



# Thermocouple/mV isolated Input Module (Catalog Number 1746-INT4)

Use this abbreviated procedure for getting the 1746-INT4 module into operation. If you need more information, refer to the user manual, publication 1746-6.16.

<b>1.</b>	<b>Unpack the Module</b>	<b>Reference</b>
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**Important::** Follow these precautions to prevent damaging the module from electrostatic discharge:

- Before handling the module, rid yourself of electric charge by touching a grounded object
- Avoid touching connector terminations and circuit components.
- When not in use, keep the module in its electrostatic shielded bag.

Unpack the module making sure that the contents include:

- module (Catalog Number 1746-INT4)
- removable terminal block (factory-installed on module) with CJC sensors attached
- this Quick Start publication (1746-10.2)

If the contents are incomplete, call your local Allen-Bradley representative for assistance.

<b>2.</b>	<b>Review Power Requirements</b>	<b>Reference</b>
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Review the power requirements of the modules drawing power from the chassis power supply.

- The fixed, 2-slot chassis supports 2 1746-INT4 modules. If combining an INT4 module with a different type of module, refer to Considerations for a Fixed Controller in chapter 3.
- For a modular system, compute the total load on the system power supply using the procedure described in the SLC Installation & Operation Manual for Modular Controllers (publication 1747-6.2) or the SLC 500 Family System Overview (publication 1747-2.30).

**Chapter 3**  
*(Installation and Wiring)*

**Appendix A**  
*(Specifications)*

<b>3.</b>	<b>Install the Module and Connect the Thermocouples</b>	<b>Reference</b>
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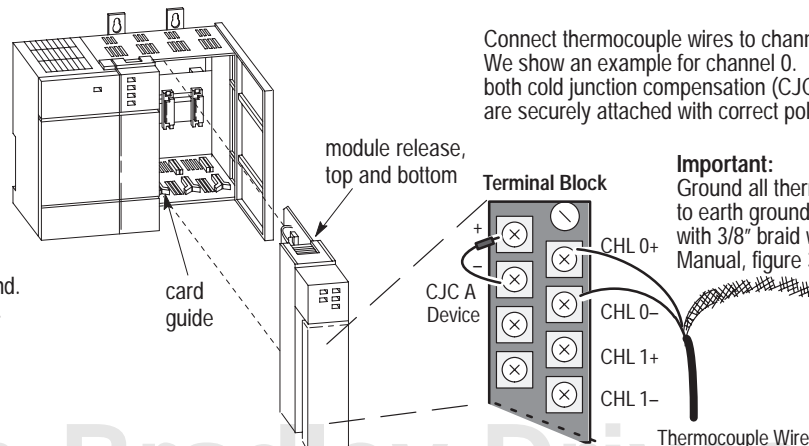
**ATTENTION:** Never install, remove, or wire modules with power applied to the chassis or devices wired to the module.

**Chapter 3**  
*(Installation and Wiring)*

Insert/remove the module into/from the I/O chassis (slot 1 in this example procedure).

**Important:**

- Thermocouple inputs are highly susceptible to electrical noise. To minimize interference:
- Place processor and I/O chassis in an industrial enclosure.
  - Keep signal wires as far from power and load lines as possible.
  - Use shielded, twisted-pair thermocouple extension wire.
  - Ground each shield only at one end.
  - Use correct thermocouple polarity.
  - Keep all unshielded leads *short*.
  - Connect the terminal block GND (#18) to nearest I/O chassis mtg. bolt with 12 gauge stranded wire.



Connect thermocouple wires to channels 0-3. We show an example for channel 0. Make sure both cold junction compensation (CJC) devices are securely attached with correct polarity.

**Important:**

Ground all thermocouple shields to earth ground at I/O chassis with 3/8" braided wire. See User Manual, figure 3.2.

<b>4.</b>	<b>Configure the Software</b>	<b>Reference</b>
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With your programming software already loaded and your computer set for off-line programming:

- Identify type of SLC processor and operating system on `PROG DIRECTORY FOR PROCESSORS` screen.
- With SLC system installed and wired, use `READ CONFIG` feature and follow prompts to configure I/O.

If not using the `READ CONFIG` feature, manually configure the I/O:

- Enter the rack configuration - Select the type of module in each slot
- If 1746-INT4 module is not listed, enter ID code 3515 for OTHER at bottom of list. Exit and save to file.

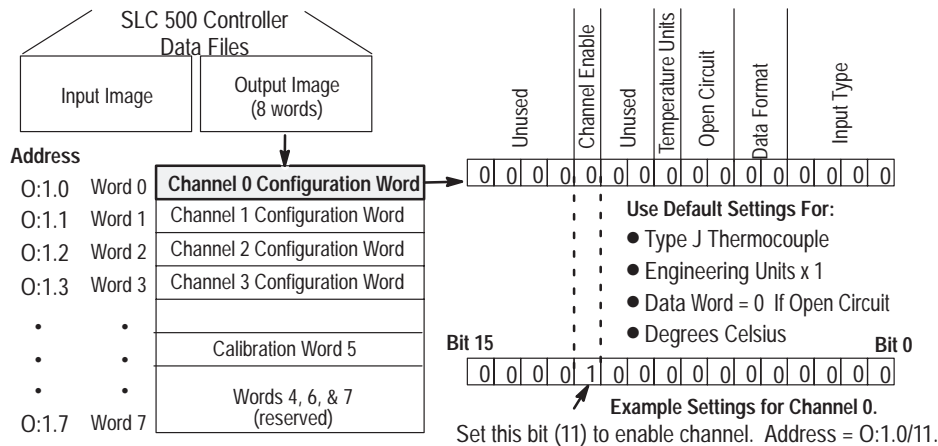
No manual entry of special I/O configuration (**SPIO CONFIG**) information is required. Module ID code automatically assigns the number of input and output words required by the module. For more information on configuring your system, refer to The Getting Started Guide for APS [publication 9399-APSQS]. If using different programming software, refer to its documentation.

**Chapter 5**  
*(Accessing Files to Configure I/O)*

<b>5.</b>	<b>Set Up Channel 0</b>	<b>Reference</b>
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Determine the operating parameters for channel 0. This example shows the channel 0 configuration word defined with all defaults (0) except for the channel enable (bit 11=1). Module assumed in slot 1. (For details on channel configuration, refer to the configuration worksheet on page 2-6)

**Chapter 6**  
*(Channel Configuration, Data, and Status)*



<b>6.</b>	<b>Program the Transfer of the Configuration Word</b>	<b>Reference</b>
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- Program the transfer of the configuration word (from step 6) to the module.
1. Using the memory map function, create integer file N10. Integer file N10 should contain one element for each channel used. (For this example we used N10:0.)
  2. Enter configuration parameters for channel 0 (from step 6) into N10:0. In this example all the bits of N10:0 are zero except for the channel enable bit (N10:0/11).
  3. Program a ladder logic instruction to copy the contents of N10:0 to output word O:1.0.

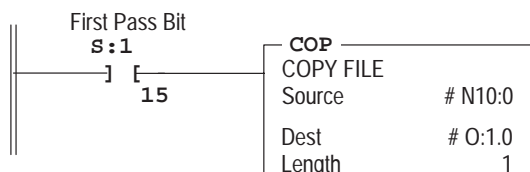
**Chapter 7**  
*(Ladder Programming Examples)*

**Chapter 9**  
*(Application Examples)*

**Data Table Display of Integer File N10:0**

address	15	data	0	address	15	data	0
N10:0		0000 1000 0000 0000					

**Ladder Logic to Transfer N10:0 to the Module:**



On power up, the first pass bit (S:1/15) is set for one scan, enabling the COPY instruction to transfer the configuration word to the processor's output image table. From there it is transferred to the module in the processor's I/O scan.

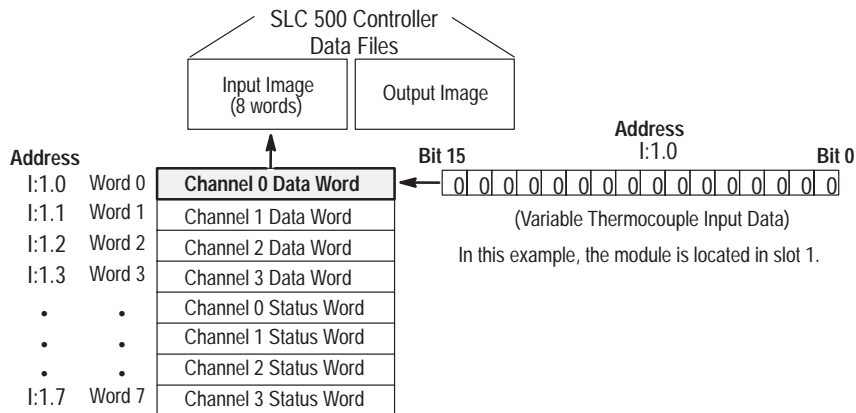
7.	Write Ladder Logic to Process Input Data	Reference
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Write ladder logic to process the thermocouple input data for your application. (For information on programming, refer to the APS User Manual, publication 9399-APSUM.)

**Chapter 5**  
*(Channel Configuration, Data, and Status)*

**Chapter 6**  
*(Ladder Programming Examples)*

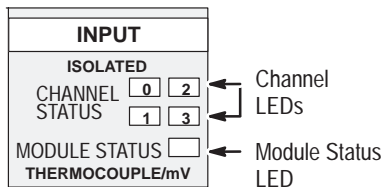
**Chapter 8**  
*(Application Examples)*



8.	Apply Power and Download Your Program	Reference
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Apply power. Download your program to the SLC and put the controller into Run mode. In this example during a normal start up, the module status LED and channel status 0 LED turn on.

**Chapter 8**  
*(Module Diagnostics and Troubleshooting)*



If channel LED is blinking:

Module detected:	and status word:
open circuit	bit 12 = 1
under range	bit 13 = 1
over range	bit 14 = 1
config error	bit 15 = 1

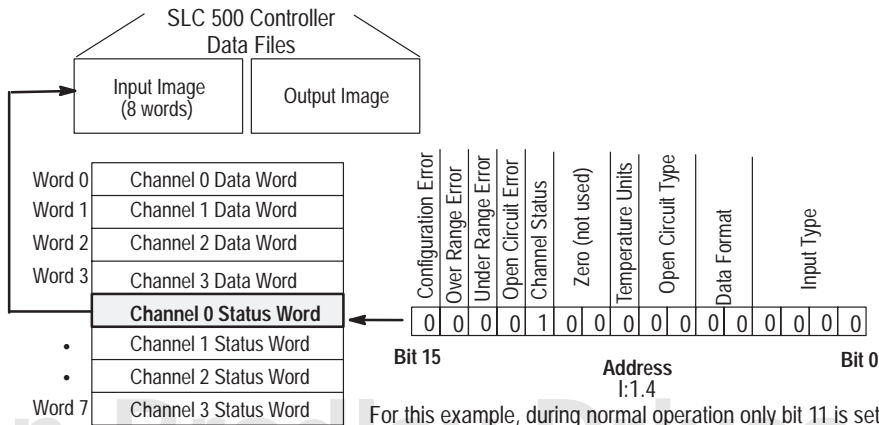
9.	Troubleshooting	Reference
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Monitor the status of input channel 0 to determine its configuration setting and operational status. This is useful for troubleshooting when the blinking channel LED indicates that an error has been flagged. If the Module Status LED is off, or if the Channel 0 LED is off or blinking, see Step 8.

**Chapter 6**  
*(Channel Configuration, Data, and Status)*

**Chapter 8**  
*(Module Diagnostics and Troubleshooting)*

**Chapter 9**  
*(Application Examples)*



# Channel Configuration Worksheet

Write bit selections at bottom of worksheet, one worksheet per channel.

Channel Configuration Word (O:e.0 through O:e.3) – Bit Descriptions

Bit(s)	Define	To Select	Set these bits in the Channel Configuration Word													Description				
			15-12	11	10	9	8	7	6	5	4	3	2	1	0					
0-3	Input Type	TC Type J														0	0	0	0	<p><b>Project</b> _____</p> <p><b>Slot Number</b> _____</p> <p><b>Channel Number</b> _____</p> <p>Configure the channel for the input type connected to it. Valid inputs are thermocouples and analog input signals of <math>\pm 50\text{mV}</math> and <math>\pm 100\text{mV}</math>. You can configure the channel to read the cold-junction (CJC) temperature. When reading the CJC temperature, the channel ignores the physical input signal.</p>
		TC Type K														0	0	0	1	
		TC Type T														0	0	1	0	
		TC Type E														0	0	1	1	
		TC Type R														0	1	0	0	
		TC Type S														0	1	0	1	
		TC Type B														0	1	1	0	
		TC Type N														0	1	1	1	
		$\pm 50\text{mV}$														1	0	0	0	
		$\pm 100\text{mV}$														1	0	0	1	
		TC Type C														1	0	1	0	
		TC Type D														1	0	1	1	
		Invalid														1	1	0	0	
		Invalid														1	1	0	1	
Invalid														1	1	1	0			
CJC Temp.														1	1	1	1			
4, 5	Data Format	Engr. Units x1													0	0			<p>Select the channel data format from:  <b>Engineering units (EU) x1 or x10</b>                      For EU x1, values are in 0.1 degrees or 0.01mV.                      For EU x10, values are in whole <math>^{\circ}\text{C}</math> or <math>^{\circ}\text{F}</math> or 0.1mV.  <b>Scaled-for-PID (value is the same for any input type)</b>                      Proportional input signal range is scaled to 0-16,383 counts.  <b>Proportional counts (value is same for any input type)</b>                      Proportional input signal range is scaled to <math>\pm 32,767</math> counts.</p>	
		Engr. Units x10													0	1				
		Scaled-for-PID														1	0			
		Counts														1	1			
6, 7	Open Circuit Mode	Zero													0	0			<p>Select module response to a detected open circuit from:  <b>Zero</b> to force the channel data word to zero.  <b>Upscale</b> to force the channel data word to full scale.  <b>Downscale</b> to force channel data word to low scale.  <b>Important:</b> A bit selection of 1 1 is invalid.                      For an open CJC thermistor, mV channels are not affected.  <b>Important:</b> The module requires 500 msec or one module update to flag the error while it ramps the channel input.</p>	
		Upscale													0	1				
		Downscale														1	0			
		Invalid														1	1			
8	Units $^{\circ}\text{F}$ , $^{\circ}\text{C}$	Degrees C													0				<p>Select <math>^{\circ}\text{C}/^{\circ}\text{F}</math> for thermal inputs. Ignored for mV inputs.  <b>Important:</b> For EU x1 and <math>^{\circ}\text{F}</math> (0.1<math>^{\circ}\text{F}</math>), an over-range error will occur above 3276.7<math>^{\circ}\text{F}</math> (cannot exceed 32767 counts).</p>	
		Degrees F													1					
9, 10	Unused	Unused				0	0												These bits must be zero for a valid configuration.	
11	Chnl Enable	Channel Off		0															<p>Disable unused channels for faster response.                      When set, module configures the channel and reads channel input before setting this bit in status word.                      If you change the configuration word, the status word must reflect the change before new data is valid.                      If you clear configuration word, module clears channel and status words. For new configuration word, channel data and status words remain cleared until the module sets this bit (11) in the status word.</p>	
		Channel On		1																
12-15	Unused	Unused	0000																These bits must be zero for a valid configuration.	
Enter Your Bit Selections >>			0000																For the Channel Configuration Word	



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## Worldwide representation

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