EZ-ZONE RMT Controller

Rail Mount TC Heater Engine Temperature with Integrated Safety Limit Controller

User Manual

WATLOW®

Powered by Possibility

TOTAL CUSTOMER SATISFACTION
3 Year Warranty

ISO 9001
Registered Company
Winona, Minnesota USA

Technical Assistance

If you encounter a problem with your Watlow® controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative (see back cover), by emailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 AM and 5 PM.Central Time USA & Canada. Ask for an Applications Engineer. Please have the complete model number available when calling.

Return Material Authorization (RMA)

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. If you do not know why the product failed, contact an Application Engineer or Product Manager. All RMA's require:

- Ship-to address
- Bill-to address
- Contact name
- Phone number
- Method of return shipment
- Your P.O. number
- Detailed description of the problem
- Any special instructions
- Name and phone number of person returning the product

2. Prior approval and an RMA number from the customer service department is required when returning any product. Make sure the RMA number is on the outside of the carton and on all paperwork returned. Ship on a freight prepaid basis.

3. After we receive your return, we will examine it to verify the reason for the product failure. Unless otherwise agreed to in writing, Watlow's standard warranty provisions, which can be located at, www.watlow.com/terms, will apply to any failed product.

4. In the event that the product is not subject to an applicable warranty, we will quote repair costs to you and request a purchase order from you prior to proceeding with the repair work.

5. Watlow reserves the right to charge for no trouble found (NTF) returns.

Warranty

The Watlow EZ-ZONE RMT Controller is warranted by Watlow in accordance with the terms and conditions set forth on Watlow's website at www.watlow.com/terms.

Registered Trademarks

Watlow® is a registered trademark of Watlow Electric and Manufacturing Company.
UL® is a registered trademarks of Underwriter's Laboratories, Inc.

TC Contents

1 | Safety Information

Safety Information

We use Note, Caution and Warning symbols throughout this book to draw your attention to important operational and safety information.

A "NOTE" marks a short message to alert you to an important detail.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The electrical hazard symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

| Symbol	Explanation
"NOTE"	An important detail or recommendation
	The safety alert symbol, (an exclamation point in a triangle) precedes a CAUTION or WARNING statement. A "CAUTION" safety alert is important for protecting your equipment and performance. A "WARNING" safety alert is important for protecting you, others and equipment from damage.
	Electrical Shock Hazard - Symbol (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.
	ESD Sensitive product, use proper grounding and handling techniques when installing or servicing product.
	Do not throw in trash, use proper recycling techniques or consult manufacturer for proper disposal.
	Unit is a Listed Device per Underwriters Laboratories. For more detail search for File E502994 on www.ul.com.
	Low Voltage (Safety) Directive. Unit passes industrial immunity levels for EMC, but additional filtering is required to pass radiated and conducted emissions. RMT is not currently CE approved.

2 Overview

Overview

The RMT Controller is a temperature controller with an integrated safety limit. The RMT Controller MUST Be used in conjunction with a Watlow designed thermocouple heater (Series _ _ _ Heater). The RMT Controller used in conjunction with the Watlow specific heater creates a thermal system. The thermal system allows for control of each zone, whereby the RMT Controller offers up to 12 zones per module. Each zone offers both input and output circuitry. In addition, the RMT Controller offers a built in certified safety limit (relay output). The safety relay is a mechanical relay that shall latch open (fail safe condition) upon an unsafe condition. A manual reset (power cycle) is required to reset the safety relay. Note: Clearing the safety can also be performed in software if user is connected to the RMT.

 The safety relay shall be incorporated in series with a mechanical contactor (not provided by Watlow). The mechanical contactor shall be wired in accordance with the application's safety requirements.
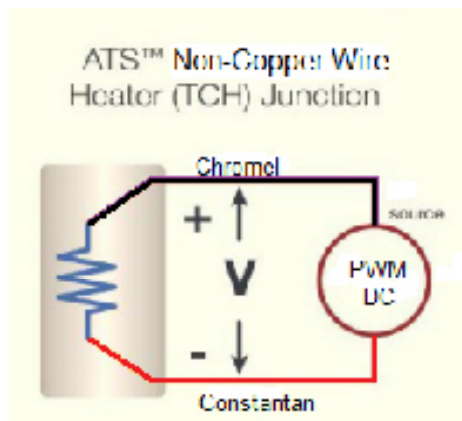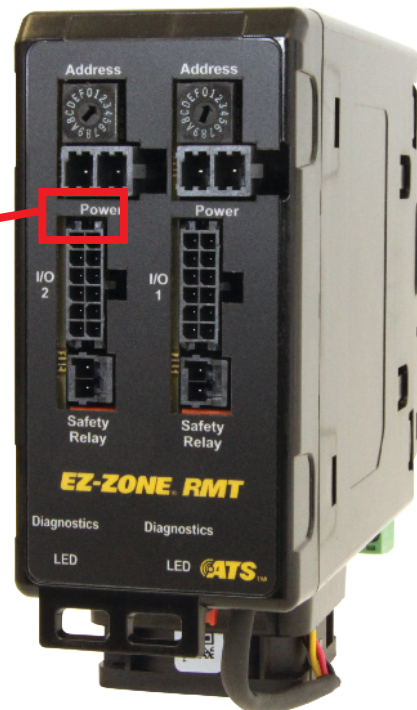
Theory of Operation

The RMT Controller supplies power to heaters through TC wires that also perform temperature and resistance checks while also monitoring power.
The RMT Controller functions to maximize control while minimizing wiring. This is accomplished by utilizing power over thermal wiring to product specific heaters for monitor and control.

Description of Sensor Inputs

The RMT inputs are compatible with heaters that have been designed to work in conjunction with the RMT Controller. Each heater is designed with thermocouple alloy wire connected to the heater element that is then connected to the RMT Controller input connector(s). Only the positive and negative wires of the thermocouple wires are terminated at the RMT Controller connectors. Both temperature measurement and power delivery are delivered through a single pair of thermocouple wires.

Description of Power to Heater Outputs

Each RMT Controller output is composed of a solid-state switch capable of a maximum of 0.75 Ampere. The solid-state switch (output) delivers power to a heater that is connected via thermocouple alloy wires. Power is delivered to the RMT in the form of AC voltage. The voltage is adjustable (power conversion) based upon the process variables required (set point and load). The output turns off momentarily to measure the temperature of the heater (TC measurement created via a TC junction made in conjunction with the heater element). In addition, each RMT Controller input is wired in series with a safety relay that will interrupt power to the output upon multiple safety directives determined by ISO 13849 (Category 2 and performance Level C). Some of which are listed below.

Safe Use Requirements

Each of the items listed in the table below must be reviewed for safe and proper operation.

Table 1:

Potential Failure Mode	Detectable	Potential Effect(s) of Failure	Potential Causes(s) / Mechanism(s) of Failure
Wrong sensor input type	No	Heater over temp	Incorrect configuration or heater
Reversed sensor wires	Yes	Heater over temp	Wrong heater construction
Heater connected without thermocouple alloy (constructed with copper wire)	No	Heater over temp	Wrong heater construction
Length of sensor wire from heater to controller	No	Resistance limit erroneously trips	Additional resistance from lead wire.
Shorted heater (large resistance change)	Yes	Hot spot in heater	Internal element short
Shorted heater (small resistance change)	No	Hot spot in heater	Internal element short
Shorted heater to pipe (earth ground)	No	Heater over temp caused by incorrect sensor values	Grounded mounting screw piercing heater
Shorted heater to AC supply	No	Heater over temp caused by incorrect sensor values	None identified
Shorted thermocouple lead wires	Yes	Sensor measurement incorrect	Lead wires short
Migrate controller from one system to another system	No	Over temp condition	Incorrect heater setup could cause over temp condition
Mismatched controller to heater(s)	No	Setpoint too high for heater type	Setpoint too high for heater type
Open heater	Yes	No heat	Failed heater
Open thermocouple	Yes	Same as open heater	Failed thermocouple connection
Compromised signal to the safety relay coil	Yes	Over temp - can't turn heater power off in a failure state	Trace failure
Welded contacts on safety relay	Yes	Over temp - can't turn heater power off in a failure state	Component failure
Over voltage of supply to heater	Yes	Heater over temp	User applies incorrect voltage. Hardware failure
User enters incorrect thermal offset parameters (dynamic offset)	No	Heater over temp	User enters incorrect thermal offset parameters

User enters incorrect temperature limit	No	Heater over temp	Correct temperature limit not entered correctly.
User enters incorrect resistance limits	No	Heater over temp	Correct temperature limit not entered correctly.
Calibration is incorrect	No	Heater over temp	Correct calibration
Excessive calibration drift	Yes	Heater over temp	Hardware failure
Interlock contactor not connected.	No	Heater over temp	Interlock contactor not connected.
Heater/sensor over temperature	Yes	Heater over temp	Failed hardware

Description and importance of each item from the table above:

⚠ **Wrong sensor input type –** Matching the controller's thermocouple input type to the heaters thermocouple alloy(s) is required for safe and proper operation. The menu operation for the controller is parameter "Input Type" identified within the controllers' operation menu or via dashboard and the thermocouple alloy of the heater is identified by the model number.

⚠ **Reversed Sensor Wires –** Should the heater decrease in temperature upon power up (output "On"), the heater is incorrectly constructed (the sensor wires are reversed internally to the heater) and the heater must be removed from the system and replaced with a new properly constructed heater.

⚠ H**eater constructed without thermocouple alloy (heater constructed with copper wire) –** Only heaters that are constructed with thermocouple alloy can be connected to the RMT Controller and must be matched to the input type of the RMT Controller. Any heater that is not constructed from thermocouple alloy may result in serious damage to thermal system and connected component/equipment and associated facilities and personnel.

⚠ **Length of sensor wire from heater to controller too long –** Each heater has been programmed to its' mating controller and should function under normal conditions. If the resistance error trips, it may be due to excessive lead wire length from the controller to the heater. Extra wire length should not be added to the wire harness that was shipped with the heater assembly.

⚠ **Large resistance changes in heater –** Heater parameters (resistance tolerances) should already be entered into the RMT Controller. Should the resistance change significantly, a hot spot within the heater may occur. The RMT Controller will detect a significant change and open the Safety Shutdown Relay.

⚠ **Shorted heater to pipe (earth ground) –** An introduction of earth ground to the heater circuit (by way of an inadvertent short) will result in incorrect temperature measurement and thermal runaway. To assure a safe system, a standard ELCI (Electronic Leakage Circuit Interrupter) should be incorporated in series with the load.

⚠ **Shorted heater to AC voltage supply –** An introduction of AC voltage to the heater circuit by way of an inadvertent short will result in incorrect temperature measurement and thermal runaway. This condition is not detectable by the RMT Controller

⚠ **Shorted thermocouple lead wires –** Should the thermocouple lead wires short, the RMT Controller will recognize this as a change in resistance and will result in an Safety Shutdown Relay open relay condition.

⚠ **Migrate a controller from one system to another system -** Removing an RMT Controller from one system and placing it into another system may result in unsafe and incorrect operation of the thermal system. Reviewing controller parameters to be certain the thermal system will operate safely is required. Otherwise, only factory configured (programmed specifically for the application requiring the replacement) RMT modules should be used in replacement of another RMT module.

⚠ **Mismatched controller to heater –** Only thermocouple alloy heaters may be used with the RMT Controller. The thermocouple alloy must be matched to the input type of the RMT Controller. In addition, all process set point values of the RMT Controllers must be reviewed by the user to be certain the heater that is connected to the RMT Controller has been constructed to operate at the process set point of the RMT Controller.

⚠ **Open Heater –** If a heater opens, the RMT Controller will recognize this as a large change in resistance and the Safety Shutdown Relay will open.

⚠ **Open Thermocouple -** If a thermocouple circuit opens, the RMT Controller will recognize this as a large change in resistance and the Safety Shutdown Relay will open.

⚠ **Compromised signal to the safety relay coil (within the RMT Controller) –** If the heater enters into a thermal run-away condition and the secondary system (safety loop) does not result in an "Off" condition of the output, the safety algorithm will shut off the primary output device.

⚠ **Welded contacts on safety relay (within the RMT Controller) -** If the heater enters into a thermal run-away condition and the secondary system (safety loop) does not result in an "Off" condition of the output, the safety algorithm will shut off the primary output device.

⚠ **Over voltage of supply to heater –** The RMT Controller has voltage input specifications (refer to Specifications section of this User's Manual) Voltage applied to the control that exceed the specified values will result in damaged hardware and the controller must be replaced.

⚠ **User enters incorrect temperature limit –** The RMT Controller has multiple user settable parameters, the user must make sure limits (temperature, voltage and resistance). If the temperature limit is set beyond the heater design, over temperature conditions may occur.

⚠ **User enters incorrect resistance limit -** The RMT Controller has multiple user settable parameters. The user must make sure limits (temperature, voltage and resistance). If the Resistance limit is set incorrectly compared to the heater design, over temperature conditions may occur.

⚠ **Calibration is incorrect –** Every RMT Controller has been calibrated by a NIST traceable calibration system and process. Calibration values are stored in non-volatile memory and will not be interrupted under normal and specified operation. Should an event occur that causes corruption to the calibration data within the RMT Controller, the process temperature may migrate to a thermal runaway condition. Thermal process should be audited from time to time to insure proper operation associated with temperature control.

3 Wiring and Set Up

Wiring

Apply 24-28 Vac/dc to terminals 98 (V+) and 99 (V-) of the 'C' Connector.

RMT Load Power 200-240 Vac 10% Mating Connector - Use 171692-0102 connector, Molex 76823-0321 14 AWG pins.

Connect heater connectors to mating connectors of the RMT Module using Heater connector Molex 43025(1200 or 1208), with molex 43030 series pins.

Connect the Safety Relay Output to system contactor that is responsible for interrupting power to the entire system or whatever mechanism is deemed as a safe environment. This will eliminate the opportunity for current flow that may result in risk of electrical hazard such as shock or fire. Mating connector - Use Molex 172256-1002, with Molex 172253 family of pins with Molex 1722643002 strain relief.

Power and Communications		
Slot C	Terminal Function	Configuration
98	Power input: ac or dc+	All
99	Power input: ac or dc-	
CF	Standard Bus EIA-485 common	Standard Bus
CD	Standard Bus EIA-485 T-/R-	Part # Digit 13
CE	Standard Bus EIA-485 T+/R+	RMCxxxxxxxxx(A)xx
CC	Standard Bus or Modbus RTU EIA-485 common	Standard Bus or Modbus
CA	Standard Bus or Modbus RTU EIA-485 T-/R-	Part # Digit 13
CB	Standard Bus or Modbus RTU EIA-485 T+/R+	RMCxxxxxxxxx(1)xx
CZ	Inter-module Bus	Inter-module Bus
CX	Inter-module Bus	
CY	Inter-module Bus	

Address Switches

Power Connectors (208)

Heaters

Safety Relay Outputs

"C" Connector (Not Shown)

LEDs
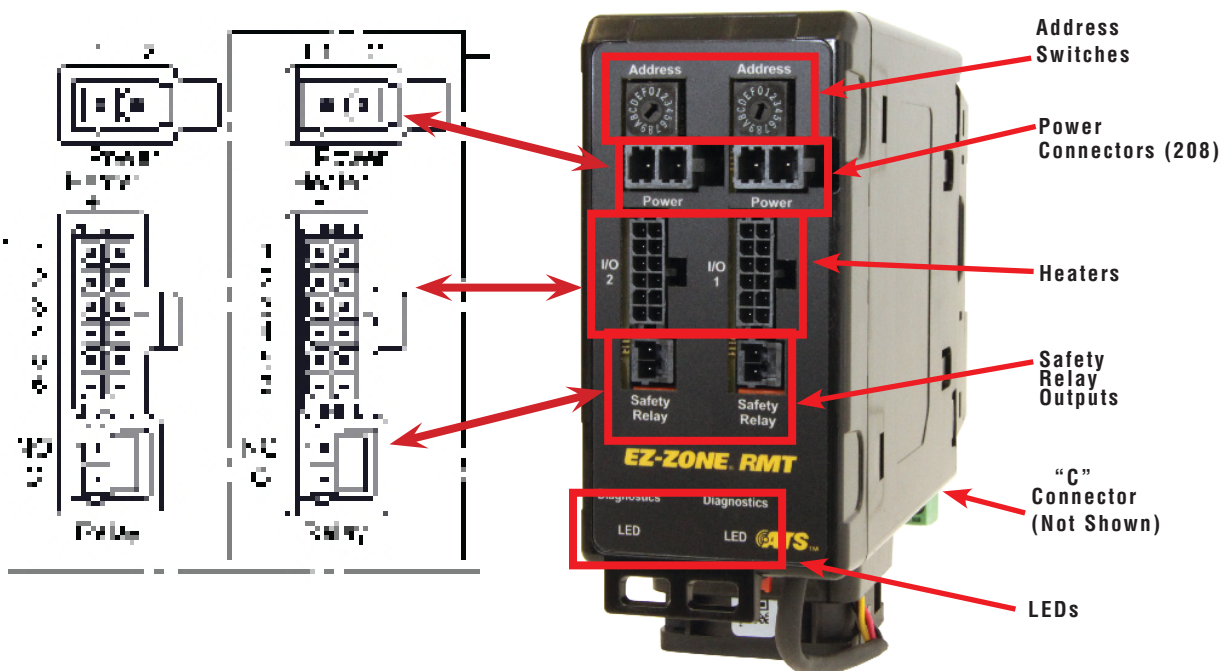
LED

There is a bi-colored LED on the front of the RMT controller. A full "On" green LED is normal operating condition. Blinking green for code update and a solid red LED indicates a safety condition.

RMT Safety Limit

This feature is available on every RMT PCBA. The safety limit output is a mechanical relay. The relay ratings are as follows:

- 2 Amps resistive 24 – 240 VAC or 30 VDC
- 125 VA Pilot Duty 120/240 VAC, 25 VAC at 24 VAC.

  The Safety Relay is intended to be wired in series with the coil of a system level contactor that will interrupt the thermal system in a safe way. An error code is available via communications, user intervention is required to clear the alarm status as it is a latching alarm.

Product Compatibility

- EZ-ZONE RMA PLUS
- EZ-ZONE RM (C, E, H, L, S) version 9.0+
- EZ-ZONE PM version 15.0+
- RM (F, G, UH, Z)
- POWER GLIDE

Software Compatibility

Software	USB	Ethernet
Dashboard	X	X
LabVIEW	X	X
Watbus DLL	X	X

Firmware Updates

RMT firmware can be updated by connecting to another RM device with Ethernet or USB connection and using either Watbus Flash Loader Utility or Dashboard to push an updated to the RMT over high-speed Watbus.

Once the program has completed sending the update to the RMT, the RMT must be power cycled for the update to complete.

Control Modes

Off – No output activity= sensing circuit is working. Does not evaluate faults.
Auto – Normal operating condition= PID control, sensing circuit is active and faults will be initiated if present.
Manual – Operates in percent power mode; sensing circuit is active and faults will be initiated if present.

Output De-Rating data
(output current vs. ambient temperature)
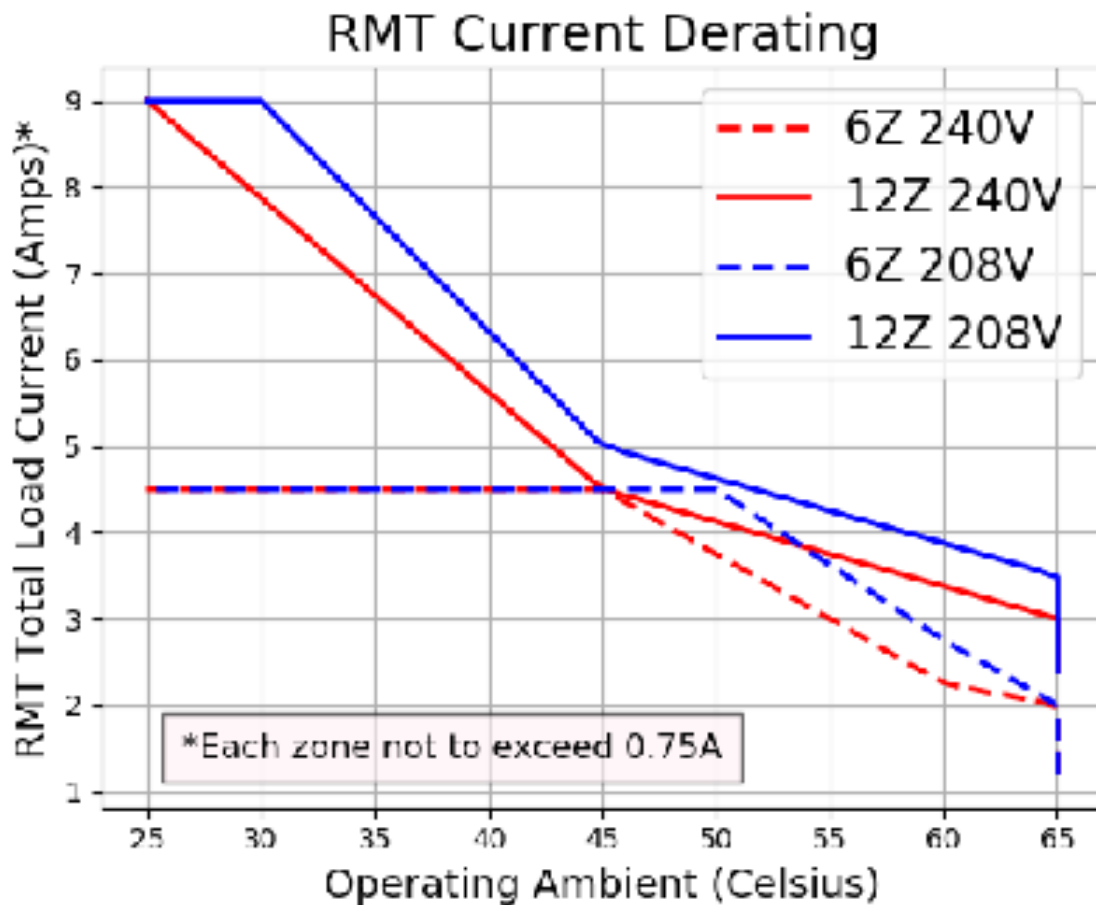
4 | Faults and Troubleshooting

Indications and Faults

A green LED (full "ON") indicates the controller is operating normally.

A red LED (full "ON") indicates a detectable unsafe fault has occurred.

A flashing green LED will occur when updating firmware.

Manual intervention is required to reset the fault condition. (Discovery of the fault, clearing the fault by power cycle or sending a "clear fault" signal via comms)

A deviation alarm should be set for each channel/output. This is accomplished by entering the value of which the temperature has become too cold or too hot for the process.

LEDs →

Troubleshooting

Heater is not heating up	• Check RMT fault codes from the RMT Controller. • Check wiring to heater
RMT fan has stopped working	Each RMT Controller has a fan mounted to the bottom side of the enclosure. The fan is not field repairable. If fan problems occur contact the Watlow Service Department NOTE: Should the fan stop operating, the output devices will self-manage their thermal properties to keep them from self-destructing. Increased ambient conditions will increase without the fan operating and the RMT Controller may not operate at full output capacity.

5 Specifications

Specifications

Voltage	Input voltage range is 85 to 265VAC 208 Vac +/- 10% or 240 Vac ±10% voltage range. Refer to the Power Derating Curve on the previous page.
Heater Outputs	Heater outputs: Maximum 0.75A on any one output, multiple outputs follow derating curve on page 13.
RMT module Ambient Rating	-18 to 65 degrees C. (Refer to de-rating chart)
Humidity	0 – 90% non-condensing
Altitude	Maximum 2,000 meters.
Safety Relay	2 Amps resistive 24 – 240 VAC or 30 VDC. 125 VAC Pilot Duty 120/240 VAC, 25 VAC at 24 VAC.
Safety Limit Output	Mechanical relay, open on fault. Output Relay COM. and N.O. terminals. Energized in safe conditions, open on fault.
Installation category	Installation category II, pollution degree category 2.No maintenance requirements or field serviceable parts apply to the RMT Controller.
Agency Directives	ISO 13849-1 Safety of Machinery - Safety-related parts of control systems - Part 1: General principles for design (Category 2 and performance level C) Third Edition, dated December 15, 2015
Standard for Safety	Electrical Equipment for measurement, control and laboratory use; Part 1: General requirements Third Edition, Dated May 11, 2012
Fan Specifications	• Operating Temperature: -20°C N +65°C • Storage Temperature: -20°C N + 75°C • Life Expectancy: 65,000 Hours (Ll0 at 45°C) • Available Options Tachometer Output Alarm Output IP Ratings • Weight: 0.07 lbs

6 Appendix

Agency Directives:

ISO 13849-1 SAFETY OF MACHINERY — Safety related parts of control systems — Part 1: General principles for design (Category 2 and performance level C).
Third edition 2015-12-15

UL 61010-1 STANDARD FOR SAFETY ELECTRICAL EQUIPMENT - For Measurement, Control, and Laboratory Use; Part 1: General Requirements.
Third Edition, May 11, 2012
Including revision dated November 21, 2018

Ordering Information
Part Number

① ② EZ-ZONE Rail Mount	③ Primary Product	④ Future Option	⑤ ⑥ Control/Limit	⑦ ⑧ Heater Technology	⑨ Future Option	⑩ Future Option	⑪ ⑫ Customization
RM	T	A			A	A	

③	Primary Product Function
T =	TC heater sensor with integrated limit

④	Future Option
A =	Standard product

⑤ ⑥	Control/Limit Loops
06 =	6 control loops (1 module card installed)
12 =	12 control loops (2 module cards installed)

⑦ ⑧	Heater Technology
CL =	Cloth heaters
SR =	Silicone rubber heaters

⑨	Future Option
A =	Standard product

⑩	Future Option
A =	Standard product

⑪ ⑫	Customization
AA =	Standard product
XX =	Any two letters or numbers for custom non-critical options

Declaration of Conformity

EZ Zone Series RM

WATLOW Electric Manufacturing Company
1241 Bundy Blvd. Winona, MN 55987 USA

Declares that the following Series RM (Rail Mount) products:

Model Numbers:	RMT A – (01 to 12)(SR or CL) – AA(XX)
	XX = Any two letters or number combinations.
Classification:	Temperature control, Installation Category II, Pollution degree 2
Voltage and Frequency:	SELV 24 to 28 V $\sim$ ac 50/60 Hz or dc; RM unit power
	Output module card 100-240 Vac 50/60 Hz
Power Consumption:	4.5 Amps/module maximum.
Environmental Rating:	IP20

Meet the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

2014/30/EU Electromagnetic Compatibility Directive

EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use – EMC requirements, Industrial immunity. *NOTE: Unit exceeds conducted and radiated emissions limits of EN 55011 Class A. Additional shielding and filtering required in end application required.*
IEC 61000-4-2:2008	Electrostatic discharge immunity
IEC 61000-4-3:2007 +A1/2008, A2/2010	Radiated, radio-frequency electromagnetic field immunity, 10 V/m 80 MHz to 1 GHz 3 V/m 1.4 GHz to 2.7 GHz
IEC 61000-4-4:2012	Electrical fast-transient / burst immunity
IEC 61000-4-5:2014 1/2017	Surge immunity
IEC 61000-4-6:2013 + Corrigendum 2015	Immunity to conducted disturbances induced by radio-frequency fields
IEC 61000-4-11:2020	Voltage dips, short interruptions and voltage variations immunity
EN 61000-3-2:2018 + A1 2020	Limits for harmonic current emissions for equipment ≤ 16 Amps per phase
EN 61000-3-3:2013, +A1 2017	Voltage fluctuations and flicker ≤ 16 Amps per phase
SEMI F47-0812	Specification for semiconductor sag immunity Figure R1-1

2014/35/EU Low-Voltage Directive

EN 61010-1:2010	Safety Requirements of electrical equipment for measurement, control and laboratory use. Part 1: General requirements
ISO 13849-1	Safety of machinery — Safety-related parts of control systems Over-temperature limit function was evaluated. PLr = e.

Compliant with 2015/863/EU RoHS "3" Directive

Per 2012/19/EU W.E.E.E Directive ☒ Please Recycle Properly

Jeff Harrington	Winona, Minnesota, USA
Name of Authorized Representative	**Place of Issue**
Director of Operations	March 2022
Title of Authorized Representative	**Date of Issue**

Signature of Authorized Representative

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Alarms

Alarms are activated when the output level, process value or temperature leaves a defined range. A user can configure how and when an alarm is triggered, what action it takes and whether it turns off automatically when the alarm condition is over. Configure alarm outputs in the Setup Page before setting alarm set points. Alarms do not have to be assigned to an output. Alarms can be monitored and controlled through the front panel or by using software.

Process and Deviation Alarms

A process alarm uses one or two absolute set points to define an alarm condition.

A deviation alarm uses one or two set points that are defined relative to the control set point. High and low alarm set points are calculated by adding or subtracting offset values from the control set point. If the set point changes, the window defined by the alarm set points automatically moves with it. Select the Type a.ty via the Setup Page, Alarm Menu.

Alarm Set Points

The high set point defines the process value or temperature that will trigger a high side alarm. The low set point defines the temperature that will trigger a low side alarm. For de-viation alarms, a negative set point represents a value below closed loop set point. A posi-tive set point represents a value above closed loop set point. View or change alarm set points with Alarm Low a.Lo and High Set Points a.hi (Operations Page, Alarm Menu).

Hysteresis

An alarm state is triggered when the process value reaches the alarm high or low set point. Hysteresis defines how far the process must return into the normal operating range before the alarm can be cleared. Hysteresis is a zone inside each alarm set point. This zone is defined by adding the hysteresis value to the low set point or sub-tracting the hysteresis value from the high set point. View or change Hysteresis a.hy via the Setup Page, Alarm Menu.

NOTE TO DAVE: See RMC Manual for diagram PAge 246

Latching

A latched alarm will remain active after the alarm condition has passed. It can only be deacti-vated by the user and only when the alarm condition no longer exists.

If using an RUI an active message, such as an alarm message, will cause the display to toggle between the nor-mal settings and the active message in the upper display and attn in the lower display.

To clear a latched alarm:
1. Push the Advance Key ‰ to display ignr in the upper display and the message source in the lower display.
2. Use the Up ¿ or Down ¯ keys to scroll through possible responses, such as Clear CLr or Silence SiL.
3. Push the Advance ‰ or Infinity ˆ key to execute the action.

Without an RUI, a latched alarm can be reset by cycling power to the module or configuring an Action function within the control to perform a reset. Do this by setting the Action Func-tion to alarm and trigger the Action to occur through Source Function A. An alarm that is not latched (self-clearing) will deactivate automatically when the alarm condition has passed. Turn Latching a.La on or off via the Setup Page, Alarm Menu.

NOTE TO DAVE: See RMC Manual for diagram PAge 247

Silencing

If silencing is on the operator can disable the alarm output while the controller is in an alarm state. The process value or temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm output function again.

If using an RUI an active message, such as an alarm message, will cause the display to toggle between the normal settings and the active message in the upper display and attn in the lower display.

To silence an alarm:

1. Push the Advance Key ‰ to display ignr in the upper display and the message source in the lower display.

2. Use the Up ¿ and Down ¯ keys to scroll through possible responses, such as Clear CLr or Silence siL.

3. Push the Advance ‰ or Infinity ˆ key to execute the action.

Without an RUI, silencing aa alarm can be accomplished by configuring an Action function within the control to silence the alarm. Do this by setting the Action Function to Silence and trigger the Action to occur through Source Function A. Turn Silencing a.si on or off via the Setup Page, Alarm Menu.

Blocking

Blocking allows a system to warm up after it has been started up. With blocking on, an alarm is not triggered when the process temperature is initially lower than the low set point or high-er than the high set point. The process temperature has to enter the normal operating range beyond the hysteresis zone to activate the alarm function.

If the RMC module has an output that is functioning as a deviation alarm, the alarm is blocked when the set point is changed, until the process value re-enters the normal operating range. Turn Blocking a.bL on or off via the Setup Page, Alarm Menu.

Note: If using current as the alarm source, see the application note below under "Current Sens-ing".

Resetting a Tripped Limit

When a limit controller is ordered (RMC[5,6] _ [5,6] _ [5,6] _ [5,6] _ _ _ _ _) output 2 (digit 4), output 4 (digit 6), output 6 (digit 8) or output 8 (digit 10) will always be a Form A (nor-mally open) Mechanical Relay and it will always be internally tied to the limit function. When the limit is in a safe state the internal coil for this relay will be energized, therefore the relay will be closed. When a condition occurs that causes the limit to trip, the internal coil will de-energize causing the relay to latch open. When the condition that caused the limit to trip has been resolved, the relay will remain latched open until reset. The process to reset a latched limit can be different from control to control and is dependent upon the controller firmware version.

To check the firmware revision of your control do one of the following:
If using an RUI:

1. Navigate to the RMC Factory Page by simultaneously pushing and holding the Advance Key and the Infinity ˆ for approximately 8 seconds and then use the up or down arrow key to navigate to the Diagnostic Menu. Once there, push the Advance Key twice where the revision rEv will be shown in the lower display and the upper display will indicate the cur-rent firmware revision.

If using EZ-ZONE Configurator software:

1. Make the connection to the RMC module.

2. Once the connection is made on the left hand side of the screen under "Parameter Menus" click the plus sign next to the Factory page.

3. Double-click the Diagnostics menu to see the RMC firmware revision.

To reset a tripped limit prior to firmware release 6.0 follow the steps below:

1. Push the Advance Key ‰ and then push the Up ¿ or Down ‾ keys and select Clear CLr.

2. Configure an Action Function to Limit Reset assigning the Source Function to a digital input (navigate to the Setup Page under the Action Menu).

3. Use a field bus protocol, i.e., Modbus, EtherNet/IP, etc...where a value of zero would be written to the associated address (to find the appropriate address, navigate to the Opera-tions Page and then the Limit Menu. Under the Limit Menu look for Clear Limit).

4. Cycle the power to the controller.

To reset a tripped limit with firmware release 6.0 and above follow the steps below:

1. Push the Advance Key ‰ and then push the Up ¿ or Down ‾ keys and select Clear CLr.

2. Follow the steps below:
   2a. Navigate to the Setup Page and then the Limit Menu
   2b. Set Source Function A to the desired device that will reset the limit (Digital I/O, Vari able or Function Key)
   2c. Define the Source Instance and Zone

3. Use a field bus protocol, i.e., Modbus, EtherNet/IP, where a value of zero would be written to the associated address (navigate to the Operations Page and look for Clear Limit under the Limit Menu to find appropriate address).

4. Cycle the power to the controller.

- Class handles all temperature input related information and settings
- Member 1 is the raw process value
- Error status member 2 is not expected to be directly used by the user for viewing errors
- Filter time member 3 allows the filter process value to be manipulated, displaying the temperature from the previous listed seconds of the process value, allowing the filtered process value to display more smooth and controlled
- Output member 4 deals with filtered process value, which is used by the control loop
- Input type member 5 will always be thermocouple
- Thermocouple Type member 6 is locked here in RMT and can only be modified by factory
- User Offset member 16 can give the user the option to offset displayed temperature to they want the temperature to display in the filtered process value
- One main use case is that the position of the sense junction for the RMT is not right on the pipe, so if we know the difference in temperature between the junction and the pipe, the user can modify the offset to match the pipe more closely for a more real world temperature
- Safety is unaffected by the offset value
- Temperature Input class 57 went into F4T manual -page 200 Temperature Input section
- Class handles all temperature input related information and settings
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- Safety is unaffected by the offset value

Temperature Input

Configure and use this input to condition a temperature measurement made with a thermocouple or RTD. The Temperature Input block scales the signal to an absolute temperature with no other configuration required.

Resistance Temperature Device (RTD) 100 and 1000 Ohm

Use this block to condition a temperature measurement made with an RTD. This FB is found on the canvas of the FB diagram. The number of these FBs that are available depends on the number of installed flex modules with temperature inputs.

The module number shown on the block is the number of the controller's slot that houses the flex module with the temperature input. The Temperature In number indicates the specific input on the flex module.

Signals

Direction	Label	Type	Function
Transmitter	- - - -	Analog	The measured temperature with filter and offset applied

Name

Uniquely identify this FB using up to 20 alphanumeric characters.

Sensor Type

Select the device used to measure temperature.

Options: *RTD 100 Ohm, RTD 1000 Ohm*

Display Precision

Set how many decimal places are displayed for the process value and associated parameters such as set points.

Options: Whole, Tenths, Hundredths, Thousandths

Calibration Offset

Set a value to add to the measured input value to compensate for sensor placement, lead wire resistance or other factors that cause the input to vary from the actual process value
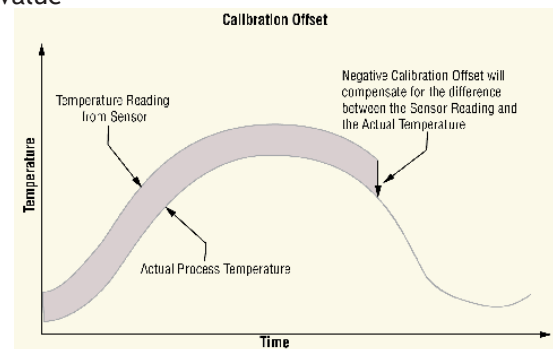
Range: -99,999.000 to 99,999.000°F or units
        -55,555.000 to 55,555.000°C

Filter

Set the amount of filtering to apply to the input. Filtering smooths signal fluctuations. Increase the time to increase filtering. Excessive filtering slows the input's response.

Range: 0.0 to 60.0 second

Input Error Latching

Set whether an input error persists until it is cleared or clears automatically when the sensor signal returns to a normal level.

Options:

- Off: error clears automatically once the input returns to normal
- On: error remains active until the input returns to normal and the error is cleared by the Clear Error parameter

Clear Error

Set this parameter to Clear to reset the input error after correcting the condition that caused it.

Options: Ignore, Clear

Thermocouple

Use this block to condition a temperature measurement made with a thermocouple. This FB is found on the canvas of the FB diagram. The number of these FBs that are available depends on the number of installed flex modules with temperature inputs.

The module number shown on the block is the number of the controller's slot that houses the flex module with the temperature input. The Temperature In number indicates the specific input on the flex module.

Signals

Direction	Label	Type	Function
Transmitter	- - - -	Analog	Supplies scaled, absolute temperature ± the offset as a connection to another FB.

Name

Uniquely identify this FB using up to 20 alphanumeric characters.

Sensor Type

Select the device used to measure temperature.

Options: Thermocouple
- TC Linearization
- Select the Thermocouple type.
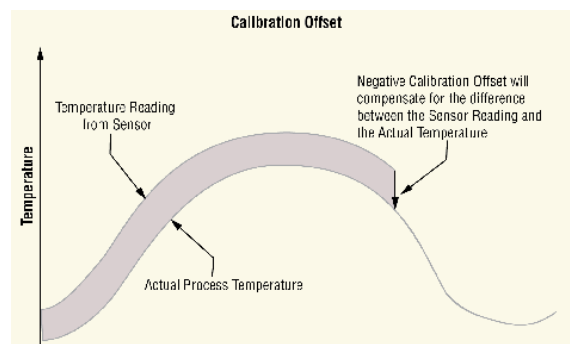- Range: B, K, C, N, D, R, E, S, F, T, J

Display Precision

Set how many decimal places are displayed for the process value and associated parameters such as set points.

Options: Whole, Tenths, Hundredths, Thousandths

Calibration Offset

Set a value to add to the measured input value to compensate for sensor placement, lead wire resistance or other factors that cause the input to vary from the actual process value

Range: -99,999.000 to 99,999.000°F or units
        -55,555.000 to 55,555.000°C

Filter

Set the amount of filtering to apply to the input. Filtering smooths signal fluctuations. Increase the time to increase filtering. Excessive filtering slows the input's response.

Range: 0.0 to 60.0 second

Input Error Latching

Set whether an input error persists until it is cleared or clears automatically when the sensor signal returns to a normal level.

Options:

- Off: error clears automatically once the input returns to normal
- On: error remains active until the input returns to normal and the error is cleared by the Clear Latch parameter

Clear Error

Set this parameter to Clear to reset the input error after correcting the condition that caused it.

Options: Ignore, Clear

Temperature Input Errors

Error Status	Description
None	No error is detected.
Open	A sensor is broken or disconnected.
Shorted	A sensor has failed or is shorted.
Measurement Error	A measurement error has occurred.
Bad Calibration	The controller has not been calibrated.
Ambient Error	The ambient temperature is outside of the controller's operating range.
RTD Error	An RTD sensor error has occurred.
Fail	A measurement failure has occurred.
Not Sourced	An input signal is not connected to a function block's output.
Stale Data	Data sourced from another controller has become unavailable.
Math Error	A calculation has no defined result (such as divide by zero).