

Limits and Scanners

SERIES LV

Watlow's family of microprocessor-based limit controllers provides an economical solution for applications requiring temperature limit control. Limits are available in a broad range of packaging options, allowing selection of the best version for an application. Limits are available with an operator interface and can be ordered in 1/8 DIN-square panel mount or DIN-rail mount design configurations.

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

The variable SERIES LV limit includes an operator interface for viewing and selecting the set point. A red, four-character seven segment LED displays the set point. Set point selection is made with a continuous turn rotary encoder. Operating range temperature values are customer defined in the product configuration part number.

The limit controllers are factory mutual (FM) approved with special UL® approval for the open board potted versions. Watlow's limit 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

High or low limit with auto or manual reset

- Provides application flexibility

Fahrenheit or Celsius operation with indication

- Offers application flexibility

Sensor break protection

- Provides positive system shutdown

Agency approvals

- Meets certification requirements/compliance

Microprocessor based technology

- Ensures accurate, repeatable control

Limits and Scanners

SERIES LV

Specifications

Limit Controller

- Microprocessor-based limit controller
- Nominal switching hysteresis, typically 3°F (1.7°C)
- High or low limit, factory selectable
- Latching output requires manual reset upon over or under temperature condition
- Manual or automatic reset on power loss, factory selectable
- Internal front panel or external customer supplied momentary reset switch
- Input filter time: 1 second

Operator Interface

- Four digit, seven segment LED displays, 0.28 in. (7 mm) high
- °F or °C indicator LED
- Alarm indicator LED
- Continuous turn, velocity sensitive rotary encoder for set point adjustment
- Front panel SET/RESET

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, 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)
- 125μA 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° 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° 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)

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

External Reset Switch

- Momentary, dry contact closure

Agency Approvals

SERIES LV (potted version only)

- UL® 991 recognized temperature limit for cooking industry
- UL® 60730-1

SERIES LV (including potted version)

- UL® 873 recognized temperature regulator
- UL® 197 reviewed for use in cooking appliances
- UL® 991
- UL® 50 IP65 for tactile key models
- ANSI Z21.23 Gas appliance thermostat approval
- CSA C22.2#24 approved limit control
- FM Class 3545 temperature limit switches
- RoHS, WEEE

Terminals

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

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)

Limits and Scanners

SERIES LV

Specifications (Continued)

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 1/8 DIN-panel	2.85 in. (72.4 mm)	2.85 in. (72.4 mm)	Behind panel 2.04 in. (51.7 mm)

Ordering Information

- Limit controller with 8A relay output, rotary set point adjustment, four character, seven segment display, reset switch

Part Number

① ②	③	④	⑤	⑥	⑦ ⑧ ⑨ ⑩	⑪ ⑫ ⑬ ⑭	⑮
	Power Supply	Package	Sensor Type and Scale	Limit Type	Low Set Point	High Set Point	Overlay/Custom Options
LV							

③	Power Supply
C =	120VAC
E =	230 to 240VAC
G =	24VAC

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	Limit Type
U =	High limit manual reset
W =	High limit auto reset
Y =	Low limit manual reset
Z =	Low limit auto reset

⑦ ⑧ ⑨ ⑩	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.	

⑪ ⑫ ⑬ ⑭	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/Custom Options
A =	Standard with Watlow logo
1 =	Standard without Watlow logo

Limits and Scanners

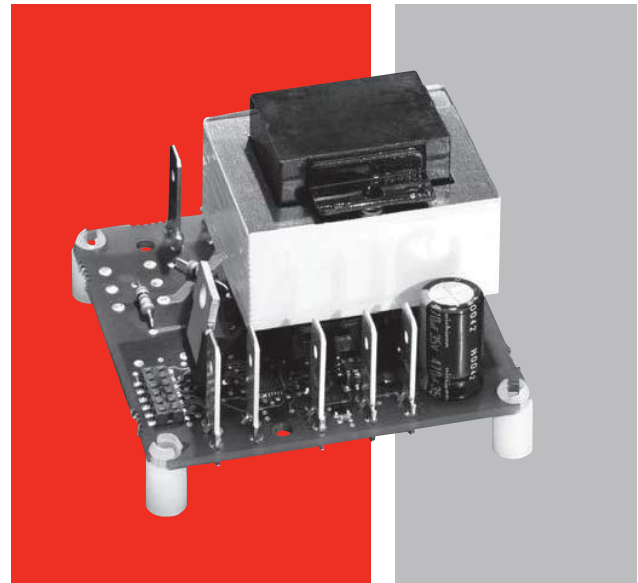
SERIES LF

Watlow's family of microprocessor-based limit controllers provide an economical solution for applications requiring temperature limit control. Limits are available in a broad range of packaging options, allowing selection of the best version for an individual application. Controllers are available without an operator interface and can be ordered in square 1/8 DIN-panel mount, DIN-rail mount or open board design configurations.

The SERIES LF limit family 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 LF limit offers fixed set points and can be supplied with or without an operator interface. Operating set point temperature values are customer defined in the product configuration part number.

The LF limit controllers are factory mutual (FM) approved with special UL® approval for the open board potted versions. Watlow's limit 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

High or low limit with auto or manual reset

- Provides application flexibility

Fahrenheit or Celsius operation with indication

- Offers application flexibility

Sensor break protection

- Provides positive system shutdown

Agency approvals

- Meets certification requirements/compliance

Microprocessor based technology

- Ensures accurate, repeatable control

Limits and Scanners

SERIES LF

Specifications

Limit Controller

- Microprocessor based, limit controller
- Nominal switching hysteresis, typically 3°F (1.7°C)
- High or low limit, factory selectable
- Latching output requires manual reset upon over or under temperature condition
- Manual or automatic reset on power loss, factory selectable
- External customer supplied momentary reset switch
- Input filter time: 1 second

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, 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)
- 125μA 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° 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° 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

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

External Reset Switch

- Momentary, dry contact closure

Agency Approvals

SERIES LF (potted version only)

- UL® 991 recognized temperature limit for cooking industry
- UL® 60730-1

SERIES LF (including potted version)

- UL® 873 recognized temperature regulator
- UL® 197 reviewed for use in cooking appliances
- UL® 991
- ANSI Z21.23 gas appliance thermostat approval
- CSA C22.2 #24 approved limit control
- FM Class 3545 temperature limit switches
- RoHS, W.E.E.E.

Terminals

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

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

Limits and Scanners

SERIES LF

Ordering Information

- Limit controller with 8A relay output, fixed set point

Part Number

① ②	③	④	⑤	⑥	⑦ ⑧ ⑨ ⑩	⑪ ⑫ ⑬ ⑭	⑮
	Power Supply	Package	Sensor Type and Scale	Limit Type	Fixed Set Point Temp. Value		Overlay/Custom Options
LF						AAAA	

③	Power Supply
C =	120VAC
E =	230 to 240VAC
G =	24VAC

④	Package
1 =	Panel mount square 1/8 DIN - spade terminals
2 =	DIN-rail mount - spade terminals
3 =	Open, non potted - spade terminals
4 =	Potted case - spade terminals
5 =	Panel mount square 1/8 DIN - screw terminals
6 =	DIN-rail mount - screw terminals
7 =	Open, 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°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	Limit Type
U =	High limit manual reset
W =	High limit auto reset
Y =	Low limit manual reset
Z =	Low limit auto reset

⑦ ⑧ ⑨ ⑩	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/Custom Options
A =	Standard with Watlow logo
1 =	Standard without Watlow logo