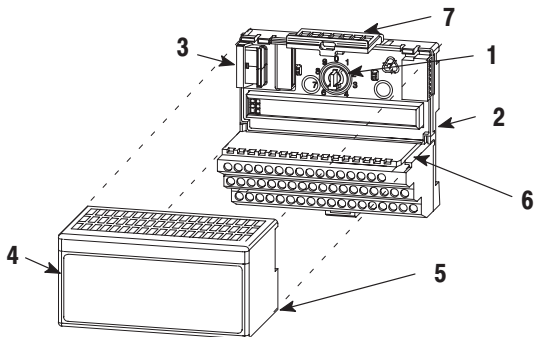




Installation Instructions

English

24V dc FLEX I/O Thermocouple/RTD Input Module (Cat. No. 1794-IRT8)



Module Installation

This module mounts on a 1794 terminal base unit.

1. Rotate keyswitch (1) on terminal base unit (2) clockwise to position 3 as required for this type of module.
2. Make certain the flexbus connector (3) is pushed all the way to the left to connect with the neighboring terminal base/adaptor. **You cannot install the module unless the connector is fully extended.**
3. Make sure that the pins on the bottom of the module are straight so they will align properly with the connector in the terminal base unit.
4. Position the module (4) with its alignment bar (5) aligned with the groove (6) on the terminal base.
5. Press firmly and evenly to seat the module in the terminal base unit. The module is seated when the latching mechanism (7) is locked into the module.



ATTENTION: Remove field-side power before removing or inserting this module. This module is designed so you can **remove and insert it under backplane power**. When you remove or insert a module with field-side 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

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

European Union 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 Council Directive 89/336/EEC Electromagnetic Compatibility (EMC) and 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 50082-2 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 following Allen-Bradley publications:

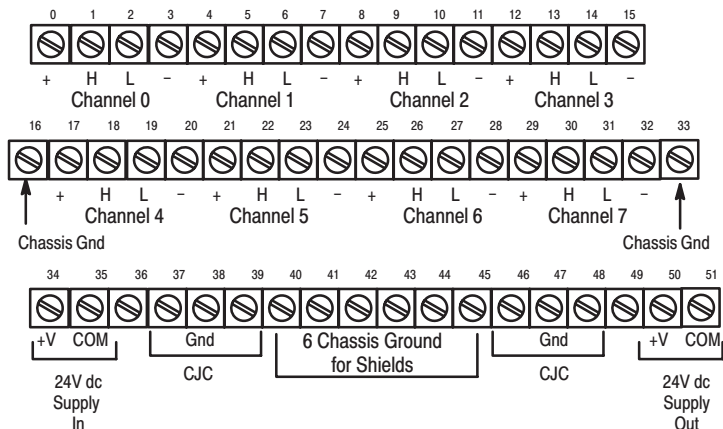
- Industrial Automation Wiring and Grounding Guidelines For Noise Immunity, publication 1770-4.1
- Automation Systems Catalog, publication B111

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

Connecting Wiring to a 1794-TB3G or 1794-TB3GS Terminal Base

Connect wiring to the terminal base as shown below.

Connections for terminal Base 1794-TB3G shown



ATTENTION: To reduce susceptibility to noise, power analog modules and digital modules from separate power supplies. Do not exceed a length of 33 ft (10m) for dc power cabling.



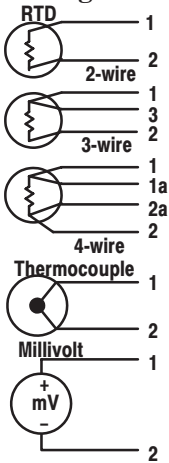
ATTENTION: Do not daisy chain power or ground from this terminal base unit to any ac or dc digital module terminal base units.



ATTENTION: Total current draw through the terminal base unit is limited to 10A. Separate power connections to the terminal base unit may be necessary.

Refer to the table on page 4 for complete wiring connections for various input devices.

Wiring Connections for the Thermocouple/RTD Module



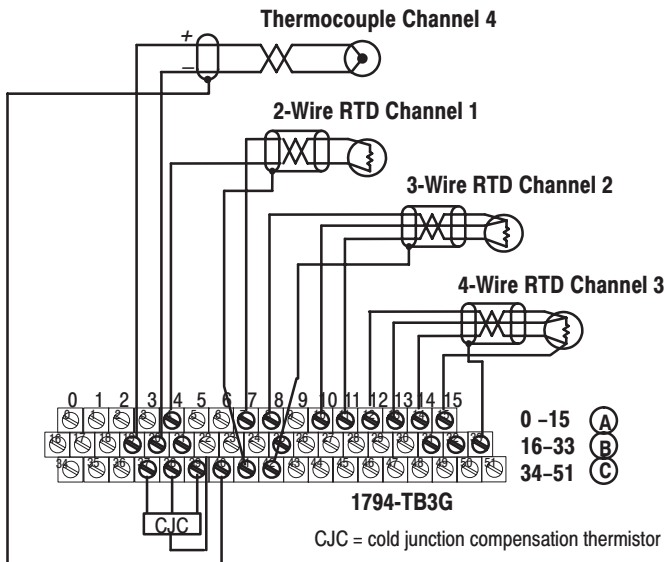
Type of Input	Connect the following:				
	H	L	+	-	Shield ¹
RTD - 2-wire			1	2	
RTD - 3-wire		3	1	2	
RTD - 4-wire	1a	2a	1	2	
Thermocouple		1		2	
Millivolt		1		2	

¹ Terminals 37, 38 and 39 and 46, 47 and 48 are for cold junction compensation (with 38 and 47 chassis GND).

RTD or Thermocouple Channel	1794-TB3G and -TB3GS Terminal Base Units			
	High Signal Terminal (H)	Low Signal Terminal (L)	RTD Source Current (+)	Signal Return ¹ (-)
0	1	2	0	3
1	5	6	4	7
2	9	10	8	11
3	13	14	12	15
4	18	19	17	20
5	22	23	21	24
6	26	27	25	28
7	30	31	29	32
+24V dc Power	34 and 50			
24V dc Common	35 and 51			

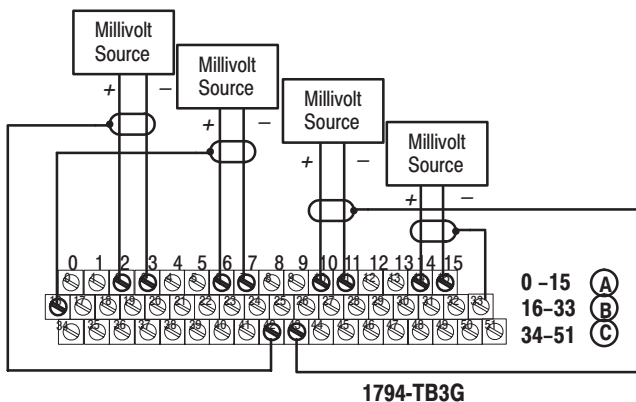
- Terminals 37, 38 and 39 and 46, 47 and 48 are for cold junction compensation (with 38 and 47 chassis GND).
- Terminals 16, 33 and 40 thru 45 are chassis ground.
- Connect tail of CJC1 to terminal 5 and CJC2 to 12 if channels 0-3 or 0-7 are thermocouples. Connect tail of CJC1 to terminal 22 and CJC2 to 29 **ONLY** if channels 4-7 are thermocouples.

Example of 2-, 3- and 4-wire RTD and Thermocouple Wiring to a 1794-TB3G Terminal Base Unit



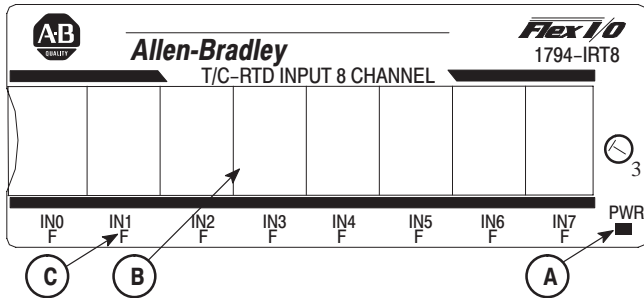
Attention: Keep exposed area of inner conductor as short as possible.

Example of Millivolt Wiring to a 1794-TB3G Terminal Base Unit



Attention: Keep exposed area of inner conductor as short as possible.

Indicators



A = Power indicator – indicates power applied to module.

B = Insertable label for writing individual I/O assignments.

C = Status indicators for individual channels.

Block Transfer Read and Write

The following block transfer read and write word bit information is presented for experienced users only. Refer to the user manual (publication 1794-6.5.12) for this product for complete information on programming and configuring your module.

Input Mapping

Bit ⇒	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word ↓	Read															
0	Channel 0 Input Data															
1	Channel 1 Input Data															
2	Channel 2 Input Data															
3	Channel 3 Input Data															
4	Channel 4 Input Data															
5	Channel 5 Input Data															
6	Channel 6 Input Data															
7	Channel 7 Input Data															
8	Overrange Alarm Bits (channel 0 = bit 08, etc)								Underrange Alarm Bits (channel 0 = bit 00, etc)							
9	Flt Alm Ch 7	Flt Alm Ch 6	Flt Alm Ch 5	Flt Alm Ch 4	Flt Alm Ch 3	Flt Alm Ch 2	Flt Alm Ch 1	Flt Alm Ch 0		CJC 2 Alm	CJC 1 Alm	Mod Cfg	Diagnostic Status			
10	EDT command response								EDT response data							

Output Mapping

Bit ⇒	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Word ↓	Write															
0					Data Format			Flt Mode Ch 4-7	Flt Mode Ch 0-3	Reference Jct.	Filter Cutoff					
1	TC/RTD Ch. 4-7		Sensor Mode Ch. 4-7		Sensor Type Ch. 4-7			TC/RTD Ch. 0-3		Sensor Mode Ch. 0-3		Sensor Type Ch. 0-3				
2	RTD Offset Ch 7		RTD Offset Ch 6		RTD Offset Ch 5	RTD Offset Ch 4	RTD Offset Ch 3			RTD Offset Ch 2	RTD Offset Ch 1	RTD Offset Ch 0				
3	EDT command								EDT command data							

Data Format for All Channels – Write Word 0

Bit	11	10	09	08	Data type for channels 0–7
	0	0	0	0	°C
	0	0	0	1	°F
	0	0	1	0	°K
	0	0	1	1	-32767 to +32767
	0	1	0	0	0 to 65535

0101 through 1111 not used

Module defaults to -4000 to 10,000 in millivolt mode, and 0 to 5000 in ohms mode.

Fault Mode – Write Word 0

Bit	06	Fault enable for channels 0–3
	07	Fault enable for channels 4–7
		0 = disabled 1 = enable wire-off detection

“Add-on” Filter Selections – Write Word 0

Bit	02	01	00	Filter Time Constants – Actual filtering depends on the module’s mode of operation.
	0	0	0	Hardware filtering only (default filtering)
	0	0	1	25ms
	0	1	0	100ms
	0	1	1	250ms
	1	0	0	500ms
	1	0	1	1s
	1	1	0	2s
	1	1	1	5s

Reference Junction Selection – Write Word 0

Bits 03–05	Reference Junction – used when sensor select is set to thermocouple and sensor mode is set to internal compensation. Sets a fixed reference junction to compensate all thermocouple channels.			
Bit	05	04	03	Reference Junction
	0	0	0	0°C
	0	0	1	20°C
	0	1	0	25°C
	0	1	1	30°C
	1	0	0	40°C
	1	0	1	50°C
	1	1	0	60°C
	1	1	1	70°C

Sensor Mode Select – Write Word 1

Bit	05	04	Sensor mode for channels 0 through 3
Bit	13	12	Sensor mode for channels 4 through 7
Thermocouple			
	0	0	External compensation – uses cold junction sensors
	0	1	Internal compensation – uses the value selected for “reference junction selection” (see note)
	1	0	No compensation (Data is referenced to 0°C.)
	1	1	Differential measurement between 2 channels (0-1, 2-3, 4-5, 6-7)
RTD			
	0	0	2-wire RTD no compensation
	0	1	2-wire RTD with user selected compensation
	1	0	3-wire RTD
	1	1	4-wire RTD

Note: Both CJC sensors must be used whenever external compensation is selected.

Input Type Selection – Write Word 1

Bit	07	06	Input type for channels 0-3
Bit	15	14	Input type for channels 4-7
	0	0	Thermocouple
	0	1	RTD
	1	0	Not used
	1	1	Not used





RTD Offset Select – Write Word 2



Bit	01	00	RTD Offset Select Bits – Channel 0
Bit	03	02	RTD Offset Select Bits – Channel 1
Bit	05	04	RTD Offset Select Bits – Channel 2
Bit	07	06	RTD Offset Select Bits – Channel 3
Bit	09	08	RTD Offset Select Bits – Channel 4
Bit	11	10	RTD Offset Select Bits – Channel 5
Bit	13	12	RTD Offset Select Bits – Channel 6
Bit	15	14	RTD Offset Select Bits – Channel 7
	0	0	Default – 0 Ω (or user calibrated value)
	0	1	5 Ω
	1	0	10 Ω
	1	1	15 Ω

Sensor Type Select - Write Word 1

RTD Type					
Bit	03	02	01	00	Sensor type for channels 0 through 3
Bit	11	10	09	08	Sensor type for channels 4 through 7
	0	0	0	0	Resistance (default)
	0	0	0	1	100 ohm Pt $\alpha = 0.00385$ Euro (-200 to +870°C)
	0	0	1	0	200 ohm Pt $\alpha = 0.00385$ Euro (-200 to +400°C)
	0	0	1	1	100 ohm Pt $\alpha = 0.003916$ U.S. (-200 to +630°C)
	0	1	0	0	100 ohm Pt $\alpha = 0.003916$ U.S. (-200 to +400°C)
	0	1	0	1	100 ohm Nickel (-60 to +250°C)
	0	1	1	0	200 ohm Nickel (-60 to +200°C)
	0	1	1	1	120 ohm Nickel (-80 to +320°C)
	1	0	0	0	10 ohm Copper (-200 to +260°C)
1001 through 1111 not used					

Thermocouple Type					
Bit	03	02	01	00	Sensor type for channels 0 through 3
Bit	11	10	09	08	Sensor type for channels 4 through 7
	0	0	0	0	mV (default)
	0	0	0	1	B 300 to 1800°C (572 to 3272°F)
	0	0	1	0	E -270 to 1000°C (-454 to 1832°F)
	0	0	1	1	J -210 to 1200°C (-346 to 2192°F)
	0	1	0	0	K -270 to 1372°C (-454 to 2502°F)
	0	1	0	1	TXK/XK(L) -200 to 800°C (-328 to 1472°F)
	0	1	1	0	N -270 to 1300°C (-450 to 2372°F)
	0	1	1	1	R -50 to 1768°C (-58 to 3214°F)
	1	0	0	0	S -50 to 1768°C (-58 to 3214°F)
	1	0	0	1	T -270 to 400°C (-454 to 752°F)
1010 through 1111 not used					

CSA Hazardous Location Approval	Approbation d'utilisation dans des emplacements dangereux par la CSA
<p>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.</p>	<p>La CSA® certifie les produits d'utilisation générale aussi bien que ceux qui s'utilisent dans des emplacements dangereux. La certification CSA en vigueur est indiquée par l'étiquette du produit et non par des affirmations dans la documentation à l'usage des utilisateurs.</p>
<p>Example of the CSA certification product label</p> 	<p>Exemple d'étiquette de certification d'un produit par la CSA</p> 
<p>To comply with CSA certification for use in hazardous locations, the following information becomes a part of the product literature for CSA-certified Allen-Bradley industrial control products.</p> <ul style="list-style-type: none"> • 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. 	<p>Pour satisfaire à la certification de la CSA dans des endroits dangereux, les informations suivantes font partie intégrante de la documentation des produits industriels de contrôle Allen-Bradley certifiés par la CSA.</p> <ul style="list-style-type: none"> • Cet équipement convient à l'utilisation dans des emplacements de Classe I, Division 2, Groupes A, B, C, D, ou ne convient qu'à l'utilisation dans des endroits non dangereux. • Les produits portant le marquage approprié de la CSA (c'est à dire, Classe I, Division 2, Groupes A, B, C, D) sont certifiés à l'utilisation pour d'autres équipements où la convenance de combinaison (application ou utilisation) est déterminée par la CSA ou le bureau local d'inspection qualifié.
<p>Important: Due to the modular nature of a PLC® control system, the product with the highest temperature rating determines the overall temperature code rating of a PLC control system in a Class I, Division 2 location. The temperature code rating is marked on the product label as shown.</p>	<p>Important: Par suite de la nature modulaire du système de contrôle PLC®, le produit ayant le taux le plus élevé de température détermine le taux d'ensemble du code de température du système de contrôle d'un PLC dans un emplacement de Classe I, Division 2. Le taux du code de température est indiqué sur l'étiquette du produit.</p>
<p>Temperature code rating</p>  <p>Look for temperature code rating here</p>	<p>Taux du code de température</p>  <p>Le taux du code de température est indiqué ici</p>
<p>The following warnings apply to products having CSA certification for use in hazardous locations.</p>	<p>Les avertissements suivants s'appliquent aux produits ayant la certification CSA pour leur utilisation dans des emplacements dangereux.</p>

CSA Hazardous Location Approval	Approbation d'utilisation dans des emplacements dangereux par la CSA
 <p>ATTENTION: Explosion hazard —</p> <ul style="list-style-type: none"> • 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 an Allen-Bradley product 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. 	 <p>AVERTISSEMENT: Risque d'explosion —</p> <ul style="list-style-type: none"> • La substitution de composants peut rendre ce matériel inacceptable pour les emplacements de Classe I, Division 2. • Couper le courant ou s'assurer que l'emplacement est désigné non dangereux avant de remplacer les composants. • Avant de débrancher l'équipement, couper le courant ou s'assurer que l'emplacement est désigné non dangereux. • Avant de débrancher les connecteurs, couper le courant ou s'assurer que l'emplacement est reconnu non dangereux. Attacher tous connecteurs fournis par l'utilisateur et reliés aux circuits externes d'un appareil Allen-Bradley à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens permettant aux connexions de résister à une force de séparation de 15 newtons (3,4 lb. - 1,5 kg) appliquée pendant au moins une minute.

Le sigle CSA est la marque déposée de l'Association des Standards pour le Canada.

PLC est une marque déposée de Allen-Bradley Company, Inc.

CSA logo is a registered trademark of the Canadian Standards Association

PLC is a registered trademark of Allen-Bradley Company, Inc.

Specifications - 1794-IRT8 RTD/Thermocouple Input Module

Number of Inputs	8 Channels (2 groups of 4)		
Module Location	Cat. No. 1794-TB3G, -TB3GS Terminal Base Unit		
Nominal Input Voltage Ranges	-40 to +100mV dc for thermocouples 0 to 325mV dc for RTDs		
Supported Thermocouple Types	Type	Range °C	Range °F
	B:	300 to 1800°C	(572 to 3272°F)
	E:	-270 to 1000°C	(-454 to 1832°F)
	J:	-210 to 1200°C	(-346 to 2192°F)
	K:	-270 to 1372°C	(-454 to 2502°F)
	TXK/XK(L)	-200 to 800°C	(-328 to 1472°F)
	N:	-270 to 1300°C	(-454 to 2372°F)
	R:	-50 to 1768°C	(-58 to 3214°F)
	S:	-50 to 1768°C	(-58 to 3214°F)
T:	-270 to 400°C	(-454 to 752°F)	
Supported RTD Types	Resistance:		
	100 ohm Pt $\alpha = 0.00385$ Euro (-200 to +870°C)		
	100 ohm Pt $\alpha = 0.003916$ U.S. (-200 to +630°C)		
	200 ohm Pt $\alpha = 0.00385$ Euro (-200 to +400°C)		
	200 ohm Pt $\alpha = 0.003916$ U.S. (-200 to +400°C)		
	100 ohm Nickel $\alpha = 0.00618$ (-60 to +250°C)		
	120 ohm Nickel $\alpha = 0.00672$ (-80 to +320°C)		
	200 ohm Nickel $\alpha = 0.00618$ (-60 to +200°C)		
	10 ohm Copper $\alpha = 0.00427$ (-200 to +260°C)		
Resolution	14 bits		
Accuracy vs. filter Cutoff	0.05% of full range in millivolt mode with filtering selected Hardware only = 0.10% of full range in millivolt mode		
Data Format	°C (implied decimal point XXX.X) °F (implied decimal point XXX.X) °K (implied decimal point XXX.X) -32767 to +32767 0-65535 0-5000 (ohms mode) (implied decimal point XXX.X) -4000 to +10000 (millivolt mode) (implied decimal point XXX.XX)		
Common Mode Rejection	-80db @ 5V peak-to-peak 50-60Hz		
Common Mode Input Range	±4V minimum		
Isolation Voltage	1500V ac (rms) or 2550V dc for 1.0s between customer and system		

Specifications continued on next page.

Specifications - 1794-IRT8 RTD/Thermocouple Input Module

System Throughput (8 channels scanned) – add 0.5ms if filtering is selected	5.4ms – millivolt 7.05ms – ohms – 2- and 4-wire RTD 9.1ms – ohms – 3-wire RTD 9.2ms – ohms – 4-wire RTD 7.3ms – 2-wire RTD (°F) 9.4ms – 4-wire RTD (°F) 7.7ms – 2-wire RTD (°C), (°K) 9.8ms – 4-wire RTD (°C), (°K) 9.35ms – 3-wire RTD (°F) 9.75ms – 3-wire RTD (°C), (°K) 6.65ms – Thermocouples (°F) 7.0ms – Thermocouples (°C), (°K)
Open Circuit Detection	Defaults to maximum value
Open Input Detection Time	0 to 3.8s for revision D or earlier Immediate detection (maximum 1 scan) for revision E or later
Overvoltage Capability	7V dc continuous @ 25°C
RFI Immunity	Error of less than 1% of range at 10V/M 27 to 1000MHz
Overall Drift with Temperature	150ppm/°C of span (maximum)
Cold Junction Compensation range	0 to 70°C for firmware revision D or earlier –20 to 100°C for firmware revision E or later
Cold Junction Compensator	A-B Part Number 969424–02
Indicators	1 green power status indicator
Flexbus Current	40mA
Power Dissipation	3W maximum @ 31.2V dc
Thermal Dissipation	Maximum 10.2 BTU/hr @ 31.2V dc
Keyswitch Position	3
External dc Power	
Supply	24V dc nominal
Voltage	19.2 to 31.2V dc (includes 5% ac ripple)
Voltage	85mA @ 24V dc
Range	
Supply	
Current	

Specifications continued on next page.

Specifications - 1794-IRT8 RTD/Thermocouple Input Module**General Specifications**

Dimensions	Inches (Millimeters)	1.8H x 3.7W x 2.1D (45.7 x 94.0 x 53.3)
Environmental Conditions		
Operational Temperature		0 to 55°C (32 to 131°F)
Storage Temperature		-40 to 85°C (-40 to 185°F)
Relative Humidity		5 to 95% noncondensing (operating)
		5 to 80% noncondensing (nonoperating)
Shock	Operating	30 g peak acceleration, 11(±1)ms pulse width
	Non-operating	50 g peak acceleration, 11(±1)ms pulse width
Vibration		Tested 5 g @ 10-500Hz per IEC 68-2-6
Conductors	Thermocouple Millivolt Category	Use appropriate shielded thermocouple wire ¹ Belden 8761 2 ²
Agency Certification (when product is marked)		<ul style="list-style-type: none"> • CSA certified • CSA Class I, Division 2 Groups A, B, C, D certified • UL listed • CE marked for all applicable directives
User Manual		Publication 1794-6.5.12

¹ Refer to thermocouple manufacturer for proper thermocouple extension.

² Use this conductor category information for planning conductor routing. Refer to publication 1770-4.1, "Industrial Automation Wiring and Grounding Guidelines for Noise Immunity."

User Manuals

Thank you for purchasing this product. This product has a user manual associated with it. If you would like a manual, you can:

- download a free electronic version from the internet:
www.ab.com/manuals or
www.theautomationbookstore.com
- purchase a printed manual by:
 - contacting your local distributor or Rockwell Automation representative,
 - visiting www.theautomationbookstore.com and placing your order
 - calling 1.800.963.9548 (USA/Canada) or 001.330.725.1574 (Outside USA/Canada)

The publication number of the user manual for your product is listed under “Specifications” in this installation instruction.



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