

## Temperature and Process

### 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

# Temperature and Process

## 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 ½ DIN-panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

# Temperature and Process

## SERIES CV

### Ordering Information

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

#### Part Number

① ②	③	④	⑤	⑥	⑦ ⑧ ⑨ ⑩	⑪ ⑫ ⑬ ⑭	⑮
	Power Supply	Package	Sensor Type and Scale	Control Type	Low Set Point	High Set Point	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 Fahrenheit (-270 to 1370°F)
M =	T/C Type T Fahrenheit (-454 to 750°F)
N =	T/C Type T Fahrenheit (-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

⑦ ⑧ ⑨ ⑩ Low Set Point Operating Range Value	
<b>Note:</b> A (-) is used in the left most digit of the set point operating ranges to indicate a negative temperature value.	

⑪ ⑫ ⑬ ⑭ High Set Point Operating Range Value	
<b>Note:</b> 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

## Temperature and Process

### 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

# Temperature and Process

## 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 ¼ DIN-panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

# Temperature and Process

## SERIES CF

### Ordering Information

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

#### Part Number

① ②	③	④	⑤	⑥	⑦ ⑧ ⑨ ⑩	⑪ ⑫ ⑬ ⑭	⑮
	Power Supply	Package	Sensor Type and Scale	Control Type	Fixed Set Point Temp. Value		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 ½ 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 ½ 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

⑦ ⑧ ⑨ ⑩ Fixed Set Point Temperature Value	
<b>Note:</b> 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