



# *Installation Instructions*

## Barrel Temperature Control Module

(Cat. No. 1746-BTM)

### Installing and Wiring

This document gives you information about:

- avoiding electrostatic damage
- compliance with European Union directive
- determining the module's chassis power requirement
- planning for sufficient enclosure depth
- choosing a module slot in a local I/O chassis
- installing the module
- wiring the module

Electrostatic discharge can damage semiconductor devices inside this module if you touch backplane connector pins. Guard against electrostatic damage by observing the following precautions:

### Avoiding Electrostatic Damage



**ATTENTION:** Electrostatic discharge can degrade performance or cause permanent damage. Handle the module as stated below.

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- Touch a grounded object to rid yourself of charge before handling.
- Wear an approved wrist strap when handling the module.
- Handle the module from the front, away from the backplane connector. Do not touch backplane connector pins.

## European Communities (EC) Directive Compliance

If this product has the CE mark it is approved for installation within the European Union and EEA regions. It has been designed and tested to meet the following directives.

### EMC Directive

This product is tested to meet the Council Directive 89/336/EC Electromagnetic Compatibility (EMC) by applying the following standards, in whole or in part, documented in a technical construction file:

- EN 50081-2 EMC — Generic Emission Standard, Part 2 — Industrial Environment
- EN 5001082-2 EMC — Generic Immunity Standard, Part 2 — Industrial Environment

This product is intended for use in an industrial environment.

### Low Voltage Directive

This product is tested to meet Council Directive 73/23/EEC Low Voltage, by applying the safety requirements of EN 61131-2 Programmable Controllers, Part 2 - Equipment Requirements and Tests. For specific information required by EN 61131-2, see the appropriate sections in this publication, as well as the Allen-Bradley publication Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

## Determining Power Requirements

5V dc amps	24V dc amps
0.110	0.085

When computing power supply requirements, add the values shown above to the requirements of all other modules in the SLC chassis to prevent overloading the chassis power supply.

## Planning for Sufficient Enclosure Depth

The cable connector sticks out from the front of the module. The enclosure must provide room for a total of 8.2 inches (215 mm) from the back-panel to the connector.

## Choosing a Module Slot in a Local I/O Chassis

Place your module in any slot of an SLC500 modular, or modular expansion chassis, except for the left-most slot (slot 0) reserved for the SLC processor or adapter modules.

**Important:** For proper operation, use this module with a local processor. The module is not designed to operate in a remote chassis.

## Installation considerations

Most thermocouple-type applications require an industrial enclosure to reduce the effects of electrical interference. Thermocouple inputs are highly susceptible to electrical noises due to the small signal amplitudes (microvolt/°C). Isolate them from other input wiring and modules that radiate electrical interference.

Group your modules within the I/O chassis to minimize adverse effects from radiated electrical noise and heat. Consider the following conditions when selecting a slot location. Position the module *away from* modules that:

- connect to sources of electrical noise such as relays and ac motor drives
- generate significant heat, such as 32-point I/O modules

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## Installing the Module

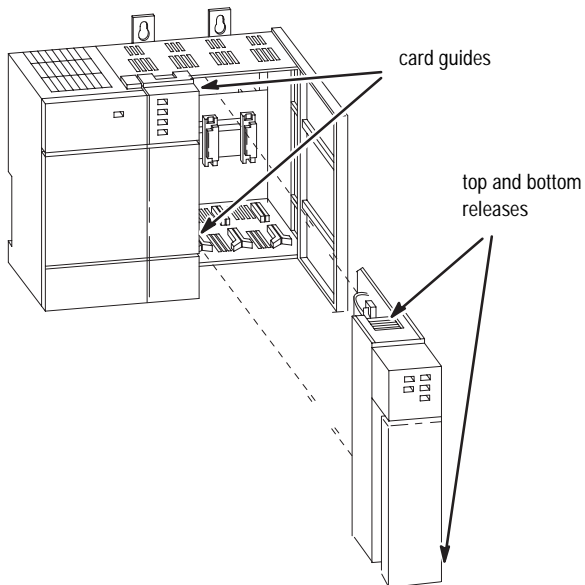
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**ATTENTION:** Never install, remove, or wire modules with power applied to the chassis or devices wired to the module.

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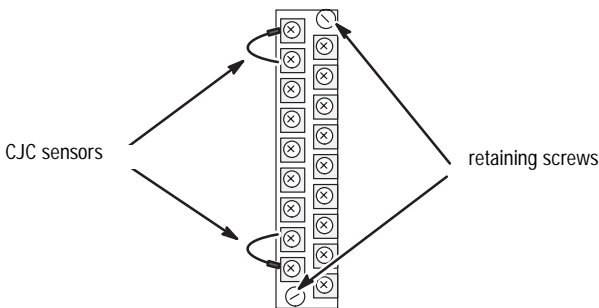
1. Align the circuit board of the thermocouple module with the card guides located at the top and bottom of the chassis.
2. Slide the module into the chassis until both top and bottom retaining clips are secured. Apply firm even pressure on the module to attach it to its backplane connector. Never force the module into the slot.
3. Cover unused slots with the card slot filler, catalog number 1746-N2.
4. To remove, press the releases at the top and bottom of the module, and slide the module out of the chassis slot.



## Removing the terminal block

When installing the module, it is not necessary to remove the terminal block. But if you need to remove it, follow this procedure:

1. Alternately loosen the two retaining screws to avoid cracking the terminal block.
2. Grasp the terminal block at the top and bottom and pull outward and down. When removing or installing the terminal block be careful not to damage the CJC sensors.



3. Use the write-on label to identify the module and its location.

SLOT _____	RACK _____
MODULE _____	

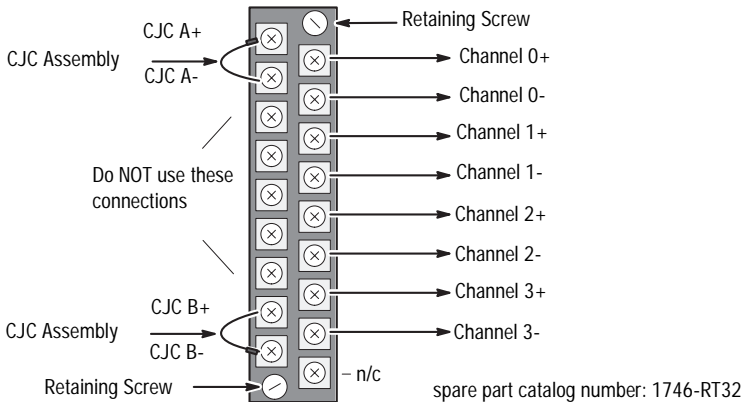
## Wiring the Module

The module has an 18-position, removable terminal block. The terminal block pin-out is shown below.



**ATTENTION:** Disconnect power to the SLC before attempting to install, remove, or wire the removable terminal wiring block.

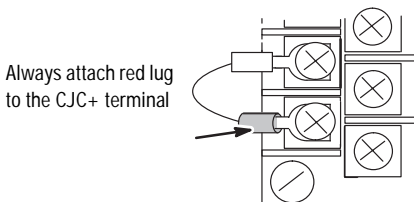
Figure 1 Terminal block pin out.



## Cold Junction Compensation (CJC)

In case of accidental removal of one or both thermistors, replace them by connecting them across the CJC terminals located at the top and/or bottom left side of the terminal block. Always connect the red lug to the (+) terminal (to CJC A+ or CJC B+).

Figure 2 Thermistor placement on the bottom of the terminal block



## Wiring considerations

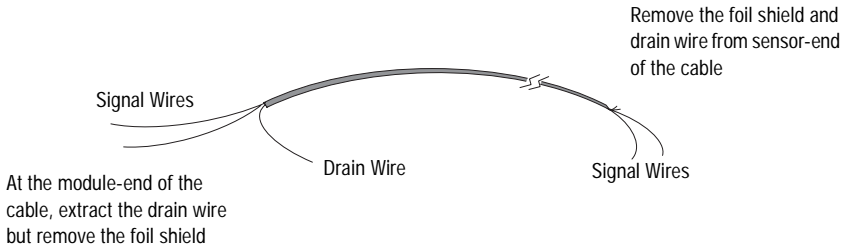
Follow the guidelines below when planning your system wiring.

- To limit the pickup of electrical noise, keep thermocouple and millivolt signal wires away from power and load lines.
- For high immunity to electrical noise, use Alpha 5121 (shielded, twisted pair) or equivalent wire for millivolt sensors; or use shielded, twisted pair thermocouple extension lead wire specified by the thermocouple manufacturer. Using the incorrect type of thermocouple extension wire or not following the correct polarity may cause invalid readings. See IEEE Std. 518, Section 6.4.2.7 or contact your sensor manufacturer for additional details.
- When trimming cable leads, minimize the length of unshielded wires.
- Ground the shield drain wire at only one end of the cable. The preferred location is at the I/O chassis ground (See Figure 4).
- For maximum noise reduction, use 3/8 inch braid wire to connect cable shields to the nearest I/O chassis mounting bolt. Then connect the I/O chassis to earth ground (See Figure 4). These connections are a requirement regardless of cable type.
- Tighten terminal screws. Excessive tightening can strip the screw.
- The open-circuit detector generates approximately 20 nano-amperes into the thermocouple cable. A total lead resistance of 25 ohms (12.5 one-way) will produce 0.5 mV of error.
- Follow system grounding and wiring guidelines found in your SLC 500 Modular Hardware Installation and Operation Manual, publication 1747-6.2.

## Preparing and Wiring the Cables

To prepare and connect cable leads and drain wires, follow these steps:

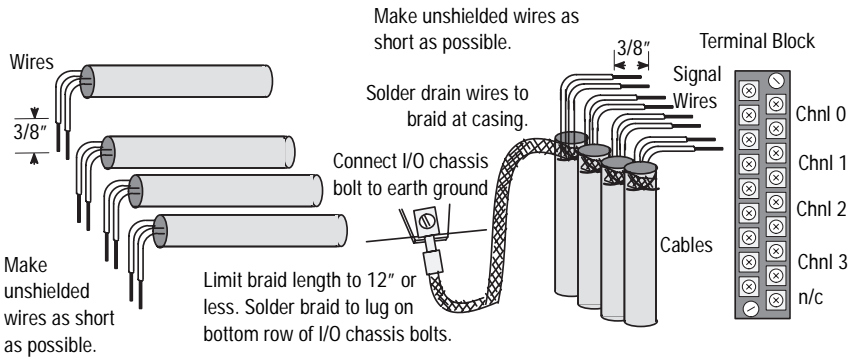
**Figure 3 Cable lead and drain wire preparation**



1. At each end of the cable, strip some casing to expose individual wires.
2. Trim signal wires to 5–inch lengths beyond the cable casing. Strip about 3/16 inch (4.76 mm) of insulation to expose the ends of the wires.
3. At the module–end of the cables:
  - extract the drain wire and signal wires
  - remove the foil shield
  - bundle the input cables with a cable strap
4. Connect drain wires together and solder them to a 3/8” wire braid, 12” long. Keep drain wires as short as possible.
5. Connect the 3/8” wire braid to the nearest chassis mounting bolt.
6. Connect the signal wires of each channel to the terminal block.
7. At the source–end of cables from mV devices (See Figure 3 and Figure 4):
  - remove the drain wire and foil shield
  - apply shrink wrap as an option
  - connect to mV devices keeping the leads short



Figure 4 Cable Preparation and Connections to Minimize Electrical Noise Interference



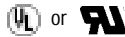
**Important:** If noise persists, try grounding the opposite end of the cable. Ground one end only.

## Specifications

<b>Backplane Current consumption</b>	110 mA at 5V dc 85 mA at 24V dc
<b>Backplane power consumption</b>	0.6W maximum (0.55W @ 5V dc, 2W @ 24V dc)
<b>Number of channels</b>	4 (backplane and channel-to-channel isolated)
<b>I/O chassis location</b>	any I/O module slot except 0
<b>A/D conversion method</b>	sigma-delta modulation
<b>Input filtering</b>	analog filter with low pass digital filter
<b>Normal mode rejection between [+]input and [-]input</b>	greater than 50 dB at 50 Hz greater than 60 dB at 60 Hz
<b>Common mode rejection between inputs and chassis ground</b>	greater than 120 dB at 50/60 Hz with 1K ohm imbalance
<b>Channel bandwidth (-3db)</b>	8 Hz
<b>Calibration</b>	once every six months
<b>Isolation</b>	1000V transient or 150 VAC continuous channel-to-channel or channel-to-backplane

### Agency Certifications

When product is marked:



marked for all applicable directives



Class I Div 2 Hazardous<sup>(1)</sup>

<sup>(1)</sup> CSA certification - Class I, Division 2, Group A,B,C,D or nonhazardous locations

## CSA Hazardous Location Approval

CSA certifies products for general use as well as for use in hazardous locations. Actual CSA certification is indicated by the product label as shown below, and not by statements in any user documentation.

Example of the CSA certification product label:



CL I, DIV 2  
GP A,B,C,D  
TEMP



To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for this CSA-certified industrial control product.

- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D, or non-hazardous locations only.
- The products having the appropriate CSA markings (that is, Class I, Division 2, Groups A, B, C, D) are certified for use in other equipment where the suitability of combination (that is, application or use) is determined by the CSA or the local inspection office having jurisdiction.

**Important:** Due to the modular nature of a programmable control system, the product with the highest temperature rating determines the overall temperature code rating of a programmable control system in a Class I, Division 2, location. The temperature code rating is marked on the product label as shown.

Temperature code rating:



CL I, DIV 2  
GP A,B,C,D  
TEMP



Look for temperature code rating here.

The following warnings apply to products having CSA certification for use in hazardous locations.

### ATTENTION: : Explosion hazard--



- Substitution of components may impair suitability for Class I, Division 2.
- Do not replace components unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
- Do not disconnect connectors unless power has been switched off or the area is known to be non-hazardous. Secure any user-supplied connectors that mate to external circuits on this equipment by using screws, sliding latches, threaded connectors, or other means such that any connection can withstand a 15 Newton (3.4 lb.) separating force applied for a minimum of one minute.
- If the Product contains batteries, they must only be changed in an area known to be non-hazardous.

CSA logo is a registered trademark of the Canadian Standards Association.

## Approbation d'utilisation dans des environnements dangereux par la CSA

La CSA certifie des produits pour une utilisation générale aussi bien que pour une utilisation en environnements dangereux. La certification CSA en vigueur est indiquée par l'étiquette produit et non par des indications dans la documentation utilisateur.

Exemple d'étiquette de certification d'un produit par la CSA :



CL I, DIV 2  
GP A,B,C,D  
TEMP



Pour satisfaire à la certification CSA en environnements dangereux, les informations suivantes font partie intégrante de la documentation des produits de commande industrielle certifiés.

- Cet équipement ne convient qu'à une utilisation dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux.
- Les produits portant le marquage CSA approprié (c'est-à-dire Classe 1, Division 2, Groupes A, B, C, D) sont certifiés pour une utilisation avec d'autres équipements, les combinaisons d'applications et d'utilisation étant déterminées par la CSA ou le bureau local d'inspection.

**Important:** De par la nature modulaire des systèmes de commande programmables, le produit ayant le code de température le plus élevé détermine le code de température global du système dans un environnement de Classe 1, Division 2. Le code de température est indiqué sur l'étiquette produit.

Code de température :



CL I, DIV 2  
GP A,B,C,D  
TEMP



Le code de température est indiqué ici.

Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour une utilisation dans des environnements dangereux.

### ATTENTION: Risque d'explosion --



- La substitution de composants peut rendre ce matériel inadapté à une utilisation en environnement de Classe 1, Division 2.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de remplacer des composants.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs fournis par l'utilisateur pour se brancher aux circuits externes de cet appareil à l'aide de vis, loquets coulissants, connecteurs filetés ou autres, de sorte que les connexions résistent à une force de séparation de 15 Newtons (1,5 kg - 3,4 lb.) appliquée pendant au moins une minute.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

## Notes

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