The Watlow Series 145 is a 1/16 DIN temperature limit controller with a thermocouple or RTD sensor input. The 1/16 DIN case features a front panel that provides the Series 145 with water and corrosion resistance.

The Series 145 is designed to meet the needs of a wide range of safety applications. It is available with a wide variety of thermocouple and RTD ranges.

The compact size of the limit allows more flexibility in applications where space is a problem. The Series 145 has a standard integral setpoint and a front panel LED output status indicator.

### Specifications

**Control Mode**
- High or low limit, factory selectable
- Manual or automatic reset on power loss, factory selectable
- Latching alarm with manual reset on over or under temperature

**Operator Interface**
- Sealed membrane front panel
- Integral set point
  - Dual temperature scale (°F and °C)
  - LED indication of output status
  - Dial scale calibrated to compensate for sensor non-linearities
  - Integral reset switch

**Input**
- Thermocouple or RTD available
- Thermocouple with automatic cold junction compensation
- Thermocouple may be isolated or grounded
- 2- or 3-wire RTD input, platinum 100Ω, 500Ω, or 1000Ω @ 0°C calibrated for DIN 0.00385Ω/°C curve
- Sensor break protection de-energizes output

**Output**
- Electromechanical relay, 3A, Form C, SPDT: 3A @ 240V~, 3A @ 28V (dc), resistive, 275VA pilot duty rated

**Accuracy**

#### Adjustable Set Point
- Calibration accuracy: ±1% of span, at 77°F ±5°F (25°C ± 3°C) ambient and rated line voltage ±1%
- Set point accuracy: ±3% of dial scale
- Accuracy span: 1000°F (540°C) minimum

#### Fixed Set Point
- Calibration accuracy: ± 10°F/±6°C of setting, at 77°F ±5°F (25°C ± 3°C) ambient and rated line voltage ±1%

**Temperature Stability**
- Thermocouple: Typically 5µV/°F ambient (9µV/°C ambient) input referenced
- RTD: Typically 0.2°F/°F ambient (0.2°C/°C ambient)

**Voltage Stability**
- ±0.01% of span (min span of 1000°F or 540°C) per % of rated line voltage

**Agency Approvals**
- CE: EN61010 - Safety
  - EN61326 - Industrial Immunity, Class B Emissions
  - Installation Category 2, Pollution Degree 2
- UL 873, File #E43684
- to C22.2 No. 24, File #E43684
- Approved for use in commercial cooking applications
- FM Class 3545, File #J.I.3008516

**Terminals**
- Screw clamp terminal: 12-26 gauge wire

**Power**
- 120V~, +10%/-15%, 50/60 Hz
- 230V~ to 240~, +10%/-15%, 50/60 Hz
- 10VA maximum power

**Operating Environment**
- 32 to 131°F (0 to 55°C)
- 0 to 90% RH, non-condensing
- Storage temperature: -4 to 185°F (-20 to 85°C)

**Dimensions**
- Height: 2.1 in (55 mm)
- Width: 2.1 in (55 mm)
- Depth: 4.0 in (102 mm)
- Behind panel: 3.50 in (89 mm)
- Front panel: 0.5 in (13 mm)

**Weight**
- 0.7 lb (0.3 kg)

Note: Specifications subject to change without notice.
**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.

**CAUTION:** A power disconnect switch located near the controller is recommended to shut down power in case of controller failure.

- Long lead lengths create electrical resistance. When using a two-wire RTD, there will be an additional 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 controller. 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).

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**Installation**

**To Mount the Series 145**

1. Make a panel cutout, using the dimensions in Figure 2b.
2. Check to see that the external case gasket of the Series 145 is facing the panel surface. Insure that the gasket is not twisted and is seated within the case bezel flush with the bezel. Insert the Series 145 into the cutout.
3. Slide the mounting collar over the back of the controller. The two tabs of the mounting collar will fit into one of the vent openings of the case.
4. While pressing the front of the case firmly against the panel, tighten the two #8-32 screws until tight. Make sure you cannot move the case within the cutout.

**To Remove the Series 145**

1. Remove the Series 145 by loosening the mounting screws located on the mounting collar.
2. Using the screws, gently pry them away from the case. This will lift the mounting tabs, allowing the collar to slide backwards.

**NOTE:** To guarantee a proper seal, make sure the gasket between the panel and the rim of the case is not twisted and is seated properly. Press firmly.

**NOTE:** Make sure the rounded side of the D-shaped external case gasket faces the panel surface and the gasket is fully seated.

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**User Interface**

**Figure 2d — Series 145 interface.**
**Power Wiring**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Model Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>120V~</td>
<td>145 - 1_ _ _ - 0000</td>
</tr>
<tr>
<td>230 to 240 V~</td>
<td>145 - 2_ _ _ - 0000</td>
</tr>
</tbody>
</table>

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

Figure 3a — Power wiring.

CAUTION Applying incorrect voltage may result in irreversible damage to the controller.

**Input Wiring**

Thermocouple

Figure 3b — Thermocouple wiring.

NOTE: When an external device with a non-isolated circuit common is connected to the dc output, you must use an isolated or ungrounded thermocouple.

2- and 3-Wire RTD

Figure 3c — 2- and 3-wire RTD wiring.

NOTE: Using 2- or 3-wire RTD input, platinum 100Ω, 500Ω, or 1000Ω at 0°C calibrated for DIN 0.003850Ω/°C curve.

**Output Wiring**

Electromechanical Relay, 3A, Form C with suppression

145D - _ _ _ _ - 0000

Figure 3d — Electromechanical relay wiring.

NOTE: No external reset wiring is available.

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.

**Safety Information**

Note, caution and warning symbols appear throughout this book to draw your attention to important operational and safety information.

A “NOTE” marks a short message to alert you to an important detail.

A “CAUTION” safety alert appears with information that is important for protecting your equipment and performance.

A “WARNING” safety alert appears with information that is important for protecting you, others, and equipment from damage. Pay very close attention to all warnings that apply to your application.

The symbol (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.

The symbol (a lightning bolt in a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.
Figure 4 — System wiring examples.
Declaration of Conformity

Series 145

WATLOW WINONA
1241 Bundy Boulevard
Winona, Minnesota 55987 USA

Declares that the following product:

Designation: Series 145
Model Number(s): 145D - (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:

EN 61326: 1995 Appareillage Electrique de mesure, de commande et de laboratoire — Prescriptions relatives à la Compatibilité Electro Magnétique (Emissions classe B)
EN 61010-1: 1993 Appareillage électrique pour la mesure, la commande et l’usage de laboratoire — Prescriptions relatives à la Compatibilité Electro Magnétique (Emissions classe B)
EN 61000-3-2: 1995 Limits d’émission de courant harmonique
EN 61000-3-3: 1995 Limits of fluctuation of tension
EN 61000-4-2: 1995 Décharge électrostatique
EN 61000-4-4: 1997 Insensibilité à l’énergie rayonnée
EN 61000-4-4: 1997 Courants électriques transitoires rapides
EN 61000-4-5: 1995 Insensibilité aux sursensations
EN 61000-4-6: 1996 Insensibilité à l’énergie par conduction
EN 61000-4-11: 1994 Insensibilité aux chutes subtiles, aux courtes interruptions et aux variations de tension
ENV 50204: 1995 Téléphone cellulaire

73/23/EEC Low-Voltage Directive
EN 61010-1: 1993 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 1: General requirements

Declara que el producto siguiente:

Designación: Serie 145
Número de modelo: 145D - (1 o 2) (100-999) - (1, 2, 3 o 4) (0 o 2) (Cualquier combinación de dos letras)
Clasificación: Categoría de instalación II, grado de contaminación ambiental II
Tensión nominal: 120 ±240V~
Frecuencia nominal: 50/60 Hz
Consumo nominal de energía: 10 VA máximo
Cumple con los requisitos esenciales de las siguientes Directivas de la Unión Europea, usando las secciones pertinentes de las reglas normalizadas y los documentos relacionados que se muestran:

EN 61326: 1997 Equipo eléctrico para mediciones, control y uso en laboratorios - Requisitos de compatibilidad electromagnética (Emisiones Clase B)
EN 61000-3-2: 1995 Límites de emisiones de corriente armónica
EN 61000-3-3: 1995 Limitaciones de fluctuaciones de voltaje
EN 61000-4-2: 1995 Descarga electrostática
EN 61000-4-4: 1997 Inmunidad a la radiación
EN 61000-4-4: 1997 Inmunidad radada
EN 61000-4-4: 1997 Perturbaciones transitorias eléctricas rápidas
EN 61000-4-5: 1995 Sobretensión
EN 61000-4-11: 1994 Inmunidad a las variaciones de tensión
ENV 50204: 1995 Teléfono móvil

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

William R. Blaisdell
Name of Authorized Representative
Winona, Minnesota, USA
Place of Issue
August 18, 2000
Date of Issue

Signature of Authorized Representative
Connect according to input wiring instructions.

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.

The polarity is reversed on the thermocouple.

A faulty unit.

The load will not turn off.

The load circuit is open.

The ac input is not connected or is connected improperly.

Check the the ac input connections. If not present, connect according to power wiring instructions.

Connect according to input wiring instructions.

The load will not turn on.

An open sensor.

The ac input is not connected or is connected improperly.

Check the fuses, circuit breakers, load and wiring.

Check the ac input connections. If not present, connect according to power wiring instructions.

Repair or replace.

## Troubleshooting

### Problem

The load will not turn off.

The load will not turn on.

### Probable Cause

The polarity is reversed on the thermocouple.

An open sensor.

### Action

Connect according to input wiring instructions.

Repair or replace.

Check the fuses, circuit breakers, load and wiring.

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.

## 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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