Watlow's Series 147 is an open-board temperature limit with a thermocouple or RTD sensor input.

The Series 147 is designed to meet the needs of a wide range of temperature limit applications. Installation and setup are simple and easy, using basic hand tools. Factory selectable options include high or low limit with either manual or automatic reset on power loss.

The Series 147 has an LED output status indication and can be ordered with an integral or a fixed set point.
Ordering Information

Output Type
- E = Electromechanical relay, 8A, Form C

Line Voltage
- 1 = 120V~
- 2 = 230V~ to 240V~

Input and Range

<table>
<thead>
<tr>
<th>Type J</th>
<th>Range</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>601</td>
<td>32 to 600°F</td>
<td>0 to 315°C</td>
</tr>
<tr>
<td>602</td>
<td>32 to 1382°F</td>
<td>0 to 750°C</td>
</tr>
<tr>
<td>609</td>
<td>50 to 150°F</td>
<td>10 to 66°C</td>
</tr>
<tr>
<td>614</td>
<td>Fixed at 750°F</td>
<td>399°C</td>
</tr>
<tr>
<td>615</td>
<td>Fixed at 600°F</td>
<td>315°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type K</th>
<th>Range</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>603</td>
<td>32 to 2282°F</td>
<td>0 to 1250°C</td>
</tr>
<tr>
<td>611</td>
<td>32 to 1112°F</td>
<td>0 to 600°C</td>
</tr>
<tr>
<td>612</td>
<td>32 to 482°F</td>
<td>0 to 250°C</td>
</tr>
<tr>
<td>613</td>
<td>0 to 2500°F</td>
<td>-17 to 1371°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type T</th>
<th>Range</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>604</td>
<td>150 to 662°F</td>
<td>66 to 350°C</td>
</tr>
<tr>
<td>605</td>
<td>-328 to 150°F</td>
<td>-200 to 66°C</td>
</tr>
<tr>
<td>610</td>
<td>-125 to 425°F</td>
<td>-87 to 218°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type R</th>
<th>Range</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>608</td>
<td>32 to 2732°F</td>
<td>0 to 1500°C</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RTD (100Ω)</th>
<th>Range</th>
<th>°F/°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>-100 to 1112°F</td>
<td>-73 to 600°C</td>
</tr>
<tr>
<td>103</td>
<td>32 to 482°F</td>
<td>0 to 250°C</td>
</tr>
</tbody>
</table>

Limit Mode
- 1 = High limit with manual reset on power loss
- 2 = Low limit with manual reset on power loss
- 3 = High limit with automatic reset on power loss
- 4 = Low limit with automatic reset on power loss

NOTE: Electromechanical relays are warranted for 100,000 closures only. Solid state switching devices recommended for applications requiring extended service life.

NOTE: Conformal coated product is available; consult factory.

NOTE: User documentation may be available in French, German, Spanish, Italian, and Dutch, as well as English. Check Watlow’s website (www.watlow.com/) for availability. Specify language at time of order.

Warranty

The Series 147 is warranted to be free of defects in material and workmanship for 36 months after delivery to the first purchaser for use, providing that the unit has not been misapplied. Since Watlow has no control over its use or misuse, we cannot guarantee against failure. Watlow’s obligations hereunder, at Watlow’s option, are limited to replacement or refund of purchase price of a unit which upon examination proves to be defective within the warranty period. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse.

Returns

- Call or fax Customer Service for a Return Material Authorization (RMA) number before returning a product.
- Put the RMA number on the shipping label, and also a description of the problem.
- A 20% of net price restocking charge applies to all standard units returned to stock.

Contact
- Phone: +1 (507) 454-5300
- Fax: +1 (507) 452-4507

Technical Support

If you encounter a problem with your Watlow controller, verify that your wiring is correct for your specific model number. If the problem persists, an Application Engineer can discuss your application with you.

Before calling, please have the complete model number and user’s manual available. You can get technical support by dialing +1 (507) 494-5656, 7 a.m. to 7 p.m. Central Standard Time.

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Troubleshooting

<table>
<thead>
<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>The load will not turn on.</td>
<td>An open sensor.</td>
<td>Repair or replace.</td>
</tr>
<tr>
<td>The load circuit is open.</td>
<td>Check the fuses, circuit breakers, load and wiring.</td>
<td></td>
</tr>
<tr>
<td>The ac input is not connected or is connected improperly.</td>
<td>Check the ac input connections. If not present, connect per Power Wiring, page 2.</td>
<td></td>
</tr>
<tr>
<td>The load will not turn off.</td>
<td>The polarity is reversed on the thermocouple.</td>
<td>Connect according to input wiring directions, page 3.</td>
</tr>
<tr>
<td>A faulty unit.</td>
<td>Remove power to the controller and the controller from the system. Apply power to the system with the controller removed. If the load turns off, return the controller to the factory. If the load remains on, there are other problems in the system that must be resolved. Consult the factory.</td>
<td></td>
</tr>
</tbody>
</table>
Use the following procedure to mount and install the Watlow Series 147 temperature limit control.

1. Locate and drill four 0.156 in (4 mm) holes in the desired panel location. See Figure 2 for hole locations.
2. Mount the Series 147 using four #6 screws.
3. Connect the sensor, load, and power as illustrated in the wiring diagrams on pages 2 and 3.

**Dimensions**

![Series 147 dimensions](image)

**Wiring Guidelines**

- Use the correct sensor type per the model number on the unit sticker.
- Use the proper thermocouple or RTD polarity.
- Insulate the thermocouple mounting from the mounting surface to prevent heat migration input errors.
- Thermocouple leads should be twisted pair wire and routed separately from any other lines.
- In electrically noisy environments (heavy switching of contactor, motors, solenoids, etc.) use shielded thermocouple lead wire with the shield connected at the sensor end only.
- All wiring and fusing must conform to the National Electric Code (NEC) NFPA70 and any other locally applicable codes.
- Fuse the independent load voltage on the L1 (hot) side and connect it to the common (COM) side of the relay.
- Long lead lengths create electrical resistance. When using a two-wire RTD, there will be an additional input error for every 1Ω of lead length resistance. That resistance when added to the resistance of the RTD element, can result in erroneous input to the temperature limit. To overcome this problem, use a three-wire RTD sensor, which compensates for lead length resistance. When extension wire is used for a three-wire RTD, all three extension wires must have the same electrical resistance (i.e. same gauge, copper stranded).

**Power Wiring**

![Power wiring](image)

**NOTE:** The line voltage is specified by your model number.

**WARNING:** To avoid potential electric shock, use National Electrical Code safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. Failure to do so could result in injury and death.

All wiring and fusing must conform to the National Electric Code and to any locally applicable codes. Failure to comply with these recommendations could result in damage to equipment and property, and injury to personnel.

**CAUTION:** The Series 147 temperature limit should be mounted in an inconspicuous location to discourage unauthorized changes to the set point. Only approved and appropriate personnel should have the authority to change the set point on the limit switch. Failure to comply with these recommendations could result in damage to equipment and property, and injury to personnel.

**CAUTION:** Applying incorrect voltage may result in irreversible damage to the controller.
Declaration of Conformity

Series 147

WATLOW WINONA
1241 Bundy Boulevard
Winona, Minnesota  55987 USA

Declarates that the following product:

Model Number(s): 147E - (1 or 2) (100-999) - (1, 2, 3 or 4) (0 or 2) (any 2 letters or numbers)
Classification: Installation Category II, Pollution Degree II
Rated Voltage: 120 or 240V~
Rated Frequency: 50/60 Hz
Rated Power Consumption: 10VA maximum

Meets the essential requirements of the following European Union Directive(s) using the relevant section(s) of the normalized standards and related documents shown:

89/336/EEC Electromagnetic Compatibility Directive
EN 61326: 1995 Mobiltelefon
EN 61000-4-1: 1995 Limits of harmonic current, voltage fluctuations and flicker
EN 61000-4-2: 1995 Electrostatic discharge
EN 61000-4-3: 1995 Radiated immunity
EN 61000-4-4: 1995 Electrical fast transients
EN 61000-4-5: 1995 Surge immunity
EN 61000-4-6: 1995 Conducted immunity
ENV 50204: 1995 Cellular phone
EN 61000-3-2: 1995 Limits for harmonic current
EN 61000-3-3: 1995 Limitations of voltage variations immunity
EN 61000-3-4: 1995 Limitations of voltage variations

Declares that the product follows:

Designation: Series 147
Model Number(s): 147E - (1 or 2) (100-999) - (1, 2, 3 or 4) (0 or 2) (any 2 letters or numbers)
Classification: Installation Category II, Pollution Degree II
Rated Voltage: 120 or 240V~
Rated Frequency: 50/60 Hz
Rated Power Consumption: 10VA maximum

Designation: Series 147
Model Number(s): 147E - (1 or 2) (100-999) - (1, 2, 3 or 4) (0 or 2) (any 2 letters or numbers)
Classification: Installation Category II, Pollution Degree II
Rated Voltage: 120 or 240V~
Rated Frequency: 50/60 Hz
Rated Power Consumption: 10VA maximum

89/336/EEC - Directiva de Compatibilidad Electromagnética
EN 61326: 1995 Equipo eléctrico para medición control y uso en laboratorios - Requisitos de compatibilidad electromagnética (Emisiones Clase B)
EN 61000-3-2: 1995 Limites de emision de corriente armónica
EN 61000-3-3: 1995 Limitaciones de fluctuaciones del voltaje
EN 61000-4-2: 1995 Descarga electrostática
EN 61000-4-3: 1995 Inmunidad radiada
EN 61000-4-4: 1995 Perturbaciones transitorias eléctricas rápidas
EN 61000-4-5: 1995 Sobretensión
EN 61000-4-6: 1995 Inmunidad conducida
EN 61000-4-11: 1994 Caídas de tensión, interrupciones breves y variaciones de tensión
ENV 50204: 1995 Teléfono portátil

73/23/EEC Directiva de Baja Tensión
EN 61010-1: 1993 Requisitos de seguridad para equipos eléctricos de medición, control y uso en laboratorios, Parte 1: Requisitos generales

William R. Blaisdell
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

August 18, 2000
Title of Authorized Representative

Date of Issue
Input Wiring

Thermocouple

Figure 5a — Thermocouple wiring.

2- and 3-wire RTD

Figure 5b — 2- and 3-wire RTD wiring.

NOTE: 2- or 3-wire RTD input, platinum 100Ω @ 0°C calibrated for 0.003850Ω/°C curve.

Output Wiring

Electromechanical Relay, Form C

8A 147E - _ _ _ _ - _ _ 00

Figure 5c — Electromechanical relay wiring.

NOTE: Switching inductive loads (relay coils, solenoids, etc.) with the mechanical relay, switched dc or solid-state relay output options requires use of an R.C. Suppressor. Watlow carries the R.C. suppressor Quencharc brand name, which is a trademark of ITW Paktron. Watlow Part No. 0804-0147-0000.

Remote Reset

NOTE: Only the use of a momentary switch is valid for FM approval.

NOTE: Reset is customer-supplied.
Figure 4 — System wiring examples.