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Cat. No. H076-E1-2

E5ZE

Multipoint Temperature Controller

OPERATION MANUAL

OMRON

E5ZE
Multipoint Temperature Controller

Operation Manual

Revised January 1999

Notice:

OMRON products are manufactured for use according to proper procedures by a qualified operator and only for the purposes described in this manual.

The following conventions are used to indicate and classify precautions in this manual. Always heed the information provided with them. Failure to heed precautions can result in injury to people or damage to property.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ Caution Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

OMRON Product References

All OMRON products are capitalized in this manual. The word “Unit” is also capitalized when it refers to an OMRON product, regardless of whether or not it appears in the proper name of the product.

The abbreviation “Ch,” which appears in some displays and on some OMRON products, often means “word” and is abbreviated “Wd” in documentation in this sense.

The abbreviation “PC” means Programmable Controller and is not used as an abbreviation for anything else.

Visual Aids

The following headings appear in the left column of the manual to help you locate different types of information.

Note Indicates information of particular interest for efficient and convenient operation of the product.

1, 2, 3... 1. Indicates lists of one sort or another, such as procedures, checklists, etc.

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No patent liability is assumed with respect to the use of the information contained herein. Moreover, because OMRON is constantly striving to improve its high-quality products, the information contained in this manual is subject to change without notice. Every precaution has been taken in the preparation of this manual. Nevertheless, OMRON assumes no responsibility for errors or omissions. Neither is any liability assumed for damages resulting from the use of the information contained in this publication.

TABLE OF CONTENTS

About this Manual:

This manual describes the installation and operation of E5ZE Multipoint Temperature Controllers and includes the sections described below.

Refer to the following manuals according to the model being used before operating the E5ZE.

Refer to the following manual when using the E5ZE Serial Communications Models:

E5ZE Multipoint Temperature Controller Communications Manual (Cat. No. H77)

Refer to the following manual when using the CompoBus/D Communications Models:

E5ZE-8 Multipoint Temperature Controller CompoBus/D Communications Manual (Cat. No. H104)

CompoBus/D Operation Manual (Cat. No. W267)

Please read this manual carefully and be sure you understand the information provided before attempting to install or operate an E5ZE Multipoint Temperature Controller. **Be sure to read the *Precautions* section**.

Precautions provides precautions for installing and using the E5ZE.

Section 1 provides information on the system configuration, component names, and functions.

Section 2 describes the installation and wiring procedures necessary before operating the E5ZE.

Section 3 describes each of the E5ZE functions.

Section 4 describes the troubleshooting procedure for the E5ZE.

The ***Appendices*** provide information on specifications, ratings, characteristics, the Current Transformer, PID constant manual adjustments, saving data, hardware tests, current outputs, and available models.

⚠WARNING Failure to read and understand the information provided in this manual may result in personal injury or death, damage to the product, or product failure. Please read each section in its entirety and be sure you understand the information provided in the section and related sections before attempting any of the procedures or operations given.

PRECAUTIONS

This section provides general precautions for using the E5ZE Multipoint Temperature Controller and related devices.

The information contained in this section is important for the safe and reliable application of the E5ZE Multipoint Temperature Controller. You must read this section and understand the information contained before attempting to set up or operate an E5ZE Multipoint Temperature Controller.

1 General Safety Precautions

⚠ WARNING Do not attempt to disassemble, apply pressure, distort, subject to temperatures of 100°C or more, or throw the E5ZE into fire. A lithium battery is built into the E5ZE and any attempt to any of the above may result in fire, explosion, or combustion.

⚠ WARNING Do not attempt to disassemble, modify, or repair the E5ZE. Any attempt to do so may result in malfunction, fire, or electric shock.

⚠ Caution Do not use any terminal that is marked “Don’t use.”

2 Operating Environment Precautions

⚠ Caution Be sure to check polarity when connecting the terminals.

⚠ Caution Do not install power lines or high-tension lines alongside lines connected to the E5ZE to prevent the E5ZE from being influenced by inductive noise. Install lines connected to the E5ZE through an independent conduit or use a shielded cable for the lines to protect them from inductive noise.

⚠ Caution Separate the E5ZE from devices generating a strong high-frequency, such as high-frequency welding machines, or devices that generate surge.

⚠ Caution Do not operate the E5ZE in the following locations:

- Locations subject to exposure to water, oil, or chemicals.
- Locations subject to corrosive or flammable gases.
- Locations subject to temperatures or humidity outside the range specified in the specifications.
- Locations subject to condensation.
- Locations subject to shock or vibration.
- Locations subject to severe changes in temperature.
- Locations subject to icing.

⚠ Caution Do not install the E5ZE in a location with obstructions preventing radiant heat from escaping.

3 Application Precautions

⚠ WARNING Make sure that no metal particles or wire chips are accidentally left in the product. Doing so may result in malfunction, fire, or electric shock.

⚠ WARNING Install a separate alarm to prevent the temperature from increasing excessively if the E5ZE malfunctions. Insufficient safety precautions may cause serious accidents if the temperature control malfunctions.

⚠ **Caution** Tighten the screws on the terminal block to the torque specified in the manual. Loose screws may result in burning or malfunction.

⚠ **Caution** Do not connect loads to the E5ZE that exceed the specified ratings. Excessively large loads may result in malfunction or burning.

⚠ **Caution** Always use the power supply voltage specified in the manual. An incorrect voltage may result in malfunction or burning.

⚠ **Caution** Confirm that no adverse effects will occur in the system before attempting to perform a hardware test. Insufficient confirmation may result in unexpected operations.

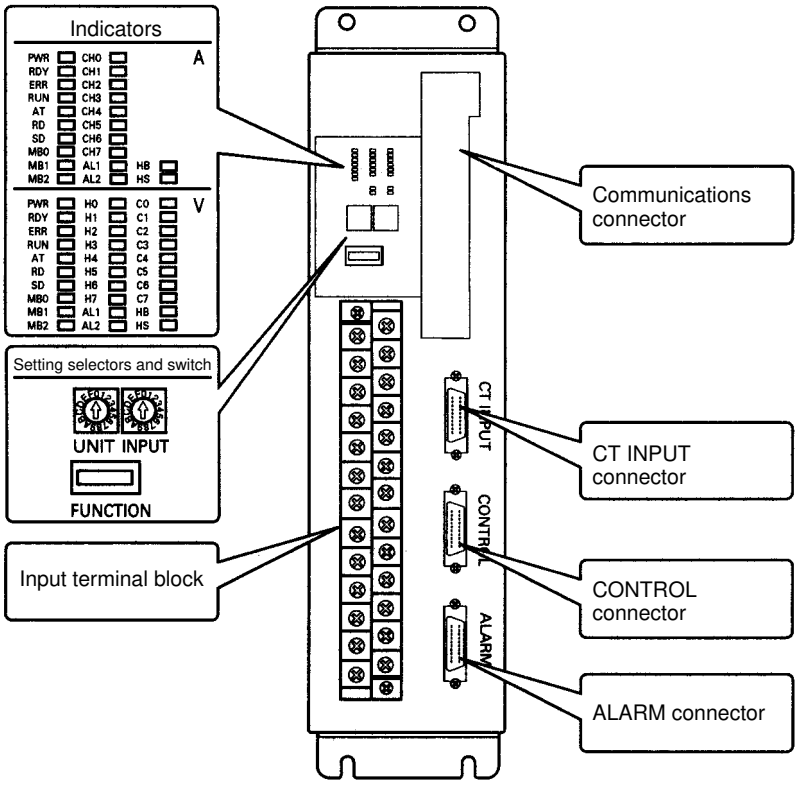
⚠ **Caution** Make sure that all the E5ZE set values are suitable for the controlled system. Unsuitable set values may result in unexpected operations causing damage to the product or accidents.

SECTION 1
Introduction

This section describes the components, a standard system configuration, and the functions of the E5ZE. Refer to *Section 2 Preparations* and later sections for details on functions and their applications.

1-1 Component Names and Functions

The component names and their functions are provided here. The positions of components on the E5ZE-8□□□□□-E (without casing) are the same as in the following.



Indicators

A: E5ZE-8A□□□□B (Standard Models with casing)

V: E5ZE-8V□□□□B (Heating and Cooling Control Models with casing)

Indicators

The indicators show the operating status of the E5ZE, as follows:

PWR: Lit when power is ON.

RDY: Lit when the E5ZE is ready to operate.

ERR: Lit when an error occurs in the E5ZE.

RUN: Lit when the E5ZE is operating.

AT: Lit when auto-tuning is being executed.

RD: Lit when the E5ZE is receiving command data.

SD: Lit when the E5ZE is sending response data.

CH0 to CH7:
Lit for the control points for which the corresponding control outputs are ON. (Not lit for Current Output Models.)

H0 to H7:
Lit for the control points for which the corresponding heating outputs are ON. (Not lit for Current Output Models.)

C0 to C7:
Lit for the control points for which the corresponding cooling outputs are ON.

AL1: Lit when alarm 1 is ON.

AL2: Lit when alarm 2 is ON.

HB: Lit when the HB (heater burnout) alarm is ON.

HS: Lit when the HS alarm (SSR short circuit) is ON.

MB0 to MB2:
Lit when the memory bank designation inputs (bits 2^0 to 2^2) are turned ON with external contacts.

Setting Selectors and Switch

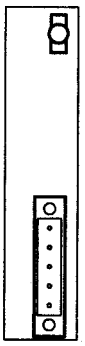
The setting selectors and switch are used to select the temperature sensor type, the unit number, and the functions to be used with the E5ZE. Refer to *2-3 Setting Selectors and Switch* for details on setting methods.

Input Terminal Block

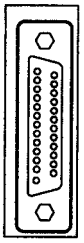
The input terminal block is connected to a DC power supply, temperature sensor, and ground wire. Refer to *2-5 Power Supply and Input Wiring* for details on wiring procedures.

Communications Connector

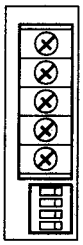
The communications connector is connected to the communications cable. Refer to the *E5ZE Multipoint Temperature Controller Communications Manual (H77)* or the *E5ZE-8 Multipoint Temperature Controller CompoBus/D Communications Manual (H104)* for details on communications functions and their applications.



E5ZE-8□□□D1□B
(for CompoBus/D communications)



E53-E01
(for RS-232C Communications Unit)



E53-E04
(for RS-422/485 Communications Unit)

CT INPUT Connector

The CT INPUT connector is connected to the Current Transformer (CT) to detect heater burnout or SSR failure. Use E5ZE-CBL□□□ Connecting Cables to connect to the Connector Terminal Conversion Unit (XW2B-20G5 for M3.5 terminal screws or XW2B-20G4 for M2.4 terminal screws). Refer to *2-6 Wiring CT Inputs and Control/Alarm Outputs* for details on wiring procedures.

CONTROL Connector

The CONTROL connector is used to connect the control output and memory bank designation input contacts. Use E5ZE-CBL□□□ Connecting Cables to connect to the Connector Terminal Conversion Unit (XW2B-20G5 for M3.5 terminal screws or XW2B-20G4 for M2.4 terminal screws). Refer to *2-6 Wiring CT Inputs and Control/Alarm Outputs* for details on wiring procedures.

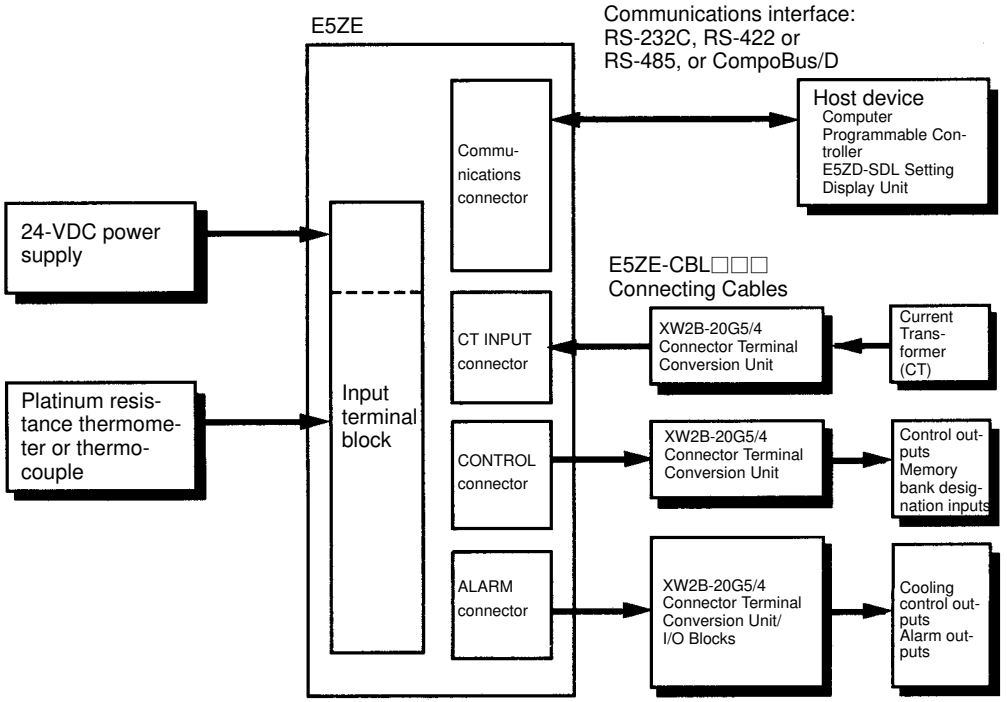
ALARM Connector

The ALARM connector for the E5ZE-8A□□□□□ Standard Models is used for an alarm output and that for the E5ZE-8V□□□□□ Heating and Cooling Control Models is used for cooling control output and alarm output. Use E5ZE-CBL-□□□ Connecting Cables to connect to the following devices.

Device	Model	Specifications
Connector Terminal Conversion Units	XW2B-20G4	M2.4 terminal screws
	XW2B-20G5	M3.5 terminal screws
I/O Blocks	G7TC-OC08	8 relay outputs (no cooling outputs)
	G7TC-OC16	16 relay outputs
	G7VC-OC16	16 relay outputs
	G7VC-OA16	16 SSR AC outputs
	G7VC-OD16	16 SSR DC outputs

1-2 System Configuration

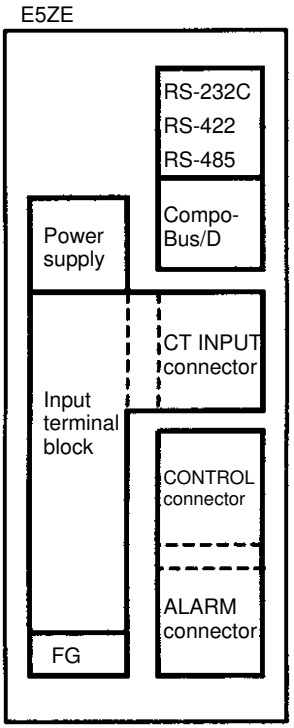
The following diagram shows the system configuration of the E5ZE.



Use the specified cables and wiring devices to prevent malfunctions or accidents caused by incorrect wiring.

- The connection between the communications connector and the host device differs according to the communications interface used. Refer to the *E5ZE Multipoint Temperature Controller Communications Manual (H77)* or the *E5ZE-8 Multipoint Temperature Controller CompoBus/D Communications Manual (H104)* for details.
- There are restrictions on the items that can be set or displayed from the E5ZD-SDL Setting Display Unit. Refer to the *E5ZD-SDL Setting Display Unit Datasheet (H61)* for details.

Isolation



The components of the E5ZE contained within bold lines in the above diagram are electrically isolated.

Note The covers of the CT INPUT, CONTROL, and ALARM connectors are connected to the frame ground (FG).

For the E5ZE-8□□□□TC□ (Thermocouple Input Models), the thermocouple inputs of the control points are insolated from each other.

1-3 Main Functions

Input Type

The E5ZE is connected to platinum resistance thermometers or thermocouples, depending on the model used. The type of temperature sensor is specified using the INPUT selector on the front panel of the Unit. The input values can be adjusted using the input adjustment function.

CONTROL Outputs

The control outputs can be either voltage output or current output, depending on the model. The control period and direct/reverse operation can be specified using the set values.

ALARM Outputs

A maximum of 2 alarm outputs are possible. There are 12 alarm modes that can be set for each alarm output according to set values. The outputs are comprehensive output for all control points.

Output Limitations

The output values are limited by the following 2 limiters:

- Output limiter
- Output change rate limiter

If an output value is outside the upper or lower limit for the output, the output will be limited to the preset upper or lower limit. The output change rate limiter limits the rate at which output values change per unit time.

Ramp

The ramp function is used to limit the control temperature (set point) from changing rapidly. If the set point changes quicker than the preset rate, the rate of temperature change will be limited to the preset rate, and the temperature will gradually change until it reaches the new temperature. The ramp can be set by the user.

Control Adjustment PID and fuzzy constants can be set by executing auto-tuning (AT). If an offset occurs during P or PD control, manual adjustment is possible using the manual reset function. Temperature turbulence caused by external disturbances can be suppressed and controlled using the fuzzy function.

Heater Burnout and SSR Failure Detection Output short circuits caused by heater burnout or SSR failure can be detected.

Control Method Selection Control can be switched between ON/OFF control and the normal 2-PID control (with 2 degrees of freedom). Manual operation is also possible.

Memory Banks The memory banks store different sets of set values for the control points. There are 8 memory banks for each control point. Memory banks allow the set values for a control point to be changed as a group rather than resetting them individually. Use the external contact inputs or communications to designate the required memory bank.

1-4 E5ZE without Casing

If an E5ZE-8□□□□□-E Temperature Controller (without casing) is being used, static electricity may be generated. Observe the following precautions when handling the E5ZE-8□□□□□.

- Unpack the Unit on a grounded conductive mat.
- Wrap the Unit in the anti-static mat provided when transporting or storing it.
- Handle the Unit's printed circuit board only by the edges.
- Do not touch the electrical components or printed pattern of the printed circuit board.
- Wrap the Unit in the anti-static mat when not using it.
- Use only the anti-static mat provided to wrap the Unit. Do not use other materials, such as vinyl or polyethylene.

SECTION 2
Preparations

This section provides details on operations that must be performed before starting the E5ZE, such as installation and wiring.

2-1 List of Models

2-1-1 Serial Communications Models

No. of control points	Casing	Control method	Control output	Heater burnout and SSR failure detection	Communications	Input type	
						Thermocouple	Platinum resistance thermometer
8	No	Standard	Option	Option	Option	E5ZE-8AAAMTC-E	E5ZE-8AAAMP-E
		Heating and cooling	Option	Option	Option	E5ZE-8VAAMTC-E	E5ZE-8VAAMP-E
	Yes	Standard	Option	Option	Option	E5ZE-8AAAMTCB-E	E5ZE-8AAAMPB-E
		Heating and cooling	Option	Option	Option	E5ZE-8VAAMTCB-E	E5ZE-8VAAMPB-E

Model Number Legend:

E5ZE-8□AAM□□-E

1 2 3 4 5 6 7

1. **Control Point**
   8: 8
2. **Control Method**
   A: Standard
   V: Heating and cooling
3. **Control Output**
   A: Option (see note 1)
4. **Heater Burnout and SSR Failure Detection (see note 2)**
   A: Option (see note 3)
5. **Communications**
   M: Option (see note 4)
6. **Input Type**
   TC: Thermocouple
   P: Platinum resistance thermometer
7. **Casing**
   B: Yes
   Blank: No (open type)

Note:
1. The E53-E8Q Voltage Output Unit or the E53-E8C Current Output Unit can be used with the E5ZE. The E53-E8Q Voltage Output Unit and the E53-E8C Current Output Unit are sold separately.
2. The heater burnout and SSR failure detection function of the E5ZE will be invalid if the heating side control output of the E5ZE is current output.
3. The E54-E8CT CT Input Unit is required for the heater burnout and SSR failure detection. The E54-E8CT CT Input Unit is sold separately.
4. The E53-E01 Communications Unit for RS-232C communication or the E53-E04 Communications Unit for RS-422 and RS-485 communication can be used with the E5ZE. The E53-E01 Communications Unit and the E53-E04 Communications Unit are sold separately.

I/O Units (Order Separately)

Units	Models
RS-232C Communications Unit	**E53-E01**
RS-422/485 Communications Unit	**E53-E04**
CT Input Unit	**E54-E8CT**
Voltage Output Unit	**E53-E8Q**
Current Output Unit	**E53-E8C**

2-1-2 CompoBus/D Communications Models

No of control points	Casing	Control method	Control output	HBA and SSR failure detection	Iput type	Name
8	Yes	Standard	Voltage	No	Thermocouple	E5ZE-8AQA D1TCB 24VDC
8	Yes	Standard	Voltage	No	Platinum resistance thermometer	E5ZE-8AQA D1PB 24VDC
8	Yes	Standard	Voltage	Yes	Thermocouple	E5ZE-8AQH D1TCB 24VDC
8	Yes	Standard	Voltage	Yes	Platinum resistance thermometer	E5ZE-8AQH D1PB 24VDC
8	Yes	Standard	Current	No	Thermocouple	E5ZE-8ACA D1TCB 24VDC
8	Yes	Standard	Current	No	Platinum resistance thermometer	E5ZE-8ACA D1PB 24VDC
8	Yes	Heating and Cooling	Voltage	No	Thermocouple	E5ZE-8VQA D1TCB 24VDC
8	Yes	Heating and Cooling	Voltage	No	Platinum resistance thermometer	E5ZE-8VQA D1PB 24VDC
8	Yes	Heating and Cooling	Voltage	Yes	Thermocouple	E5ZE-8VQH D1TCB 24VDC
8	Yes	Heating and Cooling	Voltage	Yes	Platinum resistance thermometer	E5ZE-8VQH D1PB 24VDC
8	Yes	Heating and Cooling	Current	No	Thermocouple	E5ZE-8VCA D1TCB 24VDC
8	Yes	Heating and Cooling	Current	No	Platinum resistance thermometer	E5ZE-8VCA D1PB 24VDC

Model Number Legend:

E5ZE-8□□□□□□
1 2 3 4 5 6 7

1. Control Point

8: 8

2. Control Method

A: Standard control

V: Heating and cooling control

3. Control Output

Q: Voltage output

C: Current output

4. Heater Burnout and SSR Failure Detection Function (Not available with Current Output Models.)

A: No

H: Yes

5. Communications Function

D1: CompoBus/D

6. Input Type

TC: Thermocouple

P: Platinum resistance thermometer

7. Casing

B: Yes

2-2 Mounting the Serial Communications Models

I/O Units

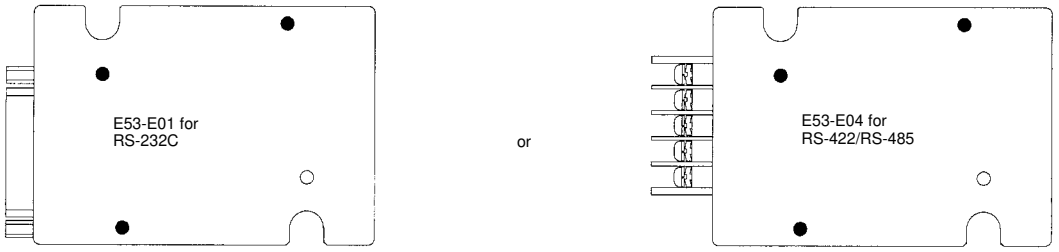
I/O Units are not mounted on the E5ZE.

Mount the appropriate I/O Units according to the specification of the E5ZE.

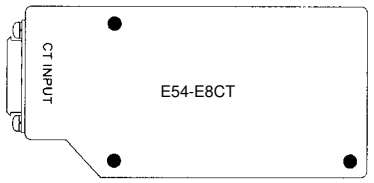
The diagram below is the view from the back of component side.

Type of I/O Units

Communication Unit

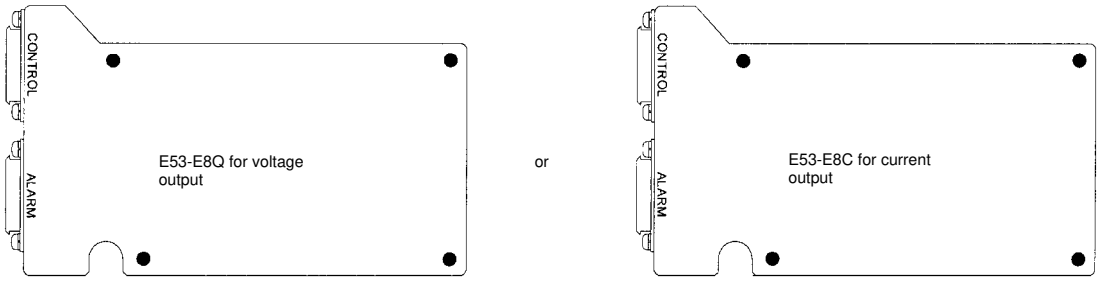


CT Input Unit



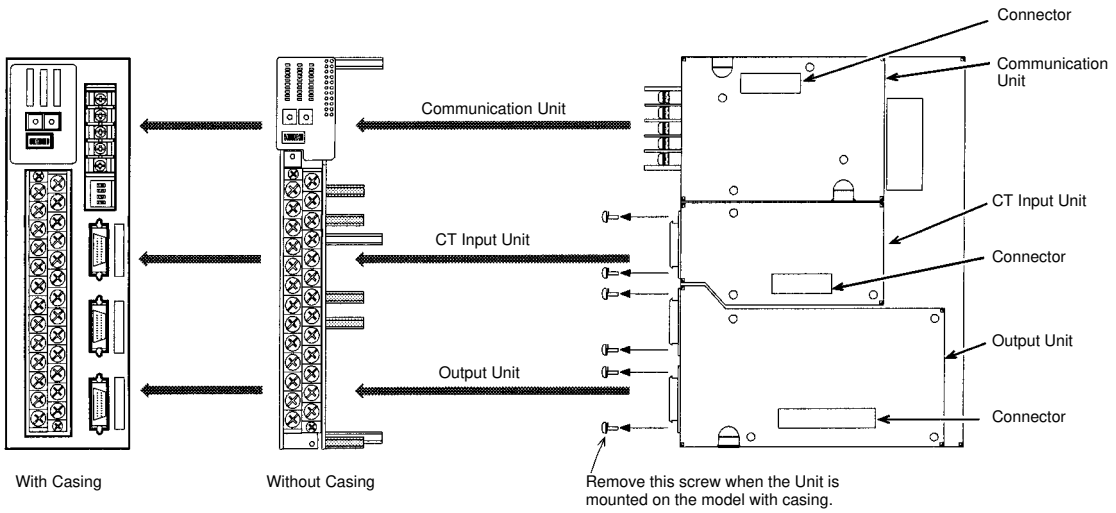
Use this CT input unit in combination with the E53-E8Q voltage output unit.

Output Unit



Tighten the screws through the holes marked with a black dot (●) to the fixing studs of the E5ZE.

Mounting Position of I/O Units



Mounting the Units

Use appropriate Phillips screwdriver for the screws. Use of an inappropriate screwdriver may damage the screws and cause insufficient tightening.

Mount the Units in an environment where anti-static electricity countermeasures have been taken.

Store the removed screws carefully and use them again when required.

Model With Casing

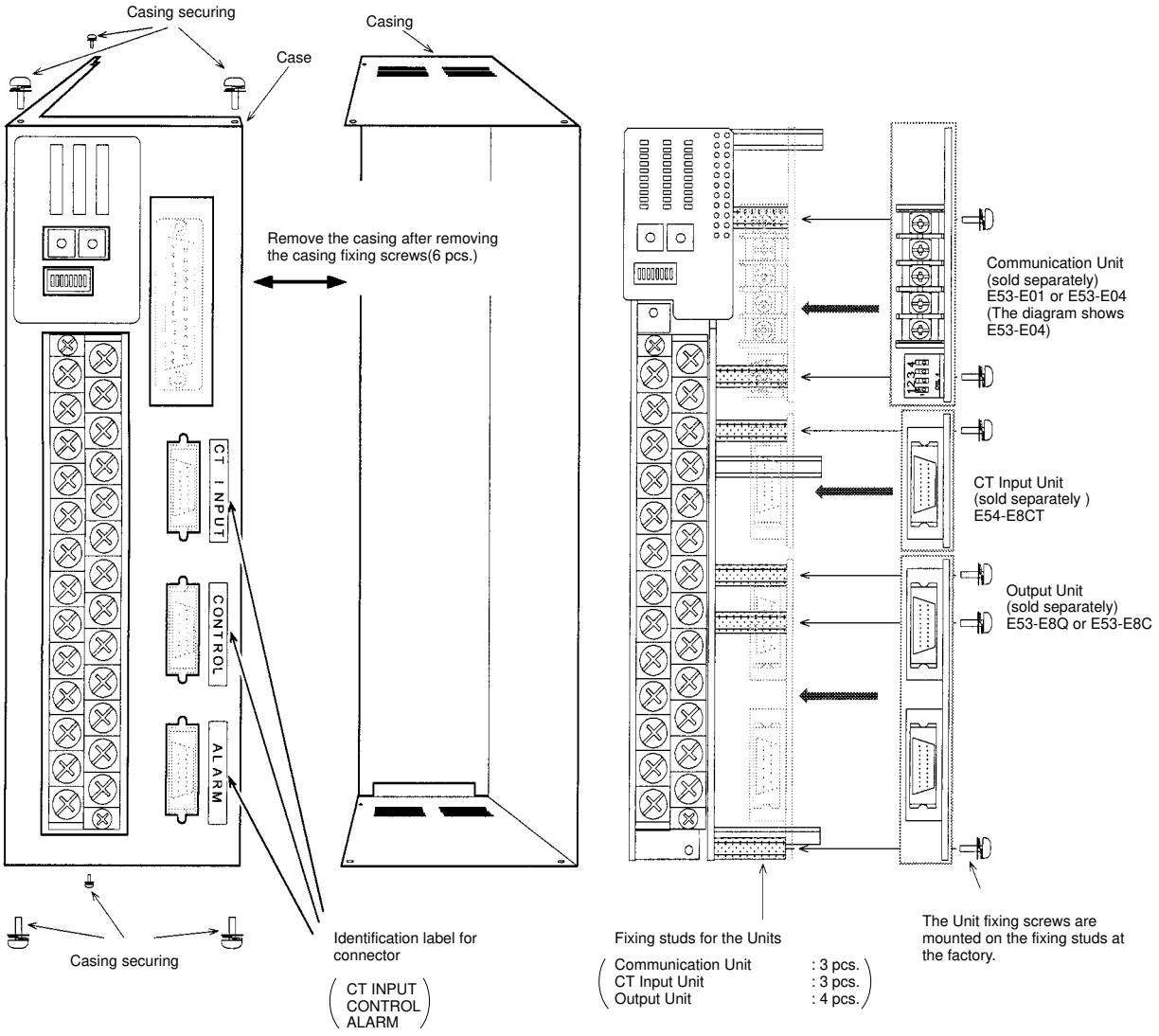
1, 2, 3...

1. Remove the connector fixing screws (2 screws each for a connector) from the Units (except for communication unit).
2. Remove the casing fixing screws (6 screws).
3. Remove the casing.
4. Mount the Units in the same manner as the model without casing.
5. Fix the connector to the case using the connector fixing screws with a torque of 0.34 to 0.39 N•m.
6. Replace the casing in its original position using six casing fixing screws.

Model Without Casing

1, 2, 3...

1. Remove the Unit fixing screws.
   When CT Input Unit is not required, do not touch the corresponding screws.
   To prevent the studs from loosening, use a wrench to fix the studs.
2. Fix the Units in the designated position.
   Connect the Units and the E5ZE connector properly.
3. Fix the Units to the studs with fixing screws with a torque of 0.43 to 0.58 N•m.

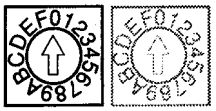


2-3 Setting Selectors and Switch

Observe the following precautions when operating the selectors and switch.

- Always make sure the power is OFF before changing the selectors and switch.
- Use a small flat-blade screwdriver to change the selector and switch settings, and be sure that the selectors are correctly positioned.

2-3-1 UNIT Selector



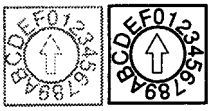
UNIT INPUT

When serial communications are being used, the UNIT selector must be set so that the host device can recognize the E5ZE unit number.

When more than one E5ZE Multipoint Temperature Controller is being used with RS-422 or RS-485 communications, set a different unit number for each E5ZE.

- The selector settings 0 to F correspond to unit numbers 00 to 0F. The factory setting of 0 corresponds to unit number 00.

2-3-2 INPUT Selector



UNIT INPUT

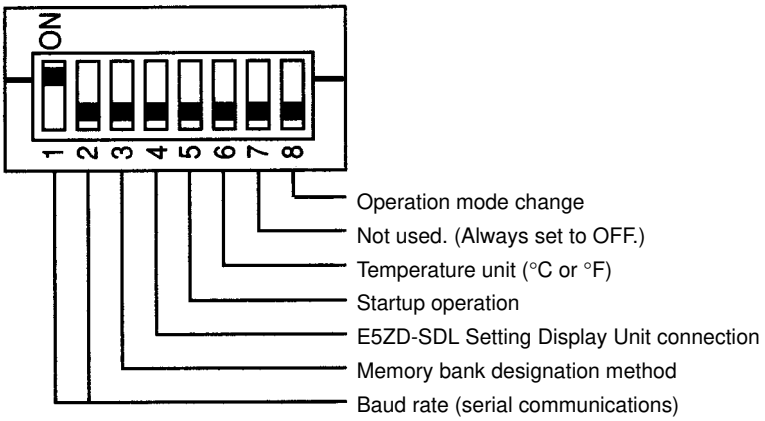
Set the INPUT selector according to the type of temperature sensor connected to the E5ZE. The selector positions and corresponding temperature sensors are as follows:

Selector setting	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Thermocouple	K	J	R	S	T	E	B	N	L	U	W	PLII	Not used.			
Platinum resistance thermometer	Pt	JPt	Not used.													

- The factory setting is 0.
- The platinum resistance thermometer settings “Pt” and “JPt” indicate Pt100 and JPt100 respectively.

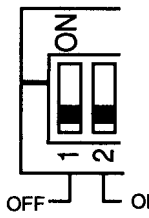
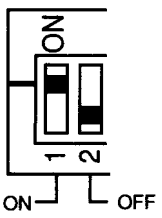
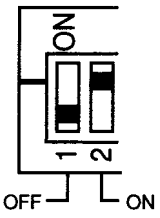
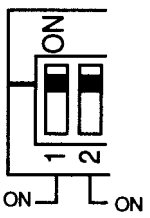
2-3-3 FUNCTION Switch

The FUNCTION switch is used to set the parameters of the E5ZE, such as the baud rate and startup operation.



Baud Rate (Serial Communications)

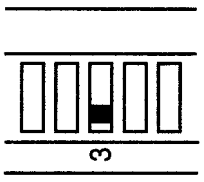
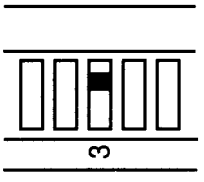
Set the baud rate using pins 1 and 2 to the baud rate of the host device connected to the EZ5E.

Baud rate	19,200 bps	9,600 bps	4,800 bps	2,400 bps
Pin 1 Pin 2				

The factory setting is 9,600 bps (pin 1 ON, pin 2 OFF).

Memory Bank Designation Method

Pin 3 is used to set the memory bank designation method.

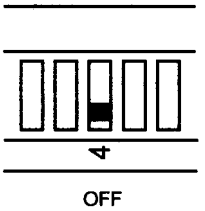
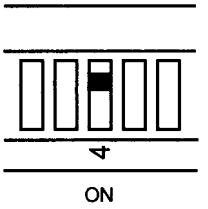
Memory bank designation	Communications	Contact inputs
Pin 3		

The factory setting is for communications (pin 3 OFF).

When contact inputs are used to switch memory banks, the specified memory bank will be used for all control points.

E5ZD-SDL Setting Display Unit Connection

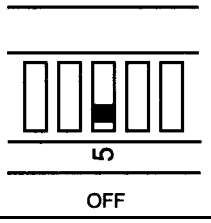
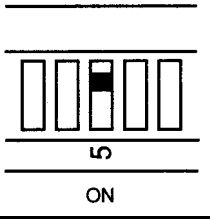
Pin 4 is used to specify when an E5ZD-SDL Setting Display Unit is connected.

E5ZD-SDL connection	Not connected	Connected
Pin 4		

The factory setting is for no connection (pin 4 OFF). Set pin 4 to ON when an E5ZD-SDL Setting Display Unit is to be connected to the E5ZE.

Startup Operation

Pin 5 is used to set the startup operation.

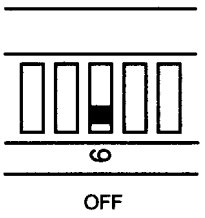
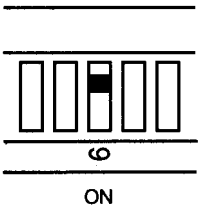
Startup operation	Stop operation control	Continue status at power OFF
Pin 5		

The factory setting is for stop operation control (pin 5 OFF).

If the power is turned OFF during manual operation and pin 5 is set to ON (continuous operation), manual operation will automatically begin when the power is turned ON again. The output value will be 0%.

Temperature Unit

Pin 6 is used to set the unit for measuring temperature.

Temperature unit	°C	°F
Pin 6		

The factory setting is for degrees Celsius (pin 6 OFF).

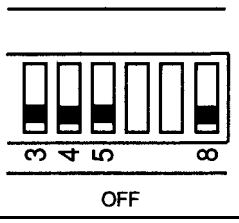
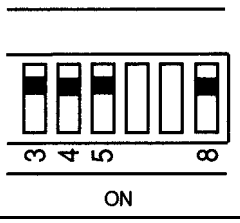
When the temperature unit is changed, the temperature data does not automatically change, so make sure to reset the temperature using the following procedure.

1, 2, 3...

1. Initialize the setting data.
2. Recalculate the data according to the following conversion formula and reset the control data within the setting range.
   (value in °F) = 1.8 x (value in °C) + 32
3. Store the settings in memory.

Operation Mode Change

Pins 3, 4, 5, and 8 are used to change the operation mode.

E5ZE operation mode	Control mode	Hardware test mode
Pins 3, 4, 5, and 8		

The factory setting is for Control Mode (pins 3, 4, 5, and 8 all OFF).

Control Mode: Use for normal temperature control.

Hardware Test Mode: Use for testing Peripheral Devices and wiring.

Refer to *Appendix E* for details on how to use Hardware Test Mode. Outputs can be turned ON and OFF in Hardware Test Mode regardless of the process value.

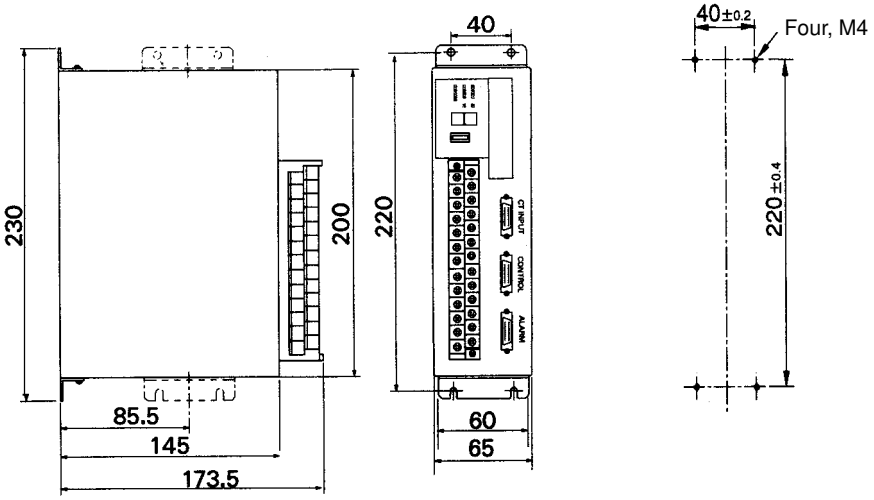
2-4 Installation

2-4-1 External and Panel Dimensions

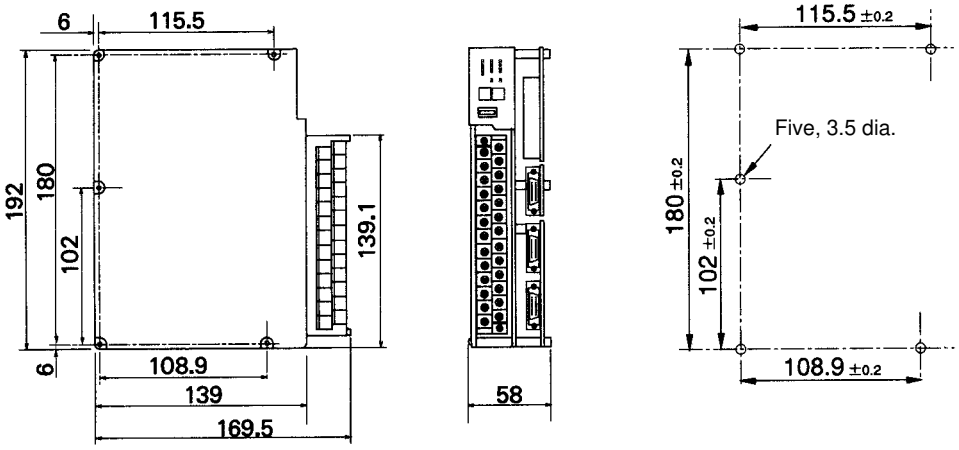
Unit: mm

Mounting Hole Dimensions

Serial Communications Model (with Casing)



Serial Communications Model (without Casing)



E5ZE-8□□□D1□B

(CompoBus/D Interface with Casing)