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An Over-temperature Limit Controller With User Defined Messages



Watlow's SERIES 97 is a microprocessor-based controller with a single input, second auxiliary input and four outputs. Input one is used to measure temperature from a sensor. Input two can be utilized as a remote reset switch or a hardware lockout switch. With up to four outputs, the controller is versatile in handling applications that require a high/low limit, alarms, retransmit and communications. The control is so user friendly that it can be set up to display safety and limit messages created by the end user to meet the exact application need.

The SERIES 97 limit controller is added to thermal applications to limit over-temperature conditions. The SERIES 97 limit controller provides safety assurance against instances where a high temperature runaway condition could occur from a shorted input sensor or an output device that could fail in a closed position.

The SERIES 97 is recommended for any application where thermal runaway could result in large product scrap costs, affect operator safety, cause damage to equipment or create a fire hazard.

The SERIES 97 is manufactured by ISO 9001 registered Watlow Winona and reliably backed up by a three-year warranty.

Features and Benefits

Programmable messages
- Controller can be set up to display user programmed limit message

NEMA 4X (IP65)
- Water and corrosion resistant; front panel can be washed down

Microprocessor-based
- Accurate set point settings and quick output response

Second auxiliary input
- Remote reset capability

Four outputs
- Handles high/low limit, alarms, communication and retransmit requirements

Software and hardware lockouts
- High security

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Winona, Minnesota USA

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Specifications

Controller
- Microprocessor-based
- Universal input 1, auxiliary input 2, 4 outputs
- Input sample period; Single input 10Hz (100 msec), dual input 5Hz (200 msec) digital filter adjustable
- Display update; 2Hz (500 msec), time filter adjustable
- Input/Output/Communication isolation
- Displayed in °C, °F

Operator Interface
- Dual 4-digit LED displays: upper 10.2 mm (0.4 in.), lower 6.2 mm (0.244 in.)
- Advance, Up Arrow, Down Arrow, Reset tactile keys

Standard Conditions For Specifications
- Ambient temperature 77°F (25°C) ±3°C, rated line voltage, 50 to 60Hz, 0 to 90 percent RH non-condensing,
  15 minute warm-up

Universal Input 1
Thermocouple
- Type J, K, T, N, C (W5), E, PTII, D (W3), B, R, S thermocouple types
- >20MΩ input impedance
- Maximum 20Ω source resistance
- 30mA open detection bias

RTD
- 2- or 3-wire platinum, 100Ω
- JIS and DIN curves
- Whole or tenth degree indication
- 150µA nominal RTD excitation current

Input 2
Event Input
- Contact or voltage
- 20KΩ input impedance
- Voltage input: event high state 3 to 36V⎓(dc), event low state 0 to 2V⎓(dc)
- Resistance/contact input: event high state > 23kΩ, event low state 0 to 2kΩ

Output Types
Open Collector/Switched DC
- Open collector configuration:
  Maximum voltage 42V⎓(dc)
  Maximum current 200mA
  Maximum “on” resistance 1.1Ω
  Maximum offstate leakage current 100µA
- Switched dc configuration:
  Switched dc supply voltage 22 to 28V⎓(dc)
  dc supply current limited to 30mA

Solid State Relay
- Optically isolated
- Zero cross switched
- Without contact suppression
- Minimum load current 0.5mA rms

Solid State Relay (cont.)
- Maximum current 0.5A rms at 20 to 280V~(ac)
- Maximum offstate leakage current 10µA rms
- For resistive loads only, must use RC suppression for inductive loads

Electromechanical Relay
- Form C contact configuration
- Minimum load current 10mA @ 5V⎓(dc)
- Rated resistive and inductive loads: 2A @ 250V~(ac) or 30V⎓(dc) maximum
- Electrical life 100,000 cycles at rated current
- For resistive loads only, must use RC suppression for inductive loads

Retransmit
- Range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)
- 0 to 10V⎓(dc) voltage output into a 1,000Ω minimum load resistance
- 0 to 20mA current output into an 800Ω maximum load resistance
- Resolution:
  Vdc ranges = 2.5mV nominal
  mA ranges = 5µA nominal
- Calibration accuracy:
  Vdc ranges = ±15mV
  mA ranges = ±30µA
- Temperature stability 100ppm/°C

Communications
- EIA/TIA-485, EIA/TIA-232
- Opto-isolated
- Modbus™ RTU protocol
- 1200, 2400, 4800, 9600, 19200 baud rates
- 32 maximum units can be connected (With additional 485 repeater hardware, up to 247 units may be connected)

Accuracy
- Input ranges

Type J:	0 to	750°C	or	32 to	1382°F
Type K:	-200 to	1250°C	or	-328 to	2282°F
Type T:	-200 to	350°C	or	-328 to	662°F
Type N:	0 to	1250°C	or	32 to	2282°F
Type E:	-200 to	900°C	or	-328 to	1470°F
Type C(W5):	0 to	2315°C	or	32 to	4200°F
Type D(W3):	0 to	2315°C	or	32 to	4200°F
Type PTII:	0 to	1393°C	or	32 to	2540°F
Type R:	0 to	1450°C	or	32 to	2642°F
Type S:	0 to	1450°C	or	32 to	2642°F
Type B:	870 to	1700°C	or	1598 to	3092°F
DIN:	-200 to	800°C	or	-328 to	1472°F
JIS:	-200 to	630°C	or	-328 to	1166°F

Modbus™ is a trademark of AEG Schneider Automation.

Thermocouple Inputs

- Calibration accuracy ±0.1 percent of span ±1˚C at standard conditions

  Exceptions:
  Type T; 0.12 percent of span for -200°C to -50°C (-328°F to -58°F)

  Types R and S; 0.15 percent of span for 0°C to 100°C (32°F to 212°F)

  Types B; 0.24 percent of span for 870°C to 1700°C (1598°F to 3092°F)
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.1 degree per degree change in ambient

RTD Inputs

- Calibration accuracy ±0.1 percent of span ±1˚C at standard conditions
- Accuracy span: 540°C (1000°F) minimum
- Temperature stability: ±0.05 degree per degree change in ambient

Agency Approvals

- FM Class 3545, File # J.I. 1B5A6.AF
- NEMA 4X, IP65
- CE 89/336/EEC, electromagnetic compatibility directive
  CE 73/23/EEC, low-voltage directive

Terminals

- Touch safe
- 22 to 12 AWG

Power

- 100-240V~(ac) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 24-28V~(ac) or V⎓(dc) +10 percent, -15 percent; 50/60Hz, ±5 percent
- 7.0VA maximum power consumption
- Data retention upon power failure via nonvolatile memory

Operating Environment

- 0 to 65°C (32 to 149°F)
- 0 to 90 percent RH, non-condensing
- Storage temperature: -40 to 85°C (-40 to 185°F)

Dimensions

- Width 52 mm (2.05 in.)
- Height 52 mm (2.05 in.)
- Length 107 mm (4.2 in.)
- Depth behind panel surface 98.4 mm (3.875 in.)
- Approximate controller weight 0.2 kg (0.4 lbs)

Allowable Operating Ranges

Type J:	1.0	0	to	815°C	or	32	to	1500°F
	0.1	0.0	to	815.0°C	or	32.0	to	999.9°F
Type K:	1.0	-270	to	1370°C	or	-454	to	2500°F
	0.1	-199.9	to	999.9°C	or	-199.9	to	999.9°F
Type T:	1.0	-270	to	400°C	or	-454	to	750°F
	0.1	-199.9	to	400.0°C	or	-199.9	to	750.0°F
Type N:	1.0	0	to	1300°C	or	32	to	2372°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type E:	1.0	-270	to	800°C	or	-454	to	1470°F
	0.1	-110.0	to	800.0°C	or	-199.9	to	999.9°F
Type C:	1.0	0	to	2315°C	or	32	to	4200°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type D:	1.0	0	to	2315°C	or	32	to	4200°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type PTII:	1.0	0	to	1395°C	or	32	to	2543°F
	0.1	0.0	to	999.9°C	or	32.0	to	999.9°F
Type R:	1.0	0	to	1760°C	or	32	to	3200°F
Type S:	1.0	0	to	1760°C	or	32	to	3200°F
Type B:	1.0	0	to	1816°C	or	32	to	3300°F
DIN	1.0	-200	to	800°C	or	-328	to	1472°F
	0.1	-199.9	to	800.0°C	or	-199.9	to	999.9°F
JIS	1.0	-200	to	630°C	or	-328	to	1166°F
	0.1	-199.9	to	630.0°C	or	-199.9	to	999.9°F

Functionality Matrix

	Universal Input	Event	High/ Low Limit	High/ Low Alarm	Retransmit	232 485 Comm
Input 1	■					
Input 2		■				
Output 1			■			
Output 2				■		
Output 3				■		
Output 4				■	■	■

Note: These specifications are subject to change without prior notice.

Ordering Information

SERIES 97 **9 7 _ _ - _ - _ _ _**

Microprocessor-based
1/16 DIN with universal input 1, thermocouple and RTD.
Options include: software, power supply, input 2, four outputs and display color

Power Supply

A = 100-240V≂(ac/dc)

B = 24-28V≂(ac/dc)

Auxiliary Input 2

0 = None

1 = Event input

Limit Output 1

D = Electromechanical relay, Form C, 2A, without RC suppression

Alarm Output 2

A = None

C = Switched dc output/open collector

D = Electromechanical relay, Form C, 2A, without RC suppression

K = 0.5A solid state relay without RC suppression

Alarm Output 3

A = None

D = Electromechanical relay, Form C, 2A, without RC suppression

Auxiliary Output 4

A = None

D = Electromechanical relay, Form C, 2A, without RC suppression

R = 232 Communications

U = 485 Communications

M = Universal Retransmit, range selectable: 0-20mA, 4-20mA, 0-5V⎓(dc), 1-5V⎓(dc), 0-10V⎓(dc)

Software/Preset Parameters

00 = Standard software

Display/Overlay

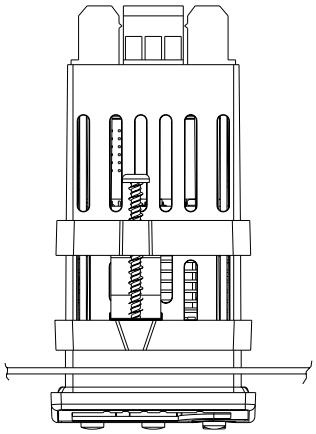
Upper/Lower

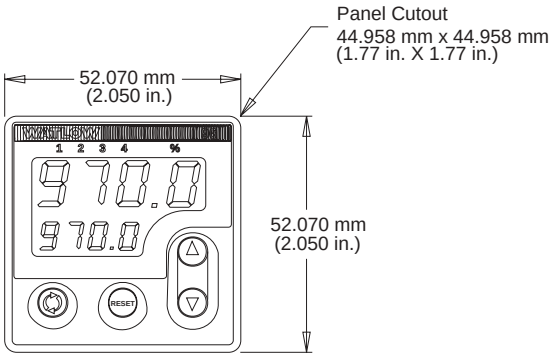
RR = Red/Red display

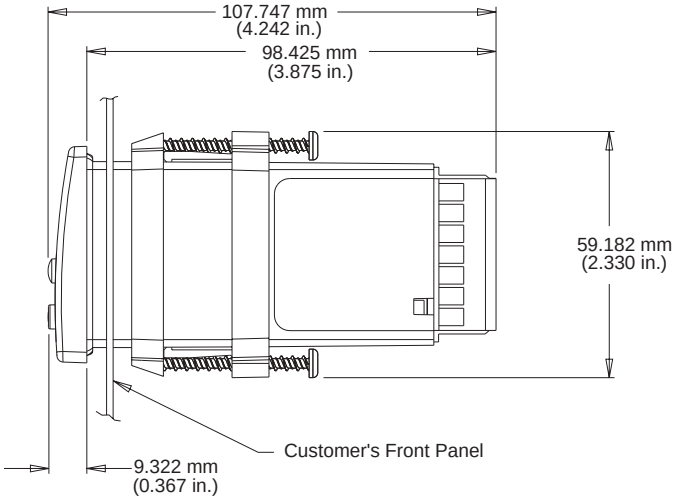
RG = Red/Green display

GR = Green/Red display

GG = Green/Green display







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