

Ramp/Soak Process Controller E5AK-T/E5EK-T

Advanced Ramp/Soak Process Controllers Ideal for Worldwide Use

- E5AK-T offers up to eight patterns of simple programming control (4 patterns for E5EK-T), with 16 steps per pattern.
- Temperature and analog inputs in a modular structure, one-stock type.
- High-accuracy: 100 ms sampling (for analog input).
- Conforms to international EMC and safety standards.
- IP66/NEMA 4 (indoor use) front face.
- Serial communications (RS-232C, RS-422 and RS-485) and transfer output (4 to 20 mA).
- Position-proportional control models available for valve control applications.
- Heat/Cool control.
- 3-year warranty.



Ordering Information

When ordering, order control output boards and option boards separately. Example: for a relay control output, order the E53-R output board in addition to the standard Process Controller (E5AK-T/E5EK-T). Also specify the current transformer.

■ Process Controllers

| Description | DIN size | Supply voltage | Model |
|---|-------------------------|----------------|--------------------------|
| Standard model with terminal cover | 1/4 DIN (96 x 96 mm) | 100-240 VAC | E5AK-TAA2-500 AC100-240 |
| | | | E5AK-TAA2 AC100-240 |
| Position-proportional model with terminal cover (See Note 3) | 1/4 DIN (96 x 96 mm) | 100-240 VAC | E5AK-TPRR2-500 AC100-240 |
| | | | E5AK-TPRR2 AC100-240 |
| Standard model with terminal cover | 1/8 DIN (48 x 96 mm) | 100-240 VAC | E5EK-TAA2-500 AC100-240 |
| | | | E5EK-TAA2 AC100-240 |
| Position-proportional model with terminal cover (See Note 3) | 1/8 DIN (48 x 96 mm) | 100-240 VAC | E5EK-TPRR2-500 AC100-240 |
| | | | E5EK-TPRR2 AC100-240 |

- Note: 1. When using the heater burnout alarm function with a standard model, the linear output board cannot be used for the control outputs (heat).
2. The Process Controller provides transfer outputs at 4 to 20 mA for the PV and SP values and control outputs at 4 to 20 mA for the current outputs.
3. Position-proportional models are intended for motorized valves (not 4 to 20 mA modulating valves). These use two relays ("open" and "close") which will turn a motor clockwise or counter-clockwise, thus opening or closing a valve.
4. Part numbers ending in -500 available at Omron USA, non -500 numbers available in Omron Canada only. Models with -500 have a terminal cover for finger protection.

■ Optional Output Boards

| Description | Specifications | Compatible controller | Max. quantity | Model |
|-------------------------|----------------------|-----------------------|---------------|-----------------|
| Relay | SPST, 5 A, 250 VAC | E5AK/E5EK | 2 | E53-R |
| SSR (solid state relay) | 1 A, 75 to 250 VAC | E5AK/E5EK | 2 | E53-S |
| Voltage pulse | NPN, 12 VDC | E5AK/E5EK | 2 | E53-Q |
| | NPN, 24 VDC | E5AK/E5EK | 2 | E53-Q3 |
| | PNP, 24 VDC | E5AK/E5EK | 2 | E53-Q4 |
| Linear current | 4 to 20 mA | E5AK/E5EK | 2 | E53-C3 |
| | 0 to 20 mA | E5AK/E5EK | 2 | E53-C3D |
| Linear voltage | 0 to 10 VDC | E5AK/E5EK | 2 | E53-V34 |
| | 0 to 5 VDC | E5AK/E5EK | 2 | E53-V35 |
| Computer communications | RS-232C | E5AK/E5EK | 3/1 | E53-AK01 |
| | RS-422 | E5AK/E5EK | 3/1 | E53-AK02 |
| | RS-485 | E5AK/E5EK | 3/1 | E53-AK03 |
| Event input | For remote set point | E5AK/E5EK | 3/1 | E53-AKB |
| Transfer output | 4 to 20 mA | E5AK/E5EK | 3/1 | E53-AKF |

Note: If the control period is less than 5 seconds, use an SSR (solid state relay) or pulse voltage output board.

■ Accessories (Order Separately)

| Description | Specifications | Compatible controller | Max. quantity | Model |
|--|---|-----------------------|---------------|-----------------------------------|
| Current transformer; order only if using heater burnout alarm function | 50 A load, 5.8 mm hole dia. | E5AK/E5EK | 1 | E54-CT1 |
| | 120 A load, 12 mm hole dia. | E5AK/E5EK | 1 | E54-CT3 |
| Terminal cover (supplied with -500 models) | Provides finger protection from terminals (VDE0106 part 100) | E5AK | 1 | E53-COV0809 |
| | | E5EK | 1 | E53-COV08 |
| Software | For setup and monitoring; requires optional computer communications board | All | 1 | Thermo tools (See Note) |

Note: Contact Omron for current version information.

Specifications

■ Ratings

| | | |
|----------------------------------|---|--|
| Model | | E5EK/AK-T (Standard) |
| Supply voltage | | 100 to 240 VAC, 50/60 Hz |
| Power consumption | E5AK-T | 16 VA |
| | E5EK-T | 15 VA |
| Operating voltage range | | 85% to 110% of rated supply voltage |
| 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 M Ω) |
| Control output | Standard model | According to Output Unit (see <i>Output Board Ratings and Characteristics</i>) |
| | Position-proportional model (See Note) | 2 Relay outputs: SPST-NO, 1 A at 250 VAC (including inrush current) |
| Auxiliary output | | SPST-NO, 3 A at 250 VAC (resistive load) |
| Control method | | ON/OFF or advanced PID control (with auto-tuning) |
| Setting method | | Digital setting using front panel keys or communications features |
| Indication method | | 7-segment digital display and LEDs |
| Potentiometer | | 100 Ω to 2.5 k Ω |
| Event input | Contact input | ON: 1 k Ω max., OFF: 100 k Ω min. |
| | No-contact input | ON: residual voltage: 1.5 V max., OFF: leakage current: 0.1 mA max. |
| Transmission output | | 4 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2,600 steps |
| Current transformer input | | Connect only Omron Current Transformers (E54-CT1 or E54-CT3) |
| Additional 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 |
| Approved standards | | UL 1092, CSA22.2 No. 14, CSA22.2 No. 1010-1 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: All control outputs are insulated from the input circuit.

■ 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% (of indication value) ±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-T) or 4 patterns (E5EK-T), 16 steps |
| 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. (approx. 30G), 3 times each in 6 directions |
| Ambient temperature | Operating | -10°C to 55°C (14°F to 131°F) with no icing and 3-year warranty period: -10°C to 50°C (14°F 122°F) |
| | Storage | -25°C to 65°C (-13°F to 149°F) with no icing |
| Ambient humidity | Operating | 35% to 85% |
| Enclosure ratings | Front panel | NEMA 4 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-T | Approx. 450 g |
| | E5EK-T | Approx. 320 g |
| | Mounting bracket | Approx. 65 g |

(This table continues on the next page.)

- Note: 1. The indication accuracy of the K1, T, and N thermocouples at a temperature of -100°C max. is ±2°C ±1 digit maximum. The indication accuracy of the U and L 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% of the indicated value or ±2°C, whichever is greater) ±1 digit maximum.
2. The sampling period of the standard model with CT and remote SP inputs is 250 ms.

Characteristics Table - continued from previous page

| | |
|---------------------------|--|
| 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: 10 V (0.15 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, CSA22.2 No. 1010-1 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. |

■ Option Board Ratings and Characteristics

| Model | Description | | Specifications |
|-----------------|-----------------|---------|---|
| E53-AKB | Event input | | Contact input: ON: 1 k Ω max., OFF: 100 k Ω 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 Synchronization method: Start-stop synchronization (asynchronous method) Baud rate: 1.2/2.4/4.8/9.6/19.2 kbps |
| E53-AK02 | | RS-422 | |
| E53-AK03 | | RS-485 | |
| E53-AKF | Transfer output | | 4 to 20 mA: Permissible load impedance: 600 Ω max.; Resolution: approx. 2,600 steps |

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

| Model | E54-CT1 | E54-CT3 |
|---------------------------------------|----------------------------------|-----------------------|
| Max. continuous heater current | 50 amps | 120 amps (See Note 1) |
| Dielectric strength | 1,000 VAC for 1 min | |
| Vibration resistance | 50 Hz, 98 m/s ² (10G) | |
| Weight | Approx. 11.5 g | Approx. 50 g |
| Accessories | -- | Armature: 2; Plug: 2 |

Note: 1. Use within the max. heater current rating of controller table shown below.

■ Heater Burnout Alarm

| | |
|--|--|
| Max. heater current | Single-phase 50 A AC |
| Heater current value display accuracy | $\pm 5\%$ FS ± 1 digit max. |
| Heater burnout alarm setting range | 0.1 to 49.9 A (in units of 0.1 A) (See Note 1) |
| Min. detection ON time | 190 ms (See Note 2) |

- Note: 1. 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.
2. No heater burnout detection or heater current value measurement is possible if the control output (heat) is ON for less than 190 ms.

■ 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° |
| Setting °C/°F for main setting and alarm | | 0.1 | 0.1 |

Thermocouple

| Input (switch selectable) | | 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) | | 1 | 0.1 | 1 | 0.1 | 0.1 | 1 | 1 | 0.1 | 0.1 | 1 | 1 | 1 | 1 | 1 | 1 |

Note: 1. The switch is factory-set to 2 (K1).

2. Thermocouple W is W/Re5-26 (tungsten rhenium 5, tungsten rhenium 26).

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 (main setting and alarm) | Depends on the scale range selected | | | | |

Nomenclature

E5AK-T

Pattern Number

Indicates the pattern number.

Program Status Indicators

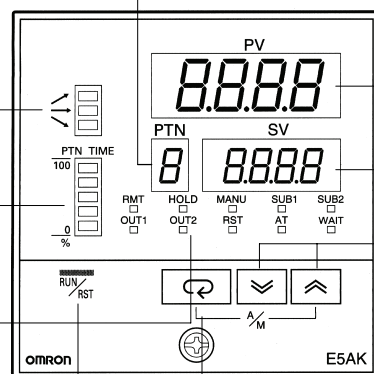
The top indicator indicates the rising step, the middle indicator indicates the constant step, and the bottom indicator indicates the falling step.

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.

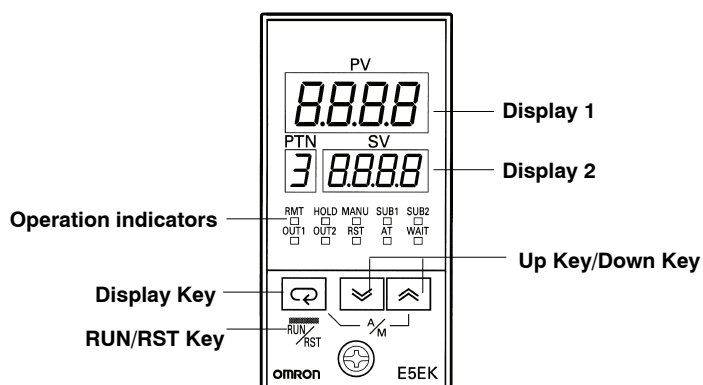
Display Key

Press to shift the display to the next parameter.

RUN/RST Key

Switches between RUN and RESET mode.

E5EK-T



Display 1

Display 2

Operation indicators

Up Key/Down Key

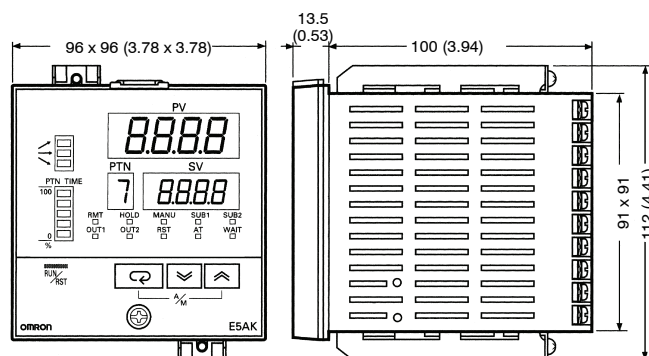
Display Key

RUN/RST Key

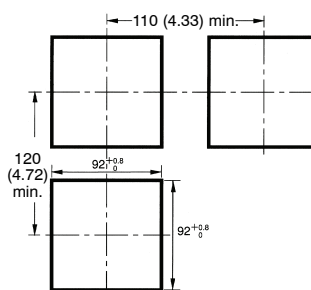
Dimensions

Unit: mm (inch)

E5AK-T

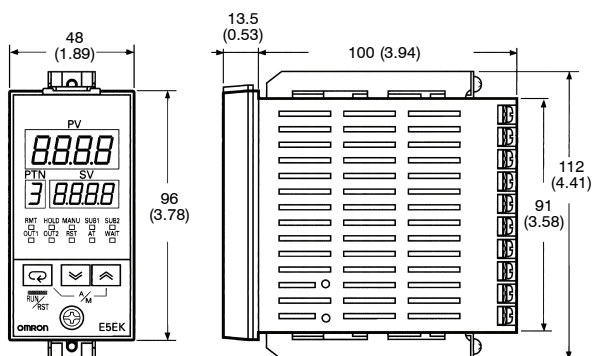
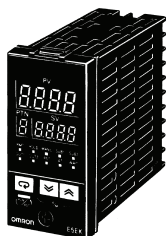


Panel Cutouts

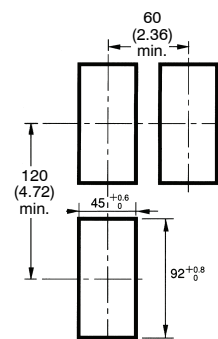


- Note: 1. Recommended panel thickness is 1 to 8 mm.
2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted (vertically or horizontally).

E5EK-T



Panel Cutouts

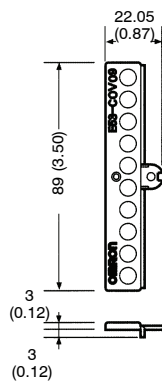
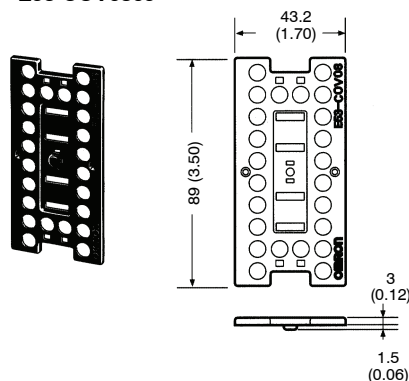


- Note: 1. Recommended panel thickness is 1 to 8 mm.
2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

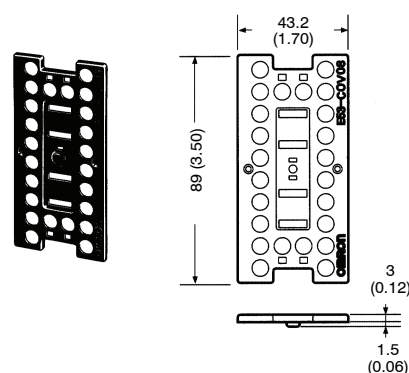
Accessories (Order Separately)

Terminal Cover

E53-COV0809

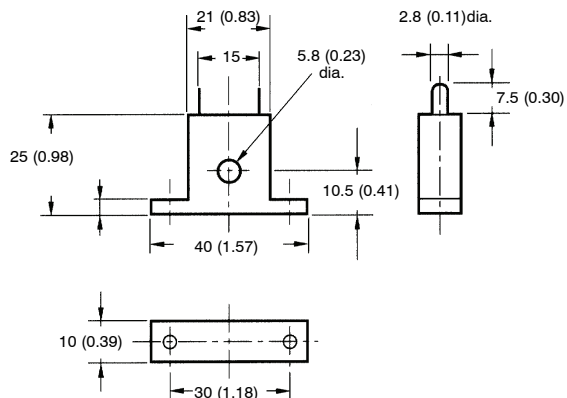
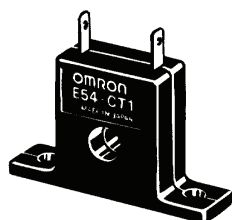


E53-COV08



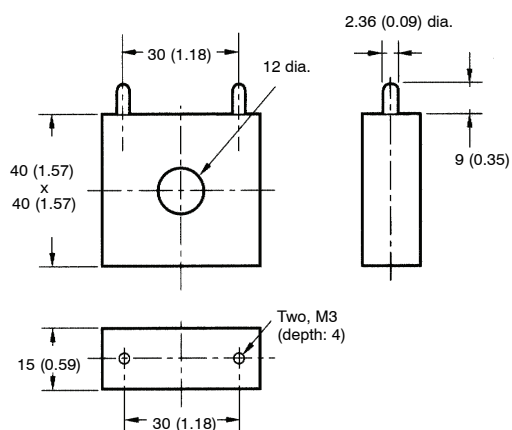
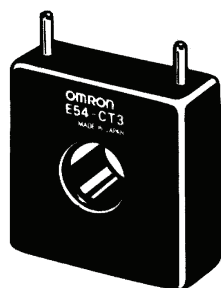
Current Transformers

E54-CT1



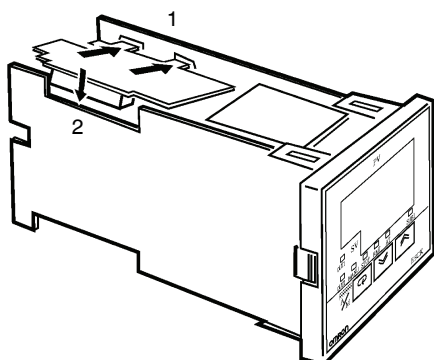
Unit: mm (inch)

E54-CT3



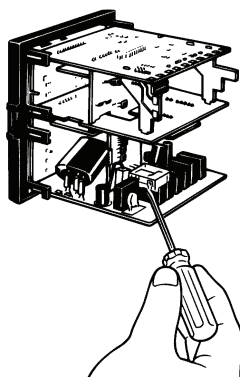
■ Setting Up the Output Board

- Two rectangular holes are provided on the power board (right side of Controller). Fit the two protrusions of the output board into these two holes.
- With the output board fitted into the power board, fit the output board into the connector on the control board (left side of Controller).

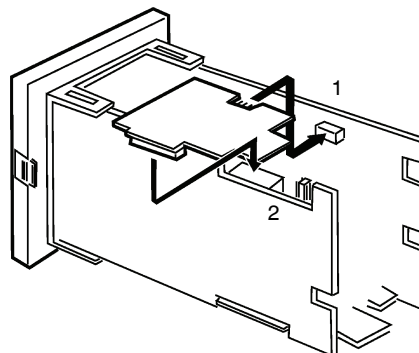


Removing the Output Board

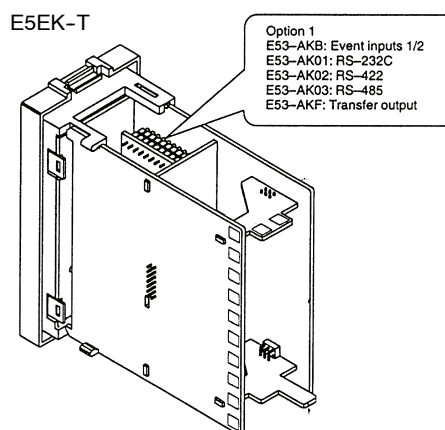
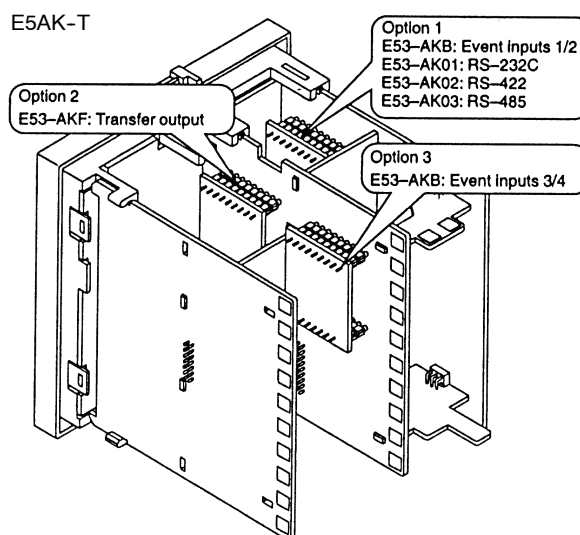
To replace the output board, use a flat-blade screwdriver to push up the output board.



■ Setting Up the Option Board



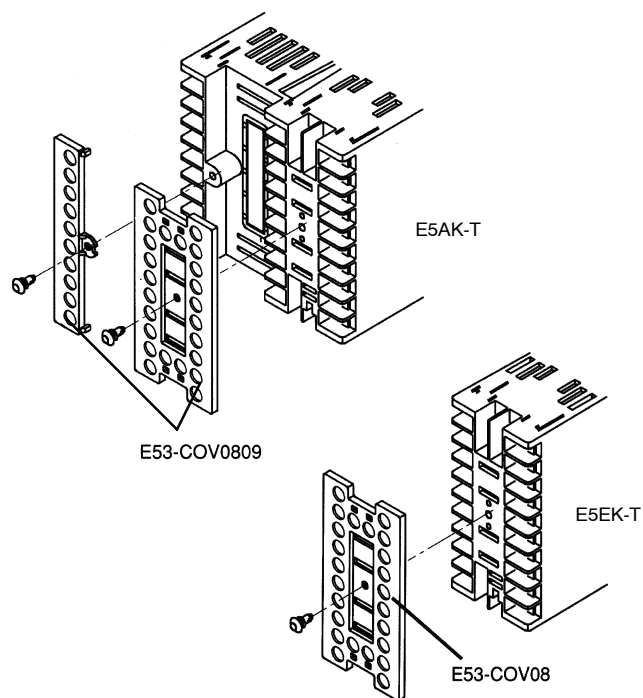
- Insert the option boards into the sockets for options 1 to 3. The following diagram shows the relationship between the option boards and mounting positions.



E53-COV0809, E53-COV08 Terminal Cover

Terminal covers are supplied for controllers with -500 in the part number; for non -500 models, order covers separately. Fasten the terminals covers as follows by using the snap pins.

Note: Snap pins are provided with the terminal covers.

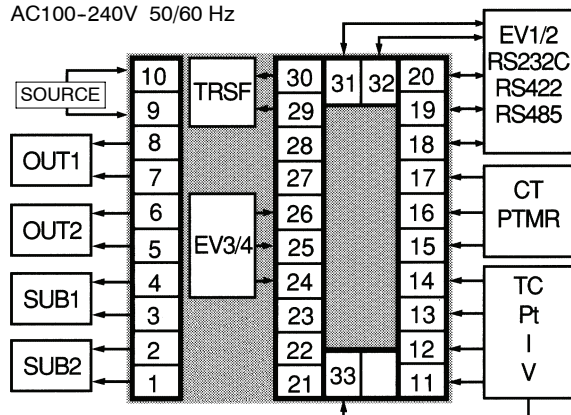


Wiring Terminals

Terminal Arrangement

E5AK-T

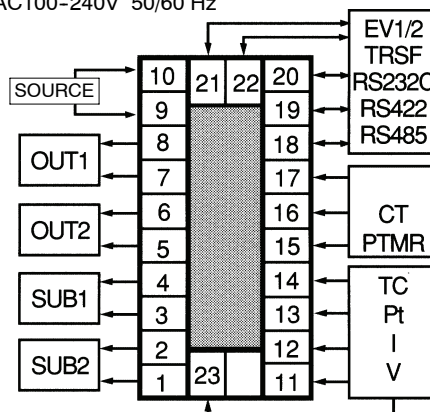
AC100-240V 50/60 Hz



TRSF: Transfer output
EV1 to 4: Event input
PTMR: Potentiometer

E5EK-T

AC100-240V 50/60 Hz



TRSF: Transfer output
EV1/2: Event input
PTMR: Potentiometer

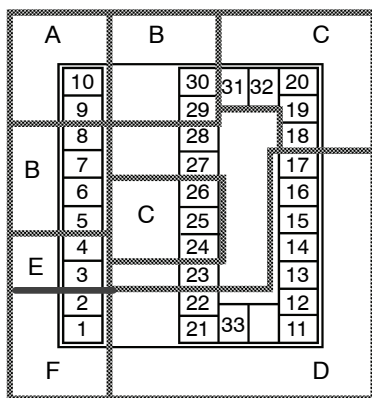
Wiring Precautions

- 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. Be careful not to tighten the terminal screws too tightly.

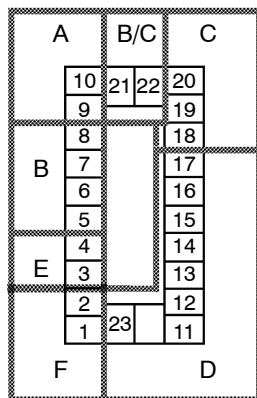
Power Blocks for E5AK-T/EK-T

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

E5AK-T



E5EK-T

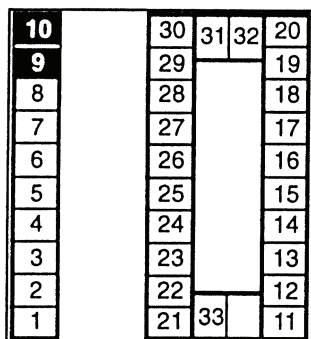


E5AK-T Wiring

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

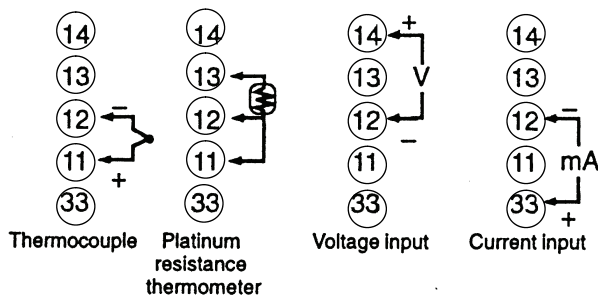
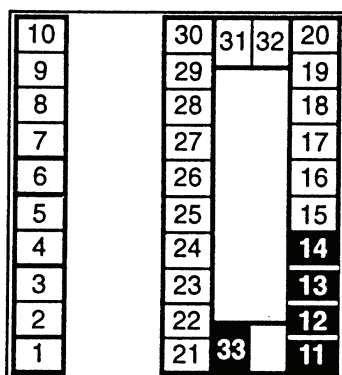
Power Supply

Input 100 to 240 VAC to terminal numbers 9 and 10 according to the specifications.



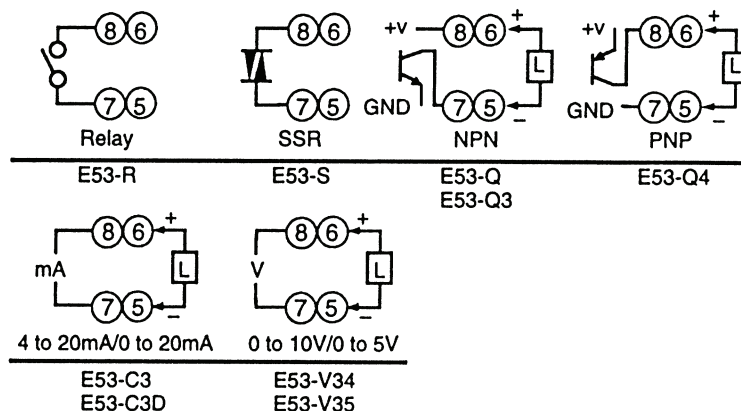
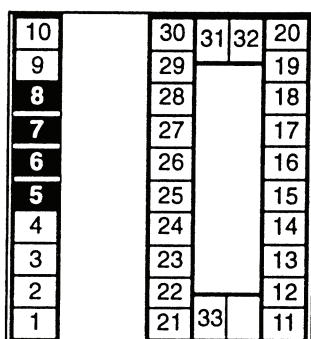
Sensor Input

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



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 boards and their internal equalizing circuits.



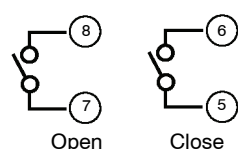
With E53-V□□ output boards, approx. 2 V is output for one second after the power is interrupted.

Specifications for Each Output Board

| Model | Output type | Specifications |
|---------------------------|---|---|
| E53-R | Relay | 5 A at 250 VAC |
| E53-S | SSR | 1 A at 75 to 250 VAC |
| E53-Q E53-Q3 E53-Q4 | Voltage (NPN) Voltage (NPN) Voltage (PNP) | NPN: 40 mA at 12 VDC (with short-circuit protection) NPN: 20 mA at 24 VDC (with short-circuit protection) PNP: 20 mA at 24 VDC (with short-circuit protection) |
| E53-C3 E53-C3D | 4 to 20 mA 0 to 20 mA | 4 to 20 mA; permissible load impedance: 600 Ω max.; resolution: approx. 2600 0 to 20 mA; permissible load impedance: 600 Ω max.; resolution: approx. 2600 |
| E53-V34 E53-V35 | 0 to 10 V 0 to 5 V | 0 to 10 VDC; permissible load impedance: 1 k Ω min.; resolution: approx. 2600 0 to 5 VDC; permissible load impedance: 1 k Ω min.; resolution: approx. 2600 |

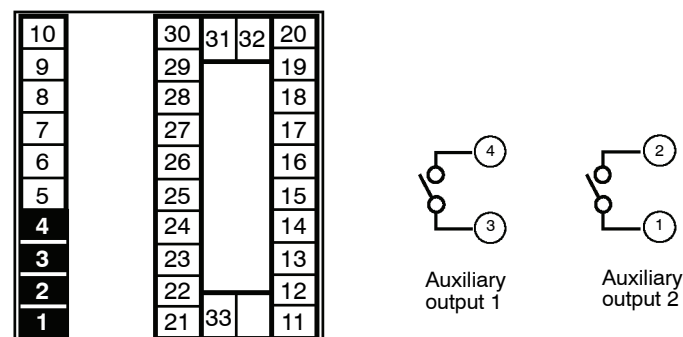
With E5AK-PRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

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



Auxiliary Output

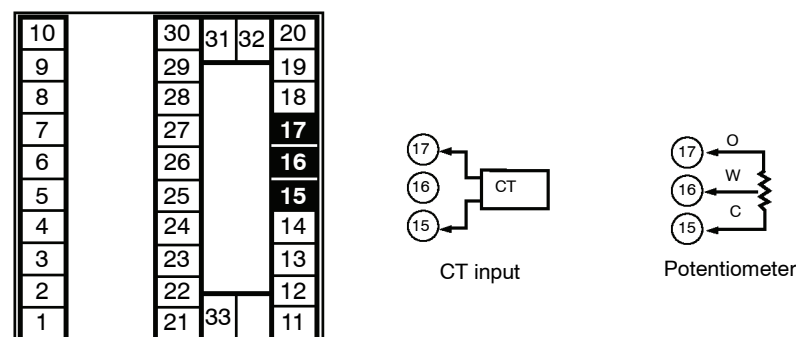
Terminal numbers 3 and 4 are for auxiliary output 1 (SUB1) and terminal numbers 1 and 2 are for auxiliary output 2 (SUB2). The following diagrams show the internal equalizing circuits for the auxiliary outputs:



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

CT Input/Potentiometer

When using the HBA function on the E5AK-TAA2 Controller, connect CT input (CT) to terminal numbers 15 to 17. When monitoring the valve opening on the E5AK-TPRR2 Controller, connect the potentiometer (PTMR) to terminal numbers 15 to 17. Connect each of these inputs as follows:

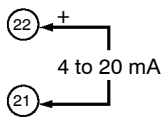
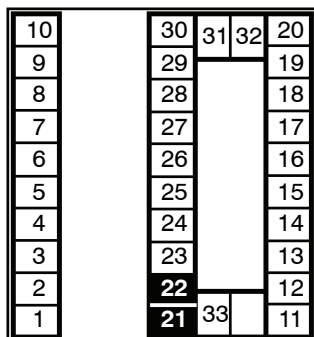


For details on CT inputs, refer to *Appendix, About Current Transformer* in the *E5AK-T/E5EK-T User's Manual (H83/H85)*.

For details on the potentiometer, refer to the *Instruction Manual* for the valve connected to the Controller. The variable resistance range is 100 Ω to 2.5 k Ω .

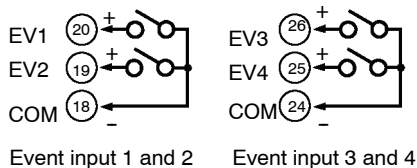
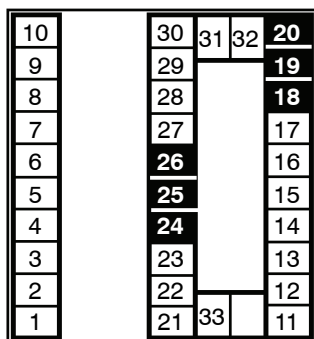
Remote SP Input

Connect the input (RSP) to be used as the remote SP to terminal numbers 21 and 22. Only 4 to 20 mA inputs can be connected. Connect the input as follows:



Event Input

Connect event inputs 1 and 2 (EV1/2) to terminal numbers 18 to 20, and 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:

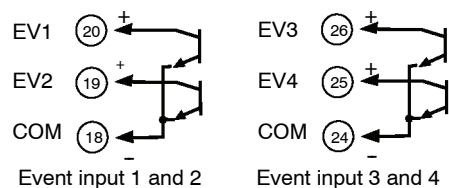


Terminals 18 and 24 (COM) are connected internally.

Use event inputs under the following conditions:

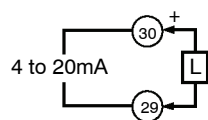
| | |
|------------------|--|
| Contact input | ON: 1 k Ω max. OFF: 100 k Ω min. |
| No-contact input | ON: Residual voltage 1.5 V max., OFF: Leakage current 0.1 mA max. |

Polarities during no-contact input are as follows:



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

Permissible load impedance: 600 Ω max.

Resolution: approx. 2600

Communications

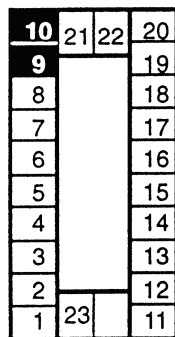
Terminal numbers 18 to 20, 31 and 32 can be used only on Controllers with communications boards (E53-AK01/02/03). For details on wiring, refer to *Chapter 6, Using the Communications Function* in the *E5AK-T/E5EK-T User Manuals (H83 and H85)*.

■ E5EK-T WIRING

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

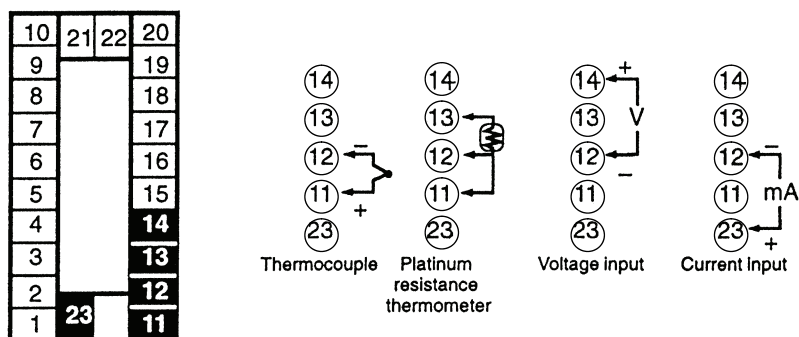
Power Supply

Input 100 to 240 VAC to terminal numbers 9 and 10 according to the specifications.



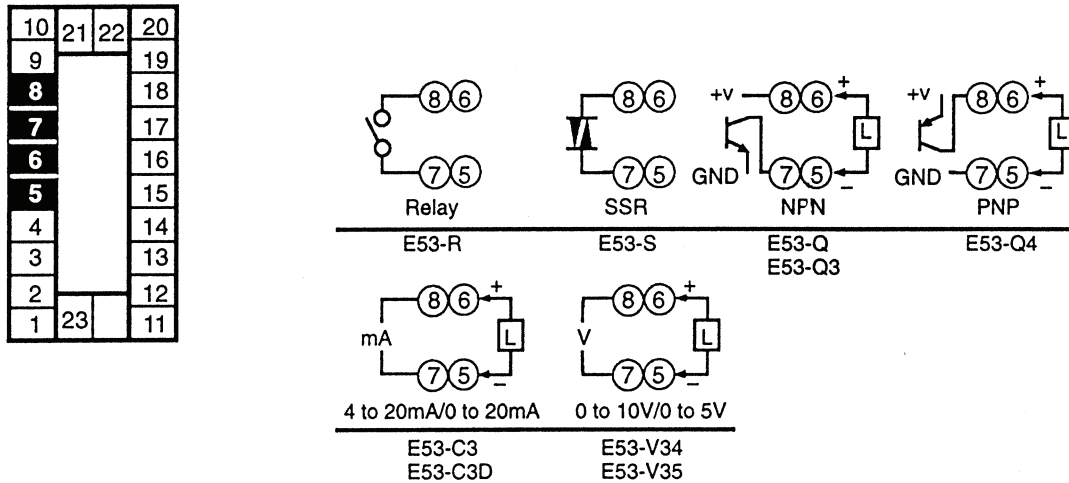
Sensor Input

Connect the sensor input to terminal numbers 11 to 14 and 23 as follows according to the input type.



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 boards and their internal equalizing circuits.



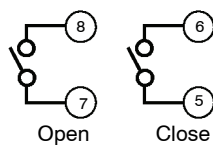
With E53-V□□ output boards, approx. 2 V is output for one second after the power is interrupted.

Specifications for Each Output Board

| Model | Output type | Specifications |
|---------------------------|---|---|
| E53-R | Relay | 5 A at 250 VAC |
| E53-S | SSR | 1 A at 75 to 250 VAC |
| E53-Q E53-Q3 E53-Q4 | Voltage (NPN) Voltage (NPN) Voltage (PNP) | NPN: 40 mA at 12 VDC (with short-circuit protection) NPN: 20 mA at 24 VDC (with short-circuit protection) PNP: 20 mA at 24 VDC (with short-circuit protection) |
| E53-C3 E53-C3D | 4 to 20 mA 0 to 20 mA | 4 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2600 0 to 20 mA, permissible load impedance: 600 Ω max., resolution: approx. 2600 |
| E53-V34 E53-V35 | 0 to 10 V 0 to 5 V | 0 to 10 VDC, permissible load impedance: 1 k Ω min., resolution: approx. 2600 0 to 5 VDC, permissible load impedance: 1 k Ω min., resolution: approx. 2600 |

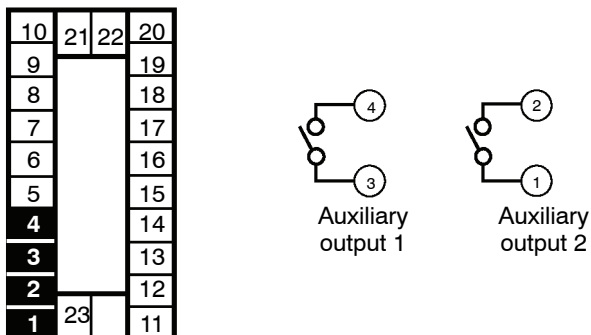
With E5EK-TPRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

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



Auxiliary Output

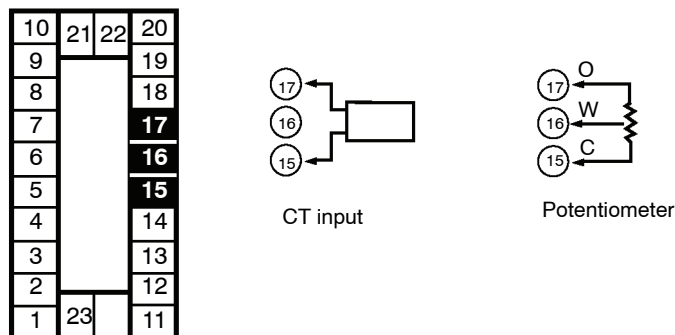
Terminal numbers 3 and 4 are for auxiliary output 1 (SUB1) and terminal numbers 1 and 2 are for auxiliary output 2 (SUB2). The following diagrams show the internal equalizing circuits for the auxiliary outputs:



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

CT Input/Potentiometer

When using the HBA function on the E5EK-TAA2 Controller, connect CT input (CT) to terminal numbers 15 to 17. When monitoring the valve opening on the E5EK-TPRR2 Controller, connect the potentiometer (PTMR) to terminal numbers 15 to 17. Connect each of these inputs as follows:

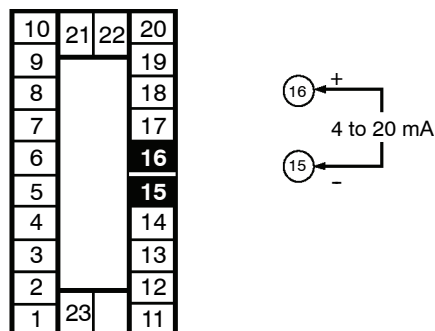


For details on CT inputs, refer to *Appendix, About Current Transformer* in the *E5AK-T/E5EK-T User's Manual (H83/H85)*.

For details on the potentiometer, refer to the *Instruction Manual* for the valve connected to the Controller. The variable resistance range is 100 Ω to 2.5 k Ω .

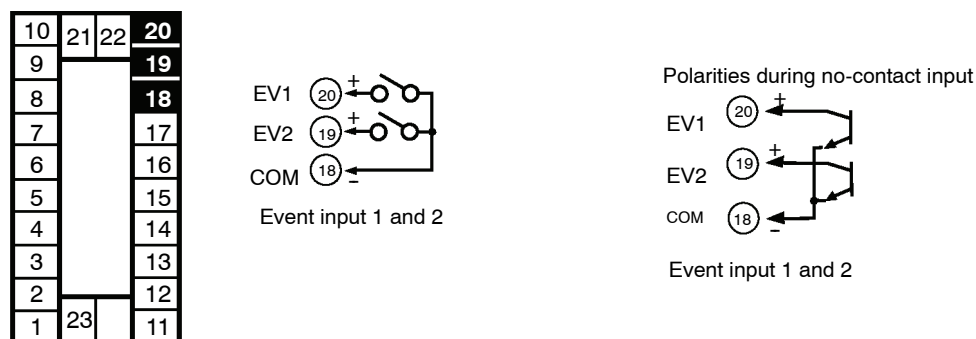
Remote SP Input

Connect the input (RSP) to be used as the remote SP to terminal numbers 15 and 16. However, note that the remote SP cannot be used on the E5EK-TPRR2 Controller. Only 4 to 20 mA inputs can be connected. Connect the input as follows:



Event Input

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

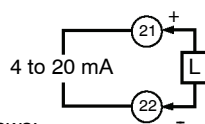


Use event inputs under the following conditions:

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

Transfer Output

Connect transfer output (TRSF) to terminal numbers 21 and 22. The internal equalizing circuit for transfer output is at right.



Transfer output specifications are as follows:
4 to 20 mA,
Permissible load impedance: 600 Ω max.,
Resolution: Approx. 2600

Communications

Terminal numbers 18 to 22 can be used only on controllers with communications boards (E53-AK01/02/03). For details on wiring, refer to *Chapter 6, Using the Communications Function* in the *E5AK-T/E5EK-T User Manuals (H088-E3-1 and H089-E3-1)*.

Precautions

■ Operating Environment

- Operate the Controller within the rated ambient operating temperature, ambient operating humidity, and storage temperature ranges.
- Use the Controller according to the vibration resistance, shock resistance, and enclosure ratings.
- Do not install the Controller in places with corrosive gas or excessive dust.
- Do not install the Controller near machines generating high-frequency noise.

■ Mounting

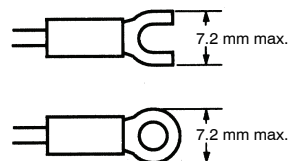
- The dimensions of the Controller conform to DIN 43700.
- Recommended panel thickness is 1 to 8 mm.
- Mount the Unit horizontally.

■ Connection

- To reduce inductive noise influence, the lead wires connecting the input type to the Controller must be separated from the power lines and load lines.
- Use the specified compensating conductors for thermocouples. Use lead wires having a small resistance for platinum resistance thermometers.

■ Connection Example

- Wire the terminals of the Unit using solderless terminals.
- The tightening torque applied to the terminal screws of the Unit must be approximately 0.78 N • m or 8 kgf • cm.
- Use the following type of solderless terminals for M3.5 screws.

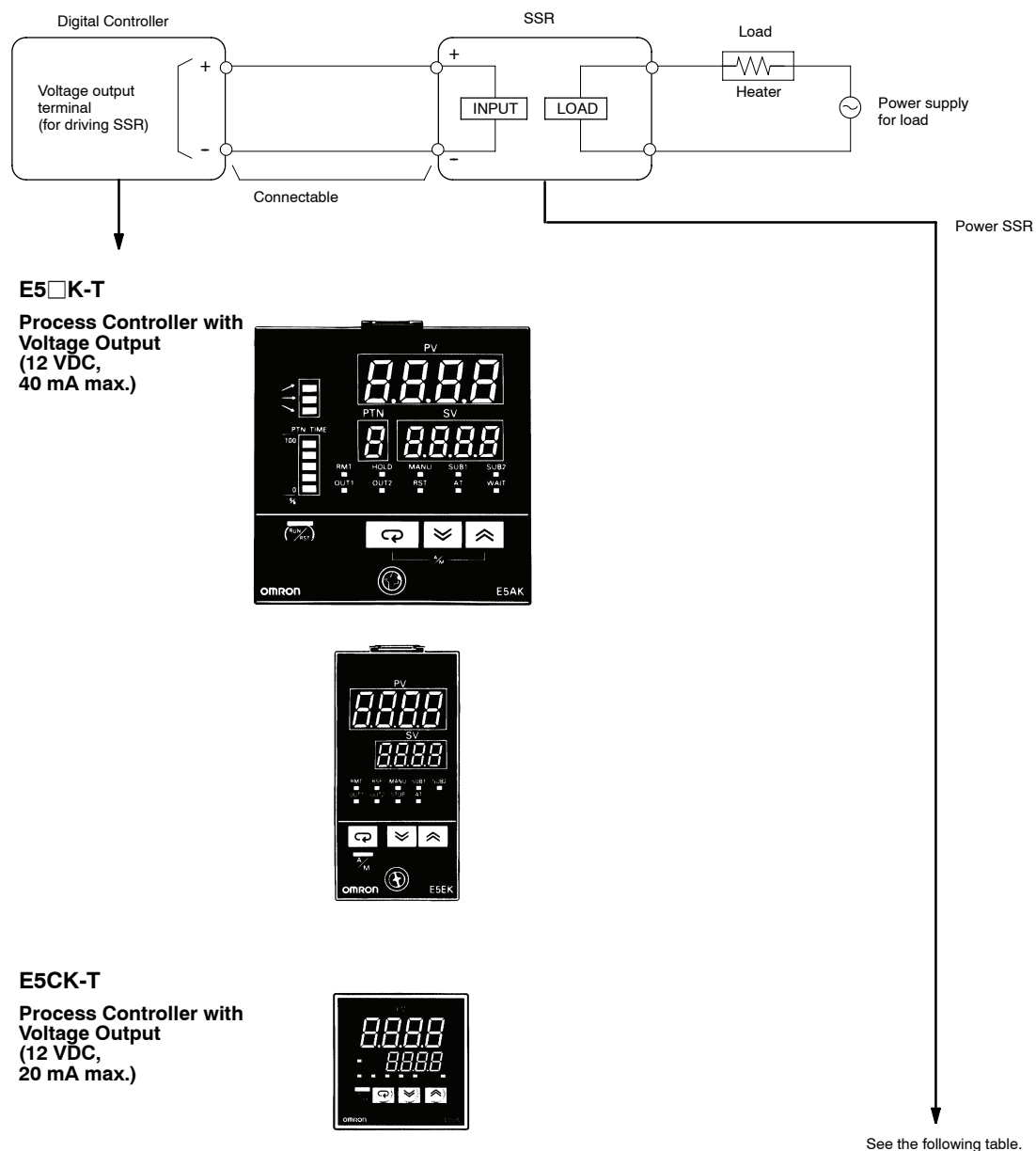


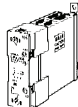


■ Operation

- The alarm outputs of a model with an alarm function may not turn ON correctly when the model malfunctions. The use of alarm equipment with the Controller is recommended.
- The parameters and internal switch are set before shipping so that the Unit will function normally. Change the settings of the parameters and internal switch according to the application if necessary.
- After power has been supplied to the Controller, several seconds are required until the relay is turned ON. Consider this time delay when designing sequenced circuits which incorporate a Controller.
- Do not use excessive force when removing the internal mechanism from the housing. Protect the internal connector or electronic parts of the Unit from shock.
- Protect against static discharge when changing the settings of the internal switch. Changing the settings on a grounded conductive mat is recommended.
- When connecting the control output board to the Temperature Controller or Process Controller, make sure that the control output board is the appropriate type, or the system may malfunction.
- The heater burnout alarm will not be available if the linear output board is used.

SSR

Connection Example of Process Controller and SSR



| Model | G3PA/G3PB | G3NA | G3NE |
|----------------------------|---|---|---|
| Appearance |  |  |  |
| SSRs connected in parallel | E5AK-/E5EK-T: 8 pcs. E5CK-T: 4 pcs. | E5AK-/E5EK-T: 5 pcs. E5CK-T: 2 pcs. | E5AK-/E5EK-T: 2 pcs. E5CK-T: 1 piece |
| Rated input voltage | 5 to 24 VDC | 5 to 24 VDC | 12 VDC |
| Features | Thin, SSR with built-in heat sink; 1-phase and 3-phase models | Standard model with screw terminals | Compact, low-cost model with tab terminals |

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- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения «JONHON», а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов «FORSTAR».



JONHON

«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели,
кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).



Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: ocean@oceanchips.ru

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А