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Data Sheet: T1F-14THM-DS Rev F

# Terminator I/O

## T1F-14THM Thermocouple Input (use with base T1K-16B only)

Insert Module into Base

Install Assembly on DIN Rail

Slide Assembly into Position

Module Specifications

Wiring and Dimensions

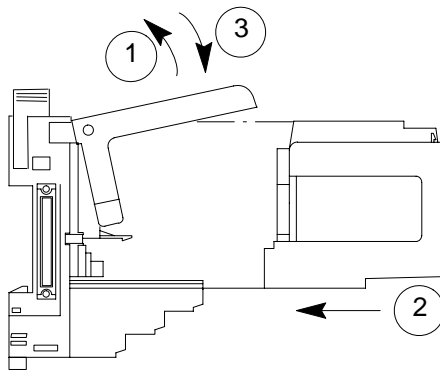
Setting Module Jumpers

**WARNING:** To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and it is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation are in compliance with the latest revision of these codes.

*Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.*

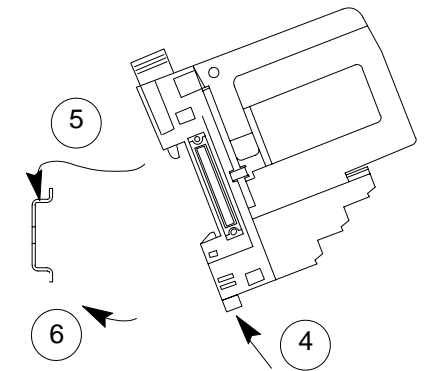
If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 770-844-4200.

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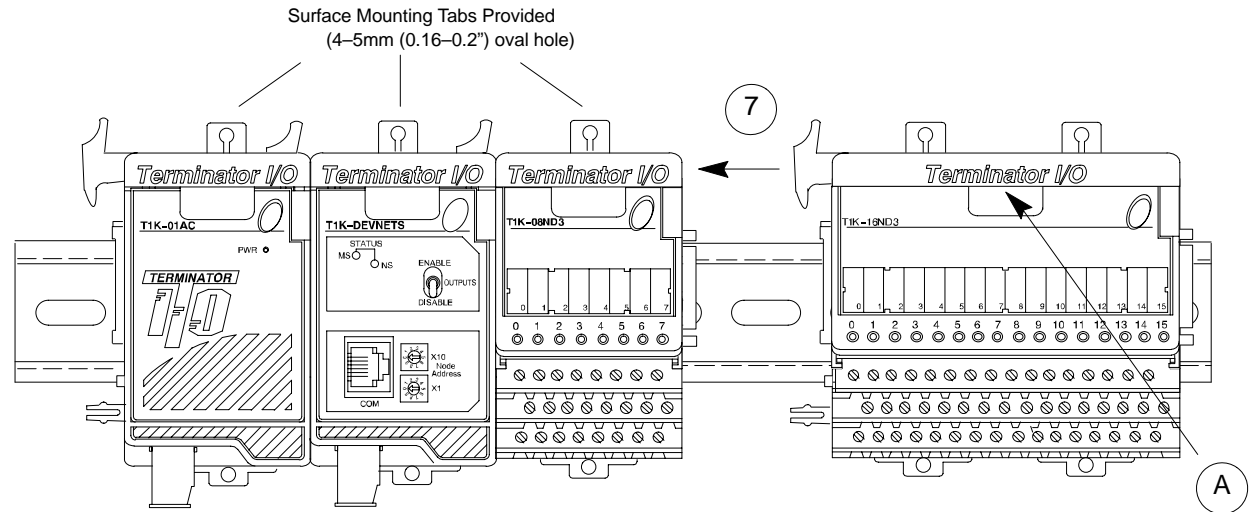
### Insert Module into Base

1. Pull base arm back to allow space for module to enter base
2. Align module slides with base track
3. Press module firmly into base



### Install Assembly on DIN Rail

4. Make sure the locking tab is in the latched position
5. Hook upper tab over upper flange of DIN rail
6. Tilt assembly toward DIN rail until module snaps securely to DIN rail



### Slide Assembly into Position on DIN Rail

7. Slide the module assembly on the DIN rail until the clip arm attaches securely to the adjacent module.

**A.** To remove the module from the base, lift the center of the base arm slightly outward and upward to release the module. Lifting the base arm further will eject the module.  
**B.** To remove the module assembly from the DIN rail, lift the clip arm up and slide the module assembly away from the adjacent module. Use a small screwdriver to pull the locking tab to the down position.

# Specifications

Rev F

## T1F-14THM 14 Channel Thermocouple Input

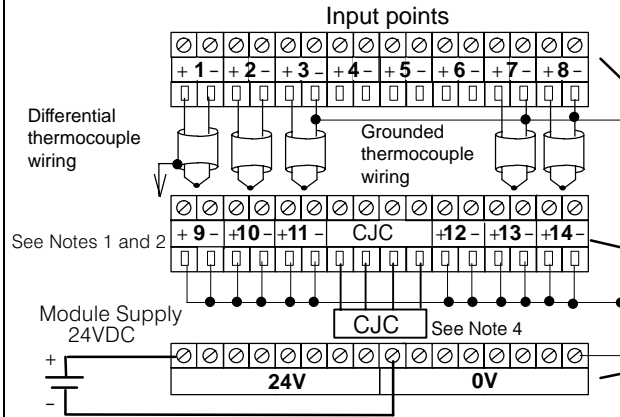
Use with I/O Module Base	T1K-16B screw type terminal base only
Number of Channels	14, differential
Common Mode Range	+ / - 5VDC
Common Mode Rejection	90db min. @ DC, 150db min. @ 50/60 Hz
Input Impedance	1M ohm
Absolute Max. Ratings	Fault Protected Input + / - 50 VDC
Master Update Rate	14 channels per scan max.
Input Points Required	512 discrete pts. or 16 dwords (d (double) word = 32 bit word) Network Interface dependent
Base Power Required	60mA @ 5VDC
External Power Supply	24VDC +/- 5%, 70mA, class 2
Operating Temperature	0 to 60°C (32 to 140°F)
Storage Temperature	-20 to 70°C (-4 to 158°F)
Accuracy vs. Temperature	+ / - 5 ppm / °C max. full scale
Relative Humidity	5 to 95% (non-condensing)
Environmental Air	No corrosive gases permitted
Vibration	MIL STD 810C 514.2
Shock	MIL STD 810C 516.2
Noise Immunity	NEMA ICS3-304
Weight	168g

### Thermocouple specifications:

Input Ranges	Type J -190 to 760°C -310 to 1400°F Type E -210 to 1000°C -346 to 1832°F Type K -150 to 1372°C -238 to 2502°F Type R 65 to 1768°C 149 to 3214°F Type S 65 to 1768°C 149 to 3214°F Type T -230 to 400°C -382 to 752°F Type B 529 to 1820°C 984 to 3308°F Type N -70 to 1300°C -94 to 2372°F Type C 65 to 2320°C 149 to 4208°F
Display Resolution	+ / - 0.1°C or + / - 0.1°F
Cold Junction Compensation (CJC Part #: T1F-CJC)	automatic
Conversion Time	100ms per channel
Warm Up Time	30 minutes typically, +/- 1°C repeatability
Linearity Error	+ / - 0.05 °C max. , + / - 0.01°C typical
Maximum Inaccuracy	+ / - 3°C

# Wiring & Dimensions

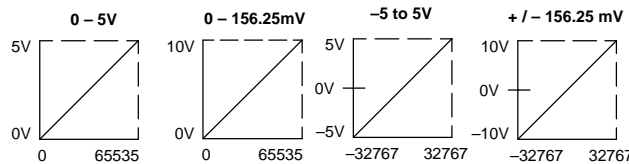
**Note:** Apply the labels that come with the I/O module to the I/O base terminals to properly identify the base terminal points. Also, the CJC sense unit must be installed to the I/O base. (see wiring diagram below)



### NOTES:

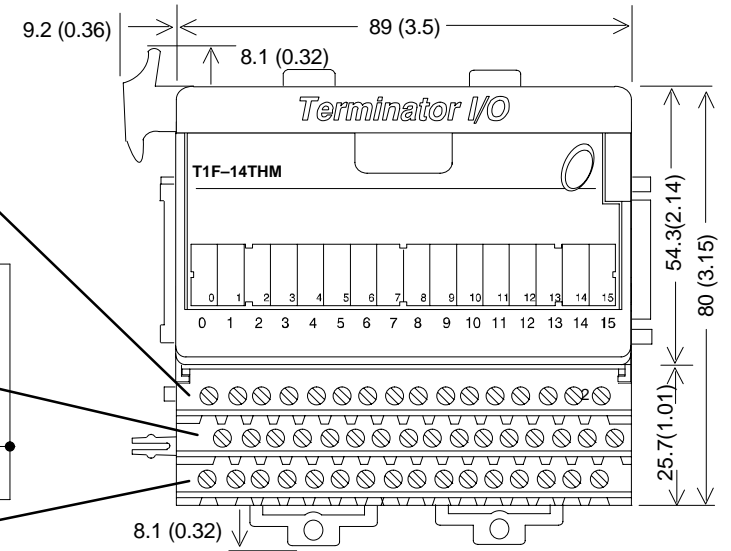
- 1: Shields should be grounded at the signal source.
- 2: Unused inputs should be connected to Common (0VDC).
- 3: When using 0-156mV and 5V ranges, connect (-) or 0V terminals to 0V to ensure common mode range acceptance
4. **The Cold Junction Compensation (Part #: T1F-CJC) temperature sense unit that comes with the module must be installed into the I/O base terminals to perform CJC of the thermocouple inputs.**

### Voltage Input Signal Ranges

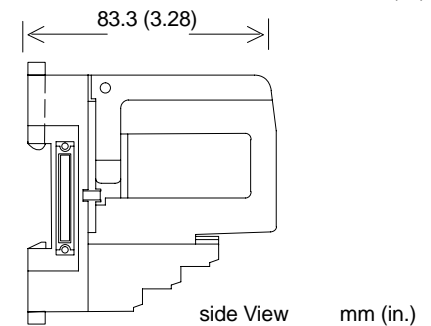


### Voltage specifications:

Input Voltage Ranges	0-5V, +/- 5V, 0-156.25mV, +/-156.25mV
Resolution	16 bit ( 1 in 65535)
Full Scale Calibration Error (Offset Error Included)	+/- 13 counts typ., +/- 33 max.
Offset Calibration Error	+/- 1 count max. @ 0V input
Linearity Error (End to End)	+/- 1 count max.
Max. Inaccuracy	+/- 0.02% @ 25°C (77°F)

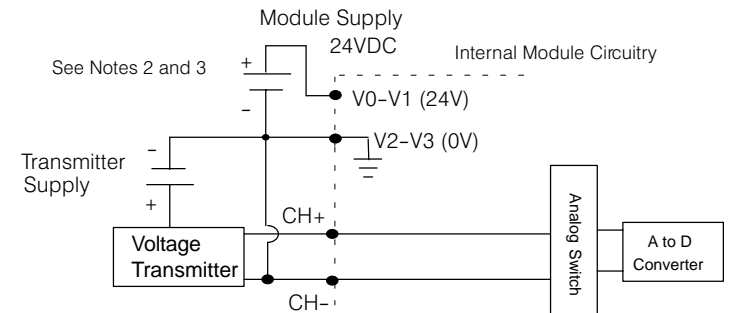


mm (in.)



side View mm (in.)

### Equivalent Input Circuit



# Setting Module Jumpers

X = Jumper Installed,  
Blank Space = Jumper Removed

## Select Input Type (see Note 3)

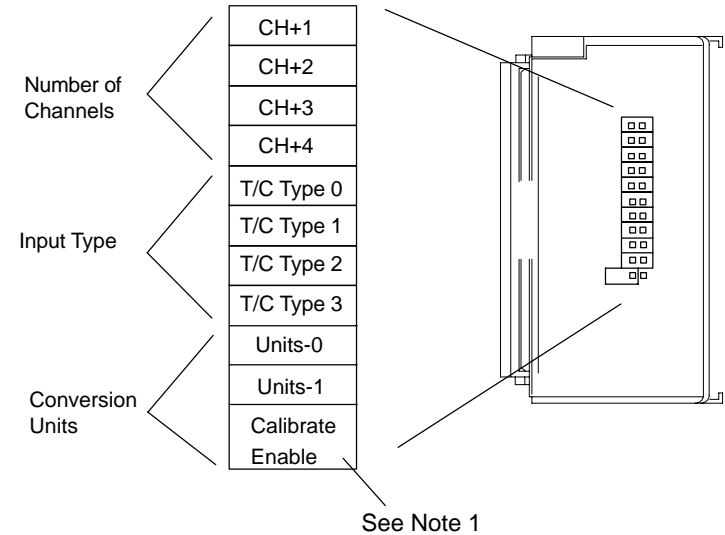
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Thermocouple / Voltage Inputs	Jumper			
	T/C Type 0	T/C Type 1	T/C Type 2	T/C Type 3
J	X	X	X	X
K		X	X	X
E	X		X	X
R			X	X
S	X	X		X
T		X		X
B	X			X
N				X
C	X	X	X	
0–5V.		X	X	
±5V.	X		X	
0–156mV.			X	
±156mV.	X	X		

## Select Number of Channels (see Note 2)

Number of Channels	Jumper			
	CH+1	CH+2	CH+3	CH+4
1				
2	X			
3		X		
4	X	X		
5			X	
6	X		X	
7		X	X	
8	X	X	X	
9				X
10	X			X
11		X		X
12	X	X		X
13			X	X
14	X	X	X	X

## Jumpers Located Under Module Top Cover



## Select the Conversion Units:

### Thermocouple Conversion Units (see Note 4)

Jumper	Temperature Conversion Units			
	Magnitude Plus Sign		2's Complement	
	°F	°C	°F	°C
Units-0	X		X	
Units-1	X	X		

### Voltage Conversion Units (see Note 5)

Jumper	Voltage Conversion Units	
	Magnitude Plus Sign	2's Complement
Units-0	X	X
Units-1	X	

### NOTES:

**Note 1:** The Calibrate Enable jumper comes from the factory not installed. Installing the jumper disables the thermocouple active burn-out detection circuitry, which enables a thermocouple calibrator to be connected to the module. To make sure that the output of the thermocouple calibrator is within the 5V common mode voltage range of the module, connect the negative side of the differential voltage input channel to the 0V terminal, then connect the thermocouple calibrator to the differential inputs (for example, Ch 3+ and Ch 3–).

**Note 2:** The module comes with all of the Number of Channels jumpers installed for fourteen channel operation. Use the table to determine the proper settings.

**Note 3:** The module comes with all of the Input Type jumpers installed for J type thermocouple operation. Use the table to determine the proper settings.

**Note 4:** The module comes with the Conversion Units jumpers set for magnitude plus sign with Fahrenheit units selected. All thermocouple types are converted into a direct temperature reading with one implied decimal place. Negative temperatures can be represented in either 2's complement or magnitude plus sign format. If the temperature is negative, the most significant bit is the sign bit. 2's complement data format may be required to correctly display bipolar data on some operator interfaces.

**Note 5:** The bipolar voltage input ranges may be converted to a 15-bit magnitude plus sign or a 16-bit 2's complement value.

## Module Channel Data

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### T1F–14THM Input Channel Data Format: Data format for each of the 14 input channels (1–14)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	BO	S	S	S	S	S	S	S	S	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

**D15 to D0:** 16-bit input temperature data, D15 is the most significant bit (MSB). See Notes 4 and 5.

**BO:** Channel burn out bit; 1= channel thermocouple sensor burn out or thermocouple is disconnected from either input terminal

0= channel OK

**S:** Channel sign extension; All bits reading “0” = positive data

All bits reading “1” = negative data

**0:** Unused channel bits are all = 0

### T1F–14THM Module Jumper Settings: Data is available in module Channel 15 (this feature is supported by module date code 1205 or later)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

**0:** Unused channel bits are all = 0

Number of Channels jumper settings:

**D0:** CH+1

**D1:** CH+2 CH+1 to CH+4 return a binary code for the number

**D2:** CH+3 of channels enabled: (0001 – 1110 binary)

**D3:** CH+4

Input Type jumper settings:

**D4:** T/C Type 0 jumper, 0 = installed, 1= removed

**D5:** T/C Type 1 jumper, 0 = installed, 1= removed

**D6:** T/C Type 2 jumper, 0 = installed, 1= removed

**D7:** T/C Type 3 jumper, 0 = installed, 1= removed

Conversion Units jumper settings:

**D8:** Units–0 jumper, 0 = installed, 1= removed

**D9:** Units–1 jumper, 0 = installed, 1 = removed

Calibrate Enable jumper setting:

**D10:** 0 = installed, 1= removed

CJC Installed:

**D11:** 0 = CJC board installed, 1= board removed

Manufacturing test points:

**D12:** always = 1; (test point No\_CJC)

**D13:** always = 1; (test point RAW\_COUNTS)

### T1F–14THM CJC Temperature in °C : Data is available in module Channel 16 (this feature is supported by module date code 1205 or later)

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0

**D15 to D0:** 16-bit CJC temperature data with implied decimal point, D15 is the most significant bit (MSB).

**0:** Unused channel bits are all = 0