

# 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.)

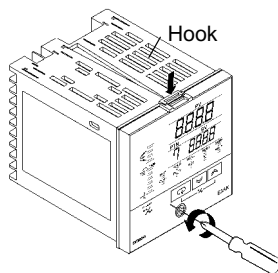
When setting up the Output Units, draw out the internal mechanism from the housing and insert the Output Units into the sockets for control outputs 1 and 2.

### 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.



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

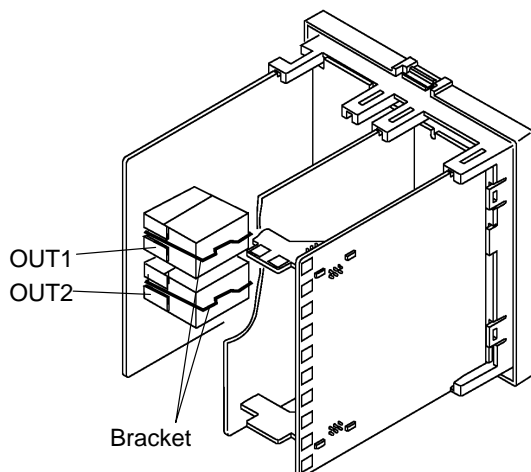
#### Setting Up the Output Unit

##### • 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.



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).

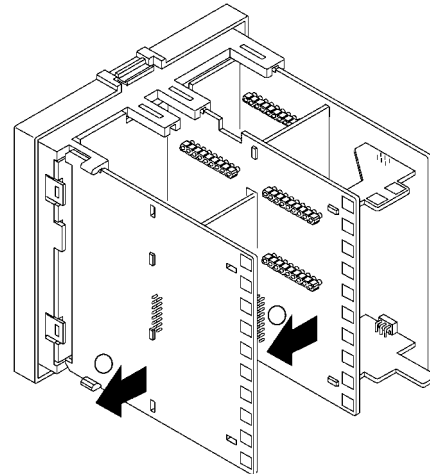
#### Setting Up the Option Unit

##### • Before Setup

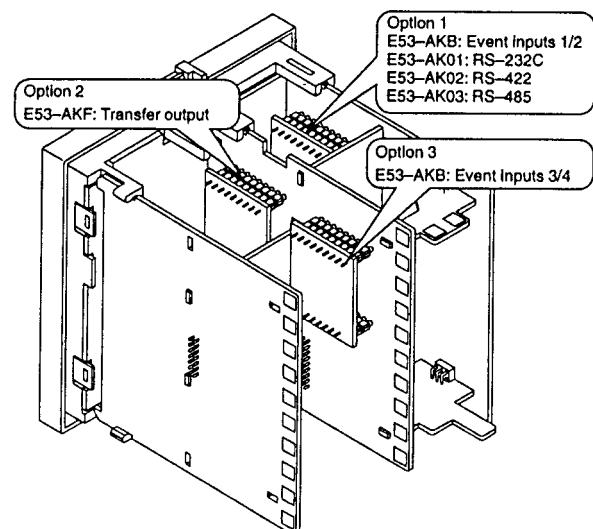
Check the type of the Option Unit you are about to set up.

##### • Procedure

1. Remove the power board and option boards in the order shown in the following diagram.



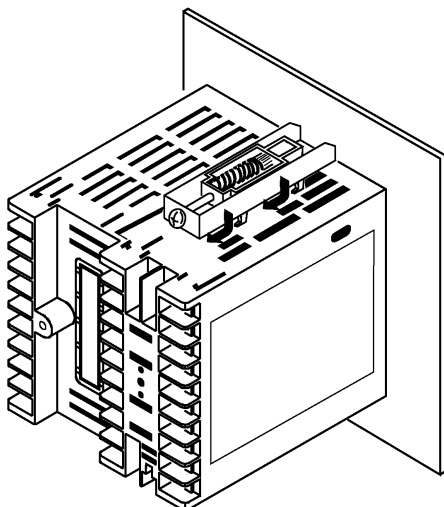
2. Insert the Option Units into the sockets for options 1 to 3. The following diagram shows the relationship between the Option Units and mounting positions.



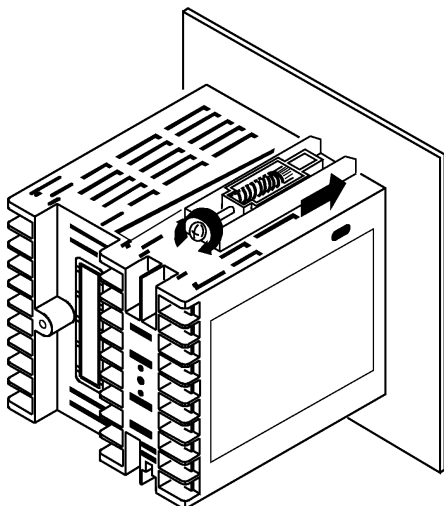
3. Mount the Option Boards and the power board in the order shown.

**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.



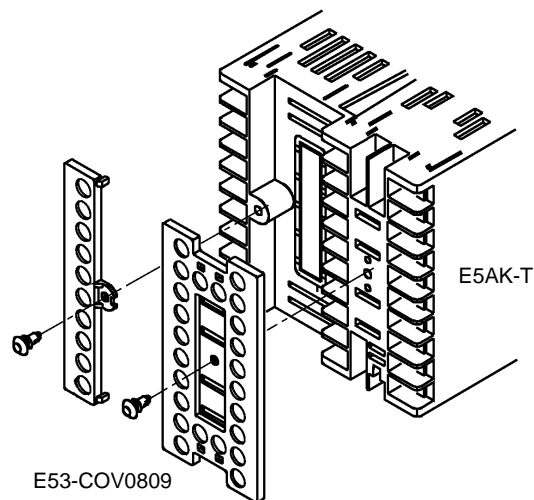
3. Tighten the mounting bracket screws alternately a little at a time until the ratchet starts to slide.

**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.

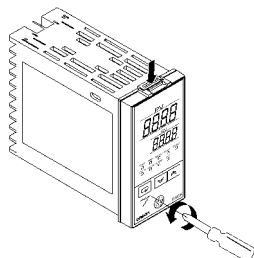
Fasten the Terminal Covers as follows by using the snap pins.



**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.

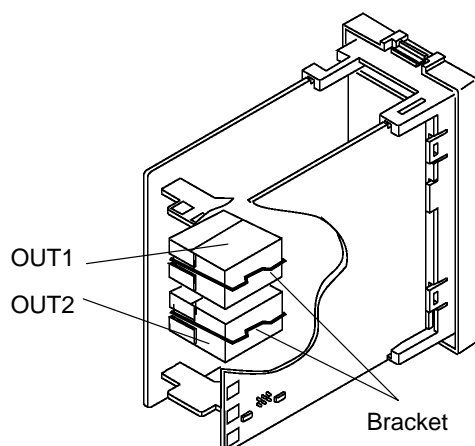
**Setting Up the Output Unit**

- **Before Setup**

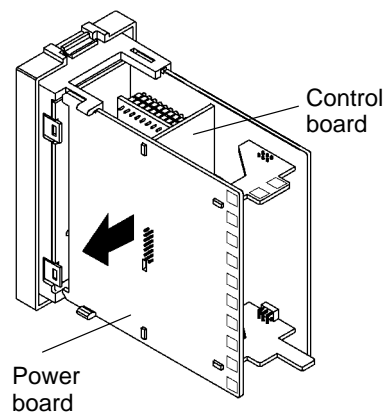
Check the type of the Option Unit you are about to set up.

- **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.

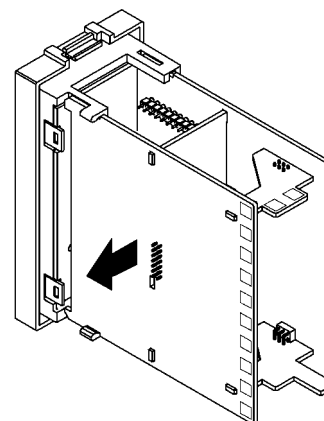
**Setting Up the Option Unit**

- **Before Setup**

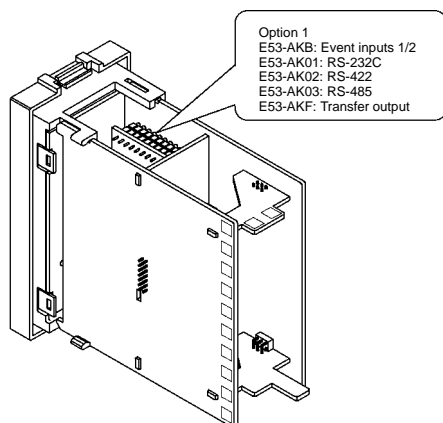
Check the type of the Option Unit you are about to set up.

- **Procedure**

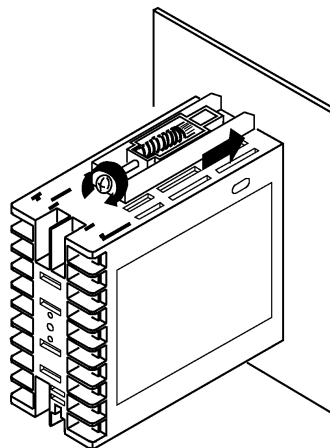
1. Remove the power board and Option Boards in the order shown in the following diagram.



2. Insert the Option Unit into the socket for option 1. The following diagram shows the relationship between Option Unit and mounting position.



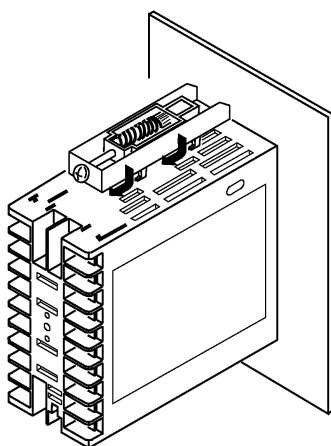
3. Tighten the mounting bracket screws alternately a little at a time until the ratchet starts to slide.



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.



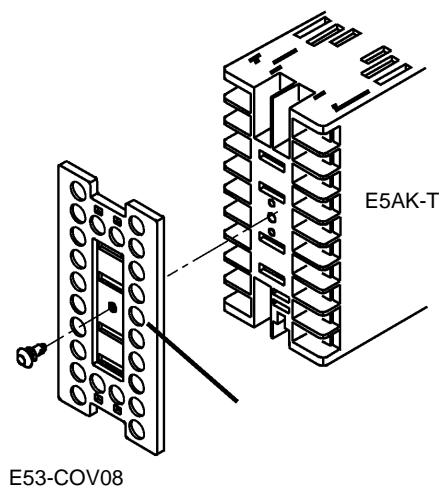
### Setting Up the Terminal Cover

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.

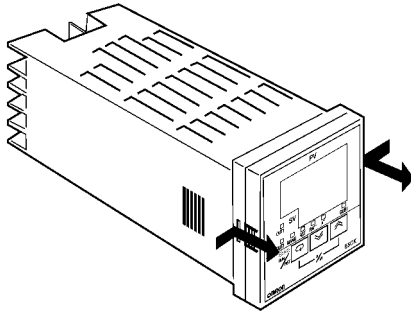


To remove the Terminal Covers, pull the edges of the snap pins.

**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.

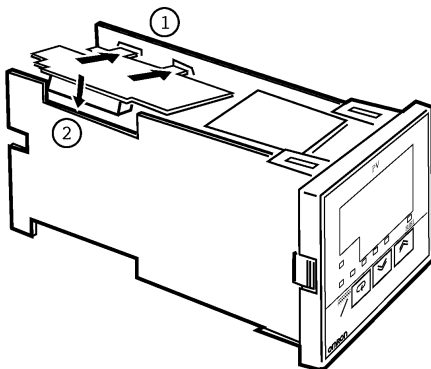


2. Draw out the internal mechanism towards you holding both sides of the front panel.

**Setting Up the Output Unit**

- **Procedure**

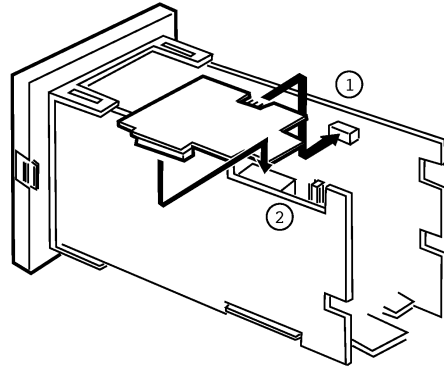
1. Two rectangular holes for slotting are provided on the power board (on right side of Controller). Fit the two protrusions on the Output Unit into these two holes.
2. With the Output Unit fitted into the power board, fit the Output Unit into the connector on the control board (on left side of Controller).

**Setting Up the Option Unit**

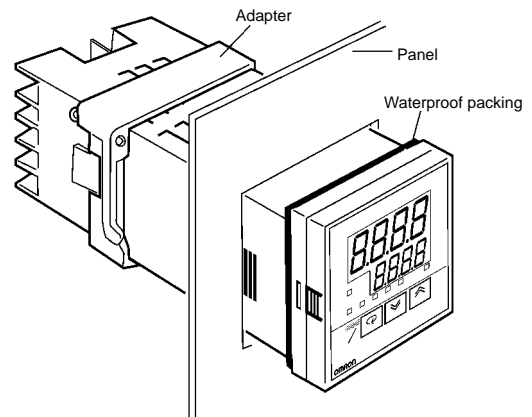
- **Procedure**

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).

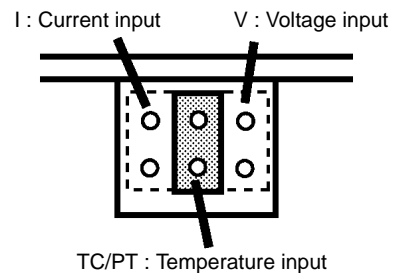
2. With the power board connected, fit the board vertically into the connector on the control board (on left side of Controller).

**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  $0.39 \text{ N} \cdot \text{m}$ , or  $3$  to  $4 \text{ kgf} \cdot \text{cm}$ .

**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.



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.

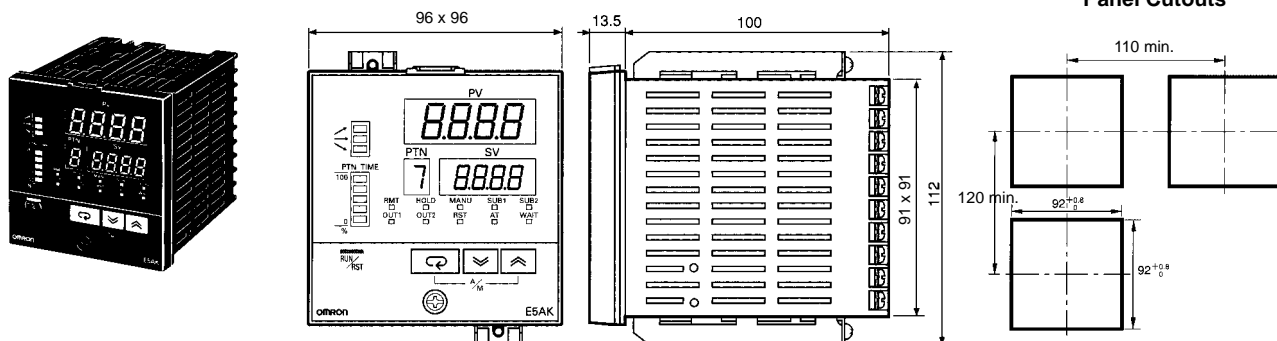
When you have finished setting the input type jumper, insert the internal mechanism back into the housing.

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

# Dimensions

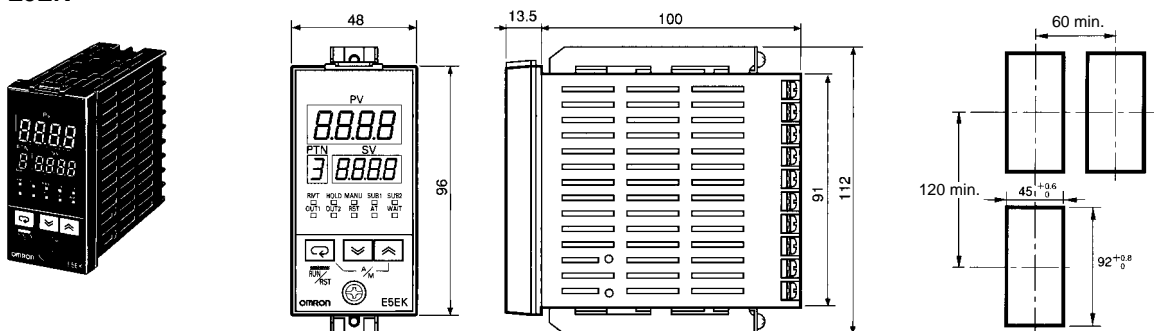
**Note:** All units are in millimeters unless otherwise indicated.

## E5AK



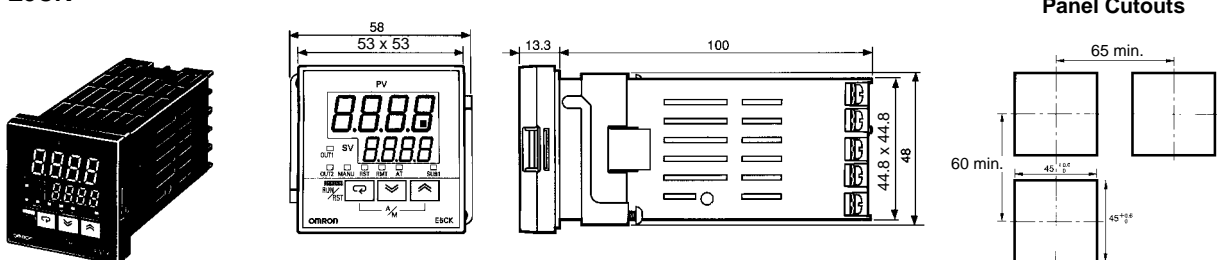
- Note:**
1. Recommended panel thickness is 1 to 8 mm.
  2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

## E5EK



- 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

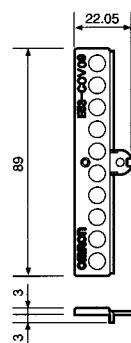
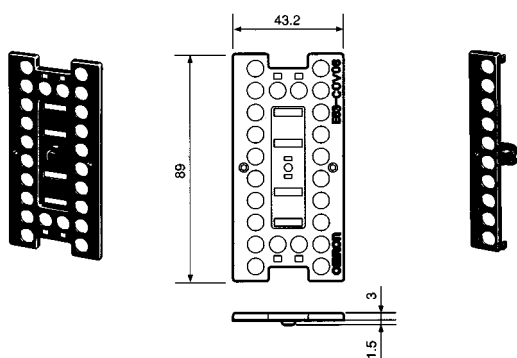


- Note:**
1. Recommended panel thickness is 1 to 5 mm.
  2. Maintain the specified vertical and horizontal mounting space between each Unit. Units must not be closely mounted vertically or horizontally.

## Accessories (Order Separately)

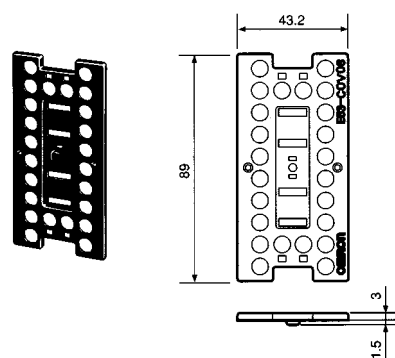
## Terminal Cover

## E53-COV0809 (E5AK)



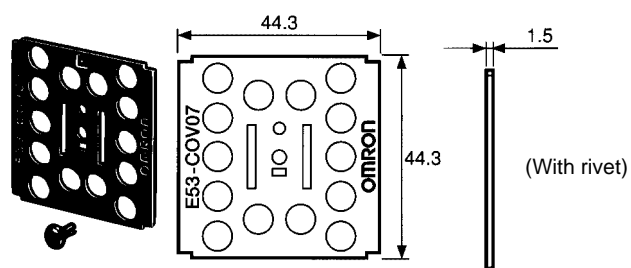
(With rivet)

## E53-COV08 (E5EK)



(With rivet)

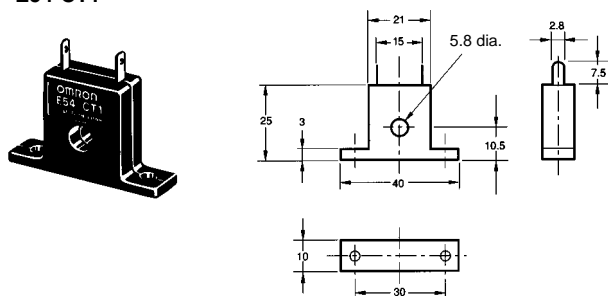
## E53-COV07



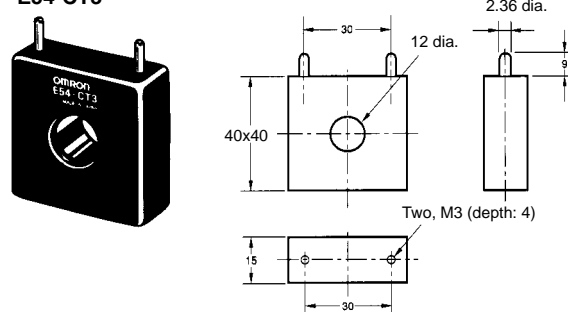
(With rivet)

## Current Transformer

## E54-CT1

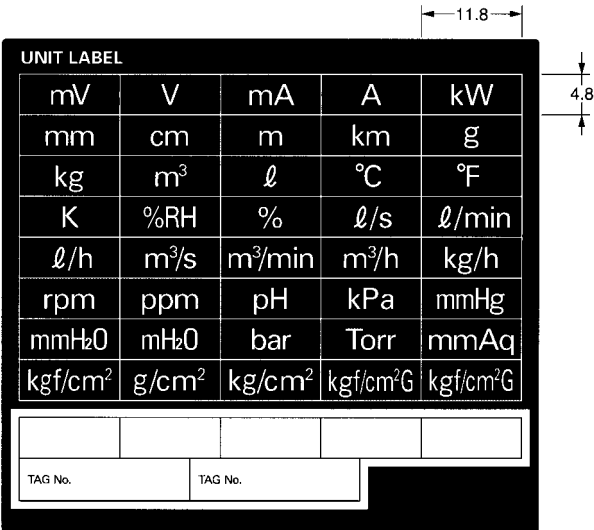


## E54-CT3



Two, M3 (depth: 4)

Rubber Seal

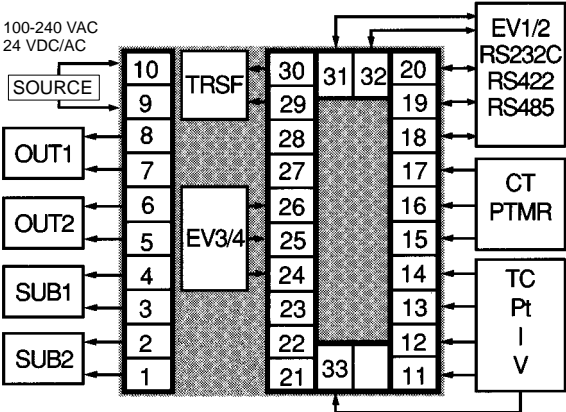


Installation

■ Wiring Terminals

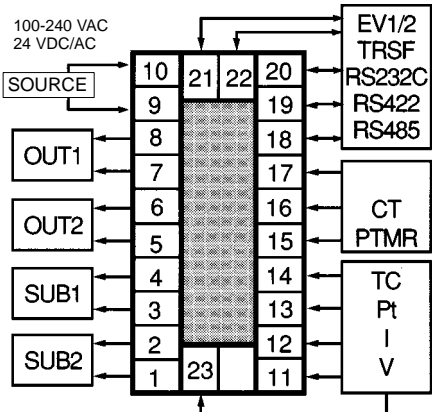
Terminal Arrangement

E5AK-T



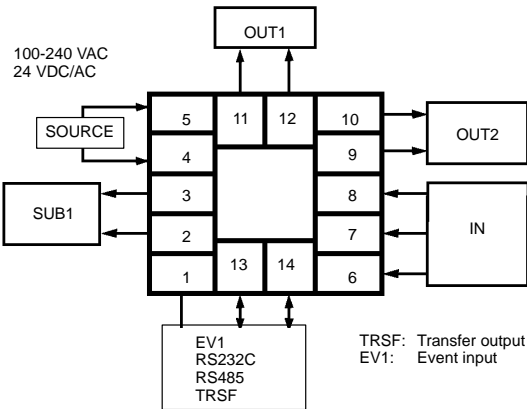
TRSF: Transfer output  
EV1 to 4: Event input  
PTMR: Potentiometer

E5EK-T



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

E5CK-T



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.

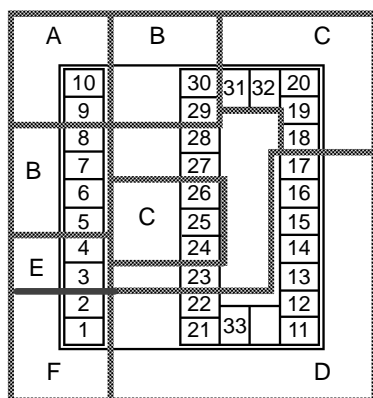
Solderless terminals are recommended when wiring the Controller.

Tighten the terminal screws using a torque no greater than  $0.78 \text{ N} \cdot \text{m}$ , or  $8 \text{ kgf} \cdot \text{cm}$  max. Take care not to tighten the terminal screws too tightly.

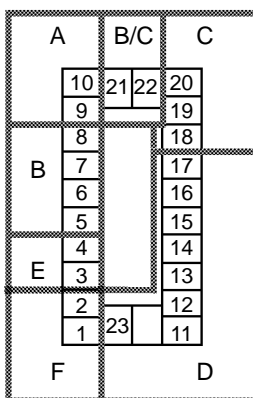
### Power Blocks

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

E5AK



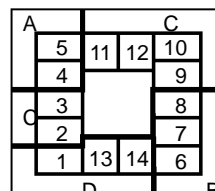
E5EK



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

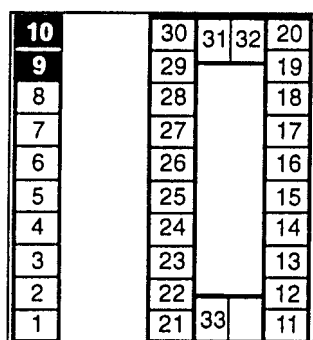


## E5AK Wiring

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

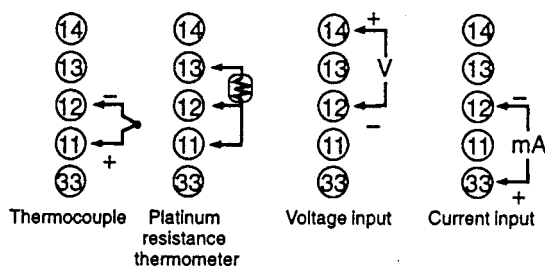
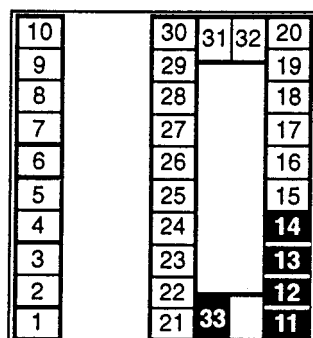
### Power Supply

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



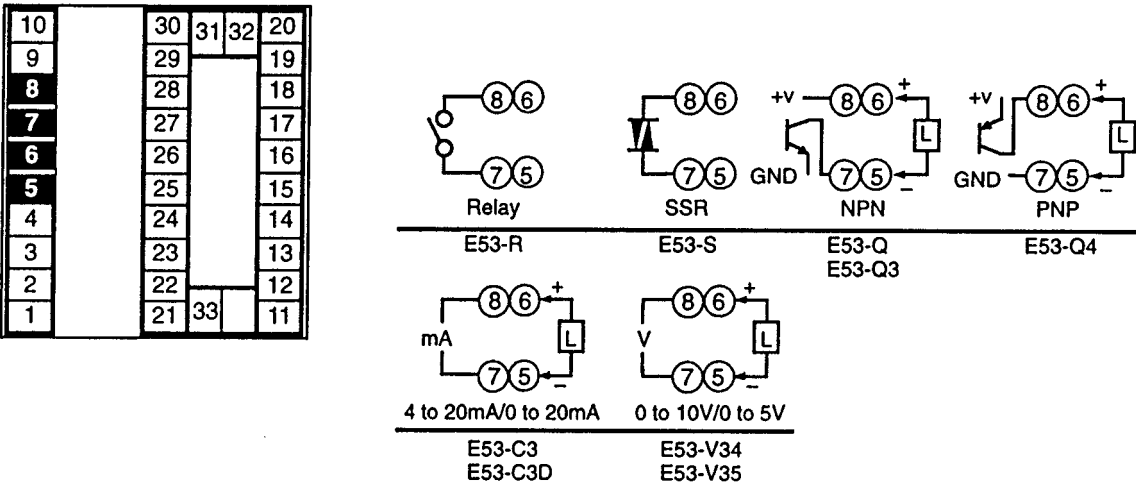
### Sensor Input

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



Control Output

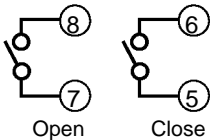
Terminal numbers 7 and 8 are for control output 1 (OUT1), and terminal numbers 5 and 6 are for control output 2 (OUT2). The following diagrams show the available Output Units and their internal equalizing circuits.



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

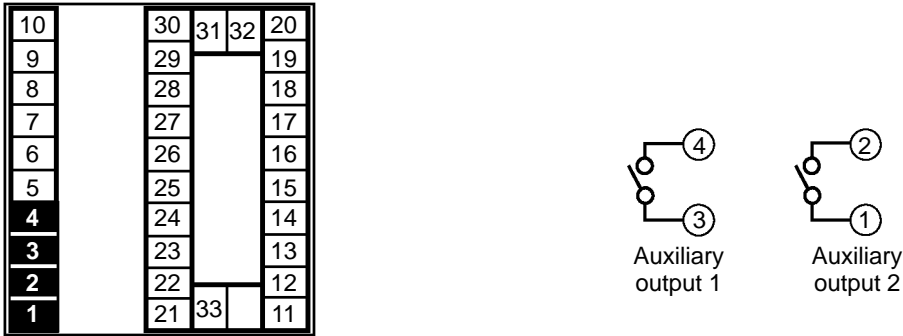
With E5AK-TPRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

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



Auxiliary Output

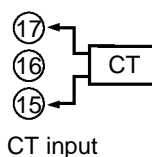
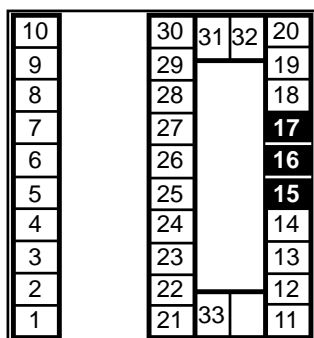
Terminal numbers 3 and 4 are for auxiliary output 1 (SUB1) and terminal numbers 1 and 2 are for auxiliary output 2 (SUB2). The following diagrams show the internal equalizing circuits for the auxiliary outputs:



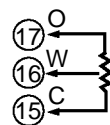
Output specifications are as follows:  
SPST-NO, 3 A at 250 VAC

**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:



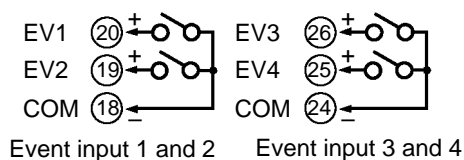
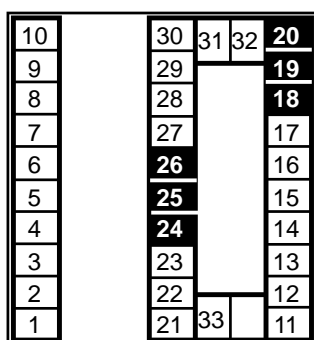
CT input



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

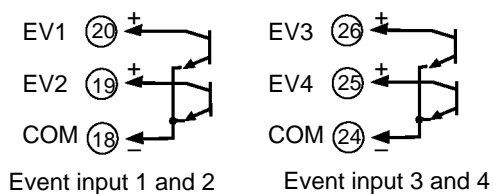
Event input 3 and 4

Terminals 18 and 24 (COM) are connected internally.

Use event inputs under the following conditions:

|                         |  |
|-------------------------|--|
| <b>Contact input</b>    | ON: 1 k $\Omega$ max.<br>OFF: 100 k $\Omega$ min.                    |
| <b>No-contact input</b> | ON: Residual voltage 1.5 V max.,<br>OFF: Leakage current 0.1 mA max. |

Polarities during no-contact input are as follows:

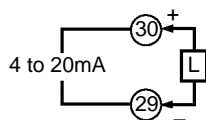


Event input 1 and 2

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  $\Omega$  max.,

Resolution: Approx. 2,600

**Communications**

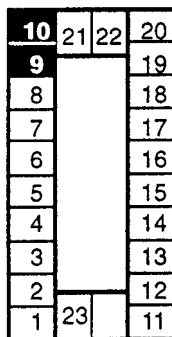
Terminal numbers 18 to 20, 31 and 32 can be used only on Controllers with Communications Units (E53-AK01/02/03). For details on wiring, refer to *Chapter 6, Using the Communications Function in the E5AK-T/E5EK-T/E5CK-T User's Manual (H88/H89/H90)*.

**E5EK Wiring**

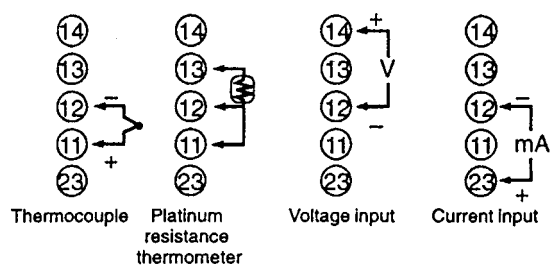
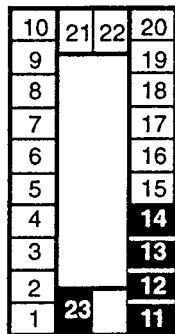
In the following wiring diagrams, the left side of the terminal numbers indicate the inside of the Controller.

**Power Supply**

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

**Sensor Input**

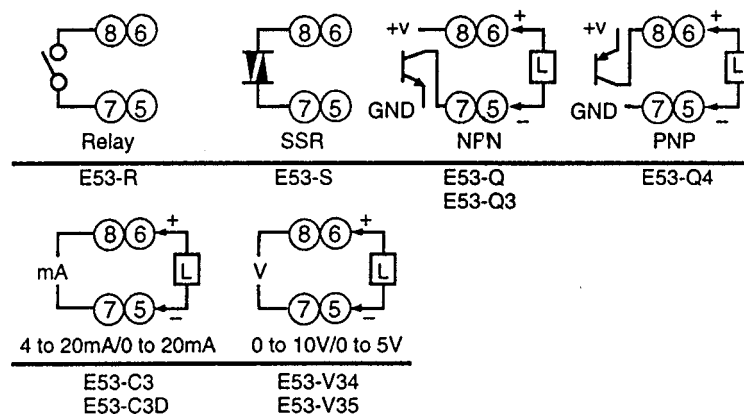
Connect the sensor input to terminal numbers 11 to 14 and 23 as follows according to the input type.



**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.

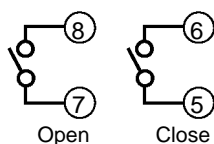
|    |    |    |    |
|----|----|----|----|
| 10 | 21 | 22 | 20 |
| 9  |    |    | 19 |
| 8  |    |    | 18 |
| 7  |    |    | 17 |
| 6  |    |    | 16 |
| 5  |    |    | 15 |
| 4  |    |    | 14 |
| 3  |    |    | 13 |
| 2  |    |    | 12 |
| 1  | 23 |    | 11 |



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

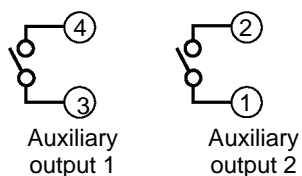
With E5EK-TPRR2 Controllers, the relay output (1 A at 250 VAC) is fixed.

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:

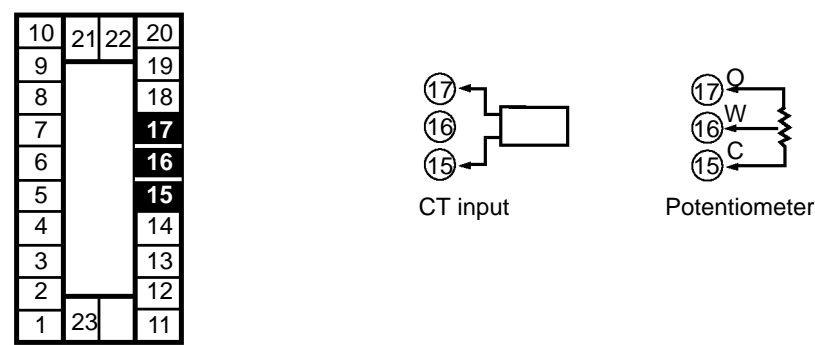
|    |    |    |    |
|----|----|----|----|
| 10 | 21 | 22 | 20 |
| 9  |    |    | 19 |
| 8  |    |    | 18 |
| 7  |    |    | 17 |
| 6  |    |    | 16 |
| 5  |    |    | 15 |
| 4  |    |    | 14 |
| 3  |    |    | 13 |
| 2  |    |    | 12 |
| 1  | 23 |    | 11 |



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

CT Input/Potentiometer

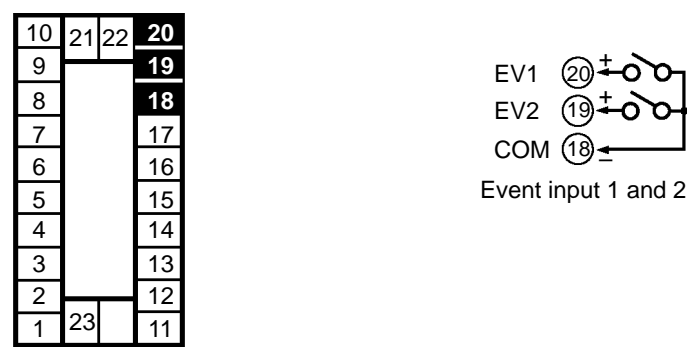
When using the HBA function on the E5EK-AA2 Controller, connect CT input (CT) to terminal numbers 15 to 17. When monitoring the valve opening on the E5EK-TPRR2 Controller, connect the potentiometer (PTMR) to terminal numbers 15 to 17. Connect each of these inputs as follows:



For details on CT inputs, refer to *Appendix, About Current Transformer* in the *E5AK-T/E5EK-T/E5CK-T User's Manual (H88/H89/H90)*. 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 kΩ.

Event Input

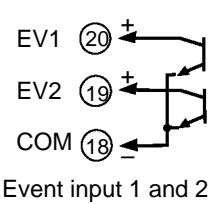
Connect event inputs 1 and 2 (EV1/2) to terminal numbers 18 to 20. However, note that terminal numbers 18 to 20 cannot be used on Controllers with a communications function. Connect the event inputs as follows:



Use event inputs under the following conditions:

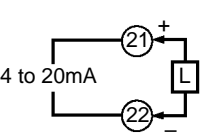
|                  |  |
|------------------|--|
| Contact input    | ON: 1 kΩ max., OFF: 100 kΩ min.                                      |
| No-contact input | ON: Residual voltage 1.5 V max.,<br>OFF: Leakage current 0.1 mA max. |

Polarities during no-contact input are as follows:



Transfer Output

Connect transfer output (TRSF) to terminal numbers 21 and 22. 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  $\Omega$  max.,  
Resolution: Approx. 2,600

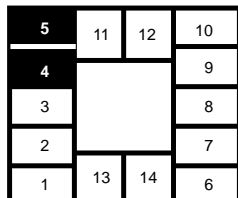
### Communications

Terminal numbers 18 to 22 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)*.

## E5CK Wiring

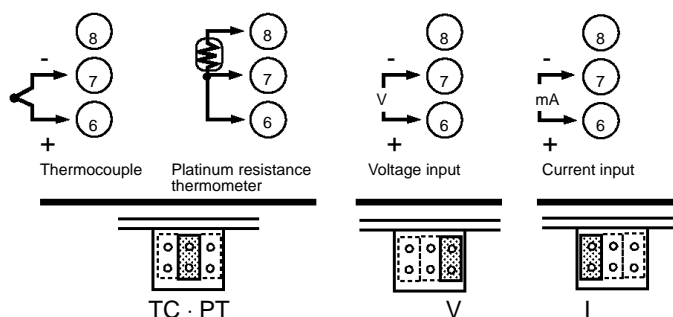
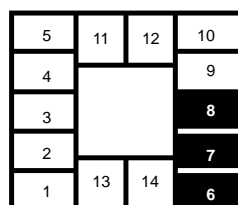
### Power Supply

Input 100 to 240 VAC or 24 VAC/DC to terminal numbers 4 and 5 according to the specification.



### Sensor Input

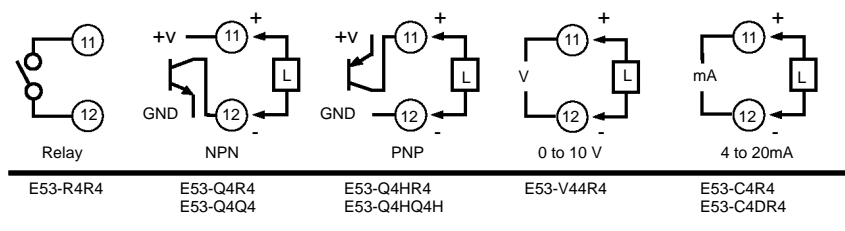
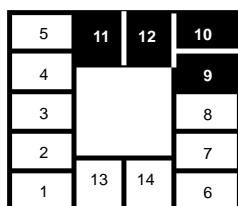
Connect the input to terminal numbers 6 to 8 as follows according to the input type.



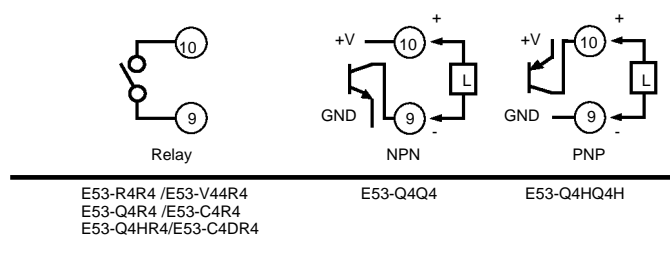
Match the inputs with the internal jumper settings for each input type. For thermocouple or platinum resistance thermometer inputs, set the inputs to a common position (TC/PT) as the temperature input.

### Control Output

Terminal numbers 11 and 12 are for control output 1 (OUT1). The five output types and internal equalizing circuits are available according to the Output Unit.

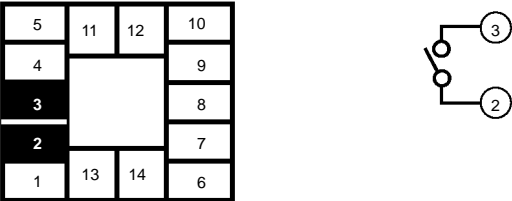


Terminal numbers 9 and 10 are for control output 2 (OUT2). The three output types and internal equalizing circuits are available according to the Output Unit.



Auxiliary Output 1

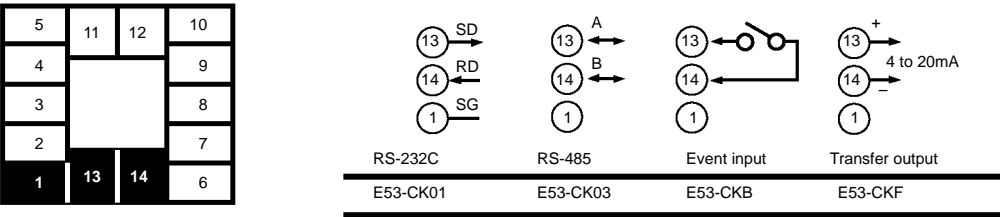
Terminal numbers 2 and 3 are for auxiliary output 1 (SUB1).  
The internal equalizing circuit for auxiliary output 1 is as follows:



Relay specifications are as follows:  
SPST-NO, 250 VAC, 1 A

Option

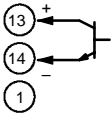
Terminal numbers 1, 13, and 14 are valid only when the Option Unit is set in the Controller.  
The following four connections are possible depending on the model of the Option Unit.



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. |

The polarity for no-contact input is as follows:



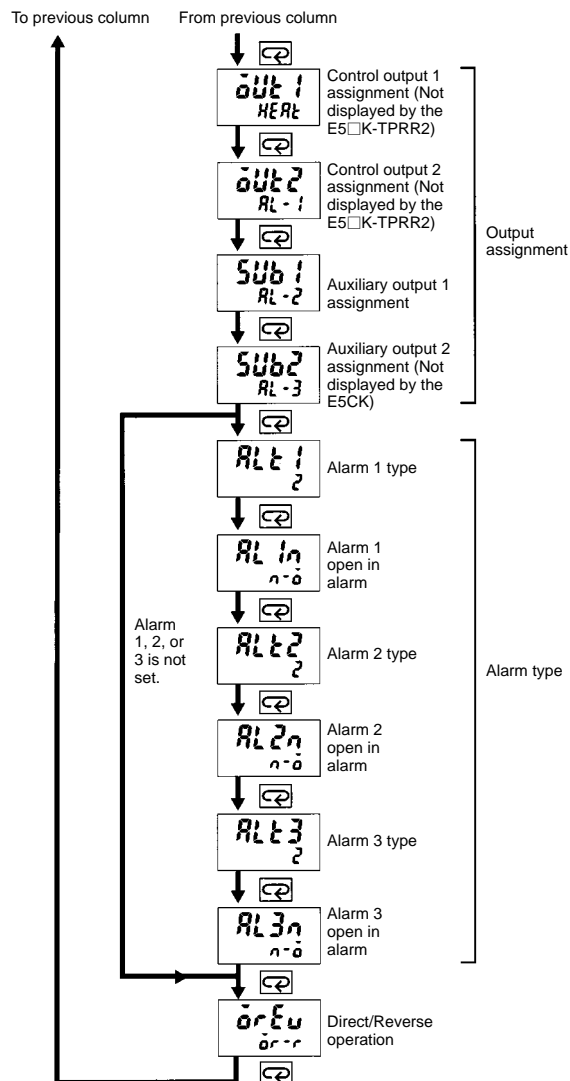
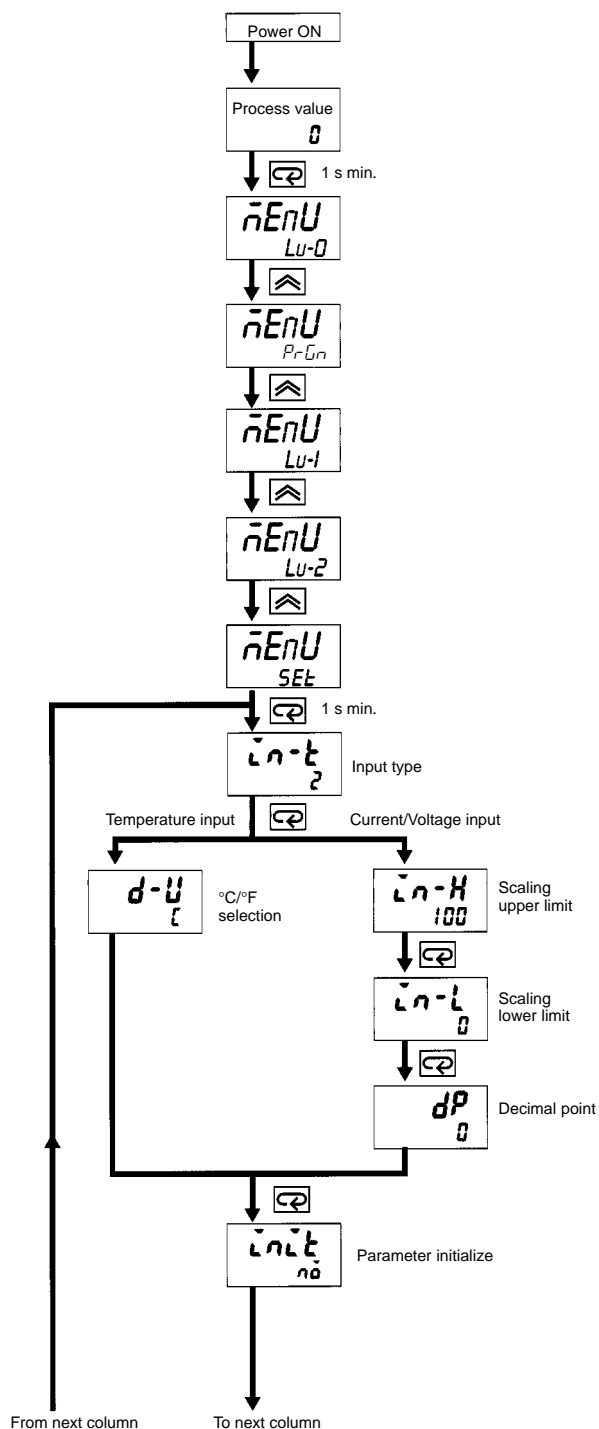
Transfer output specifications are as follows:  
4 to 20 mA DC, load: 500 Ω max., resolution approx. 2,600



## After Turning Power ON

Determine the I/O specifications of the Digital Controller in setup mode.

### Setup Mode



### Note: Parameter Initialize

Parameter initialization sets all parameters to default values except for the input type, scaling upper limit, scaling lower limit, decimal point, and °C/°F selection parameters.