



# **Compact™ I/O 1769-IT6 Thermocouple/mV Input Module**

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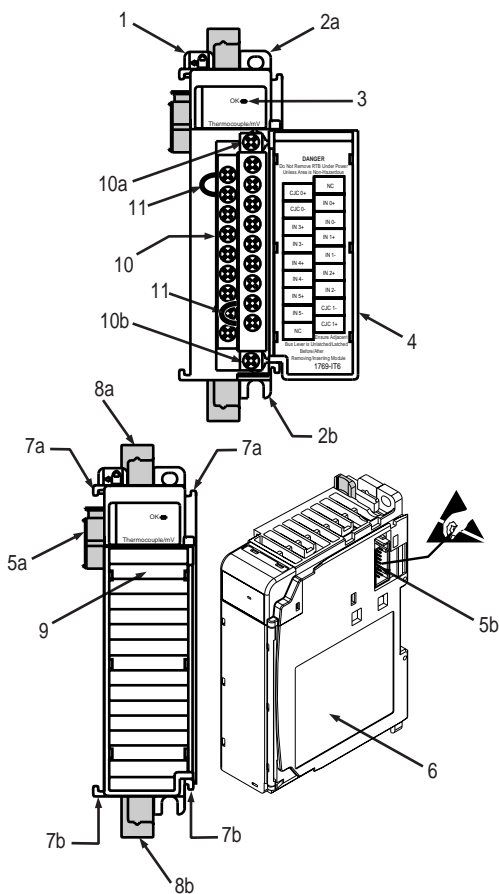
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## Module Overview

The thermocouple/mV modules receives and stores digitally converted thermocouple and/or millivolt (mV) analog data from any combination of up to six thermocouple or millivolt analog sensors. Each input channel is individually configurable via software for a specific input device and provides open-circuit, over-range and under-range detection and indication. The module receives all of its +5V dc and +24V dc power from the 1769 Compact bus. The module contains a removable terminal block with two cold-junction compensation (CJC) sensors.

Accepted Inputs	Range
Thermocouple Type J	-210 to +1200°C (-346 to +2192°F)
Thermocouple Type K	-270 to +1370°C (-454 to +2498°F)
Thermocouple Type T	-270 to +400°C (-454 to +752°F)
Thermocouple Type E	-270 to +1000°C (-454 to +1832°F)
Thermocouple Type R	0 to +1768°C (+32 to +3214°F)
Thermocouple Type S	0 to +1768°C (+32 to +3214°F)
Thermocouple Type B	+300 to +1820°C (+572 to +3308°F)
Thermocouple Type N	-210 to +1300°C (-346 to +2372°F)
Thermocouple Type C	0 to +2315°C (+32 to +4199°F)
CJC Sensors	0 to +85°C (+32 to +185°F)
millivolt inputs	-50 to +50 mV
	-100 to +100 mV

## Module Description



Item	Description
1	bus lever (with locking function)
2a	upper panel mounting tab
2b	lower panel mounting tab
3	module status LED
4	module door with terminal identification label
5a	movable bus connector with female pins
5b	stationary bus connector with male pins
6	nameplate label
7a	upper tongue-and-groove slots
7b	lower tongue-and-groove slots
8a	upper DIN rail latch
8b	lower DIN rail latch
9	write-on label (user ID tag)
10	removable terminal block (RTB) with finger-safe cover
10a	RTB upper retaining screw
10b	RTB lower retaining screw
11	CJC Sensors

## Module Installation

Compact I/O is suitable for use in an industrial environment when installed in accordance with these instructions. Specifically, this equipment is intended for use in clean, dry environments (Pollution degree 2<sup>(1)</sup>) and to circuits not exceeding Over Voltage Category II<sup>(2)</sup> (IEC 60664-1).<sup>(3)</sup>

## Prevent Electrostatic Discharge

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### ATTENTION



Electrostatic discharge can damage integrated circuits or semiconductors if you touch bus connector pins or the terminal block. Follow these guidelines when you handle the module:

- Touch a grounded object to discharge static potential.
  - Wear an approved wrist-strap grounding device.
  - Do not touch the bus connector or connector pins.
  - Do not touch circuit components inside the module.
  - If available, use a static-safe work station.
  - When not in use, keep the module in its static-shield box.
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## Remove Power

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### ATTENTION



Remove power before removing or inserting this module. When you remove or insert a module with power applied, an electrical arc may occur. An electrical arc can cause personal injury or property damage by:

- sending an erroneous signal to your system's field devices, causing unintended machine motion
- causing an explosion in a hazardous environment

Electrical arcing causes excessive wear to contacts on both the module and its mating connector. Worn contacts may create electrical resistance.

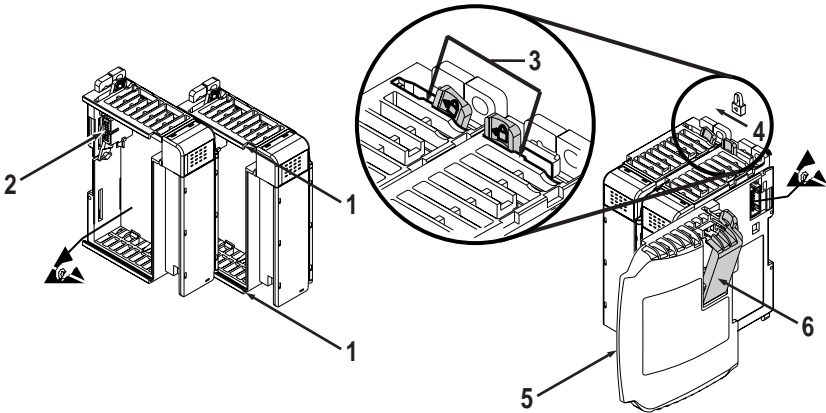
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- (1) Pollution Degree 2 is an environment where, normally, only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation shall be expected.
- (2) Over Voltage Category II is the load level section of the electrical distribution system. At this level transient voltages are controlled and do not exceed the impulse voltage capability of the product's insulation.
- (3) Pollution Degree 2 and Over Voltage Category II are International Electrotechnical Commission (IEC) designations.

## System Assembly

The module can be attached to the controller or an adjacent I/O module *before* or *after* mounting. For mounting instructions, see “Panel Mounting” on page 7, or “DIN Rail Mounting” on page 8. To work with a system that is already mounted, see “Replacing a Single Module within a System” on page 8.

The following procedure shows you how to assemble the Compact I/O system.



1. Disconnect power.
2. Check that the bus lever of the module to be installed is in the unlocked (fully right) position.
3. Use the upper and lower tongue-and-groove slots (1) to secure the modules together (or to a controller).
4. Move the module back along the tongue-and-groove slots until the bus connectors (2) line up with each other.
5. Push the bus lever back slightly to clear the positioning tab (3). Use your fingers or a small screwdriver.

- To allow communication between the controller and module, move the bus lever fully to the left (4) until it clicks. Ensure it is locked firmly in place.

**ATTENTION**



When attaching I/O modules, it is very important that the bus connectors are securely locked together to ensure proper electrical connection.

- Attach an end cap terminator (5) to the last module in the system by using the tongue-and-groove slots as before.
- Lock the end cap bus terminator (6).

**IMPORTANT**

A 1769-ECR or 1769-ECL right or left end cap (respectively) must be used to terminate the end of the communication bus.

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## Mounting Expansion I/O

**ATTENTION**

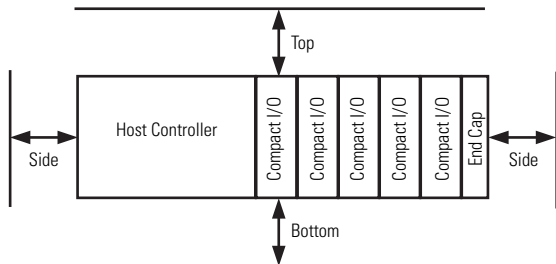


During panel or DIN rail mounting of all devices, be sure that all debris (metal chips, wire strands, etc.) is kept from falling into the module. Debris that falls into the module could cause damage on power up.

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## Minimum Spacing

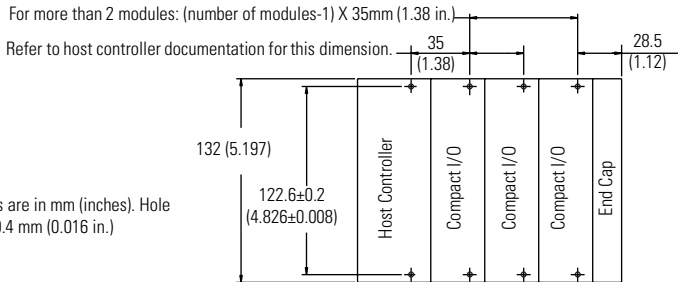
Maintain spacing from enclosure walls, wireways, adjacent equipment, etc. Allow 50 mm (2 in.) of space on all sides for adequate ventilation, as shown:



## Panel Mounting

Mount the module to a panel using two screws per module. Use M4 or #8 panhead screws. Mounting screws are required on every module.

### Panel Mounting Using the Dimensional Template



NOTE: All dimensions are in mm (inches). Hole spacing tolerance: ±0.4 mm (0.016 in.)

### Panel Mounting Procedure Using Modules as a Template

The following procedure allows you to use the assembled modules as a template for drilling holes in the panel. If you have sophisticated panel mounting equipment, you can use the dimensional template above. Due to module mounting hole tolerance, it is important to follow these procedures:

1. On a clean work surface, assemble no more than three modules.
2. Using the assembled modules as a template, carefully mark the center of all module-mounting holes on the panel.
3. Return the assembled modules to the clean work surface, including any previously mounted modules.
4. Drill and tap the mounting holes for the recommended M4 or #8 screw.
5. Place the modules back on the panel and check for proper hole alignment.
6. Attach the modules to the panel using the mounting screws.

#### NOTE

If mounting more modules, mount only the last one of this group and put the others aside. This reduces remounting time during drilling and tapping of the next group.

7. Repeat steps 1 to 6 for any remaining modules.

## DIN Rail Mounting

The module can be mounted using the following DIN rails: 35 x 7.5 mm (EN 50 022 - 35 x 7.5) or 35 x 15 mm (EN 50 022 - 35 x 15).

Before mounting the module on a DIN rail, close the DIN rail latches. Press the DIN rail mounting area of the module against the DIN rail. The latches will momentarily open and lock into place.

## Replacing a Single Module within a System

The module can be replaced while the system is mounted to a panel (or DIN rail). Follow these steps in order:

1. Remove power. See important note on page 4.
2. On the module to be removed, remove the upper and lower mounting screws from the module (or open the DIN latches using a flat-blade or phillips-style screwdriver).
3. Move the bus lever to the right to disconnect (unlock) the bus.
4. On the right-side adjacent module, move its bus lever to the right (unlock) to disconnect it from the module to be removed.
5. Gently slide the disconnected module forward. If you feel excessive resistance, check that the module has been disconnected from the bus and that both mounting screws have been removed (or DIN latches opened).

### NOTE

It may be necessary to rock the module slightly from front to back to remove it, or, in a panel-mounted system, to loosen the screws of adjacent modules.

6. Before installing the replacement module, be sure that the bus lever on the module to be installed, and on the right-side adjacent module are in the unlocked (fully right) position.
7. Slide the replacement module into the open slot.
8. Connect the modules together by locking (fully left) the bus levers on the replacement module and the right-side adjacent module.
9. Replace the mounting screws (or snap the module onto the DIN rail).



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## Field Wiring Connections

### Grounding the Module

This product is intended to be mounted to a well-grounded mounting surface such as a metal panel. Additional grounding connections from the module's mounting tabs or DIN rail (if used), are not required unless the mounting surface cannot be grounded. Refer to *Industrial Automation Wiring and Grounding Guidelines*, Allen-Bradley publication 1770-4.1, for additional information.

### System Wiring Guidelines

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**ATTENTION**

The possibility exists that grounded or exposed thermocouples can become shorted to a potential greater than that of the thermocouple itself. Due to possible shock hazard, care should be taken when wiring these types of thermocouples.

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Consider the following when wiring your system:

- Do not use the module's NC terminals as connection points.
- Do not tamper with or remove the CJC sensors on the terminal block. Removal of either one or both sensors will reduce accuracy and set the open circuit bit for that CJC sensor.
- For thermocouple inputs, always use shielded, twisted-pair thermocouple extension lead wires specified by the thermocouple manufacturer for the thermocouple type you are using. Using the incorrect thermocouple extension wire type or not following correct polarity convention will cause invalid readings.
- Keep cable shield connection to ground as short as possible.
- To limit noise, keep thermocouple and millivolt signal wires as far away as possible from power and load lines as well as other sources of electrical noise, such as motors, transformers, contactors, and AC devices.
- If the field wiring must cross AC or power cables, ensure that they cross at right angles.

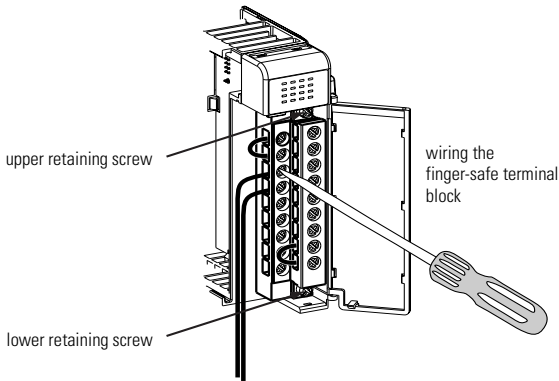
- For millivolt inputs, always use Belden™ 8761 (shielded, twisted-pair) or equivalent wire to ensure proper operation and high immunity to electrical noise.
- If multiple power supplies are used with millivolt analog inputs, the power supply commons must be connected.
- Ground the shield drain wire at one end only. The typical location is the same point as the sensor ground reference.
  - For grounded thermocouples or millivolt sensors, this is at the sensor end
  - For insulated/ungrounded thermocouples, this is at the module end.  
Contact your sensor manufacturer for additional details.
- If it is necessary to connect the shield drain at the module end, connect it to earth ground using a panel or DIN rail mounting screw.
- Routing the field wiring in a grounded conduit can further reduce electrical noise.

## Labeling the Terminals

A removable, write-on label is provided with the module. Remove the label from the door, mark your unique identification of each terminal with permanent ink, and slide the label back into the door. Your markings (ID tag) will be visible when the module door is closed.

## Removing the Finger-Safe Terminal Block

To remove the terminal block, loosen the upper and lower retaining screws. The terminal block will back away from the module as you remove the screws. When replacing the terminal block, torque the retaining screws to 0.46 Nm (4.1 in-lbs).



## Wiring the Finger-Safe Terminal Block

When wiring the terminal block, keep the finger-safe cover in place.

1. Loosen the terminal screws to be wired.
2. Route the wire under the terminal pressure plate. You can use the bare wire or a spade lug. The terminals will accept a 6.35 mm (0.25 in.) spade lug.

### NOTE

The terminal screws are non-captive. Therefore, it is possible to use a ring lug [maximum 1/4 inch o.d. with a 0.139 inch minimum i.d. (M3.5)] with the module.

3. Tighten the terminal screw making sure the pressure plate secures the wire. Recommended torque when tightening terminal screws is 0.68 Nm (6 in-lbs).

### NOTE

If you need to remove the finger-safe cover, insert a screw driver into one of the square wiring holes and gently pry the cover off. If you wire the terminal block with the finger-safe cover removed, you will not be able to put it back on the terminal block because the wires will be in the way.

If you remove the terminal block from the module, use the write-on label located on the side of the terminal block to identify the module location and type.



### Wire Size and Terminal Screw Torque

Each terminal accepts up to two wires with the following restrictions:

Wire Type		Wire Size	Terminal Screw Torque	Retaining Screw Torque
Solid	Cu-90°C (194°F)	#14 to #22 AWG	0.68 Nm (6 in-lbs)	0.46 Nm (4.1 in-lbs)
Stranded	Cu-90°C (194°F)	#16 to #22 AWG	0.68 Nm (6 in-lbs)	0.46 Nm (4.1 in-lbs)

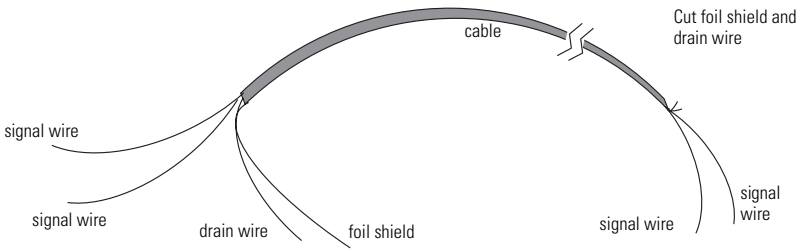
### Wiring Input Devices to the 1769-IT6

**ATTENTION**



Be careful when stripping wires. Wire fragments that fall into a module could cause damage at power up. Once wiring is complete, ensure the module is free of all metal fragments.

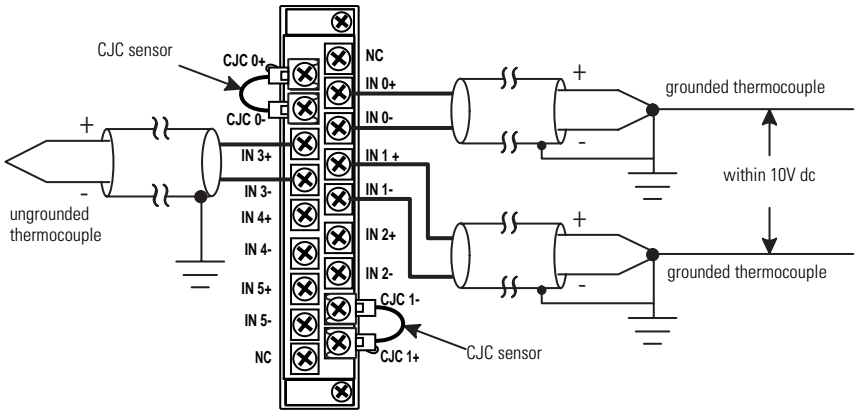
After the thermocouple module is properly installed, follow the wiring procedure below, using the shielded thermocouple extension cable recommended for the type of thermocouple you are using, or Belden 8761 for non-thermocouple applications.



To wire your sensor to the module, follow these steps:

1. At each end of the cable, strip some casing to expose the individual wires.
2. Trim the signal wires to 2-inch lengths. Strip about  $3/16$  inch (5 mm) of insulation away to expose the end of the wire.
3. At one end of the cable, twist the drain wire and foil shield together, bend them away from the cable, and apply shrink wrap. Then earth ground at the preferred location based on the type of sensor you are using.
4. At the other end of the cable, cut the drain wire and foil shield back to the cable and apply shrink wrap.
5. Connect the signal wires to the module terminal block and input.
6. Repeat steps 1 through 5 for each channel on the module.

## Terminal Block with CJC Sensors and Thermocouple Junctions



### NOTE

When using an ungrounded thermocouple, the shield must be connected to ground at the module end.

### IMPORTANT

When using grounded and/or exposed thermocouples that are touching electrically conductive material, the ground potential between any two channels cannot exceed  $\pm 10V$  dc, or temperature readings will be inaccurate and the module may be damaged.

## Cold-Junction Compensation (CJC)

To obtain accurate readings from each of the channels, the cold-junction temperature, the temperature at the module's terminal junction between the thermocouple wire and the input channel, must be compensated for. Two cold-junction compensating thermistors have been integrated in the terminal block, as shown on page 14.

### ATTENTION



Do not remove or loosen the cold-junction compensating thermistor assemblies on the terminal block. Both thermistor assemblies are critical to ensure accurate thermocouple input readings at each channel. If either CJC sensor is removed, the open-circuit detection bit (OC6 or OC7) and the general status bit (S6 or S7) are set. The module will continue to operate, but with reduced accuracy.

## I/O Memory Mapping

### Input Data File

The input data file contains the analog values of the inputs.

Word	Bit Position															
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	Analog Input Data Channel 0															
1	Analog Input Data Channel 1															
2	Analog Input Data Channel 2															
3	Analog Input Data Channel 3															
4	Analog Input Data Channel 4															
5	Analog Input Data Channel 5															
6	OC7	OC6	OC5	OC4	OC3	OC2	OC1	OC0	S7	S6	S5	S4	S3	S2	S1	S0
7	U0	U1	U2	U3	U4	U5	U6	U7	U8	U9	U10	U11	U12	U13	U14	U15

The bits are defined as follows:

- **Sx** = General status bit for channels 0 through 5 and CJC sensors (S6 and S7). This bit is set (1) when an error (over-range, under-range, open-circuit, or input data not valid) exists for that channel. An input data not valid condition is determined by the user program. This condition occurs when the first analog-to-digital conversion is still in progress, after a new configuration has been sent to the module. Refer to the *Compact™ I/O Thermocouple/mV Input Module User Manual*, publication number 1769-UM004A-EN-P for additional details.

- **OCx** = Open circuit detection bits indicate an open input circuit on channels 0 through 5 (OC0 through OC5) and on CJC sensors CJC0 (OC6) and CJC1 (OC7). The bit is set (1) when an open-circuit condition exists.
- **Ux** = Under-range flag bits for channels 0 through 5 and the CJC sensors (U6 and U7). For thermocouple inputs, the under-range bit is set (1) when a temperature measurement is below the normal operating range for a given thermocouple type. For millivolt inputs, the under-range bit indicates a voltage that is below the normal operating range. These bits can be used in the control program for error detection. The bits are reset (0) by the module when within the normal operating range.
- **Ox** = Over-range flag bits for channels 0 through 5 and the CJC sensors (O6 and O7). For thermocouple inputs, the over-range bit is set (1) when a temperature measurement is above the normal operating range for a given thermocouple type. For millivolt inputs, the over-range bit indicates a voltage that is above the normal operating range. These bits can be used in the control program for error detection.

## Configuration Data File

The manipulation of the bits from this file is normally done with programming software (e.g. RSLogix 500, RSNetwork for DeviceNet, etc.) during initial configuration of the system. In that case, graphical screens are provided by the programmer to simplify configuration. However, some systems, like the 1769-ADN DeviceNet Adapter, also allow the bits to be altered as part of the control program, using communication rungs. In that case, it is necessary to understand the bit arrangement. Refer to the *Compact™ Thermocouple/mV Input Module User Manual*, publication number 1769-UM004A-EN-P for additional details.

Words 0 to 5 of the configuration file allow you to change the parameters of each channel independently. For example, word 0 corresponds to channel 0. The functional arrangement of the bits for a single word/channel is shown in the table on the following page.



To Select		Make these bit settings													4-3	2	1	0	
		15	14	13	12	11	10	9	8	7	6	5							
Filter Frequency	10 Hz																1	1	0
	60 Hz																0	0	0
	50 Hz																0	0	1
	250Hz																0	1	1
	500 Hz																1	0	0
	1 kHz																1	0	1
Open Circuit	Upscale															0	0		
	Downscale															0	1		
	Hold Last State															1	0		
	Zero															1	1		
Temp. Units	Degrees C														0				
	Degrees F														1				
Input Type	Thermocouple J					0	0	0	0										
	Thermocouple K					0	0	0	1										
	Thermocouple T					0	0	1	0										
	Thermocouple E					0	0	1	1										
	Thermocouple R					0	1	0	0										
	Thermocouple S					0	1	0	1										
	Thermocouple B					0	1	1	0										
	Thermocouple N					0	1	1	1										
	Thermocouple C					1	0	0	0										
	-50 to +50 mV					1	0	0	1										
-100 to +100 mV					1	0	1	0											
Data Format	Raw/Proportional Data		0	0	0														
	Engineering Units		0	0	1														
	Engr. Units X 10		1	0	0														
	Scaled-for-PID		0	1	0														
	Percent Range		0	1	1														
Enable Channel	Disabled	0																	
	Enabled	1																	

Not Used<sup>(1)</sup>

(1) An attempt to write any non-valid (not used or spare bits) bit configuration into any selection field results in a module configuration error.

## NOTE

Program defaults are indicated by zero (0) values. For example, type J thermocouple is the default (no user intervention) thermocouple type.

## Module Configuration Word

Word 6 of the configuration data file contains the Enable/Disable Cyclic Calibration bit as shown in the table below.

To Select		Make these bit settings															
		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Enable/Disable Cyclic Calibration	Enabled <sup>(1)</sup>																0
	Disabled																1

(1) When enabled, an autocalibration cycle is performed on all enabled channels every 5 minutes.

## Specifications

### General Specifications

Specification	Value
Dimensions	118 mm (height) x 87 mm (depth) x 35 mm (width) height including mounting tabs is 138 mm 4.65 in. (height) x 3.43 in (depth) x 1.38 in (width) height including mounting tabs is 5.43 in.
Approximate Shipping Weight (with carton)	276g (0.61 lbs.)
Storage Temperature	-40°C to +85°C (-40°F to +185°F)
Operating Temperature	0°C to +60°C (32°F to +140°F)
Operating Humidity	5% to 95% non-condensing
Operating Altitude	2000 meters (6561 feet)
Vibration	Operating: 10 to 500 Hz, 5G, 0.030 in. peak-to-peak Relay Operation: 2G <sup>(1)</sup>
Shock	Operating: 30G, 11 ms panel mounted (20G, 11 ms DIN rail mounted) Relay Operation: 7.5G panel mounted (5G DIN rail mounted) <sup>(1)</sup> Non-Operating: 40G panel mounted (30G DIN rail mounted)
Agency Certification	<ul style="list-style-type: none"> <li>• C-UL certified (under CSA C22.2 No. 142)</li> <li>• UL 508 listed</li> <li>• CE compliant for all applicable directives</li> </ul>
Hazardous Environment Class	Class I, Division 2, Hazardous Location, Groups A, B, C, D (UL 1604, C-UL under CSA C22.2 No. 213)
Radiated and Conducted Emissions	EN50081-2 Class A

(1) When used with the 1769-OW8 or 1769-OW8I relay output modules.

Specification	Value
<i>Electrical /EMC:</i>	<i>The module has passed testing at the following levels:</i>
<ul style="list-style-type: none"> <li>ESD Immunity (IEC61000-4-2)</li> </ul>	<ul style="list-style-type: none"> <li>4 kV contact, 8 kV air, 4 kV indirect</li> </ul>
<ul style="list-style-type: none"> <li>Radiated Immunity (IEC61000-4-3)</li> </ul>	<ul style="list-style-type: none"> <li>10 V/m , 80 to 1000 MHz, 80% amplitude modulation, +900 MHz keyed carrier</li> </ul>
<ul style="list-style-type: none"> <li>Fast Transient Burst (IEC61000-4-4)</li> </ul>	<ul style="list-style-type: none"> <li>2 kV, 5kHz</li> </ul>
<ul style="list-style-type: none"> <li>Surge Immunity (IEC61000-4-5)</li> </ul>	<ul style="list-style-type: none"> <li>1 kV galvanic gun</li> </ul>
<ul style="list-style-type: none"> <li>Conducted Immunity (IEC1000-4-6)</li> </ul>	<ul style="list-style-type: none"> <li>10 V, 0.15 to 80MHz<sup>(1)</sup> (2)</li> </ul>

(1) Conducted Immunity frequency range may be 150 kHz to 30 MHz if the Radiated Immunity frequency range is 30 MHz to 1000 MHz.

(2) For grounded thermocouples, the 10V level is reduced to 3V.

## Input Specifications

Specification	1769-IT6
Number of Inputs	6 input channels plus 2 CJC sensors
Bus Current Draw (max.)	100 mA at 5V dc 40 mA at 24V dc
Heat Dissipation	1.5 Total Watts (The Watts per point, plus the minimum Watts, with all points energized.)
Converter Type	Delta Sigma
Input Filtering	Programmable notch filter with multiple frequencies.
Response Speed per Channel	Input filter and configuration dependent. See your user's manual.
Rated Working Voltage <sup>(1)</sup>	30V ac/30V dc
Common Mode Voltage Range <sup>(2)</sup>	±10V dc maximum per channel
Common Mode Rejection	115 dB (minimum) at 50 Hz (with 10 Hz or 50 Hz filter) 115 dB (minimum) at 60 Hz (with 10 Hz or 60 Hz filter)
Normal Mode Rejection Ratio	85 dB (minimum) at 50 Hz (with 10 Hz or 50 Hz filter) 85 dB (minimum) at 60 Hz (with 10 Hz or 60 Hz filter)
Cable Impedance (max.)	25 Ω
Input Impedance	>10M Ω
Open-circuit Detection Time	7 ms to 2.1 seconds <sup>(3)</sup>
Calibration	The module performs autocalibration upon power-up and whenever a channel is enabled. You can also program the module to calibrate every five minutes using the Enable/Disable Cyclic Calibration bit.

(1) Rated working voltage is the maximum continuous voltage that can be applied at the input terminal, including the input signal and the value that floats above ground potential (for example, 30V dc input signal and 20V dc potential above ground).

(2) For proper operation, both the plus and minus input terminals must be within ±10V dc of analog common.

(3) Open-circuit detection time is equal to channel update time, which is based on filter frequency.

Specification	1769-IT6
Non-linearity (in percent full scale)	±0.03%
Repeatability <sup>(1)</sup>	±0.03%
Maximum Overload at Input Terminals	±35V dc continuous <sup>(2)</sup>
Module Error over Full Temperature Range (0 to +60°C [+32°F to +140°F])	See "Calibrated Accuracy" on page 21.
CJC Sensor Accuracy	±0.3°C (±0.54°F)
CJC Accuracy	±1.0°C (±1.8°F)
Power Supply Distance Rating	8 (The module may not be more than 8 modules away from the system power supply.)
Input Group to Bus Isolation	720V dc for 1 minute (qualification) 30V ac/30V dc working voltage (IEC Class 2 reinforced insulation)
Maximum Channel-to-Channel Common-mode Separation	±10V dc
Input Channel Configuration	via configuration software screen or the user program (by writing a unique bit pattern into the module's configuration file). Refer to your controller's user manual to determine if user program configuration is supported.
Module OK LED	On: module has power, has passed internal diagnostics, and is communicating over the bus. Off: Any of the above is not true.
Channel Diagnostics	Over- or under-range and open-circuit by bit reporting
Vendor I.D. Code	1
Product Type Code	10
Product Code	36

(1) Repeatability is the ability of the input module to register the same reading in successive measurements for the same input signal.

(2) Maximum current input is limited due to input impedance.

## Calibrated Accuracy

Input Type <sup>(1)</sup>	Accuracy for 10 Hz, 50 Hz and 60 Hz Filters <sup>(2)</sup> (max.)	
	at 25°C [77°F]	at 0 to 60°C [32 to 140°F]
Thermocouples J (-210 to 1200°C [-346 to 2192°F])	±0.6°C [± 1.1°F]	±0.9°C [± 1.6°F]
Thermocouple N (-200 to +1300°C [-328 to 2372°F])	±1°C [± 1.8°F]	±1.5°C [±2.7°F]
Thermocouple N (-210 to -200°C [-346 to -328°F])	±1.2°C [±2.2°F]	±1.8°C [±3.2°F]
Thermocouple T (-230 to +400°C [-382 to +752°F])	±1°C [± 1.8°F]	±1.5°C [±2.7°F]
Thermocouple T (-270 to -230°C [-454 to -382°F])	±5.4°C [± 9.7°F]	±7.0°C [±12.6°F]
Thermocouple K (-230 to +1370°C [-382 to +2498°F])	±1°C [± 1.8°F]	±1.5°C [±2.7°F]
Thermocouple K (-270 to -230°C [-454 to -382°F])	±7.5°C [± 13.5°F]	±10°C [± 18°F]
Thermocouple E (-210 to +1000°C [-346 to +1832°F])	±0.5°C [± 0.9°F]	±0.8°C [±1.4°F]
Thermocouple E (-270 to -210°C [-454 to -346°F])	±4.2°C [± 7.6°F]	±6.3°C [±11.3°F]
Thermocouples S and R	±1.7°C [± 3.1°F]	±2.6°C [± 4.7°F]
Thermocouple C	±1.8°C [±3.2°F]	±3.5°C [±6.3°F]
Thermocouple B	±3.0°C [±5.4°F]	±4.5°C [±8.1°F]
±50 mV	±15 µV	±25 µV
±100 mV	±20 µV	±30 µV

(1) The module uses the National Institute of Standards and Technology (NIST) ITS-90 standard for thermocouple linearization.

(2) Accuracy is dependent upon the analog/digital converter output rate selection, data format, and input noise. Refer to the *Compact™ I/O Thermocouple/mV Input Module User's Manual*, publication number 1769-UM004A-ENP, for additional information.

## Repeatability

Input Type	Repeatability for 10 Hz Filter
Themocouple J	±0.1°C [±0.18°F]
Themocouple N (-110°C to +1300°C [-166°F to +2372°F])	±0.1°C [±0.18°F]
Themocouple N (-210 to -110°C [-346°F to -166°F])	±0.25°C [±0.45°F]
Themocouple T (-170°C to +400°C [-274°F to +752°F])	±0.1°C [±0.18°F]
Themocouple T (-270°C to -170°C [-454°F to -274°F])	±1.5°C [±2.7°F]
Themocouple K (-270 to +1370°C [-454°F to +2498°F])	±0.1°C [±0.18°F]
Themocouple K (-270°C to -170°C [-454°F to -274°F])	±2.0°C [±3.6°F]
Themocouple E (-220 to +1000°C [-364°F to +1832°F])	±0.1°C [±0.18°F]
Themocouple E (-270 to -220°C [-454°F to -364°F])	±1.0°C [±1.8°F]
Themocouples S and R	±0.4°C [±0.72°F]
Themocouple C	±0.7°C [±1.26°F]
Themocouple B	±0.2°C [±0.36°F]
±50 mV	±6 µV
±100 mV	±6 µV

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## Hazardous Location Considerations

This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D or non-hazardous locations only. The following WARNING statement applies to use in hazardous locations.

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**WARNING****EXPLOSION HAZARD**

- Substitution of components may impair suitability for Class I, Division 2.
  - Do not replace components or disconnect equipment unless power has been switched off or the area is known to be non-hazardous.
  - Do not connect or disconnect components unless power has been switched off or the area is known to be non-hazardous.
  - This product must be installed in an enclosure.
  - All wiring must comply with N.E.C. article 501-4(b).
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## Environnements dangereux

Cet équipement est conçu pour être utilisé dans des environnements de Classe 1, Division 2, Groupes A, B, C, D ou non dangereux. La mise en garde suivante s'applique à une utilisation dans des environnements dangereux.

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**AVERTISSEMENT****DANGER D'EXPLOSION**

- La substitution de composants peut rendre cet équipement impropre à une utilisation en environnement de Classe 1, Division 2.
  - Ne pas remplacer de composants ou déconnecter l'équipement sans s'être assuré que l'alimentation est coupée et que l'environnement est classé non dangereux.
  - Ne pas connecter ou déconnecter des composants sans s'être assuré que l'alimentation est coupée et que l'environnement est classé non dangereux.
  - Ce produit doit être installé dans une armoire.
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## For More Information

For	Refer to this Document	Pub. No.
A more detailed description of how to install and use your Compact I/O with MicroLogix 1500 programmable controller.	MicroLogix 1500 Programmable Controllers User Manual	1764-UM001A-US-P
Detailed information on installing, programming, and troubleshooting your Compact Thermocouple/mV Input module.	Compact I/O Thermocouple/mV Input Module User Manual	1769-UM004A-EN-P
An overview of the MicroLogix 1500 system, including Compact I/O.	MicroLogix 1500 Programmable Controller with Compact I/O for Expansion	1764-S0001B-EN-P
A detailed description of how to install and use your Compact I/O with the 1769-ADN DeviceNet Adapter.	1769-ADN DeviceNet Adapter User Manual	1769-UM001A-US-P
More information on proper wiring and grounding techniques.	Industrial Automation Wiring and Grounding Guidelines	1770-4.1

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