: Event inputs 1/2
E53-AK01: RS-232C
E53-AK02: RS-422
E53-AK03: RS-485
E53-AKF: Transfer output
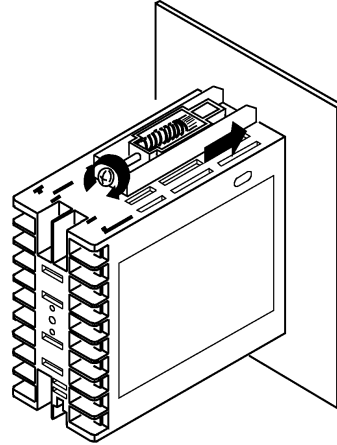
3. Mount the Option Board and the power board in the order shown.

Mounting

1. Insert the E5EK-T Controller into the mounting hole in the panel.

2. Fit the mounting bracket (accessory) into the fixing slots on the top and bottom of the rear case.

3. Tighten the mounting bracket screws alternately a little at a time until the ratchet starts to slide.

Setting Up the Terminal Cover

Fasten the Terminal Covers (E53-COV0809) to protect terminals.

E5AK-VV2-500 Controller is provided with Terminal Covers.

Use E53-COV09 for terminals 1 to 10, and E53-COV08 for terminals 11 to 33.

Fasten the Terminal Covers as follows by using the snap pins.

E5AK-T
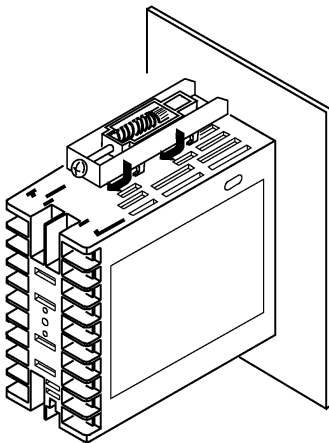
E53-COV08
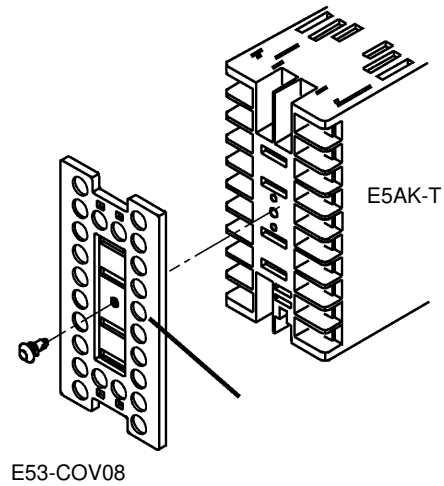
To remove the Terminal Covers, pull the edges of the snap pins.

E5CK

Draw-out

Draw out the internal mechanism from the housing.

1. Press in both of the hooks on the left and right sides of the front panel to unlock the internal mechanism from the housing.
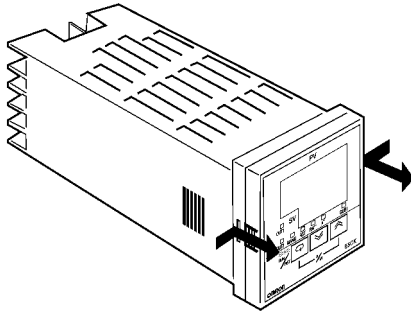
2. Draw out the internal mechanism towards you holding both sides of the front panel.

Setting Up the Output Unit

● **Procedure**

1. Two rectangular holes for slotting are provided on the power board (on right side of Controller). Fit the two protrusions on the Output Unit into these two holes.
2. With the Output Unit fitted into the power board, fit the Output Unit into the connector on the control board (on left side of Controller).
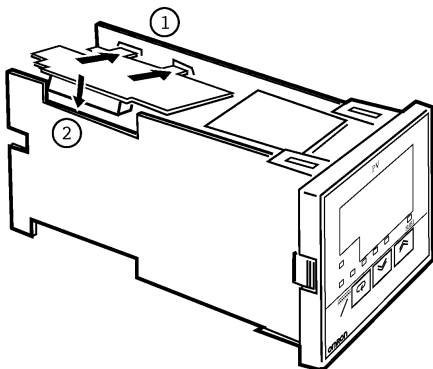
Setting Up the Option Unit

● **Procedure**

1. Place the Controller with its bottom facing up, and fit the board horizontally into the connector on the power board (on right side of Controller).

2. With the power board connected, fit the board vertically into the connector on the control board (on left side of Controller).
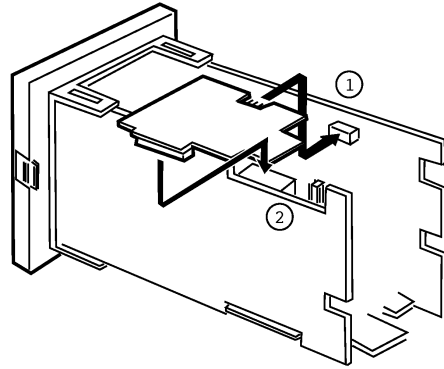
Mounting

1. Insert the E5EK-T Controller into the mounting hole in the panel.
2. Push the adapter along the Controller body from the terminals up to the panel, and fasten temporarily.
3. Tighten the two fixing screws on the adapter. When tightening screws, tighten the two screws alternately keeping the torque to approximately 0.29 to 0.39 N • m, or 3 to 4 kgf • cm.

Adapter
Panel
Waterproof packing
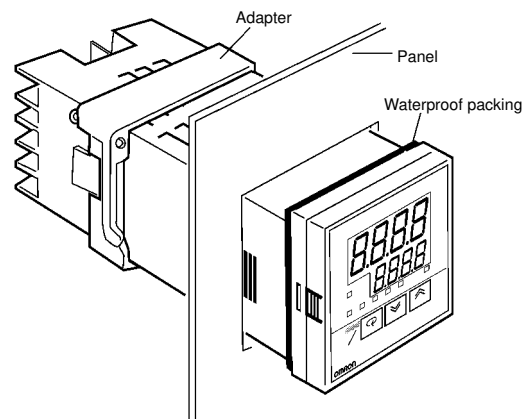
Setting the Input Type Jumper

Set the jumper to one of temperature input, voltage input or current input matched to the type of sensor connected to the input terminal.

I : Current input   V : Voltage input

TC/PT : Temperature input
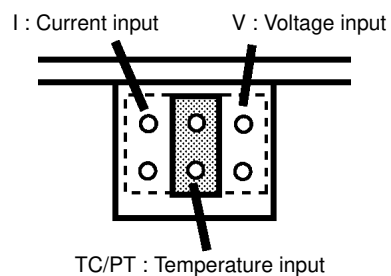
The input type jumper is factory-set to "TC/PT (temperature input)."

When you disconnect or insert the input type jumper, do not hold it directly by its pins.

When you have finished setting the input type jumper, insert the internal mechanism back into the housing.

To do this, push in the internal mechanism until you hear the hooks on the front panel snap into place.

Dimensions

Note: All units are in millimeters unless otherwise indicated.

E5AK
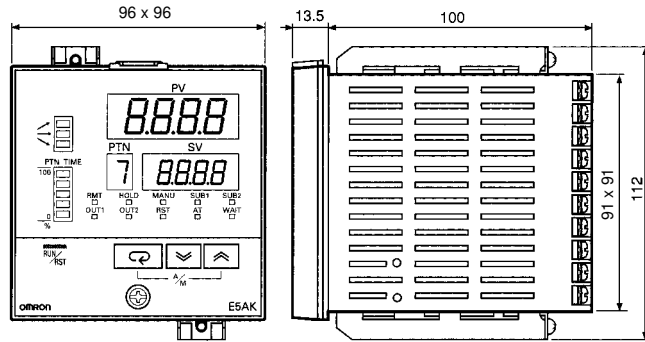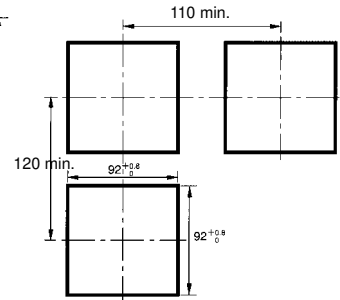
96 x 96   13.5   100

PV

PTN   SV

7

PTN TIME
100

RMT   HOLD   MANU   SUB1   SUB2
OUT1   OUT2   RST   AT   WAIT

RUN/
RST   A/M

omron   E5AK

91 x 91   112

Panel Cutouts

110 min.

120 min. $92^{+0.8}_{0}$

$92^{+0.8}_{0}$

Note: 1. Recommended panel thickness is 1 to 8 mm.

2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

E5EK

48   13.5   100

PV

PTN   SV

3

RMT   HOLD   MANU   SUB1   SUB2
OUT1   OUT2   RST   AT   WAIT

RUN/
RST   A/M

omron   E5EK

96   91   112

Panel Cutouts

60 min.

120 min. $45^{+0.6}_{0}$

$92^{+0.8}_{0}$

Note: 1. Recommended panel thickness is 1 to 8 mm.

2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

E5CK

58
53 x 53   13.3   100

PV

SV

OUT1

T2   MANU   SUB1
OUT2   RST   HT
RUN/
RST   A/M

omron   E5CK

44.8 x 44.8   48

Panel Cutouts

65 min.

60 min. $45^{+0.6}_{0}$

$45^{+0.6}_{0}$
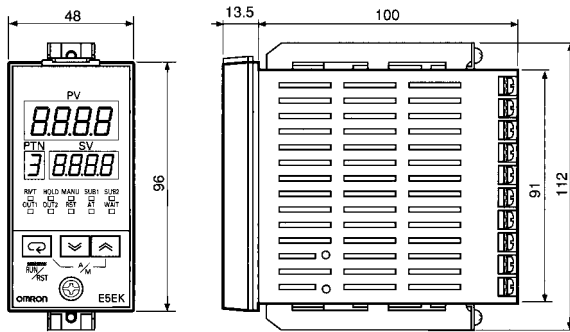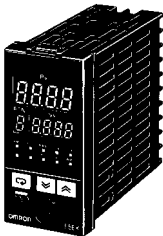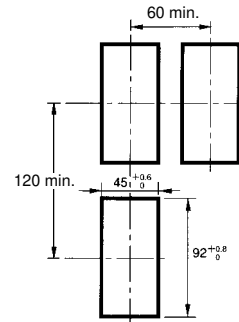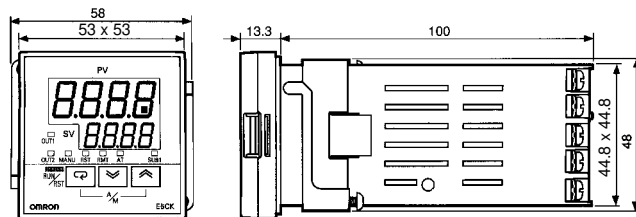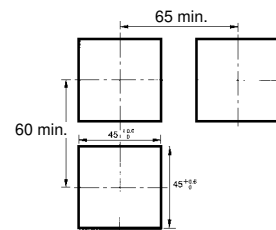
Note: 1. Recommended panel thickness is 1 to 5 mm.

2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

Accessories (Order Separately)

Terminal Cover

E53-COV0809 (E5AK)

43.2

89

3

1.5

E53-COV08 (E5EK)

22.05

89

3
3

(With rivet)

43.2

89

3

1.5

(With rivet)

E53-COV07

44.3

44.3

1.5

(With rivet)

Current Transformer

E54-CT1

21
15
5.8 dia.
2.8
7.5
25
3
10.5
40
10
30

E54-CT3

2.36 dia.
30
12 dia.
9
40x40
Two, M3 (depth: 4)
15
30

19

Rubber Seal

UNIT LABEL				
mV	V	mA	A	kW
mm	cm	m	km	g
kg	m³	ℓ	°C	°F
K	%RH	%	ℓ/s	ℓ/min
ℓ/h	m³/s	m³/min	m³/h	kg/h
rpm	ppm	pH	kPa	mmHg
mmH₂0	mH₂0	bar	Torr	mmAq
kgf/cm²	g/cm²	kg/cm²	kgf/cm²G	kgf/cm²G

TAG No.　　　　TAG No.
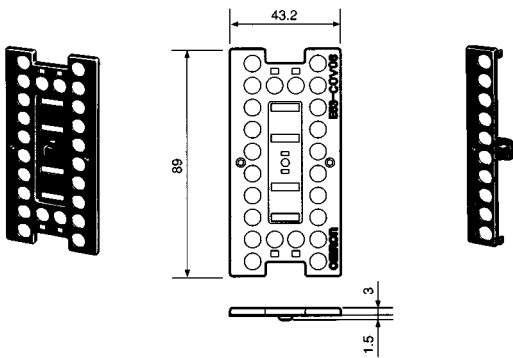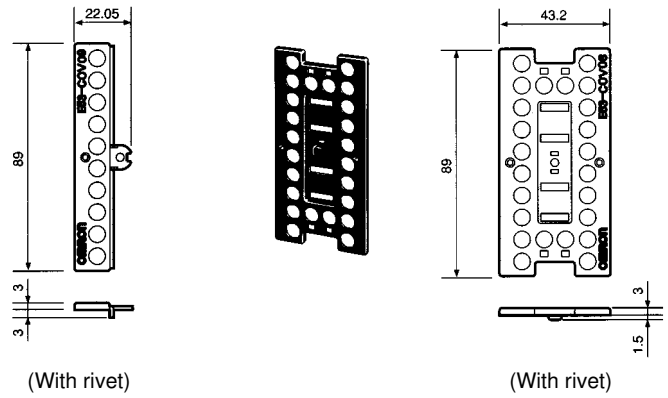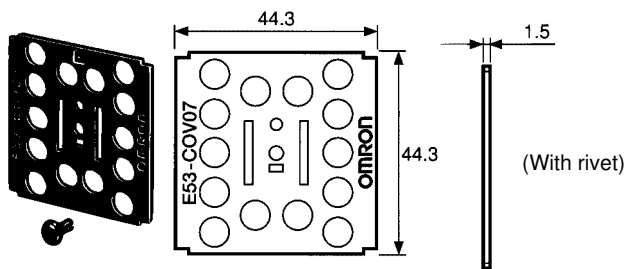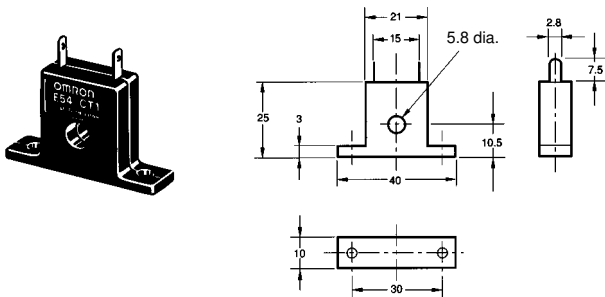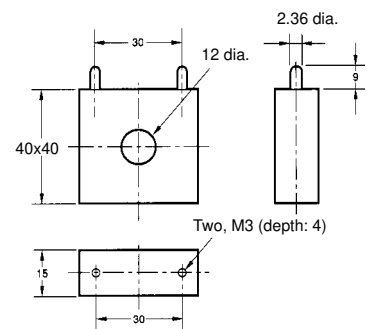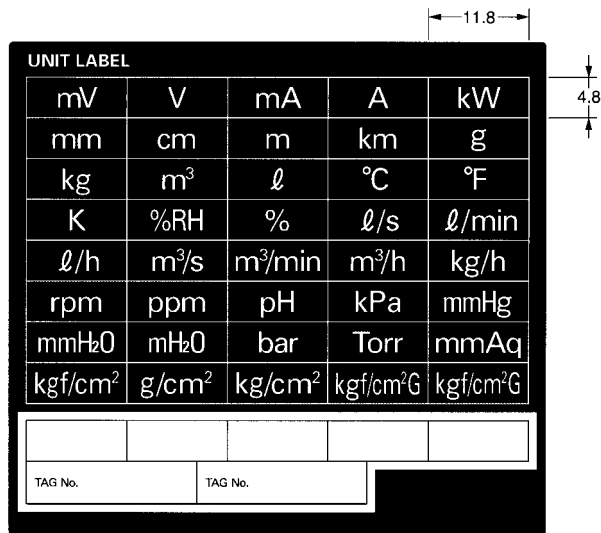
Installation

■ Wiring Terminals

Terminal Arrangement

E5AK-T

100-240 VAC
24 VDC/AC
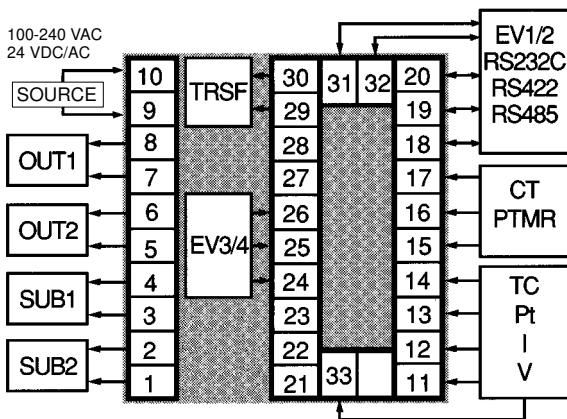
TRSF:　　　Transfer output
EV1 to 4: Event input
PTMR:　　Potentiometer

E5EK-T

100-240 VAC
24 VDC/AC
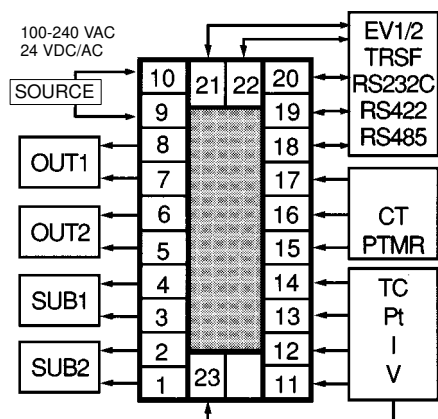
TRSF:　　　Transfer output
EV1/2:　　Event input
PTMR:　　Potentiometer

E5CK-T

100-240 VAC
24 VDC/AC

EV1
RS232C
RS485
TRSF
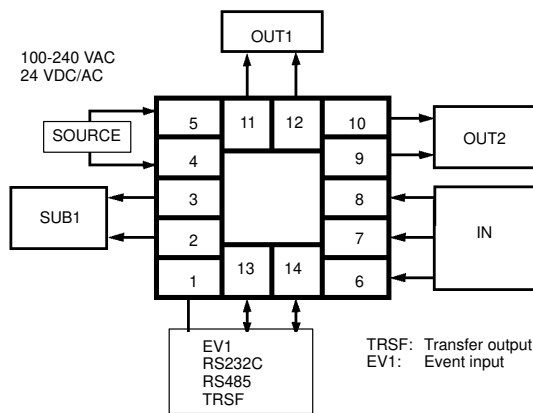
TRSF:　Transfer output
EV1:　Event input

■ Precautions when Wiring

Use ducts to separate input leads and power lines in order to protect the Controller and its lines from external noise.

Solderless terminals are recommended when wiring the Controller.

Tighten the terminal screws using a torque no greater than 0.78 N • m, or 8 kgf • cm max. Take care not to tighten the terminal screws too tightly.

Power Blocks

The E5AK/E5EK has independent power supplies for each of the terminal blocks shown below.

E5AK
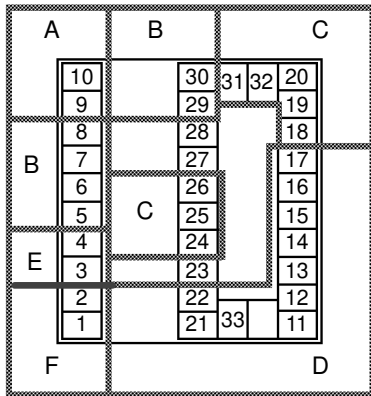
E5EK
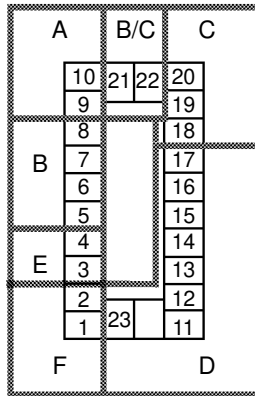
E5CK

The E5CK has independent power supplies for each of the terminal blocks shown below. However, note that the power supplies for blocks C (exclude relay output) and D are shared for the following Option Unit.

• Option Unit: E53-CKB or E53-CKF
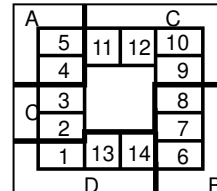
E5AK Wiring ——————————————————————————————

In the following wiring diagrams, the left side of the terminal numbers indicate the inside of the Controller.

Power Supply

Input 100 to 240 VAC or 24 VAC/DC to terminal numbers 9 and 10 according to the specifications.
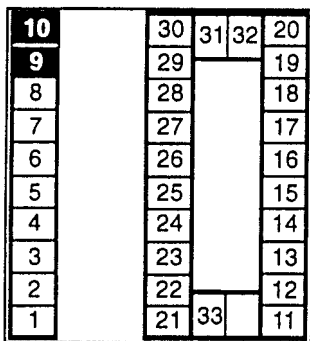
Sensor Input

Connect the sensor input to terminal numbers 11 to 14 and 33 as follows according to the input type.

Thermocouple   Platinum resistance thermometer   Voltage input   Current input

21

Control Output
Terminal numbers 7 and 8 are for control output 1 (OUT1), and terminal numbers 5 and 6 are for control output 2 (OUT2). The following diagrams show the available Output Units and their internal equalizing circuits.
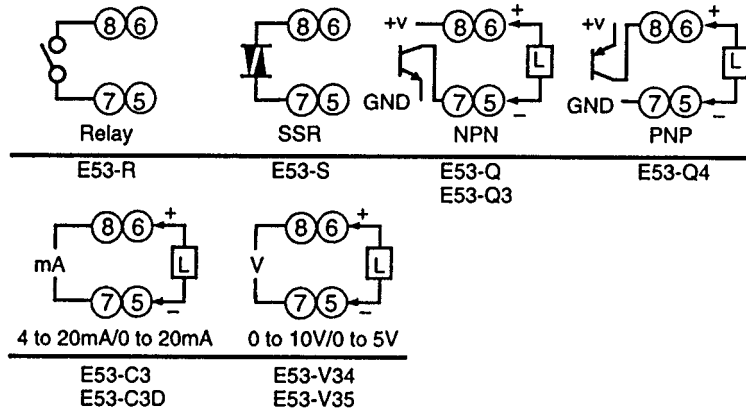
With E53-V□□ Output Units, approx. 2 V is output for one second after the power is interrupted.

With E5AK-TPRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

When replacing the Output Unit, use the E53-R. The following diagrams show the relationship between terminals and open/close relay settings.
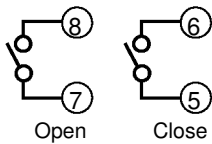
Auxiliary Output
Terminal numbers 3 and 4 are for auxiliary output 1 (SUB1) and terminal numbers 1 and 2 are for auxiliary output 2 (SUB2). The following diagrams show the internal equalizing circuits for the auxiliary outputs:

Output specifications are as follows:
SPST-NO, 3 A at 250 VAC

CT Input/Potentiometer

When using the HBA function on the E5AK-AA2 Controller, connect CT input (CT) to terminal numbers 15 to 17. When monitoring the valve opening on the E5AK-PRR2 Controller, connect the potentiometer (PTMR) to terminal numbers 15 to 17. Connect each of these inputs as follows:
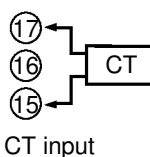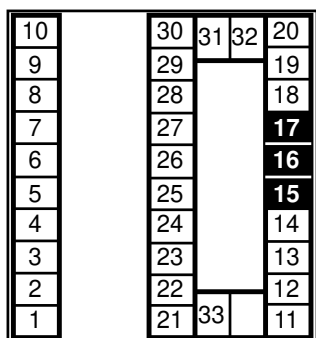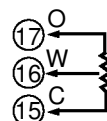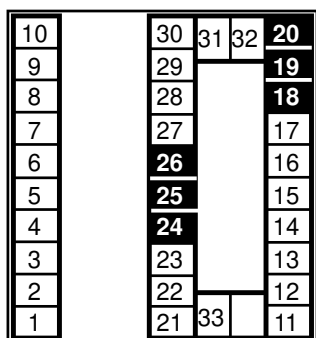

CT input   Potentiometer

Event Input

Connect event inputs 1 and 2 (EV1/2) to terminal numbers 18 to 20, and event events 3 and 4 (EV3/4) to terminal numbers 24 to 26. However, note that terminal numbers 18 to 20 cannot be used on Controllers with a communications function. Connect the event inputs as follows:
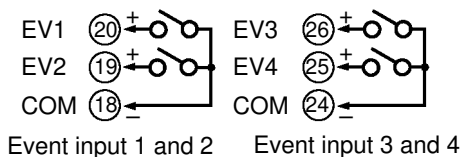
Event input 1 and 2   Event input 3 and 4

Terminals 18 and 24 (COM) are connected internally.

Use event inputs under the following conditions:

Contact input	ON: 1 kΩ max. OFF: 100 kΩ min.
No-contact input	ON: Residual voltage 1.5 V max., OFF: Leakage current 0.1 mA max.

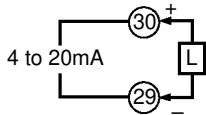Polarities during no-contact input are as follows:
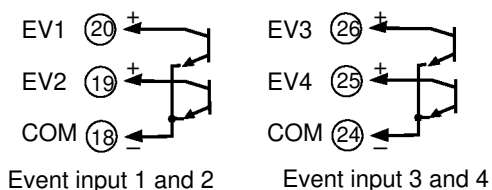
Event input 1 and 2   Event input 3 and 4

Transfer Output
Connect transfer output (TRSF) to terminal numbers 29 and 30. The internal equalizing circuit for transfer output is as follows:

Transfer output specifications are as follows: 4 to 20 mA DC,
Permissible load impedance: 600 Ω max.,
Resolution: Approx. 2,600

Communications
Terminal numbers 18 to 20, 31 and 32 can be used only on Controllers with Communications Units (E53-AK01/02/03). For details on wiring, refer to *Chapter 6, Using the Communications Function* in the *E5AK-T/E5EK-T/E5CK-T User's Manual (H88/H89/H90)*.

E5EK Wiring ——————————————————————————————————

In the following wiring diagrams, the left side of the terminal numbers indicate the inside of the Controller.
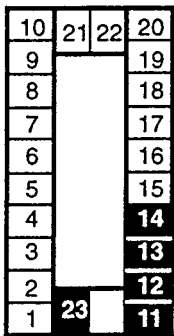
Power Supply
Input 100 to 240 VAC or 24 VAC/DC to terminal numbers 9 and 10 according to the specifications.
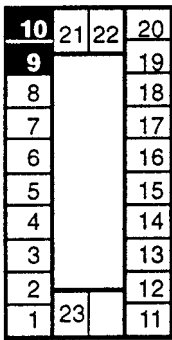

Sensor Input
Connect the sensor input to terminal numbers 11 to 14 and 23 as follows according to the input type.
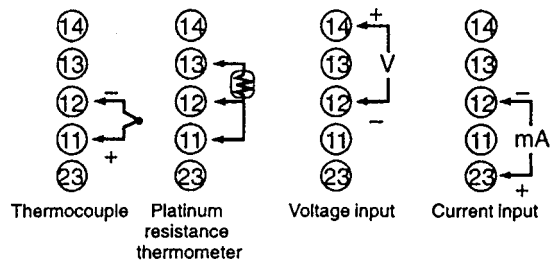
Thermocouple   Platinum resistance thermometer   Voltage input   Current input

Control Output

Terminal numbers 7 and 8 are for control output 1 (OUT1), and terminal numbers 5 and 6 are for control output 2 (OUT2). The following diagrams show the available Output Units and their internal equalizing circuits.
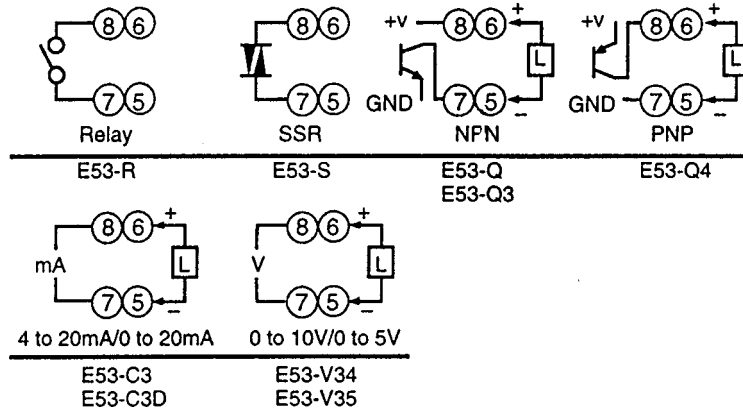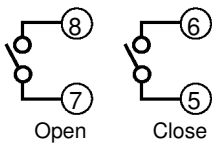
With E53-V☐☐ Output Units, approx. 2 V is output for one second after the power is interrupted.

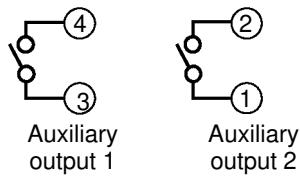With E5EK-TPRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

When replacing the Output Unit, use the E53-R. The following diagrams show the relationship between terminals and open/close relay settings.

Auxiliary Output

Terminal numbers 3 and 4 are for auxiliary output 1 (SUB1) and terminal numbers 1 and 2 are for auxiliary output 2 (SUB2). The following diagrams show the internal equalizing circuits for the auxiliary outputs:

Output specifications are as follows:
  SPST-NO, 3A at 250 VAC