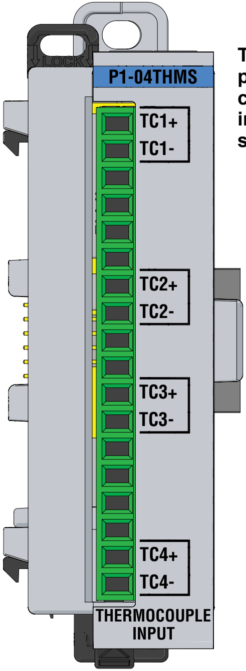
Thermocouple Input Specifications

Input Channels	4 differential channels (2 isolated pairs)
Data Format	Floating Point
Common Mode Range	±1.25 V
Common Mode Rejection	100dB @ DC
Input Impedance	>5MΩ
Maximum Ratings	Fault Protected Inputs to ±50V
Resolution	16-bit, ±0.1 °C or °F
Thermocouple 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 2505°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)
Thermocouple Linearization	Automatic
Cold Junction Compensation	Automatic
Sample Duration Time	270ms
All Channel Update Rate	1.08 s
Open Circuit Detection Time	Within 5s
Conversion Method	Sigma-Delta
Accuracy vs. Temperature	±50ppm per °C (maximum)
Maximum Inaccuracy	±3°C maximum (excluding thermocouple error)
Linearity Error	±1°C maximum (±0.5 °C typical) Monotonic with no missing codes
Warm-up Time	30 minutes for ±1% repeatability 2 minutes to reach voltage specifications
External Power Supply Required	None

P1-04THMS Analog Input



The P1-04THMS Thermocouple Input Module provides four differential channels (two isolated channels) for receiving thermocouple and voltage input signals for use with the Productivity1000 system.

Input Specifications 1
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Module Configuration 5
Warning 8

Terminal Block Included. Not Compatible with *ZIP*Link.

General Specifications

Operating Temperature	0° to 60°C (32° to 140°F)
Storage Temperature	-20° to 70°C (-4° to 158°F)
Humidity	5 to 95% (non-condensing)
Altitude	2,000 meters max
Pollution Degree	2
Environmental Air	No corrosive gases permitted
Vibration	IEC60068-2-6 (Test Fc)
Shock	IEC60068-2-27 (Test Ea)
Overvoltage Category	II
Field to Logic Side Isolation	1750VDC applied for 5s or 420VDC applied for 1 minute
Input to Input Isolation	1750VDC applied for 5s or 420VDC applied for 1 minute
Heat Dissipation	100mW
Enclosure Type	Open Equipment
Module Location	Any I/O position in a Productivity1000 System
Field Wiring	Removable terminal block (Included). The P1-04THMS is not compatible with the ***ZIP***Link Wiring System.
Connector Type (included)	18-position Removable Terminal Block
Weight	67g (2.36 oz)
Agency Approvals	UL 61010-1 and UL 61010-2-201 File E139594, Canada & USA CE (EN 61131-2 EMC, EN 61010-1 and EN 61010-2-201 Safety)*

*See CE Declaration of Conformity for details.

Voltage Input Specifications

Linear mV Device Input Ranges	±39.0625 mVDC, ±78.125 mVDC, ±156.25 mVDC, 0–1250 mVDC, 0–39.0625 mVDC, 0–156.24 mVDC
Max Voltage Input Offset Error	0.05% @ 0°–60 °C, typical 0.04% @ 25°C
Max Voltage Input Gain Error	0.06% @ 25°C
Max Voltage Input Linearity Error	0.05% @ 0°–60 °C, typical 0.03% @ 25°C
Max Voltage Input Impedance	0.2% @ 0°–60 °C, typical 0.06% @ 25°C

Configuration/Diagnostics

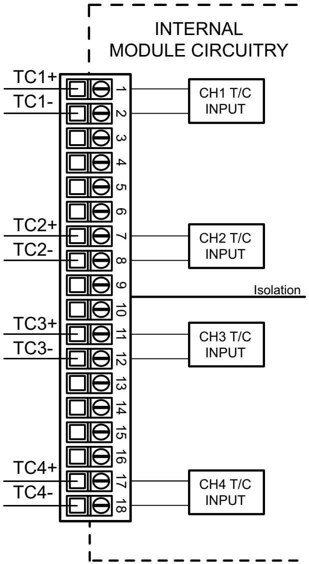
Burn-out Detection: High Side/Disable	1 bit per module
°C/°F (T/C Only)	1 bit per module
Module Diagnostics Failure	1 bit per module
Burn-out (on if T/C input is open – no connection between TCn+ and TCn-)	1 bit per channel
Channel Under-range	1 bit per channel
Channel Over-range	1 bit per channel

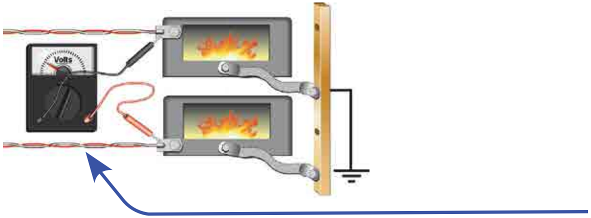
Terminal Block Specifications

Part Number	**P2-RTB (included)**	**P2-RTB-1**
Positions	18 Screw Terminals	18 Spring Clamp Terminals
Wire Range	30–16 AWG (0.051–1.31 mm^2) Solid / Stranded Conductor 3/64 in (1.2 mm) Insulation Max. 1/4 in (6–7 mm) Strip Length	28–16 AWG (0.081–1.31 mm^2) Solid / Stranded Conductor 3/64 in (1.2 mm) Insulation Max. 19/64 in (7–8 mm) Strip Length
Conductors	Use Thermocouple Extension wire for thermocouples. USE COPPER CONDUCTORS, 75°C or equivalent for mullivolt inputs.	
Screw Driver	0.1 in (2.5 mm) Maximum*	
Screw Size	M2	N/A
Screw Torque	2.5 lb·in (0.28 N·m)	N/A

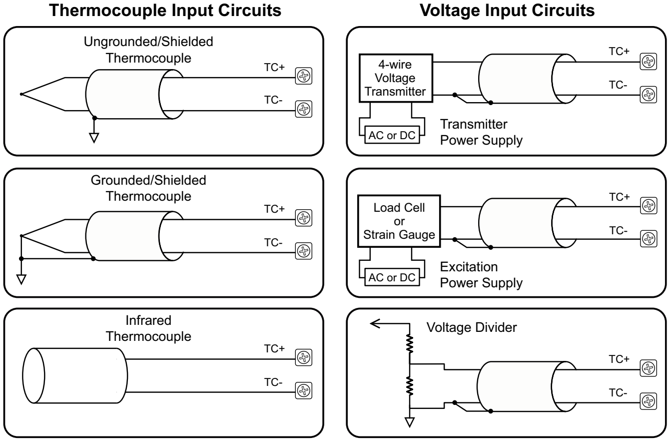
*Recommended Screw Driver TW-SD-MSL-1

P1-04THMS Schematic



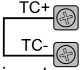


P1-04THMS Wiring Diagram



NOTES:

1. Connect shield to thermocouple signal/ground only. Do not connect to both ends.
2. Install jumper wire on each unused input, TC+ to TC-.

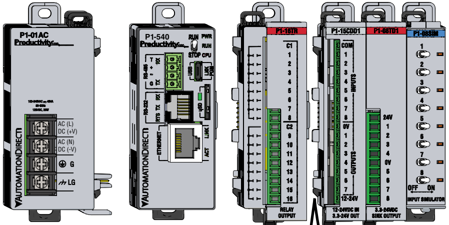


3. With grounded thermocouples, take precautions to prevent having a voltage potential between thermocouple tips. A voltage of 1.25V or greater between tips will skew measurements.
4. Use shielded, twisted thermocouple extension wire that matches the thermocouple type. Use thermocouple-compatible junction blocks.
5. Two separate isolations in the field side. Each isolation consists of a pair of channels.

Module Installation

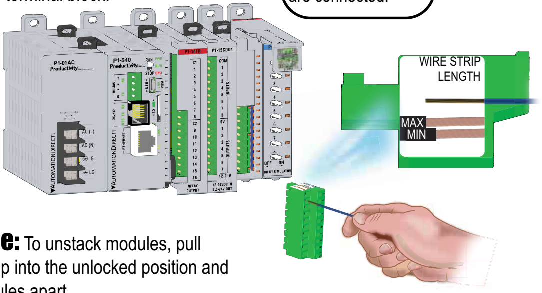
WARNING: Do not apply field power until the following steps are completed.

Step One: With latch in “locked” position, align connectors on the side of each module and stack by pressing together. Click indicates lock is engaged.

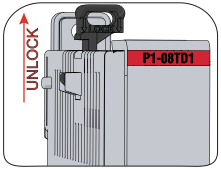


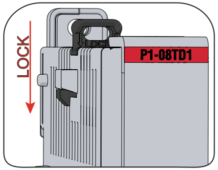
Check all latches are secure after modules are connected.

Step Two: Attach field wiring using the removable terminal block.

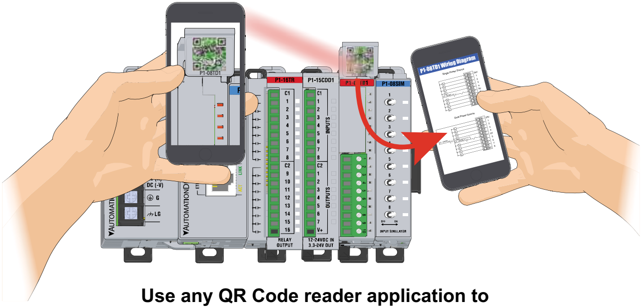


Step Three: To unstack modules, pull locking latch up into the unlocked position and then pull modules apart.

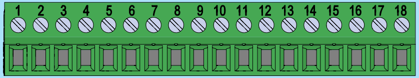
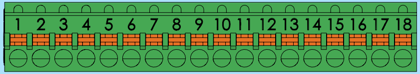




QR Code



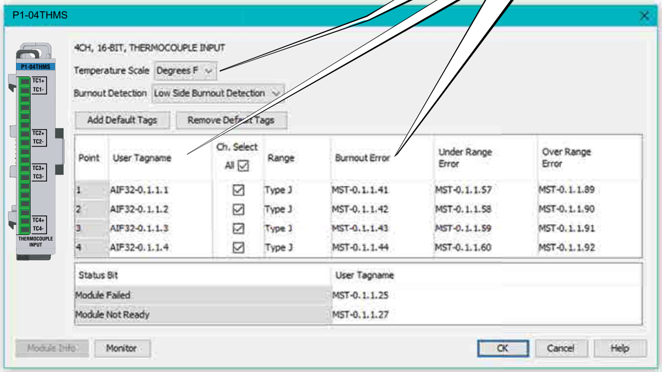
Use any QR Code reader application to display the module’s product insert.

Wiring Options	
1 ***Screw Terminal Block***  	P2-RTB (Quantity 1)
2 ***Spring Clamp Terminal Block***  	P2-RTB-1 (Quantity 1)

Module Configuration

Using the Hardware Configuration tool in the Productivity Suite programming software, drag and drop the P1-04THMS module into the configuration.

Specify *Temperature Scale* and *Burnout Detection*, and use the drop down menu to select module range and resolution. If desired, assign a *User Tagname* to each channel selected and to each *Status Bit Item*.



P1-04THMS

4CH, 16-BIT, THERMOCOUPLE INPUT

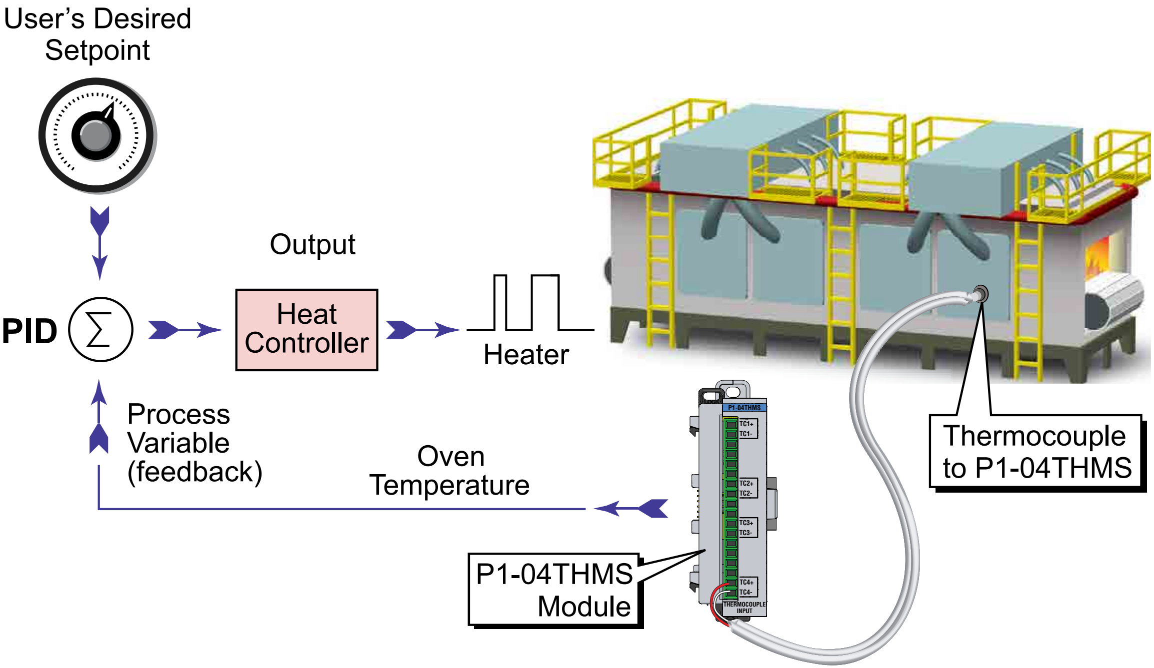
Temperature Scale: Degrees F

Burnout Detection: Low Side Burnout Detection

Point	User Tagname	Ch. Select All ☑	Range	Burnout Error	Under Range Error	Over Range Error
1	AIF32-0.1.1.1	☑	Type J	MST-0.1.1.41	MST-0.1.1.57	MST-0.1.1.89
2	AIF32-0.1.1.2	☑	Type J	MST-0.1.1.42	MST-0.1.1.58	MST-0.1.1.90
3	AIF32-0.1.1.3	☑	Type J	MST-0.1.1.43	MST-0.1.1.59	MST-0.1.1.91
4	AIF32-0.1.1.4	☑	Type J	MST-0.1.1.44	MST-0.1.1.60	MST-0.1.1.92

Status Bit	User Tagname
Module Failed	MST-0.1.1.25
Module Not Ready	MST-0.1.1.27

Typical Application Example



User's Desired Setpoint

PID ∑

Output

Heat Controller

Heater

Process Variable (feedback)

Oven Temperature

Thermocouple to P1-04THMS

P1-04THMS Module

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 Technical Support at 770-844-4200.

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