DIN-A-MITE® Style B
Solid-State Power Controller
User’s Manual

DIN-A-MITE Solid-State Power Controller

Please consult this user’s manual when you place your new DIN-A-MITE into service. It contains all the necessary information to mount and wire the product into the application. This manual also contains all user-pertinent specifications and semiconductor fusing recommendations. Refer to national and local electrical code safety guidelines whenever you install electrical equipment.

This DIN-A-MITE product is capable of switching up to 40 amps single-phase; 33 amps 3-phase, 2-leg; and 22 amps 3-phase, 3-leg at 600V~ (ac). (See the output rating curve in the specifications section of this manual.) The DIN-A-MITE is electrically touch-safe, and includes DIN rail or standard back panel mounting. An optional shorted SCR (silicon controlled rectifier) alarm feature is available on specific models. UL® 508-listed, C-UL® and CE with filter.

The DIN-A-MITE solid-state power controller is designed and manufactured by Watlow in Winona, Minnesota.
General Specifications

Operator Interface
- Command signal input and indication light
- Alarm output and indication light
- Input indicator LED

Amperage Rating
- See the output rating curve chart on page 3.
- Ratings are into a resistive heater load.
- Maximum surge current for 16.6 milliseconds, 380 A peak
- Maximum I^2t for fusing is 4000 A^2s
- Latching current: 200mA minimum
- Holding current: 100mA minimum
- Off-state leakage 1mA at 25°C (77°F) maximum
- Power Dissipation: 1.2 watts per amp switched
- 200KA SCCR type 1 and 2 approved with the recommended fusing (see page 3)

Line Voltage
- 24 to 48V~ (ac) units: 20.4V~ minimum to 53V~ maximum
- 120 to 240V~ (ac) units: 48V~ minimum to 265V~ maximum
- 277 to 600V~ (ac) units: 85V~ minimum to 660V~ maximum

Control Mode, Zero-Cross
- Input Control Signal Type C: V=(dc) input contactor. To increase service life, the cycle time should be less than 3 seconds.
- Input Control Signal Type K: V~ (ac) input contactor. To increase service life, the cycle time should be less than 3 seconds.
- Input Control Signal Type F: 4 to 20mA (dc) proportional variable time base control.

Input Command Signal
- AC contactor
  24V~ ±10%, 120V~ ±10%/−25%, 240V~ (ac) +10%/−25% @ 25mA maximum per controlled leg
- Do not use the DIN-A-MITE Vac-input models with a temperature controller that includes an RC snubber circuit across its output. Remove the RC snubber circuit before placing the DIN-A-MITE into service.
- DC Contactor
  4.5V~ to 32V=~ (dc): maximum current @ 4.5V~ (dc) is 6.0mA per leg, plus 2mA per LED used.
- Loop powered linear current
  4mA~ to 20mA~ (dc): loop-powered. Input Type F0 option only. (Requires source with 8.0V~ (dc) available. No more than two DIN-A-MITE inputs connected in series)

Linearity (Input Control Signal Type F)
- Full on point 19.5 to 19.9mA~ (dc), maximum voltage of 6.2V peak.
- ±5% input to output power accuracy, 0% to 100% of span (4.3 to 19.7mA).
- Temperature stability is less than 0.15%/°C change.

Alarm (not available on multizone models)

Shorted SCR Alarm Option
- Alarm state when the input command signal off and a 10 A or more load current is detected by the current transformer (two turns required for 5A and three turns for 2.5A).

Alarm output
- Energizes on alarm, non-latching
- Triac 24 to 240V~ (ac), external supply with a current rating of 300mA @ 25°C (77°F), 200mA @ 50°C (122°F), 100mA @ 80°C (176°F) and a holding current of 200µA with a latching current of 5mA typical.

Agency Approvals
- ROHS
- CE with proper filter:
  EN 61326: Industrial Immunity Class A emissions
  2006/95/EC Low Voltage Directive
  EN 50178 Safety Requirements
  Installation category III, pollution degree 2
- UL® 508 listed and C-UL®, File E73741

Input Terminals
- Compression: Will accept 0.2 to 1.5 mm^2 (24 to 16 AWG) wire
- Torque to 0.5 Nm (4.4 in-lb) maximum with a 3.5 mm (1/8 in) blade screwdriver
- Wire strip length 5.5 mm (0.22 in)
- Line and load wire insulation rating must be 75C or higher, copper conductor only

Line and Load Terminals
- Compression: Will accept 0.75 to 10 mm^2 (18 to 8 AWG) wire
- Torque to 1.4 Nm (12 in-lb) with a 6.4 mm (1/4 in) blade screwdriver, or a Type 1A #2 Pozi driver.
- Retorque after 48 hours to minimize wire cold flow.
- Retorque line and load terminals every 3 to 6 months.
- Wire strip length 6.35 mm (0.25 in)
- Ground terminal use spade terminal for No. 8 screw, with upturned lugs.

Operating Environment
- See the output rating curve.
- 0 to 90% RH (relative humidity), non-condensing
- Storage temperature: -40 to +85°C (-40 to 185°F)
- Insulation only tested to 3,000 meters

DIN Rail Mount
- DIN EN 50022, 35 mm by 7.5 mm
- Minimum clipping distance: 34.8 mm (1.37 in)
- Maximum clipping distance: 35.3 mm (1.39 in)

Note: Mount cooling fins vertically.

Back Panel Mount
- Four mounting holes M4 (No. 8) fastener

Weight
- 0.7 kg (1.6 lb)

Specifications are subject to change without notice.
DIN-A-MITE B Ordering Information

To order, complete the code number on the right with the information below:

**Style B** = solid-state power controller

### Phase
1 = single-phase, 1 controlled leg
2 = 3-phase, 2 controlled legs
3 = 3-phase, 3 controlled legs (for 4-wire wye)
8 = 2 independent zones (input control C or K)
9 = 3 independent zones (input control C or K)

### Cooling and Current Rating Per Pole
0 = Natural convection standard DIN rail or panel heatsink

### Line and Load Voltage
02 = 24 to 48V~ (ac)
24 = 120 to 240V~ (ac)
60 = 277 to 600V~ (ac)

### Input Control Signal
C0 = 4.5 to 32V= (dc) contactor
K1 = 22 to 26V~ contactor
K2 = 100 to 120V~ contactor
K3 = 200 to 240V~ contactor
F0 = Proportional 4 to 20mA

### Alarm
0 = No alarm
S = Shorted SCR Alarm (not available with phase options 8 or 9 above)

### User Manual Language
0 = English
1 = German
2 = Spanish
3 = French

### Custom Part Numbers
00 = Standard part
XX = Any letter or number, custom options, labeling, etc.

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**Note:**
- Recommended fusing options to meet 200KA SCCR, type 1 and 2 approved. All other fuse and SCR combinations are defaulted to 5KA SCCR per UL508A and NEC guidelines.

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### Recommended Fuse and Fuse Holder

<table>
<thead>
<tr>
<th>Fuse</th>
<th>Watlow Semiconductor</th>
<th>Bussmann Semiconductor</th>
<th>Watlow Combination</th>
<th>Bussmann Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A</td>
<td>17-8020</td>
<td>FWC20A10F</td>
<td>0808-0325-0020</td>
<td>DFJ20</td>
</tr>
<tr>
<td>25A</td>
<td>17-8025</td>
<td>FWC25A14F</td>
<td>0808-0325-0025</td>
<td>DFJ25</td>
</tr>
<tr>
<td>32A</td>
<td>17-8030</td>
<td>FW32A14F</td>
<td>0808-0325-0030</td>
<td>DFJ30</td>
</tr>
<tr>
<td>40A</td>
<td>17-8040</td>
<td>FWP40A14F</td>
<td>0808-0325-0040</td>
<td>DFJ40</td>
</tr>
<tr>
<td>50A</td>
<td>17-8050</td>
<td>FWP50A14F</td>
<td>0808-0325-0050</td>
<td>DFJ50</td>
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</tbody>
</table>

**Holders (single)**

<table>
<thead>
<tr>
<th>Fuse</th>
<th>Watlow</th>
<th>Bussmann</th>
<th>Ferraz</th>
<th>Bussmann Combination</th>
</tr>
</thead>
<tbody>
<tr>
<td>20A</td>
<td>17-5110</td>
<td></td>
<td>USM1i</td>
<td></td>
</tr>
<tr>
<td>25A</td>
<td>17-5110</td>
<td></td>
<td>USM1i</td>
<td></td>
</tr>
<tr>
<td>32A</td>
<td>17-5114</td>
<td></td>
<td>USM14i</td>
<td></td>
</tr>
<tr>
<td>40A</td>
<td>17-5114</td>
<td></td>
<td>USM14i</td>
<td></td>
</tr>
<tr>
<td>15 to 30A</td>
<td>0808-0326-1530</td>
<td></td>
<td>CH30J1i</td>
<td></td>
</tr>
<tr>
<td>35 to 60A</td>
<td>0808-0326-3560</td>
<td></td>
<td>CH60J1i</td>
<td></td>
</tr>
</tbody>
</table>

### Current Rating Table

- **Model**
  - DB10: 35A
  - DB20, DB80: 25A
  - DB30, DB90: 17A
1. Push the unit in and down to catch the rail hook on top of the rail.
2. Rotate the bottom of the unit in toward the rail.
3. The rail clasp will audibly “snap” into place. If the DIN-A-MITE does not snap into place, check to see if the rail is bent.
4. Mount the cooling fins vertically.

WARNING:
Only authorized and qualified personnel should be allowed to install and perform preventive and corrective maintenance on this unit. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

WARNING:
Hot surface, do not touch the heat sink. Failure to follow this guideline could result in personal injury.

Mount the cooling fins vertically.
WARNING: Use National Electric (NEC) or other country-specific standard wiring practices to install and operate the DIN-A-MITE. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

WARNING: Wiring examples show L2 in phase-to-phase, 200V (ac) and above configuration. In phase-to-neutral, 100 V (ac) and above applications, L2 is neutral and must not be fused or switched. Failure to follow this guideline could result in personal injury or death.

WARNING: Only authorized and qualified personnel should be allowed to install and perform preventive and corrective maintenance on this unit. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

WARNING: Do not use the DIN-A-MITE Vac-input models with a temperature controller that includes an RC snubber circuit across its output. Remove the RC snubber circuit before placing the DIN-A-MITE into service.

NOTE: Shorted SCR (silicon-controlled rectifier) alarm option not available with multizone input option.

Input Wiring
(For models DB [1, 2, 3] _ - _ [C, F, K] _ - _ _ )

Typical DIN-A-MITE Current Draw:

<table>
<thead>
<tr>
<th>Voltage (Vdc)</th>
<th>DB20-24C0-0000</th>
<th>DB10-24C0-0000</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5Vdc</td>
<td>13.0mA</td>
<td>8.0mA</td>
</tr>
<tr>
<td>9.0Vdc</td>
<td>14.0mA</td>
<td>8.0mA</td>
</tr>
<tr>
<td>12.0Vdc</td>
<td>15.0mA</td>
<td>9.0mA</td>
</tr>
<tr>
<td>24.0Vdc</td>
<td>16.0mA</td>
<td>10.0mA</td>
</tr>
<tr>
<td>32.0Vdc</td>
<td>17.0mA</td>
<td>10.0mA</td>
</tr>
</tbody>
</table>

Multizone Input Wiring
(For models DB [8, 9] _ - _ [C, K] _ - _ _ )

2-zone

3-zone

Multizone Output Wiring
(For models DB [8, 9] _ - _ [C, K] _ - _ _ )

2-zone

3-zone

Torque Guidelines
- Properly torque line and load terminals to 1.4 Nm (12 in-lb).
- Retorque after 48 hours to minimize wire cold flow.
- Retorque line and load terminals every 3 to 6 months.

NOTE: Independent loads do not have to be on the same phase.

NOTE: Terminals 2 and 5 not to exceed 40A.

NOTE: Use a grounding conductor terminal plate (fork terminal) having upturned lugs or the equivalent to hold the wire in position. Maximum 6 mm² (10 AWG) wire.
WARNING: Use National Electric (NEC) or other country-specific standard wiring practices to install and operate the DIN-A-MITE. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

WARNING: Wiring examples show L2 in phase-to-phase, 200V~ (ac) and above configuration. In phase-to-neutral, 100V~ (ac) and above applications, L2 is neutral and must not be fused or switched. Failure to follow this guideline could result in personal injury or death.

WARNING: Only authorized and qualified personnel should be allowed to install and perform preventive and corrective maintenance on this unit. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

NOTE: Use a grounding conductor terminal plate (fork terminal) having upturned lugs or the equivalent to hold the wire in position. Maximum 6 mm² (10 AWG) wire.

Torque Guidelines
- Properly torque line and load terminals to 1.4 Nm (12 in-lb).
- Retorque after 48 hours to minimize wire cold flow.
- Retorque line and load terminals every 3 to 6 months.
The Watlow DIN-A-MITE alarm option provides a common alarm output for shorted SCR conditions. 
This is a non-latching alarm.

A shorted SCR alarm is detected when there is no command signal and a load current is detected. The alarm output is then energized.

**Current Transformer and Alarm Wiring**

**Load Current Passes of Load Wire Through the Current Transformer**

<table>
<thead>
<tr>
<th>Load Current</th>
<th>Passes of Load Wire</th>
<th>Transformer</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 to 9A</td>
<td>2</td>
<td>CT</td>
</tr>
<tr>
<td>10 to 30A</td>
<td>1</td>
<td>CT</td>
</tr>
</tbody>
</table>

**3-phase, 2-leg Current Transformer Wiring**

**3-phase, 3-leg Current Transformer Wiring**

**Torque Guidelines**
- Properly torque line and load terminals to 1.4 Nm (12 in-lb).
- Retorque after 48 hours to minimize wire cold flow.
- Retorque line and load terminals every 3 to 6 months.

**WARNING:**
Use National Electric (NEC) or other country-specific standard wiring practices to install and operate the DIN-A-MITE. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

**NOTE:** If you plan to wire multiple DIN-A-MITE alarm outputs, you need to include an intermediate relay for each DIN-A-MITE used.

**WARNING:**
Wiring examples show L2 in phase-to-phase, 200 V~ (ac) and above configuration. In phase-to-neutral, 100 V~ (ac) and above applications, L2 is neutral and must not be fused or switched. Failure to follow this guideline could result in personal injury or death.

**WARNING:**
Only authorized and qualified personnel should be allowed to install and perform preventive and corrective maintenance on this unit. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

**WARNING:**
If you plan to wire multiple DIN-A-MITE alarm outputs, you need to include an intermediate relay for each DIN-A-MITE used.

**NOTE:** If you plan to wire multiple DIN-A-MITE alarm outputs, you need to include an intermediate relay for each DIN-A-MITE used.
WARNING:
Use National Electric (NEC) or other country-specific standard wiring practices to install and operate the DIN-A-MITE. Failure to do so may result in damage to equipment and property, and/or injury or loss of life.

WARNING:
Wiring examples show L2 in phase-to-phase, 200 V~ (ac) and above configuration. In phase-to-neutral, 100 V~ (ac) and above applications, L2 is neutral and must not be fused or switched. Failure to follow this guideline could result in personal injury or death.

WARNING:
Only authorized and qualified personnel should be allowed to install and perform preventive and corrective maintenance on this unit. Failure to follow this guideline could result in damage to equipment, and personal injury or death.

NOTE: If you plan to wire multiple DIN-A-MITE alarm outputs, you need to include an intermediate relay for each DIN-A-MITE used.

Torque Guidelines
- Properly torque line and load terminals to 1.4 Nm (12 in-lb).
- Retorque after 48 hours to minimize wire cold flow.
- Retorque line and load terminals every 3 to 6 months.

System Wiring Example

Latching Alarm Option
(models DB __ - __ __ __ - S __ __)

Alternative Latching Alarm Circuit
If there is a need for a latching alarm, the DIN-A-MITE alarm circuit could be used as shown at right in the latching alarm example. If the DIN-A-MITE triac alarm output energizes, it will energize the RY1 (external alarm relay) mechanical relay coil. Once the RY1 coil is energized it will latch on (via the RY1A normally open contact) until the power to the relay is removed. You could cycle the power via a reset switch. The RY1B contact can be used for alarm signaling.
Non-latching Alarm Option
(models DB_ _ - _ _ _ _ - S _ _ _ )

Shorted SCR (silicon-controlled rectifier) Alarm
Non-latching Operation

The shorted SCR detector compares the input command signal and actual load current. If load current is present without an input signal then the shorted SCR alarm will energize the alarm triac output. This is a non-latching alarm. This output can be used to drive various indication devices, such as a coil, light, buzzer, etc. See the alternative latching circuit section below.

NOTE: The current transformer must be in the center uncontrolled leg on a 2-leg DIN-A-MITE.
Declarations of Conformity

DIN-A-MITE® “B” Power Controller

WATLOW Electric Manufacturing Company
1241 Bundy Blvd. Winona, MN 55987 USA

Declarations that the following products:

Designation: DIN-A-MITE® “B” Power Control
Model Numbers: DB (1, 2, 3, 4, 8 or 9) 0 – (02, 24 or 60)(CX, FX, K1, K2, K3) – (0 or S)(followed by any 3 letters or numbers) (where X = any number 0-9)
Classification: Power Control, Installation Category III, Pollution degree 2, IP20
Rated Voltage: 24 to 600 V~ (ac), 50 or 60 Hz

Meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

EN 61326-1: 2013 Electrical equipment for measurement, control and laboratory use - EMC requirements (Industrial Immunity, Class A1,2,4 Emissions) Not for use in a Class B environment without additional filtering.
EN 61000-4-2:2009 Electrostatic Discharge Immunity
EN 61000-4-3:2010 Radiated Field Immunity 10V/m 80 MHz- 1GHz, 3V/m 1.4GHz-2.7GHz
EN 61000-4-4:2012 Electrical Fast-Transient / Burst Immunity
EN 61000-4-5:2006 Surge Immunity (Reviewed to IEC 61000-4-5 2014)
EN 61000-4-6:2014 Conducted Immunity
EN 61000-4-11:2004 Voltage Dips, Short Interruptions and Voltage Variations
EN 61000-3-2:2009 Harmonic Current Emissions (Reviewed to IEC 61000-3-2 2014)
EN 61000-3-3:2013 Voltage Fluctuations and Flicker ≤ 16A

2006/95/EC Low-Voltage Directive


Compliant with 2011/65/EU RoHS2 Directive

NOTES
1 Use of an external filter is required to comply with conducted emissions limits. See note 4 below.
2 A Line Impedance Stabilization Network (LISN) was used for conducted emissions measurements.
3 To comply with flicker requirements, command signal models F0 and F1 will require a reduced source impedance. Cycle time on ON/OFF models CX, and K1, K2, K3 may need to be up to 175 seconds at 16A or have a reduced source impedance.

EN 61326-1: 2013 Electrical equipment for measurement, control and laboratory use - EMC requirements (Industrial Immunity, Class A1,2,4 Emissions) Not for use in a Class B environment without additional filtering.

2006/95/EC Low-Voltage Directive


Compliant with 2011/65/EU RoHS2 Directive

4 Required External EMI Filters for DIN-A-MITE with More Than 6 Amp Loads
An external ElectroMagnetic interference (EMI) filter must be used in conjunction with the DIN-A-MITE for loads in excess of six amperes (6A) at 150 to 250 KHz. Watlow has verified that a tank filter will suppress EMI created by SCR power controllers to comply with the conducted emissions limits.

<table>
<thead>
<tr>
<th>DIN-A-MITE EMI Filters</th>
<th>Description</th>
<th>Crydom Filter</th>
<th>Watlow Filter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-phase, 230V~ (ac)</td>
<td>1F25</td>
<td>14-0019</td>
<td></td>
</tr>
<tr>
<td>Three-phase, 440V~ (ac)</td>
<td>3F20</td>
<td>14-0020</td>
<td></td>
</tr>
</tbody>
</table>

ISO 9001since 1996.
WARNING: Tank filters may suppress desirable communications carried on power lines in the 150 to 250 KHz region. The filters may suppress carrier current such as that used for infant monitors and medical alert systems. Verify that suppressed carrier current or other desirable communications on power lines creates no hazard to people or property. Failure to observe this warning could result in damage to property, and or injury to death for personnel.

WARNING: All filter installation and wiring must be performed by qualified personnel and conform to local and national electrical codes.

In-line power filters have been shown to properly suppress EMI; however, these filters must be rated for the entire load current and are generally more expensive than the tank filter specified. An In-line filter may be required if carrier current communications are used on site.

Joe Millanes
Name of Authorized Representative
Winona, Minnesota, USA
Place of Issue

Director of Operations
Title of Authorized Representative
September 2014
Date of Issue

Signature of Authorized Representative
Warranty

The Watlow DIN-A-MITE 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 units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow’s obligations hereunder, at Watlow’s option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse, abuse or improper fusing.

Technical Assistance

If you encounter a problem with your Watlow power controller, review your configuration information to verify that your selections are consistent with your application: inputs, outputs, alarms, limits, etc. If the problem persists, you can get technical assistance from your local Watlow representative, by e-mailing your questions to wintechsupport@watlow.com or by dialing +1 (507) 494-5656 between 7 a.m. and 5 p.m., Central Standard Time (CST). Ask for an Applications Engineer. Please have the following information available when calling:

• Complete model number
• All configuration information
• User’s Manual
• Wiring diagram of your system

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Return Material Authorization (RMA)

1. Call Watlow Customer Service, (507) 454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. We need this information:
   • Ship to address
   • Bill to address
   • Contact name
   • Phone number
   • Method of return shipment
   • Your P.O. number
   • Detailed description of the problem
   • Any special instructions
   • Name and phone number of person returning the product.

2. Prior approval and an RMA number from the Customer Service Department is needed when returning any product for credit, repair or evaluation. Make sure the RMA number is on the outside of the carton, and on all paperwork returned. Ship on a Freight Prepaid basis.

3. After we receive your return, we will examine it and try to verify the reason for returning it.

4. In cases of manufacturing defect, we will enter a repair order, replacement order or issue credit for material returned.

5. To return products that are not defective, goods must be in new condition, in the original boxes and they must be returned within 120 days of receipt. A 20 percent restocking charge is applied for all returned stock controls and accessories.

6. If the unit is unrepairable, it will be returned to you with a letter of explanation.

7. Watlow reserves the right to charge for no trouble found (NTF) returns.
How to Reach Us

Corporate Headquarters
Watlow Electric Manufacturing Company
12001 Lackland Road
St. Louis, MO 63146
Sales: 1-800-WATLOW2
Manufacturing Support: 1-800-4WATLOW
Email: info@watlow.com
Website: www.watlow.com
From outside the USA and Canada:
Tel: +1 (314) 878-4600
Fax: +1 (314) 878-6814

Latin America
Watlow de México S.A. de C.V.
Av. Fundición No. 5
Col. Parques Industriales
Querétaro, Qro. CP-76130
Mexico
Tel: +52 442 217-6235
Fax: +52 442 217-6403

Europe
Watlow France
Tour d’Asnières.
4 Avenue Laurent Cély
92800 Asnières sur Seine
France
Tel: +33 (0)1 41 32 79 70
Télécopie: +33(0)1 47 33 36 57
Email: info@watlow.fr
Website: www.watlow.fr

Watlow GmbH
Postfach 11 65, Lauchwasenstr. 1
D-76709 Kronau
Germany
Tel: +49 (0) 7253 9400-0
Fax: +49 (0) 7253 9400-900
Email: info@watlow.de
Website: www.watlow.de

Watlow Italy S.r.l.
Viale Italia 52/54
20094 Corsico  MI
Italy
Tel: +39 024588841
Fax: +39 0245869954
Email: info@watlow.it

Asia and Pacific
Watlow Singapore Pte Ltd.
16 Ayer Rajah Crescent,
#06-03/04,
Singapore 139985
Tel: +65 6773 9408 Fax: +65 6778 0323
Email: info@watlow.com.sg
Website: www.watlow.com.sg

Watlow Australia Pty., Ltd.
4/57 Sharps Road
Tullamarine, VIC 3043
Australia
Tel: +61 3 9335 6449
Fax: +61 3 9330 3566
Website: www.watlow.com

Watlow Electric Manufacturing (Shanghai) Company
1118 Fangyuan Road, Anting Industrial Park, Jiading, Shanghai,
PRC 201203
People's Republic of China
Tel: +86 21 39509510
Fax: +86 21 5080-0906
Email: info@watlow.cn
Website: www.watlow.cn

Watlow Korea Co., Ltd.
#1406, E&C Dream Tower, 46, Yangpyeongdong-3ga
Yeongdeungpo-gu, Seoul 150-103
Republic of Korea
Tel: +82 (2) 2628-5770 Fax: +82 (2) 2628-5771
Website: www.watlow.co.kr

Watlow Malaysia Sdn Bhd
No. 14-3 Jalan 2/114
Kuchai Business Centre
Jalan Kuchai Lama
58200 Kuala Lumpur
Malaysia
Tel: +60 3 7980 7741 Fax: +60 3 7980 7739

瓦特電機股份有限公司
80143 高雄市前金區七賢二路189號 10樓之一
電話: 07-2885168 傳真: 07-2885568

Watlow Electric Taiwan Corporation
10F-1 No.189 Chi-Shen 2nd Road Kaohsiung 80143
Taiwan
Tel: +886-7-2885168 Fax: +886-7-2885568

Your Authorized Watlow Distributor

Watlow Ibérica, S.L.U.
C/Mate 12, Posterior, Local 9
E-28850 Torrejón de Ardoz
Madrid - Spain
T. +34 91 675 12 92
F. +34 91 648 73 80
Email: info@watlow.es
Website: www.watlow.es

Watlow UK Ltd.
Linby Industrial Estate
Linby, Nottingham, NG15 8AA
United Kingdom
Telephone: (0) 115 964 0777
Fax: (0) 115 964 0071
Email: info@watlow.co.uk
Website: www.watlow.co.uk
From outside The United Kingdom:
Tel: ++44 115 964 0777
Fax: ++44 115 964 0071

Watlow Korea Co., Ltd.
#1406, E&C Dream Tower, 46, Yangpyeongdong-3ga
Yeongdeungpo-gu, Seoul 150-103
Republic of Korea
Tel: +82 (2) 2628-5770 Fax: +82 (2) 2628-5771
Website: www.watlow.co.kr

Watlow Malaysia Sdn Bhd
No. 14-3 Jalan 2/114
Kuchai Business Centre
Jalan Kuchai Lama
58200 Kuala Lumpur
Malaysia
Tel: +60 3 7980 7741 Fax: +60 3 7980 7739

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