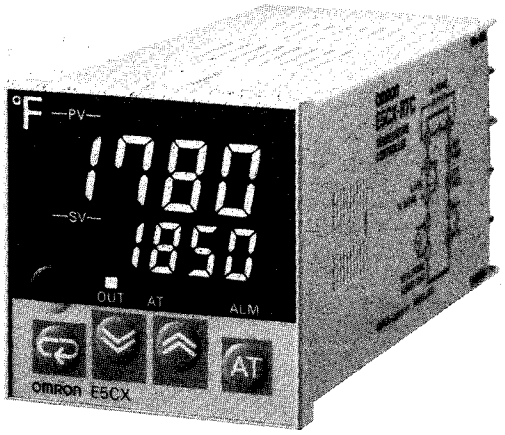
OMRON

Temperature Controller | E5CX(-H)

1/16 DIN, Multi-Range Controller Offers Advanced PID Control

- Advanced PID control provides fast, stable response without overshoot
- Large, easy-to-read displays show both process temperature and set value
- High accuracy with selectable temperature ranges
- Heater burnout alarm types are also available
- 3-year warranty



Ordering Information

■ TEMPERATURE CONTROLLERS

Models with heater burnout alarm use a single alarm output for the nine-function temperature alarm and heater burnout alarm. A current transformer is not included with the temperature controller with heater burnout alarm. Be sure to order it separately, as required. To order models factoy-set to Celsius, drop the "F" from the part number.

Input type	Heater burnout alarm	Control output type	Part number
Thermocouple	No	Relay output	**E5CX-RTC-F**
		Voltage output	**E5CX-QTC-F**
		Current output	**E5CX-CTC-F**
	Yes	Relay output	**E5CX-RHTC-F**
		Voltage output	**E5CX-QHTC-F**
Platinum RTD	No	Relay output	**E5CX-RP-F**
		Voltage output	**E5CX-QP-F**
		Current output	**E5CX-CP-F**
	Yes	Relay output	**E5CX-RHP-F**
		Voltage output	**E5CX-QHP-F**

■ TEMPERATURE RANGES

Thermocouple Types

Input type (switch selectable)		Thermocouple							
		Type K	Type J/L	Type T/U	Type E	Type B	Type N	Type R	Type S
Temperature range	°C	-200 to 1,300	-100 to 850	-200 to 400	0 to 600	100 to 1,800	0 to 1,300	0 to 1,700	0 to 1,700
	°F	-300 to 2,300	-100 to 1,500	-300 to 700	0 to 1,100	300 to 3,200	0 to 2,300	0 to 3,000	0 to 3,000
Unit of measure		1° C or F, main setting and alarm							

Platinum RTD Types

Input type (switch selectable)		Platinum RTD
		100 Ω
Temperature range	°C	-99.9 to 450
	°F	-99.9 to 800
Unit of measure		0.1° C or F, main setting and alarm

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■ CURRENT TRANSFORMERS

Hole diameter	5.8 mm (0.23 in)	12.0 mm (0.47 in)
Part number	**E54-CT1**	**E54-CT3**

■ REPLACEMENT PARTS

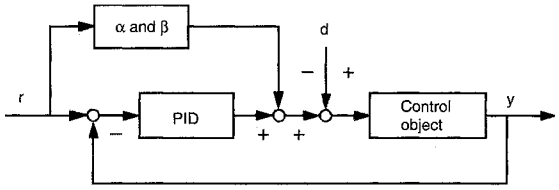
Description	**Part number**
Adapter for panel mounting (supplied with each unit)	**Y92F-30**

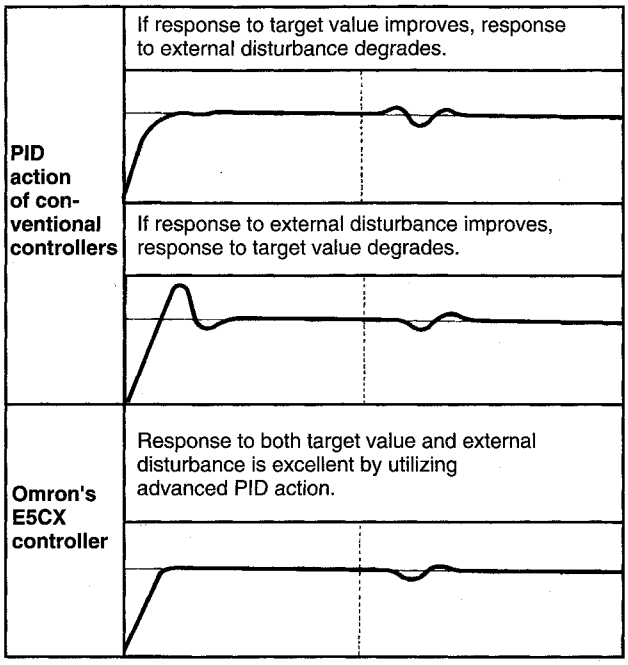
Advanced PID Control

Omron utilizes an advanced PID algorithm which provides superior control during both start-up and normal operation.

In classic PID, there is a trade-off between having the controller respond quickly and accurately to the initial target value, and also to an external disturbance that may occur after the initial target value has been achieved. PID constants set to maximize performance on start-up often degrade response to external disturbances, and the converse would also be true.

With Omron's PID algorithm, start-up and disturbance response are independent of each other. The controllers' auto-tuning process determines PID constants that are optimum for disturbance response. However, on start-up the algorithm is altered by known values (α and β). The resulting control is responsive on start-up and stable during regular operation.





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Specifications

■ TEMPERATURE CONTROLLER

Part number			E5CX-❑❑TC-F	E5CX-❑❑P-F
Sensor input types			Thermocouple types K, J, L, T, U, E, B, N, R, S	Platinum RTD (100 Ω)
Supply voltage			100 to 240 VAC, 50/60 Hz	
Operating voltage			85 to 110% of rated supply voltage	
Power consumption			Approx. 6 VA at 100 VAC to 10 VA at 240 VAC	
Control output	Type	Relay	SPST–NO, 3 A, 250 VAC (resistive load), E5CX-R❑❑	
		Voltage	20 mA, 12 VDC with short-circuit protection, E5CX-Q❑❑	
		Current	4 to 20 mA, 600 Ω max. load, E5CX-C❑❑	
	Isolation		All output units are optically isolated from the internal circuits.	
	Hysteresis		0.0 to 999.9°C/°F in units of 0.1 (during ON/OFF control action)	
	Update time	Output	500 ms for pulse and current outputs	
		Display	500 ms	
Alarm output	Type		SPST-NO relay, 1 A, 250 VAC (resistive load)	
	Setting range		Thermocouple: -999 to 9,999°C/°F	
			Platinum RTD: -99.9 to 999°C/°F	
Heater burnout output	Type		SPST-NO relay, 1 A, 250 VAC (E5CX-❑H❑❑-F)	
	Setting range		0.1 to 49.9 A in units of 0.1 A 0.0 setting disables the output; 50.0 setting turns output ON continuously	
	Minimum detectable ON time		200 ms; heater current is not measured when the control output is ON less than 200 ms	
Indication accuracy	General		±0.3% of set value or ±1°, whichever is greater, ±1 digit maximum	
	Exceptions		Accuracy of type U thermocouples is ±2°C (3.6°F) from -150° to 400°C (-240° to 700°F), ±1 digit. Accuracy is not guaranteed below -150°C (-240°F). The accuracy of types R and S thermocouples is ±3°C (±5.4°F) from 0° to 200°C (32° to 400°F), ±1 digit.	
	Heater burnout		±5% of full scale, ±1 digit maximum of heater current	
Setting accuracy			Set value coincides with the indicated value, since no relative error exists between both values	
Control modes	Type		ON/OFF or PID with automatic tuning and circuitry to prevent overshoot	
	Proportional band		0.0 to 999.9°C/°F in units of 0.1	
	Reset time		0 to 3,999 seconds in units of 1 second	
	Rate time		0 to 3,999 seconds in units of 1 second	
	Control period		Pulse output: 1 to 99 seconds in units of 1 second	
	Sampling period		500 ms	
Memory protection			Non-volatile memory (EEPROM)	
Other functions	Input shift		Offsets input value and display value to accommodate a sensor input that deviates by a known value.	
			Thermocouple range: -999 to 9,999°C/°F Platinum RTD range: -99.9 to 999°C/°F	
	Miscellaneous		Upper and lower set value limits, key protection, °C/°F selectable internally, Normal and Reverse output selection, Watchdog function to detect CPU failure and restore CPU to normal operation.	
Indicators			Preset Value, 10.5 mm (0.42 in); Set Value, 7.5 mm (0.3 in); LED indicators for others	
Materials			Plastic case	
Mounting			Panel mount	
Connections			Plated steel screw terminals mounted on rear of unit	
Weight			Approx. 160 g (5.6 oz.)	
Enclosure ratings	Front panel Rear panel Terminals		IEC IP50, NEMA 4 with optional cover Y92A-48N IEC IP20 IEC IP00	
Approvals	UL		Recognized, File Number E68481 (all models)	
	CSA		Certified, File Number LR59623 (all models)	
Ambient temperature	Operating		-10° to 55°C (14° to 131°F)	
	Storage		-25° to 65°C (-13° to 149°F)	
Humidity			35 to 85% RH	
Insulation resistance			20 MΩ minimum at 500 VDC	
Dielectric strength			2,000 VAC, 50/60 Hz for 1 minute between terminals of different polarity	
Vibration	Mechanical durability		10 to 55 Hz 0.75 mm (0.03 in) in X, Y, and Z directions for 2 hours each	
	Malfunction durability		2 to 55 Hz, 2 G, in X, Y, and Z directions for 10 minutes each	
Shock	Mechanical durability		300 m/s² in 6 directions, 3 times each	
	Malfunction durability		100 m/s² in 6 directions, 3 times each	

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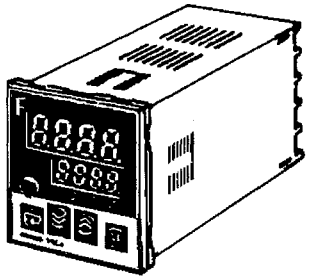
■ CURRENT TRANSFORMER

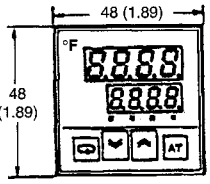
Heater current	Maximum 50 A continuous service, single-phase
Weight	Approx. 11.5 g (0.41 oz.) for E54-CT1; approx. 50 g (1.8 oz) for E54-CT3
Dielectric strength	1,000 VAC
Vibration	50 Hz (approximately 10G)

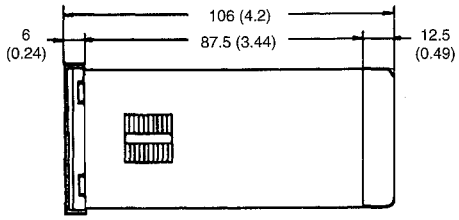
Dimensions

Unit: mm (inch)

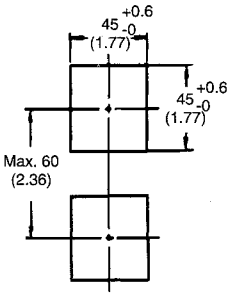
■ E5CX/E5CX-H TEMPERATURE CONTROLLERS



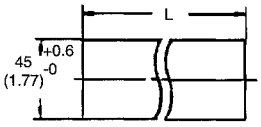




Panel Cutout



Side-by-side Mounting of Several Temperature Controllers



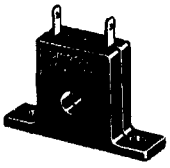
Controllers	2	3	4	5	6
L	93.5^{+1}_{-0}	141.5^{+1}_{-0}	189.5^{+1}_{-0}	237.5^{+1}_{-0}	285.5^{+1}_{-0}

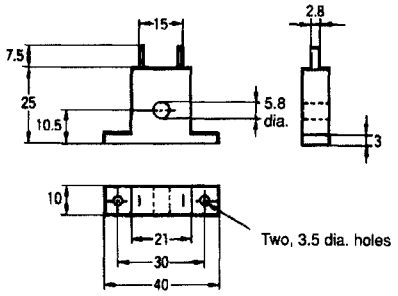
$L=(48 \times \text{block} - 2.5)^{+1}_{-0}$
for tight side-by-side mounting

Note:
1. Recommended panel thickness is 1 to 8 mm (0.04 to 0.31 in).
2. Because mounting brackets are attached to the top and bottom of a temperature controller, tight side-by-side mounting is possible.

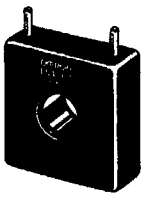
■ CURRENT TRANSFORMER

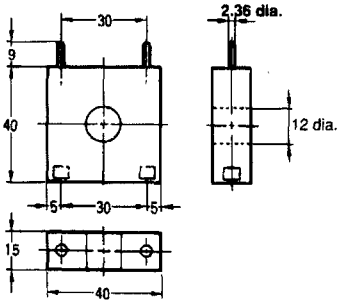
E54-CT1





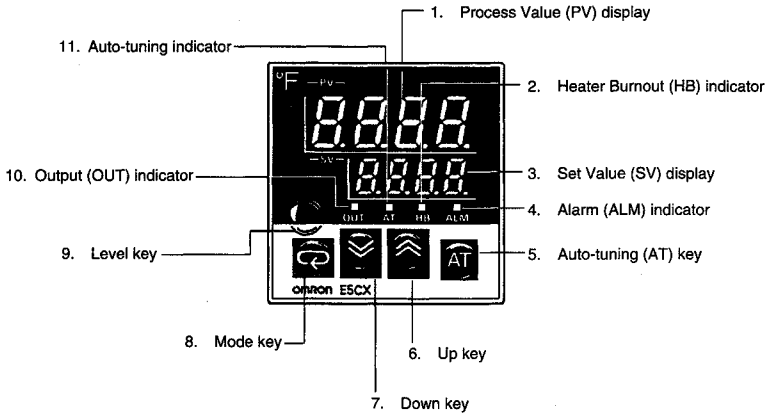
E54-CT3





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Nomenclature

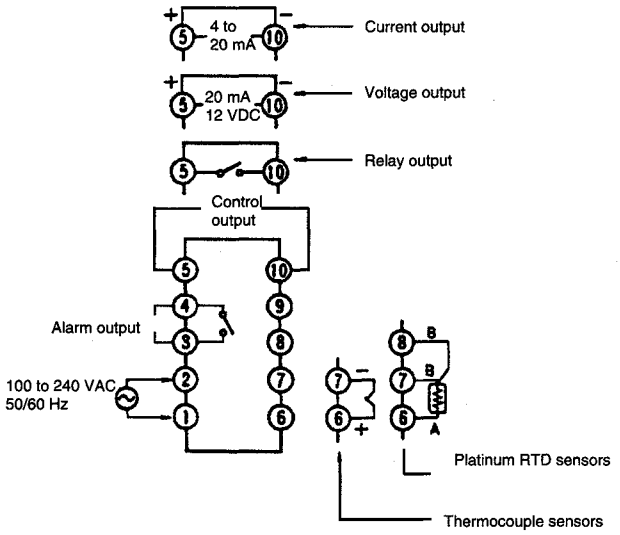


Key	Description	Key	Description
1	Process Value indicator displays the process temperature and indicates the parameter being displayed on the SV (Set Value) display and error messages.	6	When pressed, the up key increases the set temperature or other parameters. When held down, the key successively increases the value.
2	Heater Burnout indicator lights when a heater burnout is detected and stays lit until rest. Provided on the Heater Burnout Alarm Types only.	7	When pressed, the down key decreases the set temperature or other parameters. When held down, the key successively decreases the value.
3	Set Value (SV) displays set temperature and other parameters.	8	The mode key shifts display to the next parameter.
4	Alarm indicator lights when the alarm output is ON.	9	Press the level key for at least 2 seconds to change levels to set different groups of parameters.
5	Auto-tuning key. To start auto-tuning, press the key for at least 1 second when PID operation has been designated. To stop auto-tuning, press the key for at least 1 second during auto-tuning.	10	The output indicator lights when the control output is ON. There is no output indicator for Current Output Types.
		11	The auto-tuning indicator flashes on and off about every second when auto-tuning is occurring.

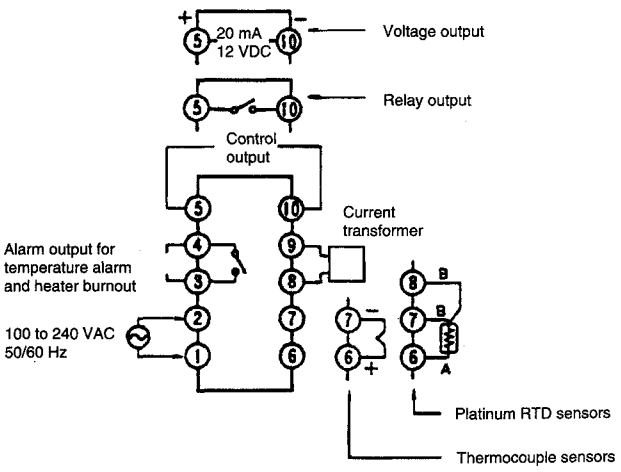
Connections

■ CONTROLLER WIRING

Controllers without Heater Burnout Alarm



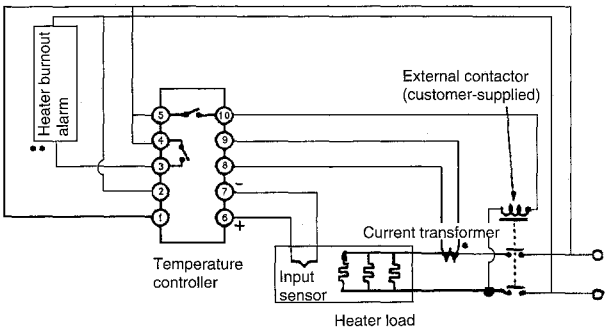
Controllers with Heater Burnout Alarm

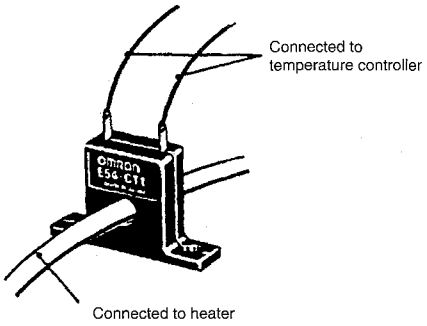


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■ OVERALL SYSTEM

Connection Example





*This wiring must be passed through the hole of the current transformer. The current transformer can be connected to the controller in any polarity.
**For the heater burnout alarm types, the alarm output goes ON when either the normal alarm or the heater burnout alarm is activated.

NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

OMRON®
OMRON ELECTRONICS LLC
One East Commerce Drive
Schaumburg, IL 60173
1-800-55-OMRON

OMRON ON-LINE
Global - http://www.omron.com
USA - http://www.omron.com/oei
Canada - http://www.omron.com/oci

OMRON CANADA, INC.
885 Milner Avenue
Scarborough, Ontario M1B 5V8
416-286-6465

Cat. No. GC TC9

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