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 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, digital communications and a remote user interface 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 (con’t)

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 (OIT)
- Optional EIA 485 Modbus® RTU
- RUI/communications gateway with optional EIA 232/485 Modbus® RTU, EtherNet IP™/TCP Modbus®, DeviceNet™ or PROFIBUS DP

Solid state relay output
- Allows faster cycling, more precise control, increased heater life and 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 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 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

Multiple U.S. and international patents pending.
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 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: ±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 (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
  - >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

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

Contact Ratings

<table>
<thead>
<tr>
<th>Full Load Amperes</th>
<th>Number of Poles</th>
<th>Line Voltage</th>
<th>Locked Rotor Amps</th>
<th>Resistive Amp Rating</th>
<th>Max. Horsepower</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>2</td>
<td>240/277</td>
<td>240</td>
<td>50</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td></td>
<td>480</td>
<td>200</td>
<td>50</td>
<td>240</td>
</tr>
<tr>
<td></td>
<td></td>
<td>600</td>
<td>160</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

- Duty cycle: continuous

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%
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

<table>
<thead>
<tr>
<th>All Versions</th>
<th>25 Amps</th>
<th>40 Amps</th>
<th>75 Amps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current output (50°C)</td>
<td>25 Amps</td>
<td>40 Amps</td>
<td>75 Amps</td>
</tr>
<tr>
<td>One-cycle surge current</td>
<td>600Apk</td>
<td>850Apk</td>
<td>1350Apk</td>
</tr>
<tr>
<td>Max. I't for fusing</td>
<td>1500A's</td>
<td>3000A's</td>
<td>7560A's</td>
</tr>
<tr>
<td>Thermo resistance</td>
<td>0.35°C/W</td>
<td>0.2°C/W</td>
<td>0.14°C/W</td>
</tr>
<tr>
<td>Base plate temperature (max.)</td>
<td>116°C</td>
<td>115°C</td>
<td>112°C</td>
</tr>
<tr>
<td>Forward voltage drop</td>
<td>1.3Vpk</td>
<td>1.3Vpk</td>
<td>1.3Vpk</td>
</tr>
<tr>
<td>Min. holding current</td>
<td>150mA</td>
<td>150mA</td>
<td>250mA</td>
</tr>
<tr>
<td>Frequency</td>
<td>47 to 63Hz</td>
<td>47 to 63Hz</td>
<td>47 to 63Hz</td>
</tr>
</tbody>
</table>

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

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

RUI (EZKB) Utilized as a Communication Gateway Device

The RUI (EZKB) can be used as a communication gateway to connect any EZ-ZONE controller with standard bus to other system components using different communication protocols such as EIA 232/485 Modbus® RTU, EtherNet/IP™/TCP Modbus®, DeviceNet™, or PROFIBUS DP.
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:

<table>
<thead>
<tr>
<th>Correct Ordering Option Letter</th>
<th>Connecting To</th>
<th>Another EZ-ZONE Product</th>
<th>RUI, EZ-ZONE Configurator, SpecView</th>
<th>Third Party Device (PLC, PC, Touch Panel, etc.)</th>
<th>Silver Series Operator Interface Terminal</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td>Yes - Via Modbus®</td>
<td></td>
</tr>
</tbody>
</table>

**Ordering Information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Integrated PID Controller</th>
<th>Integrated Limit Controller</th>
<th>Mechanical Contactor and Power Supply Options</th>
<th>Communications</th>
<th>SSR</th>
<th>Heat Sink/DIN-Rail Mounting Bracket</th>
<th>Firmware</th>
<th>Customization</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Integrated PID Controller**

- **Output 1**: SSR drive 0.5A I/O Points
- **Output 2**: No I/O Points

<table>
<thead>
<tr>
<th>K</th>
<th>B</th>
<th>D</th>
<th>F</th>
<th>H</th>
<th>J</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSR drive</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Integrated Limit Controller**

- **A**: None
- **L**: Limit control module with output 3, 5A Form C mechanical relay
- **B**: No limit control module but access to coil connection on mechanical contactor

**Mechanical Contactor and Power Supply Options**

<table>
<thead>
<tr>
<th>AH</th>
<th>AL</th>
<th>B1</th>
<th>B2</th>
<th>B3</th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No contactor and universal high voltage power supply 100-240VAC/VDC</td>
<td>No contactor and universal low voltage power supply 24-28VAC/VDC</td>
<td>Single pole, 40A Watlow contactor, 24VAC power supply</td>
<td>Single pole, 40A Watlow contactor, 110/120VAC power supply</td>
<td>Single pole, 40A Watlow contactor, 208/240VAC power supply</td>
<td>Dual pole, 40A Watlow contactor, 24VAC power supply</td>
<td>Dual pole, 40A Watlow contactor, 110/120VAC power supply</td>
<td>Dual pole, 40A Watlow contactor, 208/240VAC power supply</td>
</tr>
</tbody>
</table>

**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)
- **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)

**Heat Sink/DIN-Rail Mounting Bracket**

- **A**: None
- **B**: 25A
- **D**: 75A 24VDC fan cooled
- **E**: 75A 115VAC fan cooled
- **F**: 75A 240VAC fan cooled

**Firmware**

- **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.
Remote User Interface (RUI)—
Dimensional Drawings

Front View

Short Case Version

Long Case Version

Ordering Information

Part Number

EZK

Remote User Interface (RUI)

Power Supply Voltage for RUI

Communication Gateway Options*

(Remote Bus Always Included)

A = None

2 = EIA232/485 Modbus® RTU

3 = EtherNet/IP™/Modbus® TCP

5 = DeviceNet™

6 = PROFIBUS DP

* Options 2 through 6 require the long case dimensions

Custom RUI

AA = None

12 = Custom options, contact factory

Custom Options

AA = None

XX = Class 1, Div. 2 (only available with communication options 2, 3, 5 and 6)

Compatible Accessories

The EZ-ZONE configurator software is available FREE as a download at 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

SpecView from Watlow is designed for industrial users and includes features such as data logging, trending and support for bar code readers and touch screens. Errors are reduced for any process by creating application-specific screens. The software provides a historical replay option, easy-to-use recipe features and remote access options, including LAN, internet and modem.

Watlow®, EZ-ZONE® and TRU-TUNE® are registered trademarks 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.

Powered by Possibility

To be automatically connected to the nearest North American Technical Sales Office:
1-800-WATLOW2 • www.watlow.com
inquiry@watlow.com

International Technical Sales Offices:
China +86 21 3532 8532
France +33 1 41 32 79 70
Germany +49 7253 9400 0
India +91 40 6661 2700
Italy +39 02 4588841
Japan +81 3 3518 6630
Korea +82 2 2169 2600
Mexico +52 442 256 2200
Singapore +65 6773 9488
Spain +34 91 675 1292
Taiwan +886 7 288 5168
UK +44 115 964 0777

©2016 Watlow Electric Manufacturing Company all rights reserved.