

Integrated Multi-Function

EZ-ZONE ST

The EZ-ZONE ST integrated solid state controller from Watlow offers a complete thermal system control solution in a single package. Features include a PID temperature controller connected to a high-amperage solid state relay with the option of adding a properly sized heat sink, an over- and under-temperature limit, a power shut-down contactor and digital communications in one complete and professionally engineered product.

Because the system is modular and scalable, a user only pays for what is needed. Stacking the EZ-ZONE ST integrated controller into multiple configurations enables flexibility to standardize the product platform to solve a wide range of application needs.

This integrated controller also includes 200KA short circuit current rating (SCCR) tested up to 480VAC to minimize damage in the event of a short circuit when used with required fusing.

Features and Benefits

Back panel or DIN-rail mount

- Provides several mounting options

Compact package

- Reduces panel size

Touch-safe package

- Complies with IP2X increasing user safety

±0.1 percent temperature accuracy

- Provides efficient and accurate temperature control

200KA SCCR with proper fusing

- Minimizes damage in the event of a short circuit

Agency approvals: UL®, CSA, CE, RoHS, W.E.E.E.

- Meets applications requiring agency approvals

Three-year warranty

- Ensures Watlow's reliability and product support

Off-the-shelf designed system solution

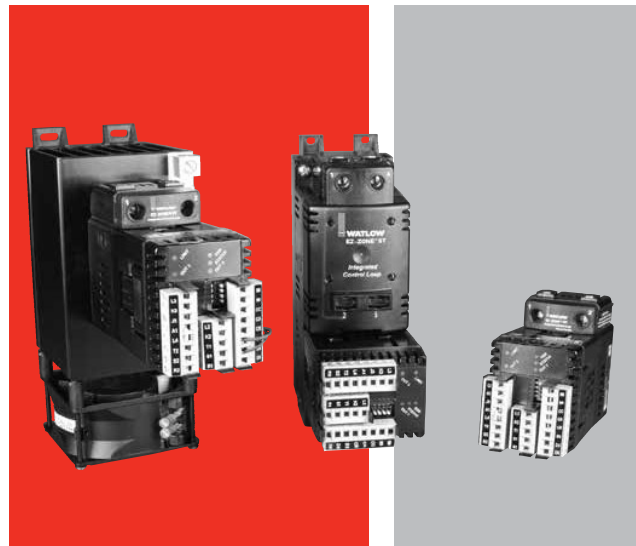
- Improves system reliability and termination reduction
- Reduces installation cost
- Eliminates incompatibility headaches often encountered with using many different components and brands

Profile capability

- Includes ramp and soak with four files and 40 total steps

Ability to communicate with programmable logic controller (PLC), personal computer (PC) or operator interface terminal (OIT)

- Optional EIA-485 Modbus® RTU
- RUI/communications gateway with optional EIA-232/485 Modbus® RTU, EtherNet/IP™/TCP Modbus®, DeviceNet™ or PROFIBUS DP. Refer to page 341 for further information.



Solid state relay output

- Allows faster cycling, more precise control, increased heater life and improves energy efficiency
- Ability to handle up to 75 amperes
- Uses either zero-cross or phase angle control modes for flexibility to control resistive loads such as Nichrome®, tungsten or quartz lamps
- Utilizes phase angle control mode to prevent load failure or blowing fuses for tungsten or quartz loads

PID temperature control

- Allows single input/dual output
- Allows standard PID or adaptive TRU-TUNE+ tuning algorithms for demanding controllability requirements

Optional temperature limit

- Increases safety in over- and under-temperature conditions

Optional definite purpose mechanical contactor

- Enables circuit safety shut down driven by limit control or PID alarm output signal

Optional current monitoring feature

- Detects heater current flow and alarm indication of failed solid state relay (SSR) or heater zone

Optional SSR heat sink

- Sized and engineered for specific applications
- Factory supplied heat sink is UL® listed

System diagnostics

- Provides continuous self-monitoring alerts when there is any system trouble to reduce maintenance and service costs

PC Software—EZ-ZONE Configurator

- Wizard style configuration of controller settings
- Online or offline recipe editing

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Specifications

Line Voltage/Power

- 100 to 240VAC, +10/-15%; (85-264VAC), 50/60Hz, $\pm 5\%$
- 24VAC/VDC, +10/-15%; 50/60Hz, $\pm 5\%$
- 12VA max. power consumption without mechanical contactor in system
- 50VA max. power consumption with mechanical contactor used in system, 140VA if using external contactor
- Data retention upon power failure via nonvolatile memory

Environment

- 0 to 158°F (-18 to 70°C) operating temperature
- -40 to 185°F (-40 to 85°C) storage temperature
- 0 to 90% RH, non-condensing

Accuracy

- Calibration accuracy and sensor conformity: $\pm 0.1\%$ of span, $\pm 1^\circ\text{C}$ @ the calibrated ambient temperature and rated line voltage
 - Types R, S, B: 0.2%
 - Type T below -50°C : 0.2%
- Calibration ambient temperature @ 77°F $\pm 5^\circ\text{F}$ ($25^\circ\text{C} \pm 3^\circ\text{C}$)
- Accuracy span: 1000°F (540°C) min.
- Temperature stability: $\pm 0.1^\circ\text{F}/^\circ\text{F}$ ($\pm 0.1^\circ\text{C}/^\circ\text{C}$) rise in ambient max.

Agency Approvals

- UL®, CSA, CE (zero cross models only), RoHS, W.E.E.E.
- Limit version features FM approval

Controller

- Microprocessor based user-selectable control modes
- PID module: single universal input, 2 outputs
- Limit module: single universal input, 2 outputs
- Two total additional digital input/outputs shared between PID and limit functions
- Control sampling rates: input = 10Hz, outputs = 10Hz
- Isolated EIA-485 Modbus® RTU serial communications

Wiring Termination—Touch Safe Terminals

- Input, power and controller output terminals touch safe removable 12 to 22 AWG
- Power load terminals 6 to 12 AWG
 - Tightening torque: 30 in.-lbs

Universal Input

- Thermocouple, grounded or ungrounded sensors
 - $>20\text{M}\Omega$ input impedance
 - Max. of 20Ω source resistance
- RTD 2- or 3-wire, platinum, 100Ω and 1000Ω @ 0°C calibration to DIN curve ($0.00385\Omega/\Omega/^\circ\text{C}$)
- Process, 0-20mA @ 100Ω , or 0-10VDC @ $20\text{k}\Omega$ input impedance; scalable, 0-50mV
- Inverse scaling

Digital Input

- Update rate: 1Hz
- Dry contact or dc voltage
 - DC voltage
 - Max. input: 36V at 3mA
 - Min. high state: 3V at 0.25mA
 - Max. low state: 2V
 - Dry contact
 - Max. short circuit: 13mA
 - Min. open resistance: 500Ω
 - Max. closed resistance: 100Ω

Current Measurement

- Accuracy: typical $\pm 1\text{A}$, max. error $\pm 3\text{A}$
- Accuracy and operating range: 0 to 75A

Digital Output

- Update rate: 1Hz
- Output voltage: 24V, current limit 10mA

Allowable Operating Range

Type J: 32 to 1500°F or 0 to 815°C
 Type K: -328 to 2500°F or -200 to 1370°C
 Type T: -328 to 750°F or -200 to 400°C
 Type N: 32 to 2372°F or 0 to 1300°C
 Type E: -328 to 1470°F or -200 to 800°C
 Type C: 32 to 4200°F or 0 to 2315°C
 Type D: 32 to 4200°F or 0 to 2315°C
 Type F: 32 to 2543°F or 0 to 1395°C
 Type R: 32 to 3200°F or 0 to 1760°C
 Type S: 32 to 3200°F or 0 to 1760°C
 Type B: 32 to 3300°F or 0 to 1816°C
 RTD (DIN): -328 to 1472°F or -200 to 800°C
 Process: -1999 to 9999 units

Output Hardware

- User selectable for heat/cool as on-off, P, PI, PD, PID, or alarm action. Not valid for limit controls
- Electromechanical relay. Form A, rated 2A
- SSR drive: 20-28VDC low side open collector switch
- SSR, Form A, 0.5A @ 24VAC min., 264VAC max., opto-isolated, without contact suppression
- Electromechanical relay, Form A, rated 5A, auxiliary output on PID module, output 2
- Electromechanical relay, Form C, rated 5A, auxiliary output on limit module, output 3

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Specifications for Mechanical Contactor

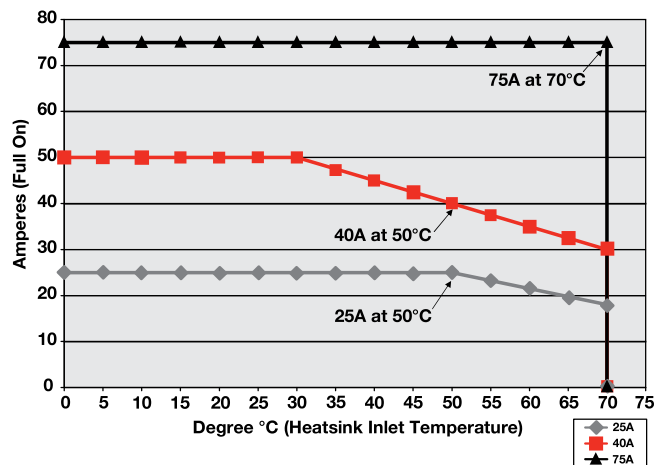
- Insulation class: UL® Class B 266°F (130°C)
- Min. load of 100 watts
- Duty cycle: continuous

Contact Ratings

Full Load Amperes	Number of Poles	Line Voltage	Locked Rotor Amps	Resistive Amp Rating	Max. Horsepower	
					Voltage	Single-Phase
40	2	240/277	240	50	120	2
		480	200	50	240	3
		600	160	50		

EZ-ZONE ST Solid State Relay with Heat Sink Specifications

Temperature and SSR Amperage Performance Curve Watlow 25, 40 and 75 Ampere Solid State Relays



All Versions			
Current output (50°C)	25 Amps	40 Amps	75 Amps
One-cycle surge current	600Apk	850Apk	1350Apk
Max. I ² t for fusing	1500A ² s	3000A ² s	7560A ² s
Thermo resistance	0.35°C/W	0.2°C/W	0.14°C/W
Base plate temperature (max.)	116°C	115°C	112°C
Forward voltage drop	1.3Vpk	1.3Vpk	1.3Vpk
Min. holding current	150mA	150mA	250mA
Frequency	47 to 63Hz	47 to 63Hz	47 to 63Hz

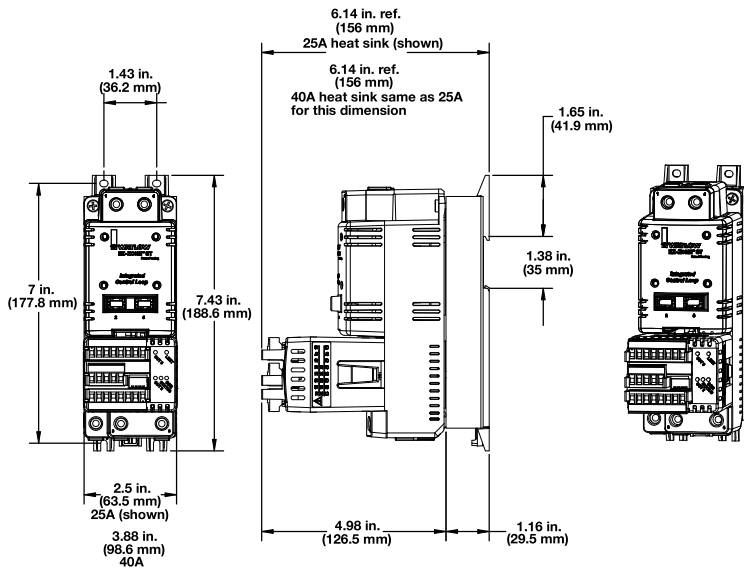
Time Proportioned Models	
Off-state leakage	1mA
Max. off-state dv/dt	500V/μsec
120/240VAC	
Output voltage range	24 to 280VAC
Over voltage rating	600Vpk
Input voltage range	0 to 28VDC
277/600VAC	
Output voltage range	48 to 660VAC
Over voltage range	1200Vpk
Input voltage range	0 to 28VDC

Phase Angle Models	
Off-state leakage	6mA
Max. off-state dv/dt	200V/μsec
120/240VAC	
Output voltage range	100 to 240VAC
Over voltage rating	600Vpk
Input voltage range	2.7 to 10VDC
277/600VAC	
Output voltage range	260 to 600VAC
Over voltage range	1200Vpk
Input voltage range	2.8 to 10VDC

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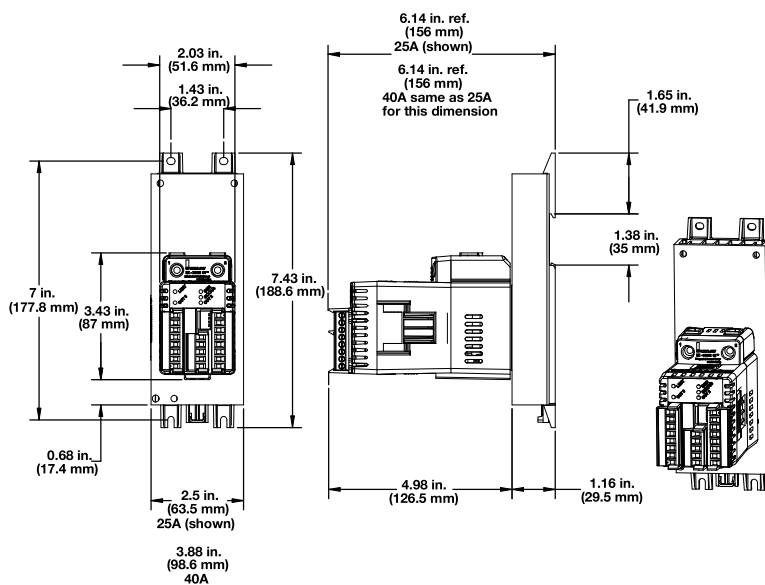
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EZ-ZONE ST with Definite Purpose Mechanical Contactor—Dimensional Drawing



Note: EZ-ZONE ST must be mounted vertically (as shown) to meet amp/ambient performance curve.

EZ-ZONE ST with 25 or 40A Heat Sink, without Definite Purpose Mechanical Contactor—Dimensional Drawing

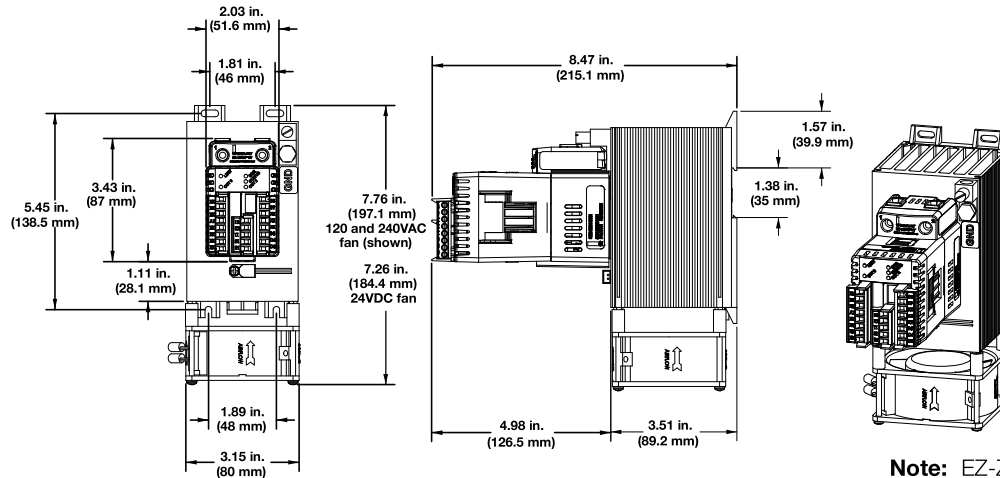


Note: EZ-ZONE ST must be mounted vertically (as shown) to meet amp/ambient performance curve.

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EZ-ZONE ST with 75A Heat Sink, without Definite Purpose Mechanical Contactor— Dimensional Drawing



Note: EZ-ZONE ST must be mounted vertically (as shown) to meet amp/ambient performance curve.

Communications

Selecting the right communications ordering option for the EZ-ZONE ST:

Correct Ordering Option Letter	Connecting To	Another EZ-ZONE Product	RUI, EZ-ZONE Configurator, SpecView	Third Party Device (PLC, PC, Touch Panel, etc.)	Silver Series Operator Interface Terminal
Option A*			Yes		
Option M**				Yes - Via Modbus®	Yes - Via Modbus®
Option A*		Yes	Yes		
Option M**		Yes		Yes - Via Modbus®	Yes - Via Modbus®

*A = Standard bus used to connect to Watlow PC software, RUI, other EZ-ZONES
 **M = Modbus® RTU (needed to communicate to third-party devices) and standard bus. User selectable

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Ordering Information

Part Number

① ②	③	④	⑤ ⑥	⑦	⑧	⑨	⑩	⑪ ⑫
	Integrated PID Controller	Integrated Limit Controller	Mech. Cont. & Pwr. Supply	Comm.	SSR	Heat Sink/DIN-Rail Mtg.	Firmware	Customization
ST								

③ Integrated PID Controller				
	Output 1*	Output 2	Total of 2 Digital I/O Points	Current Measurement
K =	SSR drive	0.5A SSR	No	No
B =	SSR drive	0.5A SSR	Yes	No
P =	SSR drive	0.5A SSR	No	Yes
E =	SSR drive	0.5A SSR	Yes	Yes
H =	SSR drive	5A mechanical relay	No	No
D =	SSR drive	5A mechanical relay	Yes	No
J =	SSR drive	5A mechanical relay	No	Yes
C =	SSR drive	5A mechanical relay	Yes	Yes

* Output 1 is dedicated to providing the command signal to the internal SSR.

Note: If 75A heat sink is selected below, then 1 digital I/O will be factory set and fixed as the SSR over-temperature digital input.

④ Integrated Limit Controller	
A =	None
L =	Limit control module with output 3, 5A Form C mechanical relay; with output 4, 2A Form A mechanical relay
B =	No limit control module but access to coil connection on mechanical contactor

⑤ ⑥ Mechanical Contactor and Power Supply Options	
AH =	No contactor and universal high voltage power supply 100-240VAC/VDC
AL =	No contactor and universal low voltage power supply 24-28VAC/VDC
B1 =	Single pole, 40A Watlow contactor, 24VAC power supply
B2 =	Single pole, 40A Watlow contactor, 110/120VAC power supply
B3 =	Single pole, 40A Watlow contactor, 208/240VAC power supply
F1 =	Dual pole, 40A Watlow contactor, 24VAC power supply
F2 =	Dual pole, 40A Watlow contactor, 110/120VAC power supply
F3 =	Dual pole, 40A Watlow contactor, 208/240VAC power supply

⑦ Communications	
A =	Standard bus used to connect to Watlow PC software, RUI, other EZ-ZONES
M =	485 Modbus® RTU (needed to communicate to third-party devices) and standard bus. User selectable

⑧ SSR	
B =	Zero cross 10A (24 to 240VAC output)
C =	Zero cross 25A (24 to 240VAC output)
D =	Zero cross 40A (24 to 240VAC output)
E =	Zero cross 50A (24 to 240VAC output)
K =	Zero cross 75A (24 to 240VAC output)
F =	Zero cross 90A (24 to 240VAC output)
G =	Zero cross 25A (48 to 600VAC output)
H =	Zero cross 40A (48 to 600VAC output)
L =	Zero cross 75A (48 to 600VAC output)
J =	Zero cross 90A (48 to 600VAC output)
M =	Phase angle 25A (100 to 240VAC output)
N =	Phase angle 40A (100 to 240VAC output)
P =	Phase angle 75A (100 to 240VAC output)
R =	Phase angle 25A (260 to 600VAC output)
S =	Phase angle 40A (260 to 600VAC output)
T =	Phase angle 75A (260 to 600VAC output)

Note: EZ-ZONE ST phase angle is designed to work with tungsten or quartz loads. The EZ-ZONE ST should not be used with globars, molybdenum, graphite or transformer loads.

⑨ Heat Sinks/DIN-Rail Mounting Bracket	
A =	None
B =	25A
C =	40A
D =	75A 24VDC fan cooled
E =	75A 115VAC fan cooled
F =	75A 240VAC fan cooled

Note: If heat sink option D, E or F is selected you must also order integrated PID controller options B, E, D or C. 75A heat sink option includes SSR over-temperature thermostat shut-down feature.

⑩ Firmware	
A =	Standard Watlow
P =	Profile ramp and soak (40 total steps, 1 to 4 profiles total)
S =	Custom

⑪ ⑫ Customization (logo, parameters, hardware, firmware)	
AA =	Standard
XX =	Letters to be determined, contact factory

Note: Maximum rating of final configured product is determined by the lowest component rating of either the mechanical contactor, solid-state relay or heat sink. Maximum UL® rating for product is 75A.