### General Description

The Watlow Series 103 is a DIN rail mount, on-off temperature controller with a thermocouple or RTD sensor input. The DIN rail mounting offers quick and easy installation with the use of simple hand tools. The controller may also be flush mounted.

The Series 103 can be factory configured as either a heat or cool output. Output types include electromechanical relay, solid-state relay or open collector output.

The Series 103 has an LED for output status indication and can be ordered with an integral, adjustable set point or a fixed set point.

### Specifications

**Series 103 User’s Manual**

**On/Off Temperature Controller**

**1241 Bundy Boulevard, P.O. Box 5580, Winona, Minnesota USA 55987-5580**

**Phone: +1 (507) 454-5300, Fax: +1 (507) 452-4507, Internet: http://www.watlow.com**

**0600-0004-0007 Rev D** January 2001

Supersedes: 0600-0004-0007 Rev C

S5.00 Made in the U.S.A.
Printed on Recycled Paper
10% Postconsumer Waste

**TOTAL 3 Year Warranty**

**CUSTOMER SATISFACTION**

**0600-0004-0007 Rev D** January 2001

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

**Operator Interface**
- LED indication of output status
- Dial scale calibrated to compensate for sensor non-linearities
- Integral set point
  - Dual temperature scale (°F and °C)
- Fixed set point
  - Manufactured to specified value

**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/°C curve, factory selectable

**Output**
- Solid-state relay, Form A, 0.5A @ 24V~ min., 264V~ maximum, opto-isolated, zero cross switching
- Switched dc signal provides a non-isolated minimum turn-on voltage of 3V (dc) into a minimum 500Ω load, maximum on voltage not greater than 32V (dc)
- Electromechanical relay, 8A, Form C, SPDT: 8A @ 240V~ resistive, 8A, 28V (dc) resistive, 275 VA 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® to C22.2 No. 24, File #E43684
- Approved for use in commercial cooking applications

**Terminals**
- Captive screw, cage clamp connection, 0.155 in. (4mm) max. width screwdriver blade, 30 to 14-gauge wire

**Mounting**
- DIN rail, DIN EN50022, 35mm x 7.5mm
- Sub-panel mounting

**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**
- Width: 2.28 in (60 mm)
- Height: 4.45 in (115mm)
- Depth: 3.89 in (100 mm)

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

UL® is a registered trademark of Underwriter’s Laboratories, Inc. Note: Specifications subject to change without notice.
Sub-Panel Mounting the Series 103
1. Using the controller as a location template, mark both mounting holes.
2. Drill two 0.19 in. (5mm) diameter holes in the desired panel location. See Figure 2a for hole locations.
3. Mount the Series 103 using two #8-32 screws.

DIN Rail Mounting the Series 103
1. Place the Series 103 upper mounting clip on the top edge of the DIN rail. See the Figure 2b on this page.
2. Press down firmly on the top front edge of the Series 103. The control "snaps" securely onto the rail. If the control does not snap on, check to see if the DIN rail is bent. Minimum clipping distance is 1.37 in. (34.8mm), the maximum is 1.39 in. (35.3mm).

Removing the Series 103 from the DIN Rail
1. Place your fingers on the release lever located at the base of the Series 103.
2. While gently pressing on the top of the case, above Terminals 1 to 9, pull forward on the release lever.

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~

103-1__-0000

230 to 240V~

103-2__-0000

**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 or death.

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

⚠️ **CAUTION:** Applying incorrect voltage may result in irreversible damage to the control.

---

**Input Wiring**

Thermocouple

![Thermocouple Wiring](image)

Figure 3b — Thermocouple wiring.

2- and 3-wire RTD

![2- and 3-wire RTD Wiring](image)

Figure 3c — 2- and 3-wire RTD wiring.

**NOTE:** 2- or 3-wire RTD input, calibrated for 0.003850Ω/°C curve.

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**Output Wiring**

**Electromechanical Relay, Form C without contact suppression**

10A 103 E-__-000

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

5A 103 K-__-000

⚠️ **NOTE:** We strongly recommend that all control loops use an approved temperature limit for over or under temperature limit protection.

⚠️ **WARNING:** Failure to install a temperature limit for protection where a potential hazard exists could result in damage to equipment and property wiring and injury to personnel.

---

**Switched DC**

103 C-__-000

![Switched DC Wiring](image)

Figure 3e — Switched DC

**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.

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Figure 4 — System wiring examples.
Declaration of Conformity

Series 103

WATLOW WINONA
1241 Bundy Boulevard
Winona, Minnesota 55987 USA

Declares that the following product:

Designation: Series 103
Model Number(s): 103(C, E 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 240 V~
Rated Frequency: 50/60 Hz
Rated Power Consumption: 10 VA maximum

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

89/336/EEC Electromagnetic Compatibility Directive
EN 50204: 1995 Cellular phone
EN 61000-4-1: 1994 Limits for harmonic current
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: 1995 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
EN 61010-2: 1993 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 2: Safety requirements
EN 61010-3: 1993 Safety requirements for electrical equipment for measurement, control, and laboratory use, Part 3: Overvoltage category

89/336/EEC - Directiva de Compatibilidad Electromagnética
EN 50204: 1995 Equipos de telecomunicaciones
EN 61000-4-1: 1994 Límites de emisión de ruido interferente
EN 61000-4-2: 1995 Radiación electrostática
EN 61000-4-3: 1997 Inmunidad electromagnética
EN 61000-4-4: 1995 Inmunitad a transientes rápidos
EN 61000-4-5: 1995 Inmunidad a sobretensiones
EN 61000-4-6: 1995 Conducción de inmunidad
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

Erklärt, daß das folgende Produkt:

Beschreibung: Serie 103
Modellnummer(n): 103(C, E oder K) - (1 oder 2) (100-999) - (1 oder 2) (beliebig Buchstaben oder Ziffern)
Klassifikation: Installationskategorie II, Emissionsgrad II
Nominalspannung: 120 oder 240 V~
Nominalfrequenz: 50/60 Hz
Nominaler Stromverbrauch: Maximaler 10 VA

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 50204: 1995 Mobiltelefon
EN 61000-4-1: 1994 Grenzen der Oberwellenstrommittenwerte
EN 61000-4-2: 1995 Elektrostatische Entladung
EN 61000-4-3: 1997 Strahlungsoptimalität
EN 61000-4-4: 1995 Elektrische schnelle Stößefrequenzen
EN 61000-4-5: 1995 Spannungsoptimalität
EN 61000-4-6: 1995 Schutzoptimalität
EN 61000-4-11: 1994 Immunität gegen Spannungsspitzen, kurze Unterbrechungen und Spannungsschwankungen
ENV 50204: 1995 Mobiltelefon

73/23/EEC Niederspannungrichtlinie zu entsprechen
EN 61010-1: 1993 Sicherheitshinweise für Elektrogeräte zur Messung, zur Steuerung und im Labor, Teil 1: Allgemeine Richtlinien

Declara que el producto siguiente:

Designación: Serie 103
Números de modelo: 103(C, E o K) - (1 o 2) (100-999) - (1 o 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 50204: 1995 Equipos telefónicos
EN 61000-4-1: 1994 Límites de emisión de ruido interferente
EN 61000-4-2: 1995 Radiación electrostática
EN 61000-4-3: 1997 Inmunidad electromagnética
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EN 61000-4-6: 1995 Conducción de inmunidad
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EN 61010-1: 1993 Requisitos de segurança para equipamentos elétricos de medição, controlo e uso em laboratórios, Parte 1: Requisitos gerais

Signature of Authorized Representative

William R. Blaisdell
Winona, Minnesota, USA

Name of Authorized Representative

Place of Issue

Date of Issue

(2003)
## Output Type

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Switched dc, non-isolated</td>
</tr>
<tr>
<td>E</td>
<td>Electromechanical relay, 8A, Form C</td>
</tr>
<tr>
<td>K</td>
<td>Solid-state relay, Form A, 0.5A</td>
</tr>
</tbody>
</table>

## Line Voltage

<table>
<thead>
<tr>
<th>Code</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>120V~</td>
</tr>
<tr>
<td>2</td>
<td>230V~ to 240V~</td>
</tr>
</tbody>
</table>

## Input and Range

<table>
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<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type E</td>
<td></td>
</tr>
<tr>
<td>619</td>
<td>32 to 1470°F (0 to 799°C)</td>
</tr>
<tr>
<td>Type J</td>
<td></td>
</tr>
<tr>
<td>601</td>
<td>32 to 600°F (0 to 315°C)</td>
</tr>
<tr>
<td>602</td>
<td>32 to 1382°F (0 to 750°C)</td>
</tr>
<tr>
<td>618</td>
<td>0 to 200°F (-17 to 93°C)</td>
</tr>
<tr>
<td>620</td>
<td>300 to 800°F (149 to 427°C)</td>
</tr>
<tr>
<td>623</td>
<td>110 to 130°F (43 to 54°C)</td>
</tr>
<tr>
<td>624</td>
<td>75 to 275°F (24 to 135°C)</td>
</tr>
<tr>
<td>Type K</td>
<td></td>
</tr>
<tr>
<td>603</td>
<td>32 to 2382°F (0 to 1250°C)</td>
</tr>
<tr>
<td>611</td>
<td>32 to 1112°F (0 to 600°C)</td>
</tr>
<tr>
<td>626</td>
<td>60 to 300°F (16 to 149°C)</td>
</tr>
<tr>
<td>627</td>
<td>24 to 150°F (0 to 66°C)</td>
</tr>
<tr>
<td>Type T</td>
<td></td>
</tr>
<tr>
<td>629</td>
<td>-328 to 662°F (-200 to 350°C)</td>
</tr>
<tr>
<td>630</td>
<td>-22 to 158°F (-30 to 70°C)</td>
</tr>
<tr>
<td>RTD</td>
<td></td>
</tr>
<tr>
<td>101</td>
<td>-100 to 1112°F (-73 to 600°C)</td>
</tr>
</tbody>
</table>

## Control Mode

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<th>Description</th>
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<tbody>
<tr>
<td>1</td>
<td>Heat</td>
</tr>
<tr>
<td>2</td>
<td>Cool</td>
</tr>
</tbody>
</table>

---

### Note:

- Electromechanical relays are warranted for 100,000 closures only. Solid-state relay switching devices are recommended for applications requiring extended service life.
- Outputs with contact suppression should be used with inductive loads.

---

### Order Information

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<tr>
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</tr>
</thead>
<tbody>
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<td>32 to 600°F (0 to 315°C)</td>
</tr>
<tr>
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<td>32 to 1382°F (0 to 750°C)</td>
</tr>
<tr>
<td>618</td>
<td>0 to 200°F (-17 to 93°C)</td>
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### Troubleshooting

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<tr>
<th>Problem</th>
<th>Probable Cause</th>
<th>Action</th>
</tr>
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<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></td>
<td>Check the fuses, circuit breakers, load and wiring.</td>
</tr>
<tr>
<td>The ac input is not connected or is connected improperly.</td>
<td>Compare the ac input connections with the appropriate wiring diagram.</td>
<td></td>
</tr>
<tr>
<td>The load will not turn off.</td>
<td>The thermocouple polarity is reversed.</td>
<td>Compare the input connections with the appropriate wiring diagram.</td>
</tr>
<tr>
<td>A faulty unit.</td>
<td></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>
</tr>
</tbody>
</table>

---

### Warranty

The Series 103 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: 507/454-5300
- Fax: 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 507/494-5656, 7 a.m. to 7 p.m. Central Standard Time. The Series 103 User’s Manual is copyrighted by Watlow, Inc., © January 2001, with all rights reserved. (2000)