Using This Retrofit Guide

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Specification sheets on Watlow® product may be obtained at http://www.watlow.com/literature/specsheets.cfm
User Manuals on Watlow product may be obtained at http://www.watlow.com/literature/manuals.cfm
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To locate a controller open the file Series 93 Source.pdf at bottom of this document, then search on the part number such as 93BA-1CD0-00RG. Press the Ctrl+F to highlight search box. Enter partial or complete model number. Hit enter key to search document. Use the Help feature in Adobe Reader on how to search documents.

Some retrofit choices do not have all of the features or inputs/output types of the original. Notes are added to bring attention to differences.

If you do not find your model number, contact Watlow Technical Support. For custom models contact the OEM (Original Equipment Manufacturer) for possible replacement.

If there are multiple listings, then the retrofit is conditional upon field use. Select the appropriate selection. The Specification Sheets are included at the bottom of this document when available.

Before selecting a replacement controller:

1. Know the application.
    *   Temperature range
    *   Sensor type
        *   Is the sensor upgradeable if required?
    *   Additional input requirements – remote set points, secondary sensor or events
    *   Output required – control, alarm, event
        *   Is the power-switching device upgradeable?
    *   Operating voltage of controller
    *   Mounting requirements – panel space
    *   Is a safety limit device required?

2. Know the product.
    *   Inputs – quantity and type
    *   Control function – direct (cool) or reverse (heat)
    *   Alarms – quantity and type
    *   Outputs – switched DC, SSR, or mechanical relay
    *   Communication requirements (configuration, operations, and device type connected)
    *   Which control features are required? (cascade, ratio, slidewire, differential, remote control, profiling, other)

3. Use your best judgment for selecting a replacement controller. All applications require close examination of inputs, outputs and the control mode to have the controller function properly.

4. Safety: Remember to make sure all redundant safety equipment is in place and working when retrofitting equipment. If a system has been retrofitted without the proper safety equipment, you could be liable if an accident occurs.

This is only a guide to replacement controllers. If you have doubts, please call (507) 494-5656 and ask for technical support or email wintechsupport@watlow.com. We are here to help. The suggested replacement will differ in fit and form. Please review the replacement controller specifications for suitability. Carefully check the notes for additional information that may apply.

Abbreviation & Terminology (as used in this document)

0.5 – 0.5 amperes of current switching capability

2A – 2 amperes of current switching capability

5A - 5 amperes of current switching capability

10A – 10 amperes of current switching capability

15A – 15 amperes of current switching capability

12-24 – Supply voltage can be between 12 to 24 Volts

100-240 – Supply voltage can be between 100 to 240 Volts

100 ohm DIN – refers to 100-ohm platinum RTD that has a DIN curve.

100 ohm JIS – refers to 100-ohm platinum RTD that has a JIS curve.

1000 ohm DIN – refers to 1000-ohm platinum RTD that has a DIN curve.

1/32 DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 1.78"w x 0.88"h.

1/16 DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 1.78"w x 1.77"h.

1/8V DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 1.78"w x 3.63"h.

1/8H DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 3.63"w x 1.77"h"

1/8S DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 2.68"w x 2.68"h.

¼ DIN – Deutsche Industrial Norm standard for panel mounted controller, panel size cutout is 3.63"w x 3.63"h.

Action – determines the direction of control. Heat (reverse acting) or Cool (direct acting).

Auto Reset – the limit will automatically reset on a power cycle but requires manual reset on limit trip.

Cascade – a control algorithm in which the output of one control loop provides a set point for another loop. The second loop, in turn, determines the control action. Cascade control can handle a difficult process with minimal overshoot, while reaching the set point quickly. This minimizes damage to system components and allows for oversizing heaters for optimal heat-up rates.

Ch – Channel refers to an analog input. There are single and dual channel controllers.

Control Mode – the method that a controller uses to switch the outputs such as PID, ON/OFF, and Manual.

Differential – control algorithm in which the output is based on the difference of the inputs plus set point.

Dual PID – a controller offering two sets of PID constants. This second set of PID parameters enables the controller to switch between two sets of PIDs, to compensate for changes in the system characteristics.

DIN – Deutsche Industrial Norm, a set of technical, scientific and dimensional standards developed in Germany. RTD sensors with the DIN curve change resistance at a rate of 0.00385 ohms/ohms/C.

DIN Rail – standard DIN EN50022 mounting method for attaching devices onto a metal rail.

EZ-ZONE® – a family of controller products manufactured and sold by Watlow Electric Mfg Co

EZ-ZONE® PM Express – The next generation of controllers leveraging the strong legacy of Watlow's SERIES 93, SERIES 935 and SERIES SD controllers where easy-to-use features are needed for basic applications. Available as a PID controller or Limit controller.

EZ-ZONE® PM – A panel mount controller from Watlow® offers control options to reduce system complexity and the cost of thermal loop ownership which is available in common DIN sizes as PID controller, Limit controller and Integrated controller.

Fixed – refers to a set point that is fixed at one value.

High Limit - device will deactivate output on a temperature rise above set point.

Inductive Load – any device that has a wire winding such as solenoids, electromechanical relays or transformers.

Input – refers to the sensor types that may be connected.

Integral – the set point in integral (on board) to the controller.

JIS – Joint Industrial Standards, a set of technical, scientific and dimensional standards developed in Japan. RTD sensors with the JIS curve change resistance at a rate of 0.00396 ohms/ohms/C.

Line Voltage – the voltage required powering the electronics of the controller.

Low Limit - device will deactivate output on a temperature drop below set point.

On/Off – a method of control that turns the output full on until set point is reached and then off until the process error exceeds the hysteresis.

Open Brd – the form factor of this controller is an open circuit board mounted on four standoffs.

Manual Reset – the limit must be reset on a power cycle and requires manual reset on limit trip.

Multi RSP – multiple remote set potentiometers were supported. Each allowed the set point to be selected and adjusted.

NO-ARC Relay – refers to a hybrid electromechanical relay used to drive AC resistive heaters with very long life (typically greater than 2 million operations)

Relay – refers to an electromechanical relay.

Remote – set point is adjusted using a remote potentiometer.

Panel – the form factor of this controller is mounted through a hole cut in the panel.

PI – Proportional and Integral, a control algorithm mode with two functions: proportional action dampens the systems response, and integral corrects for droop.

PID – Proportional, Integral, and Derivative, a control algorithm mode with three functions: proportional action dampens the systems response, integral corrects for droop, and derivative prevents overshoot and undershoot.

Potted – the circuit board and electronics are encased in epoxy.

Proc – Process analog input may accept 0-5, 1-5, 0-10 volts or 0-20 and 4-20 mA.

Profiling – Controller will perform a sequence of programmed steps.

Programmable – The feature is changeable in the field through jumpers and/or parameter selection.

RTD – Resistance Temperature Detector, a sensor that is 100 ohms at 0 degrees C and made of platinum material.

Ratio – a control algorithm in which two analog inputs are required to monitor the process and at least one output adjusts the controlled part of the process. This feature allows the control of one process as a ratio of another process. This is especially useful in applications that mix two materials, whether steam, paint or food ingredients.

SSR – Solid State Relay, these devices will switch AC voltage only and require a load to latch on.

Sw DC – Switched DC, a time proportioning DC output used to drive DC input solid state relays.

t/c – Thermocouple sensor device made by joining two dissimilar metals whose standards is identified by a letter.

Temp Range – the range over which the controller could have the set point adjustment.

Thermistor – a sensor that changes resistance as the temperature changes providing very accurate temperature measurement in a narrow temperature range. Resistance decreases as temperature increases. Similar but not the same as an RTD.

Universal – an analog input which can be a thermocouple, 100 or 1000 ohm DIN RTD, 1000 ohm potentiometer or process (volts or milliamperes). Does not include thermistor input selection.

VAC – Volts Alternating Current

VAC/DC- Volts Alternating Current or Direct Current

VDC – Volts Direct Current

VTB Sw DC – Variable Time Base Switched Direct Current, a time proportioning DC output where the cycle time is variable.