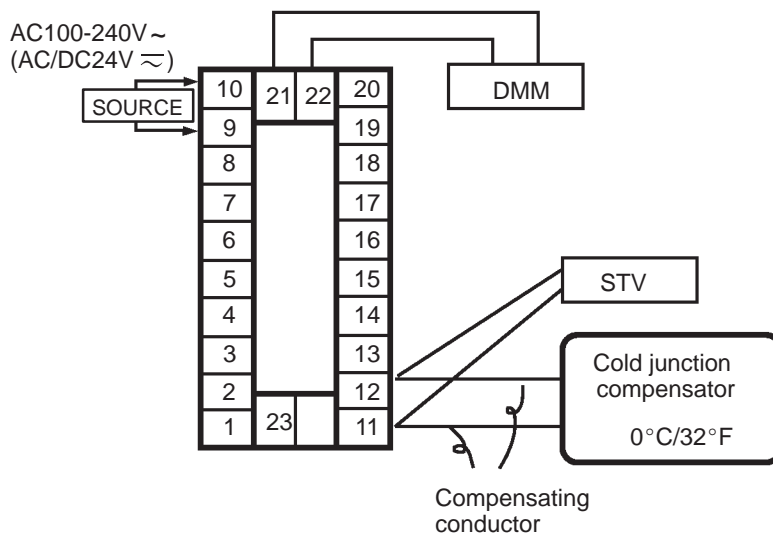


Calibrating Thermocouples

- Calibrate according to the type of thermocouple, thermocouple 1 group (K1, J1, L1, E, N, W, PLII) and thermocouple 2 group (K2, K2, L2, R, S, B, T, U).
- When calibrating, do not cover the bottom of the controller. Also, do not touch the input terminals (Nos.11 and 12) or compensating conductor on the E5EK-T controller.

Preparations

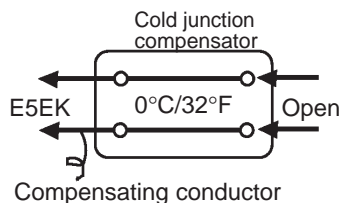
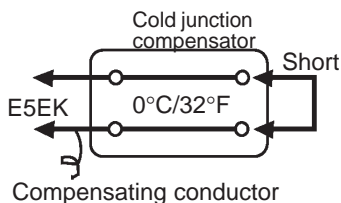


- Set the cold junction compensator designed for compensation of internal thermocouples to 0°C. However, make sure that internal thermocouples are disabled (tips are open).
- In the above figure, STV refers to a standard DC current/voltage source, and DMM refers to a precision digital multimeter. However, note that DMM is required only when the transfer output function is supported.
- Use the compensating conductor on the selected thermocouple. However, note that when thermocouple R, S, E, B, W and PLII is used, the cold junction compensator and the compensating conductor can be substituted with the cold junction compensator and the compensating conductor for thermocouple K.

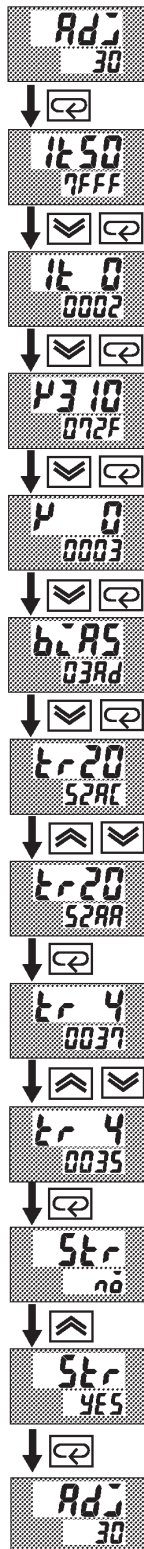


Connecting the Cold Junction Compensator

Correct process values cannot be obtained if you touch the contact ends of the compensating conductor during calibration of a thermocouple. Accordingly, short (able) or open (disable) the tip of the thermocouple inside the cold junction compensator as shown in the figure below to create a contact or non-contact state for cold junction compensator.




Calibration: thermocouple 1

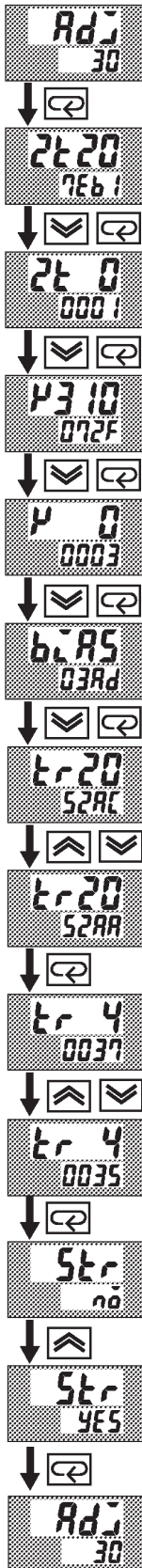


This example describes how to calibrate a thermocouple when the transfer output function is supported. If the transfer output function is not supported, skips steps (7) to (10).



















- (1) When [**AdJ**] is displayed, the 30-minute timer is displayed on the No.2 display and counts down. This timer serves as a guide for the aging time when aging is required.
- (2) First, calibrate the main input. Press the key to display [**1E50**] (50 mV calibration display). Set STV output to 50 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the key to temporarily store the calibration data.
- (3) Press the key to display [**1E 0**] (0 mV calibration display). Set STV output to 0 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the key to temporarily store the calibration data.
- (4) Next, calibrate the cold junction compensator. Press the key to display [**P3 10**] (310 mV calibration display). Set STV output to 310 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the key to temporarily store the calibration data.
- (5) Press the key to display [**P 0**] (0 mV calibration display). Set STV output to 0 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the key to temporarily store the calibration data.
- (6) Finally, calibrate the bias compensation value. Disconnect the STV, and enable the thermocouple of the cold junction compensator. When carrying this out, make sure that the wiring on the STV is disconnected. Make sure that the cold junction compensator is set to 0°C and press the key. The display changes to [**bEAS**] (calibration display for the bias compensation value). When the value on the No.2 display has stabilized (changes of several digits max.), press the key to temporarily store the calibration data.
- (7) Next, calibrate the transfer output function. If the transfer output function is not supported, skip to step (11). Press the key. The display changes to [**Er 20**] (20 mA calibration display).
- (8) Set the output to 20 mA by the or keys while monitoring the voltage on the digital multimeter. In the example on the left, the display indicates that the value two digits smaller than before calibration is “20 mA”.
- (9) Press the key. The display changes to [**Er 4**] (4 mA calibration display).
- (10) Set the output to 4 mA by the or keys while monitoring the voltage on the digital multimeter. In the example on the left, the display indicates that the value two digits smaller than before calibration is “4 mA”:
- (11) Press the key until the display changes to the date save display. Press the key. The No.2 display changes to [**4E5**], and two seconds later the calibration data is stored to internal memory. If you press the key when the No.2 display reads [**n0**], the calibration data is disabled.


- (12) This completes calibration of the thermocouple 1 group. Press the  key to return the display to [*Ad*].


Calibration: thermocouple 2



This example describes how to calibrate a thermocouple when the transfer output function is supported. If the transfer output function is not supported, skips steps (7) to (10).

- (1) When [*Ad*] is displayed, the 30-minute timer is displayed on the No.2 display and counts down. This timer serves as a guide for the aging time when aging is required.
- (2) First, calibrate the main input. Press the  key to display [*2t 20*] (20 mV calibration display). Set STV output to 20 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the  key to temporarily store the calibration data.
- (3) Press the  key to display [*2t 0*] (0 mV calibration display). Set STV output to 0 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the  key to temporarily store the calibration data.
- (4) Next, calibrate the cold junction compensator. Press the  key to display [*P3 10*] (310 mV calibration display). Set STV output to 310 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the  key to temporarily store the calibration data.
- (5) Press the  key to display [*P 0*] (0 mV calibration display). Set STV output to 0 mV. When the value on the No.2 display has stabilized (changes of several digits max.), press the  key to temporarily store the calibration data.
- (6) Finally, calibrate the bias compensation value. Disconnect the STV, and enable the thermocouple of the cold junction compensator. When carrying this out, make sure that the wiring on the STV is disconnected.
Make sure that the cold junction compensator is set to 0°C and press the  key. The display changes to [*b 85*] (calibration display for the bias compensation value). When the value on the No.2 display has stabilized (changes of several digits max.), press the  key to temporarily store the calibration data.
- (7) Next, calibrate the transfer output function. If the transfer output function is not supported, skip to step (11). Press the  key. The display changes to [*t 20*] (20 mA calibration display).
- (8) Set the output to 20 mA by the  or  keys while monitoring the voltage on the digital multimeter. In the example on the left, the display indicates that the value two digits smaller than before calibration is “20 mA”.
- (9) Press the  key. The display changes to [*t 4*] (4 mA calibration display).
- (10) Set the output to 4 mA by the  or  keys while monitoring the voltage on the digital multimeter. In the example on the left, the display indicates that the value two digits smaller than before calibration is “4 mA”.
- (11) Press the  key until the display changes to the data store display. Press the  key. The No.2 display changes to [*YES*], and two seconds later the calibration data is stored to internal

memory. If you press the  key when the No.2 display reads [*no*], the calibration data is disabled.

- (12) This completes calibration of the thermocouple 2 group. Press the  key to return the display to [*Ad*].