

On-Off Controllers

SERIES CV

Watlow's family of microprocessor based temperature controllers provide an economical solution for applications requiring simple on-off control. These controllers are available in a broad range of packaging options, allowing users to select the best version for their individual application. The controllers are available with an operator interface and can be ordered in 1/8 DIN square panel mount or DIN-rail mount configurations.

The SERIES CV temperature controller incorporates a microprocessor design platform. This design provides significant improvements in the performance, repeatability and accuracy offered by Watlow's current line of analog basic temperature controllers.

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

The 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 backed by a three-year warranty.

Applications

- Food preparation
- Industrial machinery
- Packaging
- Plastics processing

Features and Benefits

Adjustable set points

- Offer control flexibility

Four character LED display

- Improves set point selection accuracy

Multiple mounting options

- Minimize installation time



Heat or cool operation

- Provides application flexibility

Fahrenheit or Celsius operation with indication

- Offers application flexibility

Agency approvals

- Meet certification requirements/compliance

Microprocessor based technology

- Ensures accurate repeatable control

Specifications

On-Off Controller

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

Operator Interface

- Four digit, seven segment LED displays, 7 mm (0.28 in.) high
- °C or °F 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 percent, RH, non-condensing, 15-minute warm-up
- Calibration ambient range: 25°C (77°F) ±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:	-200 to 800°C
	(-328 to 1470°F)
Type J:	0 to 750°C
	(32 to 1382°F)
Type K:	-200 to 1250°C
	(-328 to 2282°F)
Type T:	-200 to 350°C
	(-328 to 662°F)
RTD (DIN)	-200 to 800°C
	(-328 to 1472°F)

Thermocouple Input

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

On-Off Controllers

F.O.B.: Winona, Minnesota

SERIES CV

Specifications Cont.

RTD Input

- Calibration accuracy ± 1 percent of input accuracy span $\pm 1^\circ$ at standard conditions and actual calibration ambient
- Temperature stability: ± 0.2 degree per degree change in ambient

Allowable Operating Ranges

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

Output Types

Switched dc (non-isolated)

- Supply voltage maximum: 24V \approx (dc) into an infinite load
- Supply voltage minimum: 5V \approx (dc) at 10mA
- Minimum load impedance: 500 Ω

Electromechanical Relay, Form C

- Minimum load current: 100mA
- 8 A @ 240V \sim (ac) or 30V \approx (dc) maximum, resistive
- 250VA pilot duty, 120/240V \sim (ac) maximum, 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
- UL[®] 197 Reviewed for Use in Cooking Appliances
- ANSI Z21.23 Gas Appliance Thermostat Approval
- Temperature Control and Indicator CSA 22.2 No. 24

Terminals

- 6.3 mm (0.25 in.) quick connect, push on terminal

Power

- 24V \sim (ac) +10 percent; -15 percent; 50/60Hz, ± 5 percent
- 120V \sim (ac) +10 percent; -15 percent; 50/60Hz, ± 5 percent
- 230 to 240V \sim (ac) +10 percent; -15 percent; 50/60Hz, ± 5 percent
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment

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

Dimensions

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

Style	Width	Height	Depth
DIN-rail	78.1 mm (3.08 in.)	112.3 mm (4.42 in.)	90.7 mm (3.57 in.)
Square $\frac{1}{8}$ DIN-panel	72.4 mm (2.85 in.)	72.4 mm (2.85 in.)	Behind panel 51.7 mm (2.04 in.)

Ordering Information

To order, complete the model number on the right with the information below.

C V

SERIES CV = On-off controller rotary set point adjustment, four character, seven segment display

Power Supply

B = 120V \sim (ac), switched dc output
 C = 120V \sim (ac), eight amp relay output
 D = 230 to 240V \sim (ac), switched dc output
 E = 230 to 240V \sim (ac), eight amp relay output
 F = 24V \sim (ac), switched dc output
 G = 24V \sim (ac), eight amp relay output

Package

1 = Panel mount square $\frac{1}{8}$ DIN
 2 = DIN-rail mount

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)

Control Type

H = Heat
 C = Cool

Low Set Point Operating Range Value^①

High Set Point Operating Range Value^①

Overlay/Customs Options

A = Standard
 B = Push to show process
 C = Push to adjust set point

^①A (-) is used in the left most digit of the set point operating ranges to indicates a negative temperature value

On-Off Controllers

SERIES CF

Watlow's new family of micro-processor based temperature controllers provide an economical solution for applications requiring simple on-off control. These controllers are available in a broad range of packaging options, allowing users to select the best version for their individual application. The controllers are available without an operator interface and can be ordered in square 1/2 DIN panel mount, DIN-rail mount or open board design configurations.

The SERIES CF temperature controller incorporates a micro-processor design platform.

This design provides significant improvements in the performance, repeatability and accuracy offered by Watlow's current line of analog basic temperature controllers.

The SERIES CF controller offers fixed set points and is supplied without an operator interface. Operating set point temperature values are customer definable in the product configuration part number.

The new temperature controllers are UL® and C-UL® listed and carry CSA and CE approvals. Watlow's basic temperature controllers include industry leading service and support and are backed by a three-year warranty.

Applications

- Food preparation
- Industrial machinery
- Packaging
- Plastics processing

Features and Benefits

Fixed set points

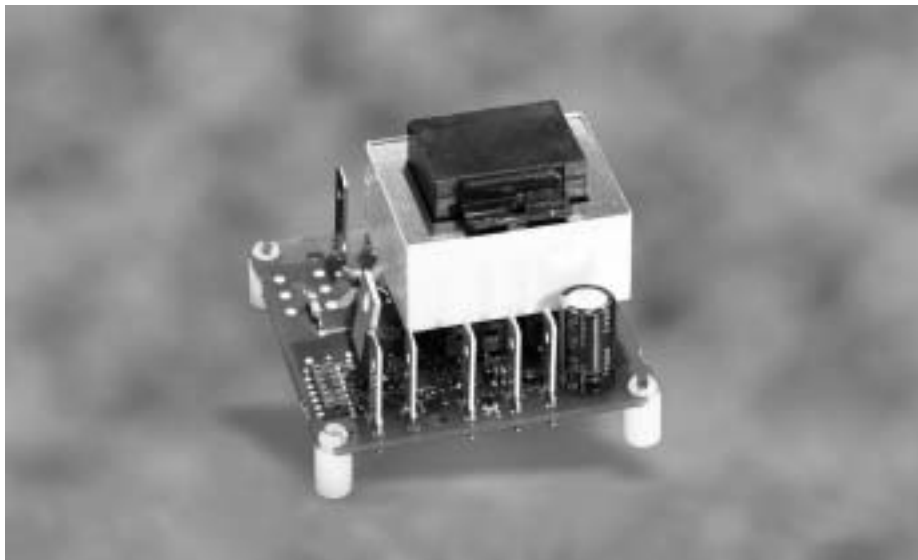
- Provide tamper-proof operation

Multiple mounting options

- Minimize installation time

Heat or cool operation

- Provides application flexibility



Fahrenheit or Celsius operation with indication

- Offers application flexibility

Agency approvals

- Meet certification requirements/compliance

Microprocessor based technology

- Ensures accurate repeatable control

Specifications

On-Off Controller

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

Standard Conditions For Specifications

- Rated line voltage, 50 to 60Hz, 0 to 90 percent RH non-condensing, 15-minute warm-up
- Calibration ambient range: 25°C (77°F) ±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:	-200 to 800°C
	(-328 to 1470°F)
Type J:	0 to 750°C
	(32 to 1382°F)
Type K:	-200 to 1250°C
	(-328 to 2282°F)
Type T:	-200 to 350°C
	(-328 to 662°F)
RTD (DIN)	-200 to 800°C
	(-328 to 1472°F)

Thermocouple Input

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

RTD Input

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

On-Off Controllers

F.O.B.: Winona, Minnesota

SERIES CF

Specifications Cont.

Allowable Operating Ranges

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

Output Types

Switched dc (non-isolated)

- Supply voltage maximum: 24V $\overline{=}$ (dc) into an infinite load
- Supply voltage minimum: 5V $\overline{=}$ (dc) at 10mA
- Minimum load impedance: 500 Ω

Electromechanical Relay, Form C

- Minimum load current: 100mA
- 8 A @ 240V \sim (ac) or 30V $\overline{=}$ (dc) maximum, resistive
- 250VA pilot duty, 120/240V \sim (ac) maximum, 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
- UL[®] 197 Reviewed for Use in Cooking Appliances
- ANSI Z21.23 Gas Appliance Thermostat Approval
- Temperature Control and Indicator CSA 22.2 No. 24

Terminals

- 6.3 mm (0.25 in.) quick connect, push on terminal

Power

- 24V \sim (ac) +10 percent; -15 percent; 50/60Hz, \pm 5 percent
- 120V \sim (ac) +10 percent; -15 percent; 50/60Hz, \pm 5 percent
- 230 to 240V \sim (ac) +10 percent; -15 percent; 50/60Hz, \pm 5 percent
- 10VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment

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

Dimensions

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

Style	Width	Height	Depth
Open Board	61.7 mm (2.43 in.)	61.7 mm (2.43 in.)	45.1 mm (1.78 in.)
Potted	70.1 mm (2.76 in.)	102.9 mm (4.05 in.)	46.6 mm (1.84 in.)
DIN-Rail	78.1 mm (3.08 in.)	112.3 mm (4.42 in.)	90.7 mm (3.57 in.)
Square $\frac{1}{2}$ DIN-panel	72.4 mm (2.85 in.)	72.4 mm (2.85 in.)	Behind panel 51.7 mm (2.04 in.)

Ordering Information

To order, complete the model number on the right with the information below.

C F _____ **A A A A** _____

SERIES CF = On-off controller, fixed set point, no user interface

Power Supply _____

B = 120V \sim (ac), switched dc output
 C = 120V \sim (ac), eight amp relay output
 D = 230 to 240V \sim (ac), switched dc output
 E = 230 to 240V \sim (ac), eight amp relay output
 F = 24V \sim (ac), switched dc output
 G = 24V \sim (ac), eight amp relay output

Package _____

1 = Panel mount square $\frac{1}{2}$ DIN
 2 = DIN-rail mount
 3 = Open board, non potted
 4 = Potted case

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)

Control Type _____

H = Heat
 C = Cool

Fixed Set Point Temperature Value^① _____

Overlay/Customs Options _____

A = Standard

^①A (-) is used in the left most digit of the fixed set point indicates a negative temperature value

On-Off Controllers

SERIES 80M6

Watlow's SERIES 80M6 temperature controllers provide an economical, easy to install unit for temperature sensing and control in a space saving package. The SERIES 80M6 delivers single zone, on-off heating control and is available in three temperature ranges. The controller features open sensor and positive off circuit protection, preventing heating once the sensor temperature falls below the low end of the set point range.

The SERIES 80M6 consists of a temperature controller along with a relay output potted in a rugged, plastic shell. This feature makes the SERIES 80M6 ideal for foodservice and other applications requiring rugged construction.

With 6.35 mm (0.25 in.) quick connect terminals for thermocouple input, power input and relay output as well as a sub-panel mount, the SERIES 80M6 also allows for simple, quick installation. The SERIES 80M6 provides the convenience of precision temperature control with the turn of a potentiometer and fits within the same footprint as the current Watlow 80M5.

The SERIES 80M6 controller is backed by a 12-month warranty from Watlow Winona and is UL® 873 and C-UL® recognized.



Applications

- Proofers
- Ovens
- Deep Fryers
- Griddles
- General heating applications

Features and Benefits

Potted shell design

- Safe for use in various environmental conditions

Compact size

- Easily retrofittable to the current 80M5
- Space-saving replacement for filled-bulb controllers

Open sensor protection

- Contacts de-energize in the event of an open sensor, turning off power to the load and preventing a runaway

Quick connect terminals

- Fast, easy installation

On-off control

- Provides simple, reliable operation

Specifications

Control Mode

- On-off control with a -16°C (4°F) switching hysteresis for Type E thermocouple

Operator Interface

- Remote set point potentiometer - user mounted potentiometer provides set point adjustment and indication
- User provided dial scale

Input

- Type E thermocouple
- Sensor may be isolated or grounded
- Sensor break protection de-energized output

Output

- Electromechanical relay, SPST, sealed, $24\text{V}=\text{(dc)}$, 30A @ $120\text{V}\sim\text{(ac)}$, 30A @ $240\text{V}\sim\text{(ac)}$ UL® rated

On-Off Controllers

F.O.B.: Winona, Minnesota

SERIES 80M6

Specifications Cont.

Power

- Nominal voltage - 120 VRMS +10 percent, -15 percent (102 to 132V~(ac)), 240VRMS +10 percent, -15 percent (204 to 264V~(ac))
- Power requirements - 4.0 VA nominal
- Frequency - 47 to 63Hz (50Hz ± 5 percent and 60Hz ± 5 percent)

Operating Environment

- Operating temperature up to -0 to 55°C (32 to 131°F)
- 0 - 90 percent RH, non-condensing
- Shipping and storage temperature, 40 to 70°C (104 to 158°F)

Dimensions

Control

- Length: 112.5 mm (4.428 in.)
- Width: 91.8 mm (3.615 in.)
- Height: 38.1 mm (1.500 in.)
- Weight: 0.3402 kg (0.75 lb)

Set Pot Assembly

- Pot depth behind: 12.7 mm (0.5 in.)
- Shaft depth in front: 25.4 mm (1.0 in.)
- Lead length: 1066.8 mm (42 in.)
- Weight: 0.01 kg (0.03 lb)

Agency Approvals

- UL® 873 and C-UL® recognized

Terminals

- Quick connects, 6.4 mm (0.25 in.)

Accuracy

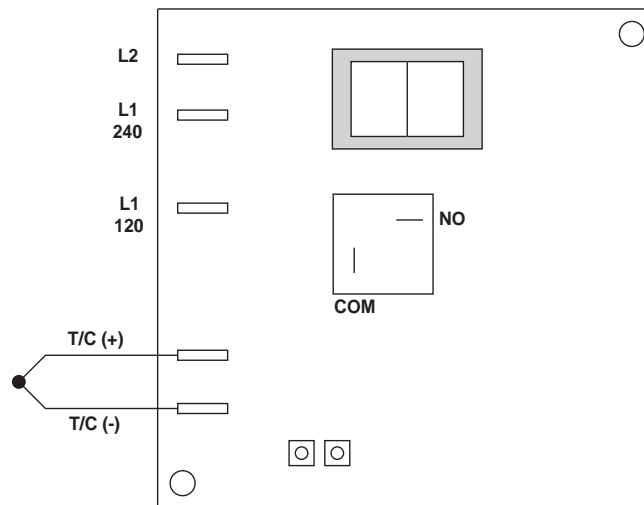
- Calibration accuracy $\pm 10^\circ\text{F}$
- 120V~(ac) line, 102 min, 132 max, VRMS

- 240V~(ac) line, 204 min, 264 max, VRMS
- Switching differential 2 min, 4 max, F
- Positive off switch point 5° min, 25° max, mechanical degree from CCW

Ordering Information

- 80M6-2623-2AAD — 65.5 to 287.8°C (150 to 550°F)
- 80M6-2624-2AAD — 10 to 121.1°C (50 to 250°F)
- 80M6-2634-2AAD — 10 to 218.3°C (50 to 425°F)

Wiring Diagram



Set Pot Cutout

