Product	Control/ Limit Loops	Mounting	Fiber Optic Temp. Measure-ment	Profiling	Maximum Output	Communication Protocols	Page
F4T with INTUITION®	4/4	DIN-rail, Flush mount	–	✓	12A	Standard bus, Modbus® TCP (Ethernet), Modbus® RTU, SCPI, USB Host (2), USB device	253
EZ-ZONE® RM	152/192	DIN-rail	–	✓	15A	Standard bus, EtherNet/IP™, DeviceNet™, PROFIBUS DP, Modbus® TCP, Modbus® RTU	254
EZ-ZONE RMF	8/0	DIN-rail	✓	–	–	Standard bus, EtherNet/IP™, DeviceNet™, PROFIBUS DP, Modbus® TCP, Modbus® RTU	255
EZ-ZONE RMZ	48/0	DIN-rail	✓	–	–	EtherCAT® Standard bus, EtherNet/IP™, DeviceNet™, PROFIBUS DP, Modbus® TCP, Modbus® RTU	255
EZ-ZONE ST	1/1	DIN-rail	–	✓	75A	Standard bus, Modbus® RTU	256
EZ-ZONE PM	2/1	1/32, 1/16, 1/8, 1/4 DIN front panel	–	✓	15A	Standard bus, EtherNet/IP™, DeviceNet™, PROFIBUS DP, Modbus® TCP, Modbus® RTU	257
EZ-ZONE PM Express	1/1	1/32, 1/16 DIN front panel	–	–	15A	Standard bus	258
SERIES CV	1/0	DIN-rail, Front panel, chassis	–	–	8A	N/A	259
SERIES CF	1/0	DIN-rail, Front panel, chassis	–	–	8A	N/A	262
SERIES EHG® SL10	1/1	In-line/ Sub panel	–	–	10A	Modbus® RTU	265
SERIES EHG	1/0	In-line	–	–	10A	N/A	266

Note: The specifications in the table above are best available values in each category. Not all combinations of these values are available in a single model number.

F4T with INTUITION®

The F4T with INTUITION® temperature process controller offers a wide range of field removable I/O modules for maximum design flexibility. Configurations can be custom tailored to meet the scaling needs of a tremendous range of equipment and applications while providing exactly the hardware types required for compatibility. The F4T controller also features a 4.3 inch, color, graphical touch panel. Combining power, flexibility and functionality, this new controller offers unmatched versatility, and its best-in-class ease of use could very well make user manuals a thing of the past.

Features and Benefits

4.3-inch, color touch panel with high-resolution, graphical user-interface

- Shortens learning curve and reduces operator errors
- Allows channels, profiles, alarms, inputs and outputs to be personalized with user defined names

Temperature PID, data logger, trend chart, over/under-temperature limit, power switching, math, logic, timers and counters combined into an integrated system

- Lowers ownership costs
- Eliminates the need for separate discrete components
- Reduces complexity
- Simplifies design, ordering and installation
- Saves money

Robust algorithms for temperature, cascade, altitude, humidity and compressor

- Improves process control
- Offers one to four channels of control
- Provides multiple PID sets
- Enables TRU-TUNE®+ adaptive control algorithm
- Offers 40 ramp and soak profiles with real-time clock and battery backup

COMPOSER® graphical configuration PC software

- Speeds up and simplifies commissioning
- Archives and documents controller setup
- Connects with controller easily via Ethernet

Many communications options available including Ethernet Modbus® TCP and SCPI and EIA-232/485 Modbus® RTU

- Offers two USB host ports and one device port
- Simplifies file transfers
- Connects easily

Batch Processing with Bar Code Data Entry

- Easily collects and manages data records
- Inputs information from bar code scan for fast and easy data entry
- Offers foolproof processing via smart profile to part linkage
- Provides data security through password and data log encrypted file options
- Improves manufacturing robustness via reminder screens ensuring all data is entered during processing
- Helps ensure compliance with growing regulations and minimizes warranty exposure
- Eliminates part processing skips or walk arounds due to improved quality control
- Produces formatted data record report for easy receipt or record management uses

Modular design

- Adapts quickly to evolving requirements
- Offers numerous types of field pluggable modules for maximum flexibility and easiest compatibility
- Features scalable and modular firmware functions
- Delivers scalable input/output quantities from 1 to 36

For detailed product and ordering information, see the full F4T product section located on pages 189 through 199.

EZ-ZONE® RM

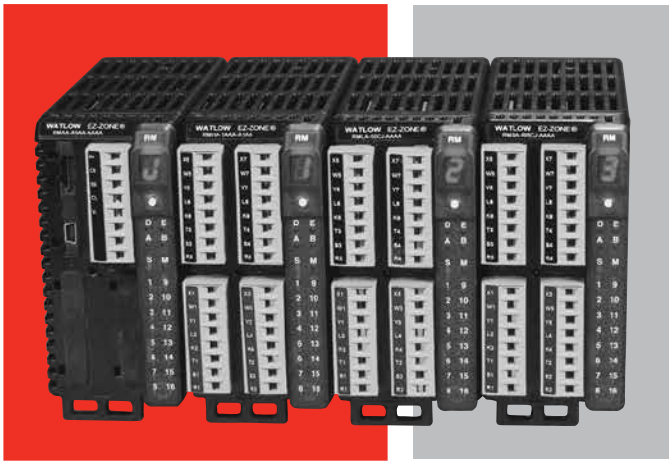
The EZ-ZONE® RM controller simplifies thermal system management. The EZ-ZONE RM controller family is comprised of six module types: an integrated on-off or PID control, monitoring and over/under temperature limit module, a high-density on-off or PID control module, a high-density limit only module, an input/output (I/O) expansion module, a high-density monitor/scanner module and a data logging and field communications access module. A system is configured by connecting any combination of module types to address specific application needs. The EZ-ZONE RM is extremely flexible and scalable allowing mixing and matching of I/O to configure one to 152 control loops and up to 256 monitor points.

Optional integrated controller functions can be combined or ordered in different quantities:

- PID control loops
- Over/under temperature limit control loops
- 10 and 15 ampere power output/heater driver options
- On-board data logging
- Current measurement input
- Sequencer start up and control function
- Programmable timer and counter functions
- Programmable math and logic options
- Multiple communication protocol options
- Mobile configuration with removable secure digital (SD) flash card

Benefits of using an integrated controller solution:

- Reduces wiring time and termination complexity compared with connecting multiple discrete products
- Improves system reliability
- Reduces termination and installation cost
- Eliminates compatibility issues often encountered with using various discrete components and brands
- Reduces troubleshooting time and downtime costs because the system can specifically identify any problems with a sensor, controller, solid state relay (SSR) power output or heater load
- Complete thermal solution saves engineering time and labor costs while shortening project schedules



Features and Benefits

Multiple inputs; from one to 152 PID loops of control or monitor up to 256 analog inputs

- Mix and match I/O to fit any application; from one input with two outputs to 152 analog inputs with 152 outputs, or monitor up to as many as 256 analog inputs all in one system
- Reduces cost because only required loops are purchased
- Allows a common controller platform across many design applications as both loops and outputs can be ordered in single increments

Advanced PID control algorithm

- Offers TRU-TUNE®+ adaptive control to provide tighter control for demanding applications
- Enables auto-tune for fast, efficient start-up

Communication capabilities

- Provides a range of protocol options including universal serial bus (USB) device port, Modbus® RTU, EtherNet/IP™, Modbus® TCP, DeviceNet™ and PROFIBUS

USB port

- Provides data log retrieval

SPLIT-RAIL control

- Allows modules mounted in separate high-voltage and low-voltage cabinets to function as an integrated system
- Minimizes the length and cost of wire runs and improves system reliability by locating inputs closer to sensors and outputs closer to loads

For detailed product and ordering information, see the full EZ-ZONE RM product section located on pages 200 through 219.

EZ-ZONE® RMZ/RMF

By combining advances in fluorescent temperature sensing with the power of the proven EZ-ZONE® RM control system, Watlow® developed a best-in-class fiber optic temperature measurement and control system that will provide industry-leading performance for your specific application. By integrating fiber optic sensing capabilities into the EZ-ZONE RM control system, users will save space, improve performance with faster response times while simplifying their control system.

Watlow's EZ-ZONE RMZ and EZ-ZONE RMF make the system adaptable to all system requirements. Both are compatible with all other modules within the EZ-ZONE RM family and self-discover all existing modules within the system making a seamless integration into your temperature control/logic system.

EZ-ZONE RMZ Offers Fiber Optic Sensing Capabilities and EtherCAT® Communications

The EZ-ZONE RMZ integrates fiber optics, PID temperature control and EtherCAT® communications into a single package. It features multi-channel control, hosting up to four channels of fiber optic inputs as well as supporting up to 44 additional control loops from other EZ-ZONE RM modules. These modules support a wide array of capabilities including I/O, logic, current measurement, power switching and more.

EZ-ZONE RMF Offers Additional Fiber Optic Inputs for Expansion Opportunities

The EZ-ZONE RMF module is a dedicated fiber optic input module integrating the advanced control technology of the EZ-ZONE system with one to eight channels of fiber optic temperature sensing.

The EZ-ZONE RMF can also serve as additional inputs to the EZ-ZONE RMZ enabling extensive expansion opportunities for future system needs. The EZ-ZONE RMF is ideal either as an expansion module or configured with built-in temperature control loops (outputs via EZ-ZONE RME module). The EZ-ZONE RMF can be used independently when only sensing is required.

Benefits of Watlow's high-performance fluorescence-based temperature measurement system include:

- Compact integrated fiber optic sensing with temperature control
- Easily expands to increase number of zones as your system needs increase
- Integrates seamlessly with the temperature control system avoiding additional analog signal processing
- Faster temperature sampling rates with high resolution
- Minimizes installed footprint due to the small form factor and DIN-rail mounting
- Highly accurate fluorescent signal processing electronics
- Offers highly reliable LED light source designed to run at low currents for maximum life
- Up to 48 loops of input and control with all EZ-ZONE RM temperature control features
  - Temperature / limit loops
  - Current measurement
  - Power switching
  - Logic

For detailed product and ordering information, see the full RMZ/RMF product section located on pages 220 through 221.

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

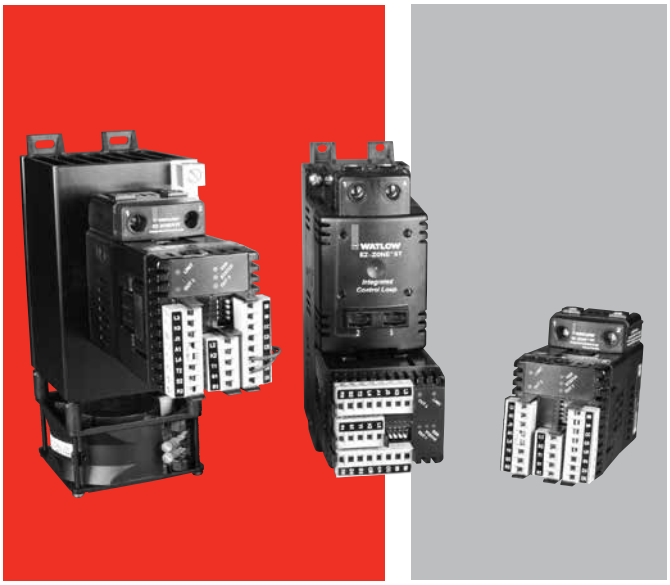
200KA SCCR with proper fusing
- Minimizes damage in the event of a short circuit

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

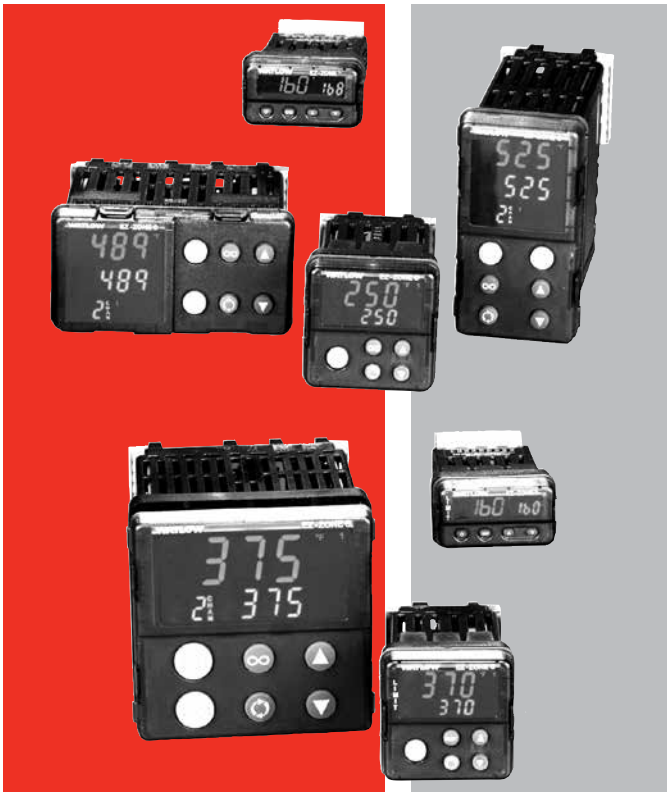
Optional definite purpose mechanical contactor
- Enables circuit safety shut down driven by limit control or PID alarm output signal

For detailed product and ordering information, see the full EZ-ZONE ST product section located on pages 222 through 228.

EZ-ZONE PM

The EZ-ZONE PM panel mount controller offers control options that reduce system complexity and thermal loop ownership cost. It can be ordered as a PID controller, an over/under limit controller or its functions can be combined into an integrated controller. An option to integrate a high amperage power controller output with a high-performance PID controller and an over/under limit controller in one space-saving, panel mount package is also available. Many communications options are offered to support connectivity needs.

Because the EZ-ZONE PM controller is highly scalable, pay only for what is needed. This controller is available in 1/32, 1/16, 1/8 and 1/4 DIN panel mount packages. The EZ-ZONE PM controller is easy to use and is ideal for PID, over/under limit or integrated controller needs.



Features and Benefits

Integrated PID and limit controller
- Reduces wiring time and termination complexity compared with connecting discrete products
- Decreases required panel space
- Lowers installation costs
- Increases user and equipment safety for over/under temperature conditions

High amperage power control output
- Drives 15 ampere resistive loads directly
- Reduces component count
- Decreases cost of ownership

Current monitoring
- Detects heater current flow and provides alarm indication of a failed output device or heater load
- Drives output on open or shorted heater

Serial communication capabilities
- Provides a wide range of protocol choices including Modbus® RTU, EtherNet/IP™, Modbus® TCP, PROFIBUS DP, DeviceNet™ and J1939 CAN bus
- Supports network connectivity to a PC or PLC

Dual-channel controller
- Provides two PID controllers in one space-saving package

Enhanced control options
- Easily handles complex process problems such as cascade, ratio, differential, square-root, motorized valve control without slidewire feedback, wet-bulb/dry-bulb, compressor control and peltier loads

Countdown timer option
- Provides batch process control
- Supports set point change during countdown

EZ-LINK™ mobile application for iPhone® and Android™
- Expedites controller setup with intuitive navigation
- Simplifies setting parameters with plain text names and descriptions
- Connects quickly and easily via Bluetooth® wireless communications

Advanced PID control algorithm
- Offers TRU-TUNE®+ adaptive control to provide tighter control for demanding applications
- Provides auto-tune for fast, efficient startup

For detailed product and ordering information, see the full EZ-ZONE PM product section located on pages 229 through 238.

EZ-ZONE PM Express

The EZ-ZONE PM Express panel mount controller is an industry-leading PID controller that allows optimal performance utilizing simple control and menu functionality without complex features. It is ideal for basic applications and usage levels.

The EZ-ZONE PM Express is the next generation controller to follow the legacy of Watlow's SERIES 93, SERIES 935 AND SERIES SD controllers that offer easy-to-use features to perform many basic applications. The EZ-ZONE PM Express includes one universal input and an option for up to two outputs and is available in 1/32, 1/16 ,1/8 and 1/4 DIN panel mount packages. It can be ordered as a PID process controller or as a dedicated over and under-temperature limit controller.

The EZ-ZONE PM Express is a valuable addition to the EZ-ZONE PM controller family which also includes the EZ-ZONE PM integrated controller and the EZ-ZONE PM standard version.

Features and Benefits

Simplified menu
- Fits basic applications with a user-friendly interface supported by two menus and a streamlined list of parameters
- Eliminates complexity often experienced with more advanced controllers and unnecessary features
- Reduces training costs and user programming errors

PID auto-tune
- Provides auto-tune for fast, efficient startup

Standard bus communications
- Allows easy product configuration via PC communications protocol and free software
- Saves time, simplifies programming process and improves reliability of controller setup

Factory Mutual (FM) approved over and under limit with auxiliary outputs
- Increases user and equipment safety for over and under-temperature conditions

Agency approvals: UL® listed, CSA, CE, RoHS, W.E.E.E., FM, SEMI F47-0200, Class 1, Div. 2 rating on selected models
- Assures prompt product acceptance
- Reduces end product documentation costs

Front panel removable
- Saves time and labor for replacements and troubleshooting

EZ-LINK™ mobile application for iPhone® and Android™
- Expedites controller setup with intuitive navigation
- Simplifies setting parameters with plain text names and descriptions
- Connects quickly and easily via Bluetooth® wireless communications

P3T armor sealing system
- Complies with NEMA 4X, IP65 specifications
- Allows controller to be cleaned and washed
- Certified UL® 50 independent to NEMA 4X specification

Touch-safe package
- Increases installer and operator safety
- Complies with IP2X requirements

Three-year warranty
- Demonstrates Watlow's reliability and product support

High-amperage power control output
- Drives 15 ampere resistive loads direct
- Reduces component count
- Saves panel space and simplifies wiring
- Reduces cost of ownership

For detailed product and ordering information, see the full EZ-ZONE PM Express product section located on pages 239 through 243.

SERIES CV

Watlow's family of microprocessor-based temperature controllers offers an economical solution for applications that require simple, on/off control. Controllers are available in a broad range of packaging options, allowing selection of the best version for a specific application. They are available with an operator interface and can be ordered in a 1/8 DIN square panel mount or DIN-rail mount configuration.

The SERIES CV temperature controller incorporates a microprocessor design that delivers the repeatability, accuracy and performance advantages you can count on from Watlow's basic temperature controllers.

The SERIES CV controller includes an operator interface for viewing and set point selection. A red, four-character, seven segment LED displays the set point to show process options. The set point selection is made with a continuous turn, rotary encoder. Operating range temperature values are user definable as specified in the product configuration part number.

SERIES CV controllers are UL® and C-UL® listed and carry CSA and CE approvals. Watlow's temperature controllers include industry-leading service and support and are protected by a three-year warranty.

Features and Benefits

Adjustable set points
- Offers control flexibility

Four character LED display
- Improves set point selection accuracy

Multiple mounting options
- Minimizes installation time

Heat or cool operation
- Provides application flexibility

Fahrenheit or Celsius operation with indication
- Offers application flexibility

Agency approvals
- Meets certification requirements/compliance

Microprocessor based technology
- Ensures accurate repeatable control

SERIES CV

Specifications

On-Off Controller
- Microprocessor based, on-off control mode
- Nominal switching hysteresis, typically 3°F (1.7°C)
- Input filter time: 1 second

Operator Interface
- Four digit, seven segment LED displays, 0.28 in. (7 mm) high
- °F or °C indicator LED
- Load indicator LED
- Continuous turn, velocity sensitive rotary encoder for set point adjustment
- Front panel key push for set point or push for show process options

Standard Conditions For Specifications
- Rated line voltage, 50 to 60Hz, 0 to 90%, RH, non-condensing, 15-minute warm-up
- Calibration ambient range: 77°F (25°C) ±3°C

Sensor Input
Thermocouple
- Grounded or ungrounded
- Type E, J, K or T thermocouple
- >10 MΩ input impedance
- 250 nV input referenced error per 1Ω source resistance

RTD
- 2-wire platinum, 100Ω
- DIN-curve (0.00385 curve)
- 125 µA nominal RTD excitation current

Input Accuracy Span Range

Type E:	-328	to	1470°F	(-200	to	800°C)
Type J:	32	to	1382°F	(0	to	750°C)
Type K:	-328	to	2282°F	(-200	to	1250°C)
Type T:	-328	to	662°F	(-200	to	350°C)
RTD (DIN)	-328	to	1472°F	(-200	to	800°C)

Thermocouple Input
- Calibration accuracy: ±1% of input accuracy span, ±1° at standard conditions and actual calibration ambient. Exception: Type T, ±2.4% of input accuracy span for -328 to 32°F (-200 to 0°C)
- Temperature stability: ±0.3 degree per degree change in ambient

RTD Input
- Calibration accuracy ±1% of input accuracy span ±1° at standard conditions and actual calibration ambient
- Temperature stability: ±0.2 degree per degree change in ambient

Allowable Operating Ranges

Type E:	-328	to	1470°F	(-200	to	800°C)
Type J:	-346	to	1900°F	(-210	to	1038°C)
Type K:	-454	to	2500°F	(-270	to	1370°C)
Type T:	-454	to	750°F	(-270	to	400°C)
RTD (DIN)	-328	to	1472°F	(-200	to	800°C)

Output Types
Switched dc (non-isolated)
- Supply voltage max.: 24VDC into an infinite load
- Supply voltage min.: 5VDC at 10mA
- Min. load impedance: 500Ω

Electromechanical Relay, Form C
- Min. load current: 100mA
- 8A @ 240VAC or 30VDC max., resistive
- 250VA pilot duty, 120/240VAC max., inductive
- Use RC suppression for inductive loads
- Electrical life 100,000 cycles at rated current

Agency Approvals
- UL® 60730-1 Recognized Temperature Controller and Indicator on potted models
- UL® 50 IP65 - tactile key models
- UL® 197 Reviewed for Use in Cooking Appliances
- UL® 873
- ANSI Z21.23 Gas Appliance Thermostat Approval
- Temperature Control and Indicator CSA 22.2 No. 24

Terminals
- 0.25 in. (6.3 mm) quick connect, push on terminal or removable screw style terminal block

Power
- 24VAC +10%; -15%; 50/60Hz, ±5%
- 120VAC +10%; -15%; 50/60Hz, ±5%
- 230 to 240VAC +10%; -15%; 50/60Hz, ±5%
- 10VA max. power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment
- 32 to 158°F (0 to 70°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 185°F (-40 to 85°C)

Dimensions
- DIN-rail model can be DIN-rail or chassis mount DIN-rail spec DIN 50022, 1.38 in. x 0.30 in. (35 mm x 7.5 mm)

Style	Width	Height	Depth
DIN-rail	3.08 in. (78.1 mm)	4.42 in. (112.3 mm)	3.57 in. (90.7 mm)
Square ⅛ DIN-panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

SERIES CV

Ordering Information

- **On-off controller, rotary set point adjustment, four character, seven segment display**

Part Number

① ②	③ Power Supply	④ Package	⑤ Sensor Type and Scale	⑥ Control Type	⑦ ⑧ ⑨ ⑩ Low Set Point Operating Range Value	⑪ ⑫ ⑬ ⑭ High Set Point Operating Range Value	⑮ Overlay/ Customs Options
CV							

③	Power Supply
B =	120VAC, switched dc output
C =	120VAC, 8A relay output
D =	230 to 240VAC, switched dc output
E =	230 to 240VAC, 8A relay output
F =	24VAC, switched dc output
G =	24VAC, 8A relay output

④	Package
1 =	Panel mount square 1/8 DIN - spade terminals
2 =	DIN-rail mount - spade terminals
5 =	Panel mount square 1/8 DIN - screw terminals
6 =	DIN-rail mount - screw terminals
A =	NEMA 4X panel mount, tactile keys (spade terminals)
B =	DIN-rail mount, tactile keys (spade terminals)
C =	NEMA 4X panel mount, tactile keys (screw terminals)
D =	DIN-rail mount, tactile keys (screw terminals)

⑤	Sensor Type and Scale
H =	T/C Type J Fahrenheit (-346 to 1900°F)
J =	T/C Type J Celsius (-210 to 1038°C)
K =	T/C Type K Fahrenheit (-454 to 2500°F)
L =	T/C Type K Celsius (-270 to 1370°C)
M =	T/C Type T Fahrenheit (-454 to 750°F)
N =	T/C Type T Celsius (-270 to 400°C)
P =	RTD Fahrenheit (-328 to 1472°F)
R =	RTD Celsius (-200 to 800°C)
S =	T/C Type E Fahrenheit (-328 to 1470°F)
T =	T/C Type E Celsius (-200 to 800°C)

⑥	Control Type
H =	Heat
C =	Cool

⑦⑧⑨⑩ Low Set Point Operating Range Value

Note: A (-) is used in the left most digit of the set point operating ranges to indicate a negative temperature value.

⑪⑫⑬⑭ High Set Point Operating Range Value

Note: A (-) is used in the left most digit of the set point operating ranges to indicate a negative temperature value.

⑮	Overlay/Customs Options
A =	Standard with Watlow logo
B =	Push to show process with Watlow logo
C =	Push to adjust set point with Watlow logo
D =	Show process push to adjust set point with Watlow logo
1 =	Standard without Watlow logo
2 =	Push to show process without Watlow logo
3 =	Push to adjust set point without Watlow logo
4 =	Show process push to adjust set point without Watlow logo

SERIES CF

Watlow's family of microprocessor-based temperature controllers offers an economical solution for applications that require simple, on-off control. Controllers are available in a broad range of packaging options, allowing selection of the best version for a specific application. They are available with or without an indicating display and can be ordered in a 1/8 DIN square panel mount, DIN-rail mount or open board design configuration.

The SERIES CF temperature controller incorporates a microprocessor design that delivers the repeatability, accuracy and performance advantages you can count on from Watlow's basic temperature controllers. Fixed set points are available and an indicating display is an option. Operating set point temperature values can be specified in the product configuration part number.

SERIES CF controllers are UL® and C-UL® listed and carry CSA and CE approvals. Watlow's temperature controllers include industry-leading service and support and are protected by a three-year warranty.

Features and Benefits

Fixed set points
- Provides tamper-proof operation

Multiple mounting options
- Minimizes installation time

Heat or cool operation
- Provides application flexibility

Fahrenheit or Celsius operation with indication
- Offers application flexibility

Agency approvals
- Meets certification requirements/compliance

Microprocessor based technology
- Ensures accurate repeatable control

SERIES CF

Specifications

On-Off Controller
- Microprocessor based, on-off control mode
- Nominal switching hysteresis, typically 3°F (1.7°C)
- Input filter time: 1 second

Operator Interface
- 4-digit, 7-segment LED displays, 0.28 in. (7 mm) high non-condensing, 15-minute warm-up
- °F or °C indicator LED

Standard Conditions For Specifications
- Rated line voltage, 50 to 60Hz, 0 to 90%, RH, non-condensing, 15-minute warm-up
- Calibration ambient range: 77°F (25°C) ±3°C

Sensor Input
Thermocouple
- Grounded or ungrounded
- Type E, J, K or T thermocouple
- >10 MΩ input impedance
- 250 nV input referenced error per 1Ω source resistance

RTD
- 2-wire platinum, 100Ω
- DIN-curve (0.00385 curve)
- 125 µA nominal RTD excitation current

Input Accuracy Span Range

Type E:	-328	to 1470°F	(-200	to	800°C)
Type J:	32	to 1382°F	(0	to	750°C)
Type K:	-328	to 2282°F	(-200	to	1250°C)
Type T:	-328	to 662°F	(-200	to	350°C)
RTD (DIN)	-328	to 1472°F	(-200	to	800°C)

Thermocouple Input
- Calibration accuracy: ±1% of input accuracy span, ±1° at standard conditions and actual calibration ambient. Exception: Type T, ±2.4% of input accuracy span for -328 to 32°F (-200 to 0°C)
- Temperature stability: ±0.3 degree per degree change in ambient

RTD Input
- Calibration accuracy ±1% of input accuracy span ±1° at standard conditions and actual calibration ambient
- Temperature stability: ±0.2 degree per degree change in ambient

Allowable Operating Ranges

Type E:	-328	to 1470°F	(-200	to	800°C)
Type J:	-346	to 1900°F	(-210	to	1038°C)
Type K:	-454	to 2500°F	(-270	to	1370°C)
Type T:	-454	to 750°F	(-270	to	400°C)
RTD (DIN)	-328	to 1472°F	(-200	to	800°C)

Output Types
Switched dc (non-isolated)
- Supply voltage max.: 24VDC into an infinite load
- Supply voltage min.: 5VDC at 10mA
- Min. load impedance: 500Ω

Electromechanical Relay, Form C
- Min. load current: 100mA
- 8A @ 240VAC or 30VDC max., resistive
- 250VA pilot duty, 120/240VAC max., inductive
- Use RC suppression for inductive loads
- Electrical life 100,000 cycles at rated current

Agency Approvals
- UL® 60730-1 Recognized Temperature Controller and Indicator on potted models
- UL® 197 Reviewed for Use in Cooking Appliances
- UL® 873
- ANSI Z21.23 Gas Appliance Thermostat Approval
- Temperature Control and Indicator CSA 22.2 No. 24

Terminals
- 0.25 in. (6.3 mm) quick connect, push on terminal or removable screw style terminal block

Power
- 24VAC +10%; -15%; 50/60Hz, ±5%
- 120VAC +10%; -15%; 50/60Hz, ±5%
- 230 to 240VAC +10%; -15%; 50/60Hz, ±5%
- 10VA max. power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment
- 32 to 158°F (0 to 70°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -40 to 185°F (-40 to 85°C)

Dimensions
- DIN-rail model can be DIN-rail or chassis mount DIN-rail spec DIN 50022, 1.38 in. x 0.30 in. (35 mm x 7.5 mm)

Style	Width	Height	Depth
Open Board	2.43 in. (61.7 mm)	2.43 in. (61.7 mm)	1.78 in. (45.1 mm)
Potted	2.76 in. (70.1 mm)	4.05 in. (102.9 mm)	1.84 in. (46.6 mm)
DIN-rail	3.08 in. (78.1 mm)	4.42 in. (112.3 mm)	3.57 in. (90.7 mm)
Square ⅛ DIN-panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

SERIES CF

Ordering Information

- **On-off controller, fixed set point, no user interface**

Part Number

① ②	③ Power Supply	④ Package	⑤ Sensor Type and Scale	⑥ Control Type	⑦⑧⑨⑩ Fixed Set Point Temp. Value	⑪⑫⑬⑭	⑮ Overlay/ Customs Options
CF						AAAA	

③	Power Supply
B =	120VAC, switched dc output
C =	120VAC, 8A relay output
D =	230 to 240VAC, switched dc output
E =	230 to 240VAC, 8A relay output
F =	24VAC, switched dc output
G =	24VAC, 8A relay output

④	Package
1 =	Panel mount square ⅛ DIN - spade terminals
2 =	DIN-rail mount - spade terminals
3 =	Open board, non potted - spade terminals
4 =	Potted case - spade terminals
5 =	Panel mount square ⅛ DIN - screw terminals
6 =	DIN-rail mount - screw terminals
7 =	Open board, non potted - screw terminals

⑤	Sensor Type and Scale
H =	T/C Type J Fahrenheit (-346 to 1900°F)
J =	T/C Type J Celsius (-210 to 1038°C)
K =	T/C Type K Fahrenheit (-454 to 2500°F)
L =	T/C Type K Celsius (-270 to 1370°F)
M =	T/C Type T Fahrenheit (-454 to 750°F)
N =	T/C Type T Celsius (-270 to 400°F)
P =	RTD Fahrenheit (-328 to 1472°F)
R =	RTD Celsius (-200 to 800°C)
S =	T/C Type E Fahrenheit (-328 to 1470°F)
T =	T/C Type E Celsius (-200 to 800°C)

⑥	Control Type
H =	Heat
C =	Cool

⑦⑧⑨⑩	Fixed Set Point Temperature Value
Note: A (-) is used in the left most digit of the set point operating ranges to indicate a negative temperature value.	

⑮	Overlay/Customs Options
A =	Standard with Watlow logo
1 =	Standard without Watlow logo

SERIES EHG® SL10

The SERIES EHG® SL10 integrated, multi-function controller is a key component to a powerful system that includes a heater, an adjustable set point temperature controller, a high/low temperature alert, a power switching device and a high temperature safety limit. Its agency recognized controller/safety limit meets UL® 1998 and CE 60730 requirements.

An optional display/communications module can be easily added in the field to provide a digital display indication, an adjustment of set point, RS-485 Modbus® communications and other Human Machine Interface (HMI) features. As a scalable system, only what is needed can be purchased.

The EHG SL10 controllers' easy to install, compact design, inherent reliability and integrated limit functions offer unmatched value. It is designed for easy integration with Watlow heaters to simplify engineering, reduce component count for new equipment and decrease ownership cost. For original equipment manufacturers (OEMs), the EHG SL10 controller's CE, Semi-S2 compliance and UL® recognition reduces time and costs associated with global agency testing and validation. U.S. Patent Number 8,044,329.

Features and Benefits

Process controller and safety limit in one package
- Meets UL® 1998 and CE 60730 requirements
- Eliminates the need for a thermal fuse on a heater
- Eliminates replacement of heater when fuse fails

Optional display/communications module
- Allows easy upgrade on to base device
- Offers low cost field upgrade
- Provides easy, snap-on installation

Accurate and flexible temperature process controller
- Replaces problematic bi-metal thermostats with accurate electronic temperature process controller
- Allows easy change of process parameters

Ambient operating temperature range 32 to 158°F (0 to 70°C)
- Increases reliability when mounting in harsh temperature environments or in close proximity to heaters

Integrated high/low temperature alert signal relay
- Provides dry contact output to activate external alarm or process function
- Signals control status with three integrated LEDs
- Allows a signal of up to two amperes 30VAC/VDC, Form A to alert if process temperature is out of range limits

Health check diagnostics
- Monitors maximum heater process temperature, maximum ambient temperature and thermocouple operation
- Provides health check signal to inform operator that the process is working correctly

Universal power supply
- Allows an input of 85 to 264VAC, 50/60Hz
- Provides safe control of up to 2400 watts with 10 amperes switching in both controller and safety limit

Can be switched from on-off and PID algorithm
- Increases product life (on-off control is default)
- Offers selectable PID control algorithm for tighter temperature uniformity

Universal ⅛ turn mounting bracket
- Allows mounting to most surfaces
- Provides flexible mounting—either horizontally or vertically

For detailed product and ordering information, see the full EHG SL10 product section located on pages 244 through 247.

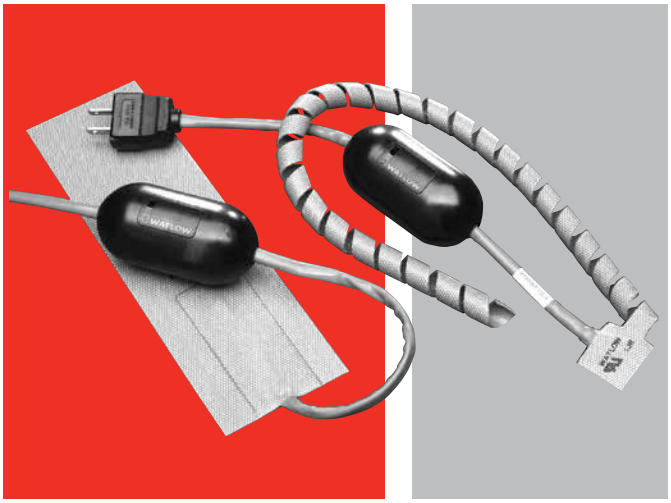
SERIES EHG

Many applications requiring a fixed temperature set point rely on a mechanical thermostat for thermal control. Thermostats have proven, however, to be inadequate for many applications due to long-term reliability issues, such as 100,000 cycle rating and poor temperature control.

The SERIES EHG thermal solution includes a compact temperature control, thermocouple sensor and power switching device integrated into the heater's power cord. The SERIES EHG reduces system costs and lasts substantially longer than a conventional thermostat solution.

The evolution of miniature microprocessor technology and Watlow switching technology fostered development of a small, versatile temperature control and thermocouple sensor that is integrated with Watlow silicone rubber heater products. This device senses the temperature via input from a thermocouple strategically placed on the heater mat. The microprocessor is programmed prior to shipment with an application specific set point. This results in quick delivery of a custom, integrated system.

The small thermocouple mass provides superior response to changes in process temperature enabling higher watt density silicone rubber heater designs. These features offer an integrated custom set point temperature controller with superior life span, faster heat-up rates and improved accuracy. The SERIES EHG System has been tested to over four million cycles at rated amperage. Depending on the application, Watlow's power switching design can last up to 40 times longer than a conventional thermostat.



Features and Benefits

Long operational life
- Improves system reliability

Tight temperature control
- Ensures process accuracy

Small sensor footprint
- Fits with almost any heater
- Responds quickly to temperature changes
- Controls high watt densities in low mass applications

Reduced system cost
- A single EHG control can be configured with multiple heaters

Pre-wired, in line control
- Simplifies installation
- Two wire power connection

Durable housing with built-in strain relief
- Protects electronics
- Low risk of mechanical damage

Manufactured with proven Watlow components
- Assures reliable system performance

For detailed product and ordering information, see the full EHG product section located on pages 248 through 249.