



## EZ-ZONE® ST Integrated Control Loop Makes Solving the Thermal Requirements of Your System Easy

The EZ-ZONE® ST integrated solid state controller from Watlow® offers complete thermal system control in a single package solution. 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 shut-down power contactor, digital communications and a remote user interface in one complete and professionally engineered product.

Because the system is modular and scalable, you only pay for what you need. You can stack the EZ-ZONE ST integrated controller into multiple configurations giving you the flexibility to standardize on the product's platform to solve a wide range of application needs.

### Features and Benefits

#### Back panel or DIN-rail mount

- Provides several mounting options

#### Compact package

- Reduces panel size

#### Touch-safe package

- Complies to IP2X which increases safety for user

#### ±0.1 percent temperature accuracy

- Provides efficient and accurate temperature control

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

- Meets applications requiring agency approvals

#### EZ-ZONE P3T armor sealing system Remote User Interface (RUI)

- Complies to NEMA 4X, IP65 RUI
- Offers water and dust resistance, can be cleaned and washed down

#### Three-year warranty

- Demonstrates Watlow's reliability and product support

#### Off-the-shelf designed system solution

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

#### Profile capability

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

#### Communications with PLC, PC or OIT

- EZ-ZONE ST with optional EIA 485 Modbus® RTU
- EZKB (RUI/Communications Gateway) with optional EIA 232/485 Modbus® RTU, EtherNet IP™/TCP Modbus®, DeviceNet™ or PROFIBUS DP

Multiple U.S. and international patents pending.

EZ-ZONE® ST  
75 ampere configuration



EZ-ZONE® ST  
40 ampere full configuration  
with mechanical contactor



EZ-ZONE® ST  
configuration with only  
the controller and SSR



### Features and Benefits (con't)

#### Solid state relay output

- Allows faster cycling, more precise control, increased heater life and energy efficiency
- Up to 75 amperes
- Uses either zero-cross or phase angle control modes for flexibility to control resistive or inductive loads
- Soft start feature with phase angle control mode to prevent load failure or blowing fuses

#### 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 condition

#### 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 Remote User Interface EZKB (RUI)

- Uses one RUI for multiple zone solutions to save costs
- Fits in small places due to shallow panel depth
- Eliminates costs and complexity of having to bring all controller related wires to front panel area
- Enables use of multiple remote user interfaces to improve usability of system

#### 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
- On-line or off-line recipe editing

 **WATLOW®**  
Better Thermal Solutions...Faster

**ISO 9001**



Registered Company  
Winona, Minnesota USA

WIN-EZST-0410



## Specifications

### Line Voltage/Power

- 100 to 240VAC, +10/-15%; (85-264VAC), 50/60Hz, ±5%
- 24VAC/VDC, +10/-15%; 50/60Hz, ±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 149°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: ±0.1% of span, ±1°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 ±5°F (25°C ±3°C)
- Accuracy span: 1000°F (540°C) min.
- Temperature stability: ±0.1°F/°F (±0.1°C/°C) rise in ambient max.

### Agency Approvals

- UL®, CSA, CE, IP65/NEMA 4X indoor use RUI, 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
  - >20MΩ input impedance
  - Max. of 20Ω source resistance
- RTD 2- or 3-wire, platinum, 100Ω and 1000Ω @ 0°C calibration to DIN curve (0.00385Ω/Ω/°C)
- Process, 0-20mA @ 100Ω, or 0-10VDC @ 20kΩ 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 ±1A, max. error ±3A
- 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

## Specifications for Basic Remote User Interface EZKB (RUI)

### Operator Interface

- Dual 4 digit, 7 segment LED displays
- Forward, backward, up and down keys plus a customer programmable function key - EZ key
- Typical display update rate: 1Hz
- Agency approved to IP65/NEMA 4X
- Standard bus (ships with all units). Options: EIA 232/485 Modbus® RTU, EtherNet/IP™/TCP Modbus® or DeviceNet™, PROFIBUS DP

### Line Voltage/Power

- 100 to 240VAC, +10/-15%; (85-264VAC) 50/60Hz, ±5%
- 24VAC/VDC, +10/-15%; 50/60Hz, ±5%

## Specifications for Mechanical Contactor

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

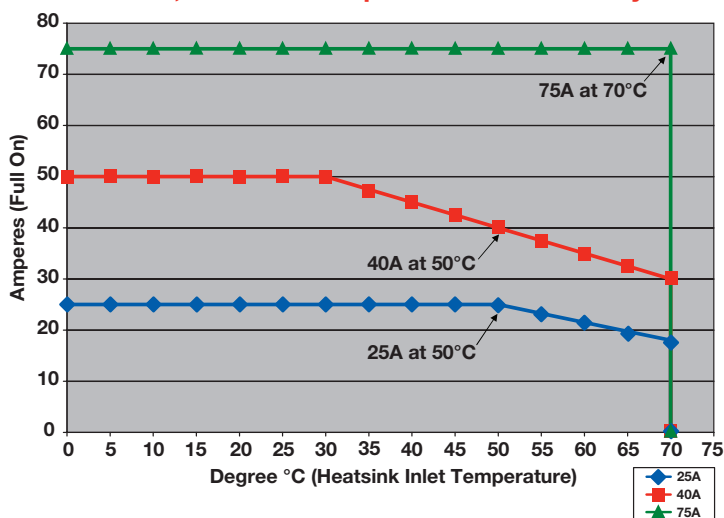
### Contact Ratings

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

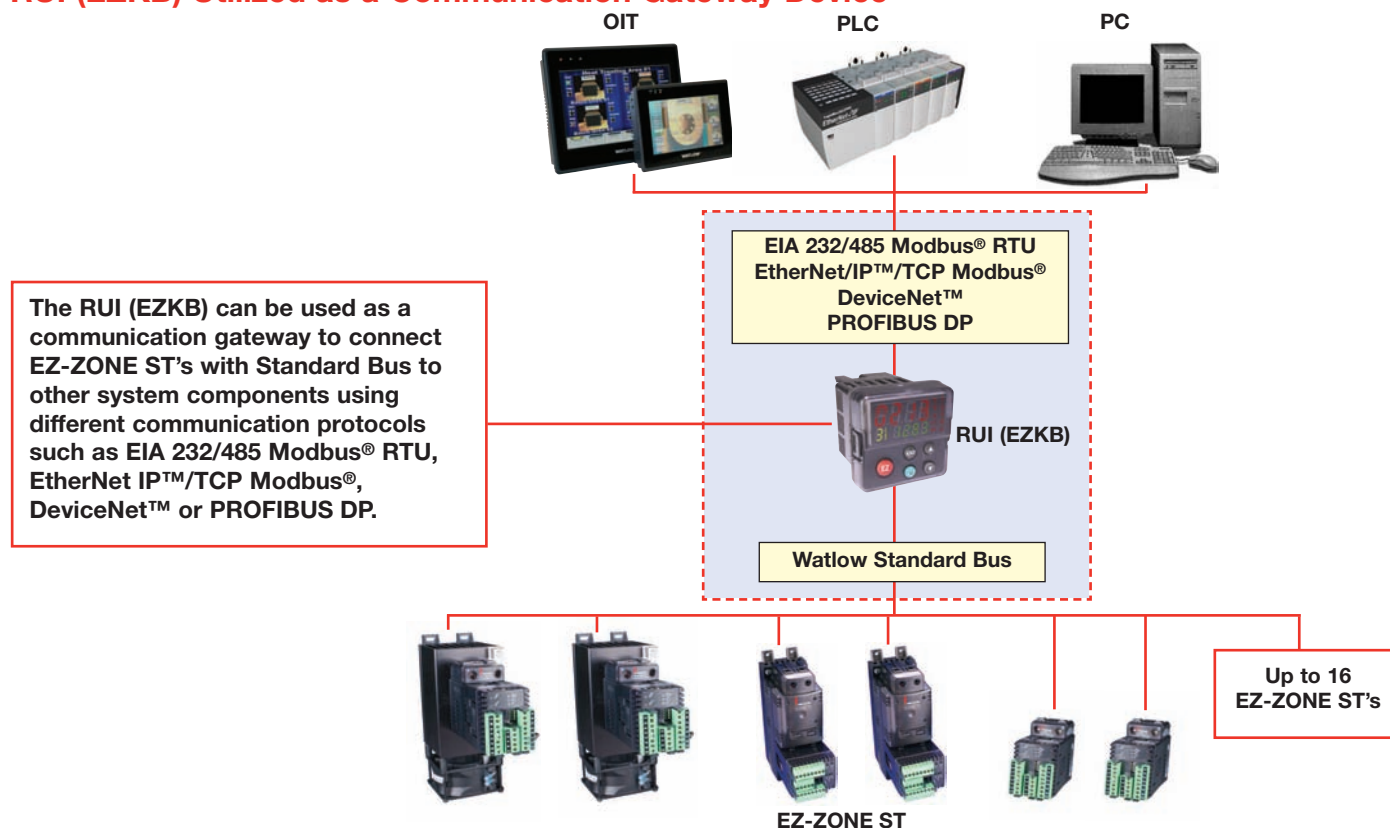


All Versions			
Current output (50°C)	25Arms	40Arms	75Arms
One-cycle surge current	600Apk	850Apk	1350Apk
Max. I <sup>2</sup> t for fusing	1500A <sup>2</sup> s	3000A <sup>2</sup> s	7560A <sup>2</sup> s
Thermo resistance	0.35°C/W	0.2°C/W	0.14°C/W
Base plate temperature (max.)	116°C	115°C	112°C
Forward 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	1mA	1mA
Max. off-state dv/dt	500V/usec	500V/usec	500V/usec
<b>120/240VAC</b>			
Output voltage range	24 to 280VAC	24 to 280VAC	24 to 280VAC
Over voltage rating	600Vpk	600Vpk	600Vpk
Input voltage range	0 to 28VDC	0 to 28VDC	0 to 28VDC
<b>277/600VAC</b>			
Output voltage range	48 to 660VAC	48 to 660VAC	48 to 660VAC
Over voltage range	1200Vpk	1200Vpk	1200Vpk
Input voltage range	0 to 28VDC	0 to 28VDC	0 to 28VDC

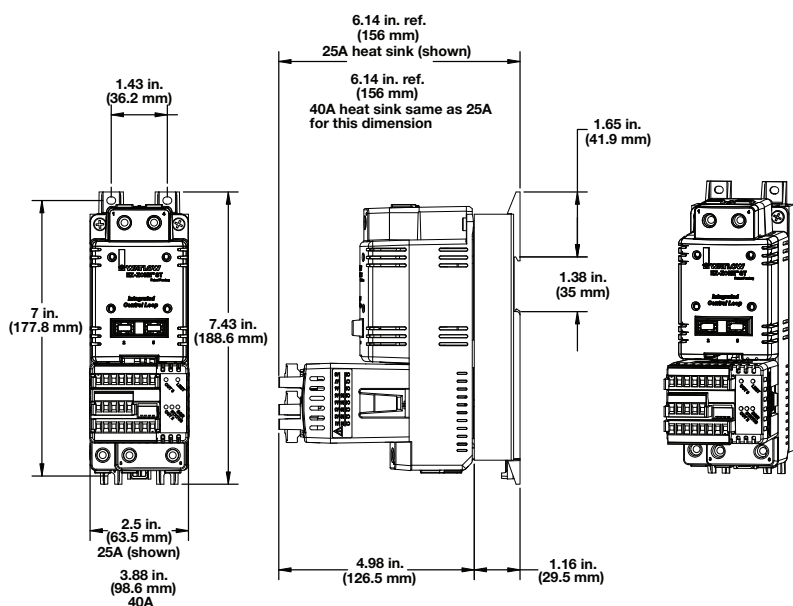
Phase Angle Models			
Off-state leakage	6mA	6mA	6mA
Max. off-state dv/dt	200V/usec	200V/usec	200V/usec
<b>120/240VAC</b>			
Output voltage range	100 to 240VAC	100 to 240VAC	100 to 240VAC
Over voltage rating	600Vpk	600Vpk	600Vpk
Input voltage range	2.7 to 10VDC	2.7 to 10VDC	2.7 to 10VDC
<b>277/600VAC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

## RUI (EZKB) Utilized as a Communication Gateway Device



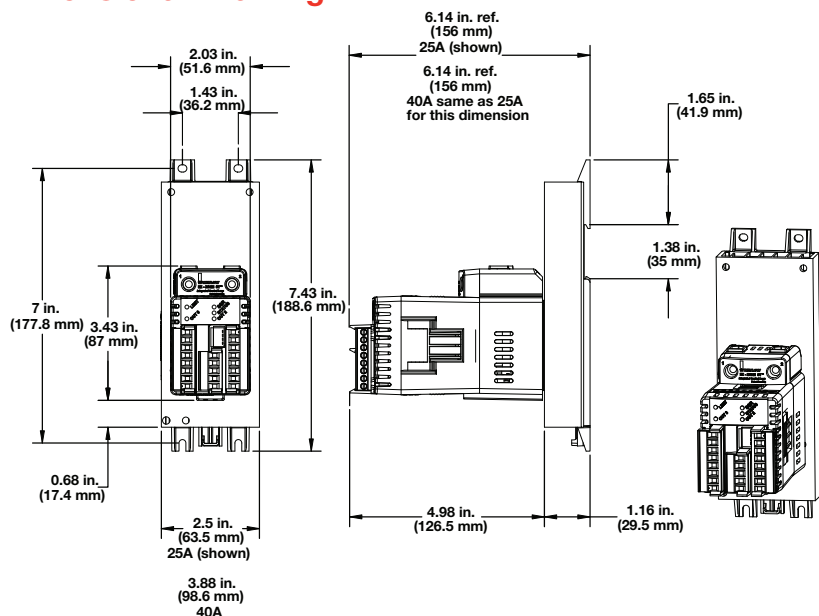


## EZ-ZONE ST with Definite Purpose Mechanical Contactor—Dimensional Drawing



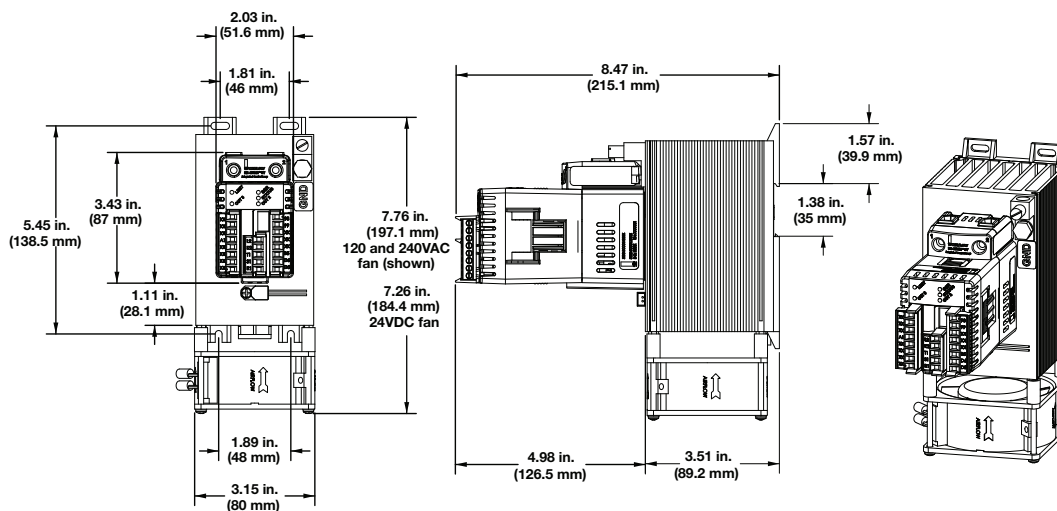
**Note:** EZ-ZONE ST needs to be mounted vertically (as shown) to meet amp/ambient performance curve.

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



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

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



**Note:** EZ-ZONE ST needs to 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

## Ordering Information

### EZ-ZONE ST Integrated Control Loop

#### Code Number

ST = EZ-ZONE ST Integrated Control Loop

#### 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.

#### 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

#### 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

#### 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

#### SSR

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

#### Heat Sinks/DIN-rail Mounting Bracket

- |          |                           |
|----------|---------------------------|
| A = None | D = 75A 24VDC fan cooled  |
| B = 25A  | E = 75A 115VAC fan cooled |
| C = 40A  | 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

#### Firmware

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

#### Customization (logo, parameters, hardware, firmware)

- AA = Standard
- XX = Letters to be determined, contact factory

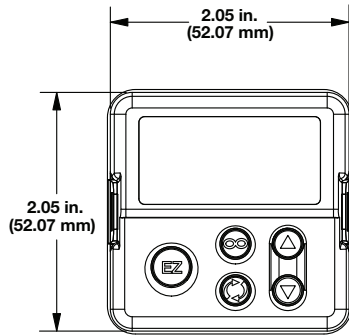
**Note:** Maximum rating of final configured product is determined by the lowest component rating of either the mechanical contactor, solid-state relay or heat sink. Maximum UL® rating for product is 75A

S T - - - - -

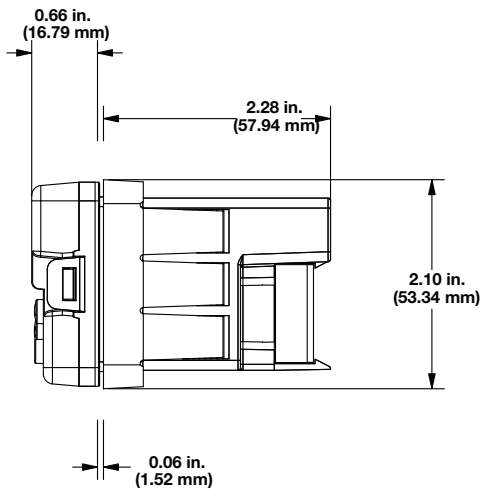


## Remote User Interface (RUI) — Dimensional Drawings

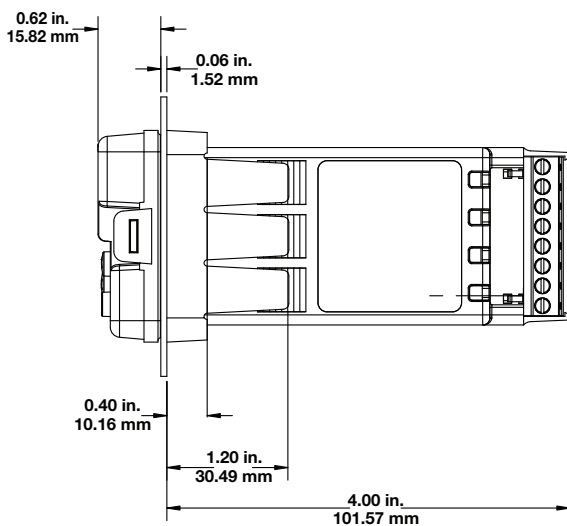
### Front View



### Short Case Version



### Long Case Version



## Ordering Information

### EZ-ZONE ST Integrated Control Loop - Accessory Kit

#### Code Number

**E Z K** -

**EZK** = EZ-ZONE ST accessory kit

**Remote User Interface (RUI)**

B = Basic 1/6 DIN

**Power Supply Voltage for RUI**

L = Low voltage 24-28VAC/VDC

H = Universal high voltage 100-240VAC/VDC

**Additional Communications Options\***  
(Standard Bus Always Included)

A = None

2 = EIA 232/485 Modbus® RTU

3 = EtherNet/IP™/Modbus® TCP

5 = DeviceNet™

6 = PROFIBUS

\* Options 2 through 6 require the long case dimensions

**Custom RUI**

AA = None

XX = Custom options, contact factory

**Future Option**

A = None

**Future Option**

A = None

**Future Option**

AA = None

The EZ-ZONE® configurator software is available FREE as a download at [www.watlow.com](http://www.watlow.com). Looking for an easy-to-use method for configuring all parameter settings via PC? Simply download the EZ-ZONE configurator software and connect via the standard bus communication protocol. The communication protocol is included with every EZ-ZONE ST.



Watlow also offers a line of Operator Interface Terminals (OIT). Refer to the Watlow Silver Series OIT product specification sheet on the web at [www.watlow.com](http://www.watlow.com)

Watlow® is a registered trademark of Watlow Electric Manufacturing Company. EZ-ZONE® is a registered trademark of Watlow Electric Manufacturing Company. TRU-TUNE® is a registered trademark of Watlow Electric Manufacturing Company. UL® is a registered trademark of Underwriter's Laboratories Inc. Modbus® is a registered trademark of Schneider Automation Incorporated. DeviceNet™ and EtherNet/IP™ are trademarks of Open DeviceNet Vendors Association.



Sales@ptsheat.com

Dave Farmery  
Ben Midulla

Toll Free Phone/Fax

844-787-4328  
844-PTS HEAT

[www.PhoenixThermalSupply.com](http://www.PhoenixThermalSupply.com)