

Series 102

User's Manual



On-off Temperature Controller



TOTAL
CUSTOMER
SATISFACTION
3 Year Warranty

ISO 9001



Registered Company
Winona, Minnesota USA



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0600-0004-0006 Rev C

August 2000

Supersedes: 0600-0036-0002 Rev B

\$5.00 Made in the U.S.A.



Printed on Recycled Paper
10% Postconsumer Waste

General Description

The Watlow Series 102 is a 1/16 DIN, on-off temperature controller with a thermocouple or RTD sensor input.

The compact size of the controller allows more flexibility in applications where space is a problem. The Series 102 has a standard integral setpot and front panel LED output status indicator.

Specifications

(1915)

Control Mode

- On-off
- Nominal switching hysteresis, typically 3°F (1.7°C)

Operator Interface

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

Input

- Thermocouple or platinum RTD available
- Thermocouple with automatic cold junction compensation
- Thermocouple may be isolated or grounded
- Thermocouple and RTD break protection de-energizes output
- 2- or 3-wire RTD input, 100Ω, 500Ω or 1000Ω @ 0°C calibrated for 0.003850Ω/Ω °C curve, factory selectable

Output

- Electromechanical relay, 3A, Form C, SPDT: 3A @ 240V~, 3A @ 28V= (dc), resistive, 240V~ 275 VA pilot duty rated
- Solid-state relay, Form A, 0.5A @ 24V~ min., 264V~ max., opto-isolated, zero cross switching
- Switched dc configuration; switched dc supply voltage 3 to 32V= (dc) into a minimum 500Ω load

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
- 873, File #E43684
- to C22.2 No. 24, File #E43684
- Approved for use in commercial cooking applications

Terminals

- Screw clamp terminal: 12- to 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 (0.3kg)

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Note: Specifications subject to change without notice.

Dimensions

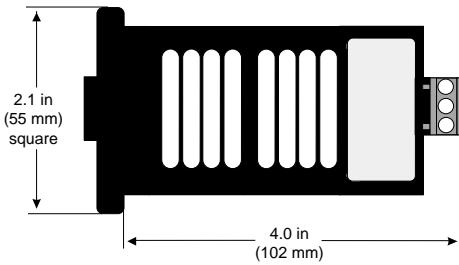


Figure 2a — Series 102 dimensions.

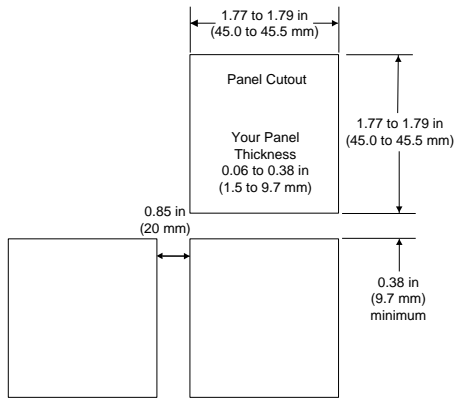


Figure 2b — Panel cutout and spacing.

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 high voltage 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).

Installation

To Mount the Series 102

1. Make a panel cutout, using the dimensions in Figure 2b.
2. Check to see that the external case gasket of the Series 102 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 102 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.

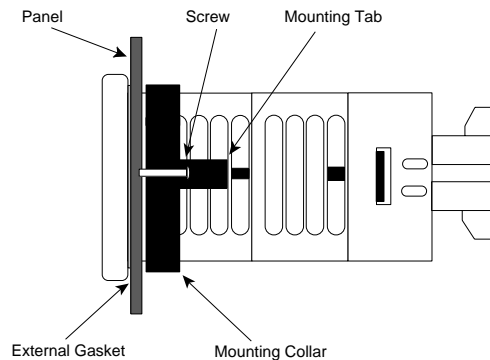


Figure 2c — Mounting.

To Remove the Series 102

1. Remove the Series 102 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: Make sure the rounded side of the D-shaped external case gasket faces the panel surface and the gasket is fully seated.


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 triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

Power Wiring

120V~ 102 _ 1 _ _ _ - 0000

230 to 240V~ 102 _ 2 _ _ _ - 0000

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

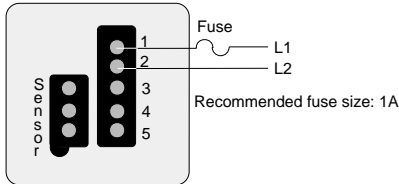


Figure 3a — Power wiring.

Input Wiring

Thermocouple

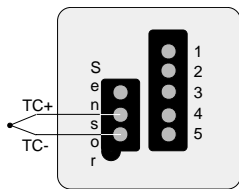


Figure 3b — Thermocouple wiring.

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

2- and 3-wire RTD

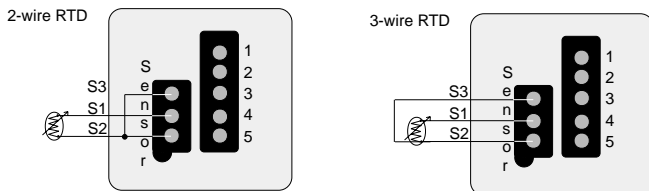


Figure 3c — 2- and 3-wire RTD wiring.

User Interface

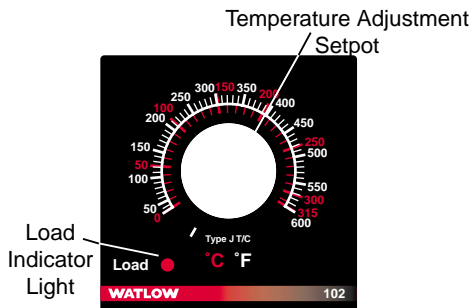


Figure 3d — Series 102 interface.



WARNING: To avoid potential electric shock, use National Electrical Code (NEC) safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices.

All wiring and fusing must conform to the National Electric Code and to any locally applicable codes.



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

Output Wiring

Electromechanical Relay, Form C without

contact suppression

3A 102 **D** - _ _ _ _ - _ 000

Solid-State Relay, Form A, 0.5A without contact suppression

0.5A 102 **K** - _ _ _ _ - _ 000

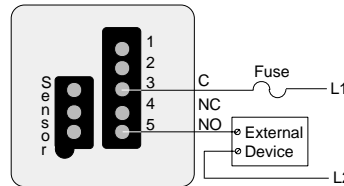


Figure 3e — Electromechanical and solid-state relay wiring.

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 of ITW Paktron, Watlow Part No. 0804-0147-0000.

Switched DC

102 **C** - _ _ _ _ - _ 000

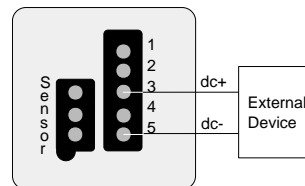


Figure 3f — Switched dc wiring.



WARNING: We strongly recommend that all control loops use an approved temperature limit controller for over or under temperature limit protection. Failure to install temperature limit control protection where a potential hazard exists could result in damage to equipment and property and injury to personnel.

System Wiring Example

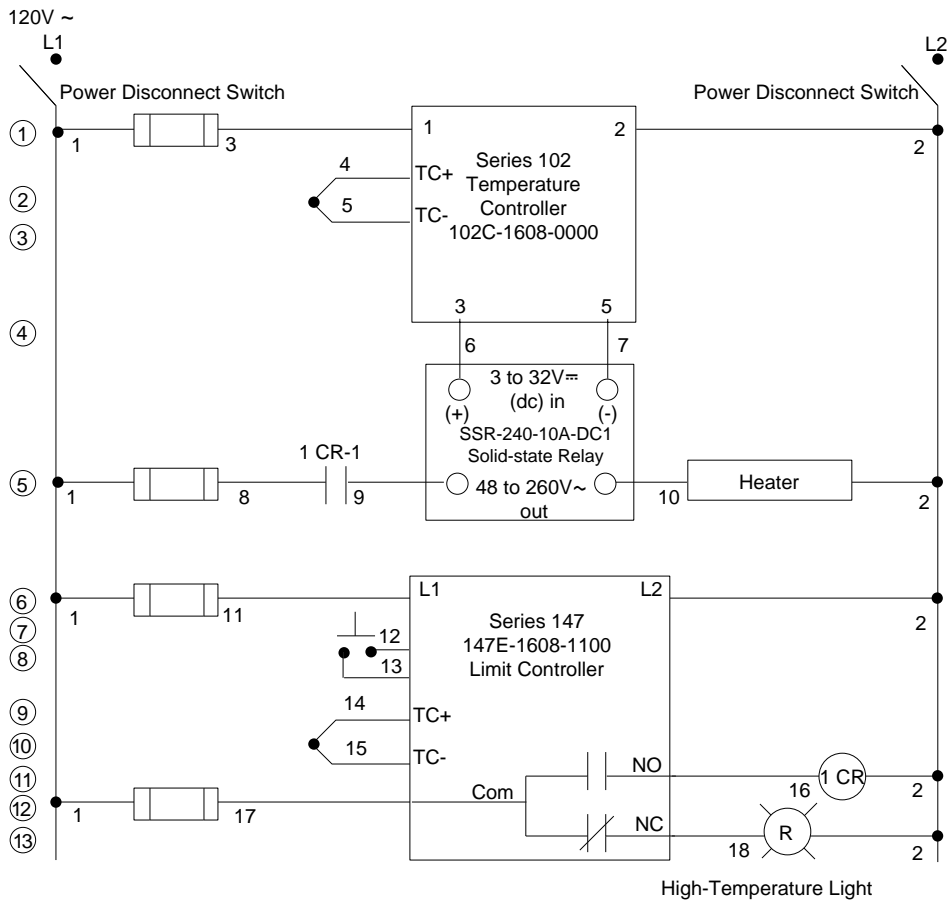
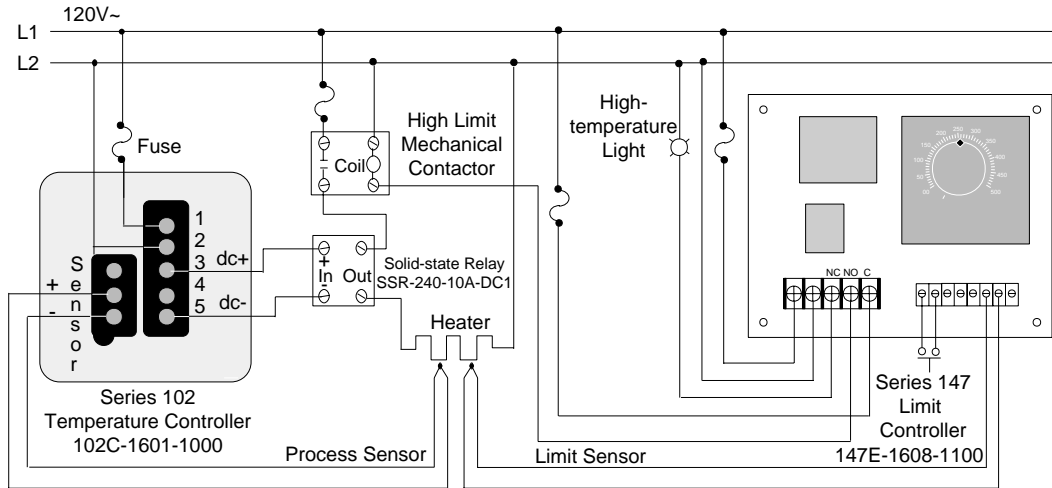


Figure 4 — System wiring examples.

Declaration of Conformity

Series 102



WATLOW WINONA

1241 Bundy Boulevard

Winona, Minnesota 55987 USA

Declares that the following product:

English

Designation: Serie 102
Model Number(s): 102 (C, D or K) - (1 or 2) (100-999) - (1 or 2) (any 3 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: 1997 **Electrical equipment for measurement, control and laboratory use - EMC requirements (Emissions Class B)**
EN 61000-3-2: 1995 Limits for harmonic current
EN 61000-3-3: 1995 Limitations of voltage fluctuations and flicker
EN 61000-4-2: 1995 Electrostatic discharge
EN 61000-4-3: 1997 Radiated immunity
EN 61000-4-4: 1995 Electrical fast transients
EN 61000-4-5: 1995 Surge immunity
EN 61000-4-6: 1994 Conducted immunity
EN 61000-4-11: 1994 Voltage dips, short interruptions and voltage variations immunity
ENV 50204: 1995 Cellular phone

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**

Déclare que le produit suivant :

Français

Désignation : Série 102
Numéro(s) de modèle(s) : 102 (C, D ou K) - (1 ou 2)(100-999) - (1 ou 2) (trois lettres ou chiffres quelconques)
Classification : Installation catégorie II, degré de pollution II
Tension nominale : 100 ou 240 V~
Fréquence nominale : 50/60 Hz
Consommation d'alimentation nominale : 10 volt-ampères maximum

Conforme aux exigences de la (ou des) directive(s) suivante(s) de l'Union Européenne figurant aux sections correspondantes des normes et documents associés ci-dessous :

89/336/EEC Directive de compatibilité électromagnétique

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

73/23/EEC Directive liée aux basses tensions

EN 61010-1: 1993 **Exigences de sécurité pour le matériel électrique de mesure, de commande et de laboratoire, Partie 1 : Exigences générales**

(1925)

Erklärt, daß das folgende Produkt:

Deutsch

Beschreibung: Serie 102
Modellnummer(n): 102 (C, D oder K) - (1 oder 2) (100-999) - (1 oder 2) (3 beliebige Buchstaben oder Ziffern)
Klassifikation: Installationskategorie II, Emissionsgrad II
Nennspannung: 120 oder 240 V~
Nennfrequenz: 50/60 Hz
Nominaler Stromverbrauch: Maximaler 10VA

Erfüllt die wichtigsten Normen der folgenden Anweisung(en) der Europäischen Union unter Verwendung des wichtigsten Abschnitts bzw. der wichtigsten Abschnitte der normalisierten Spezifikationen und der untenstehenden einschlägigen Dokumente:

89/336/EEC Elektromagnetische Übereinstimmungsanweisung

EN 61326: 1997 **Elektrogeräte zur Messung, Regelung und zum Laboreinsatz EMC-Richtlinien (Emissions Klasse B)**
EN 61000-3-2: 1995 Grenzen der Oberwellenstromemissionen
EN 61000-3-3: 1995 Grenzen der Spannungsschwankungen
EN 61000-4-2: 1995 Elektrostatische Entladung
EN 61000-4-3: 1997 Strahlungsimmunität
EN 61000-4-4: 1995 Elektrische schnelle Stöße
EN 61000-4-5: 1995 Spannungsstoßimmunität
EN 61000-4-6: 1994 Störimmunität
EN 61000-4-11: 1994 Immunität gegen Spannungsgefälle, kurze Unterbrechungen und Spannungsabweichungen
ENV 50204: 1995 Mobiltelefon

73/23/EEC Niederspannungsrichtlinie zu entsprechen

EN 61010-1: 1993 **Sicherheitsrichtlinien für Elektrogeräte zur Messung, zur Steuerung und im Labor, Teil 1: Allgemeine Richtlinien**

Declara que el producto siguiente:

Español

Designación: Serie 102
Números de modelo: 102 (C, D ó K) - (1 ó 2)(100-999) - (1 ó 2) (Cualquier combinación de tres números y letras)
Clasificación: Categoría de instalación II, grado de contaminación ambiental II
Tensión nominal: 120 ó 240 V~
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:

89/336/EEC - Directiva de Compatibilidad Electromagnética

EN 61326: 1997 **Equipo eléctrico para medición control y uso en laboratorios - Requisitos de compatibilidad electromagnética (Emisiones Clase B)**
EN 61000-3-2 1995 Límites para corriente armónica
EN 61000-3-3 1995 Limitaciones de oscilaciones y fluctuaciones de voltaje
EN 61000-4-2: 1995 Descarga electrostática
EN 61000-4-3: 1997 Inmunidad radiada
EN 61000-4-4: 1995 Perturbaciones transitorias eléctricas rápidas
EN 61000-4-5: 1995 Sobretensión
EN 61000-4-6: 1994 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 **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

Plant Manager
Title of Authorized Representative

August 18, 2000
Date of Issue

Signature of Authorized Representative

Ordering Information

(1914)	102	-	-	000
Output Type				
C = Switched (dc), non-isolated D = Electromechanical relay, 3A, Form C K = Solid-state relay, Form A, 0.5A				
Line Voltage				
1 = 120V~ 2 = 230V~ to 240V~				
Input and Range				
Type J				
601 = 32 to 600°F (0 to 315°C) 602 = 32 to 1382°F (0 to 750°C) 609 = 50 to 150°F (10 to 66°C) 618 = 0 to 200°F (-17 to 93°C) 631 = 32 to 800°F (0 to 427°C)				
Type K				
603 = 32 to 2282°F (0 to 1250°C) 611 = 32 to 1112°F (0 to 600°C) 612 = 32 to 482°F (0 to 250°C) 613 = 0 to 2500°F (-17 to 1371°C)				
Type R				
608 = 32 to 2732°F (0 to 1500°C)				
Type S				
607 = 32 to 2732°F (0 to 1500°C)				
Type T				
604 = 150 to 662°F (66 to 350°C) 605 = -328 to 150°F (-200 to 66°C) 610 = -125 to 425°F (87 to 218°C)				
Pt 2				
606 = 32 to 2543°F (0 to 1395°C)				
RTD (100Ω)				
103 = 32 to 482°F (0 to 250°C)				
Control Mode				
1 = Heat 2 = Cool				

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

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 of ITW Paktron, Watlow Part No. 0804-0147-0000.

Warranty

The Series 102 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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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.

Troubleshooting

Problem	Probable Cause	Action
The load will not turn on.	An open sensor.	Repair or replace.
	The load circuit is open.	Check the fuses, circuit breakers, load and wiring.
	The ac input is not connected or is connected improperly.	Check the ac input connections. If not present, connect as indicated in the wiring section.
The load will not turn off.	The polarity is reversed on the thermocouple.	Connect as indicated in the wiring section.
	A faulty unit.	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. Consult the factory. If the load remains on, there are other problems in the system that must be resolved. Consult the factory.