



High Density Thermocouple Input Module

Product Specifications and Installation Data

1 DESCRIPTION

The Horner APG High Density Thermocouple Input Module offers superior channel density, with 16 input channels per module. This module allows thermocouple temperature sensors to be directly connected to the PLC without external signal processing (transducers, transmitters, etc.). All analog and digital processing of the thermocouple signal is performed on the module. Temperature resolution is 0.5°C, and temperature values may be reported to the PLC %AI I/O table in 0.5°C or 0.5°F increments. This module features open circuit detection, where the %AI register goes to its maximum value upon an open circuit condition, and a corresponding %I bit is energized. Field wiring is connected to a special high density, 32 position removable terminal block. **Recommended wire size is 24 AWG.**

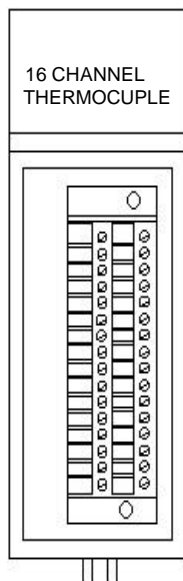


Figure 1 – HE693THM166 (Front View)

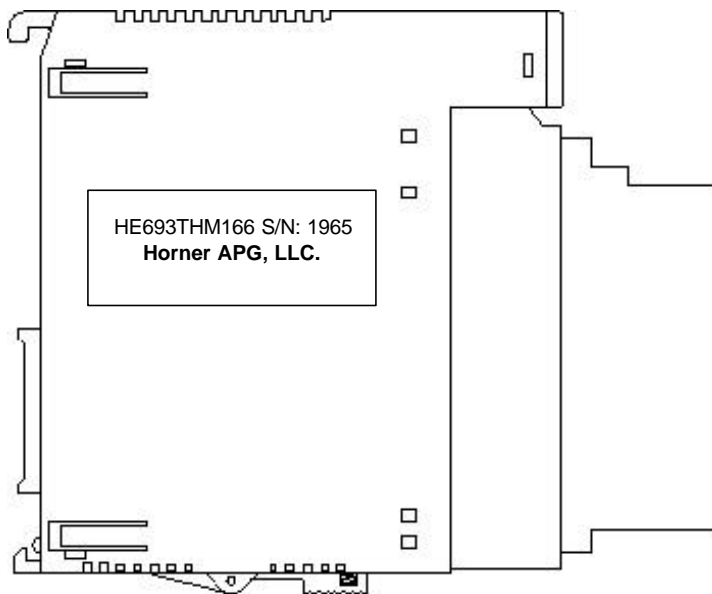


Figure 2 – HE693THM166 (Right Side View)

2 SPECIFICATIONS

Table 1 – HE693THM166					
Specification	THM166			Specification	THM166
Power Consumption	100mA @ 5VDC			I/O Points Required	16 %AI, 16 %I
Number of Channels	16			Input Impedance	20Mohms
Types Supported	J, K, N, T, E, R, S, B, C, X			Maximum Safe Overload	+/- 35V
Input Range (Temp)	J: -210 to +760°C	T: -270 to +400°C	S: 0 to +1768°C	Common Mode Range	+/- 12V
	K: -270 to +1372°C	E: -270 to +1000°C	B: 0 to +1820°C	Common Mode Rejection	>100dB
	* X: -210 to +1200°C (+/- 2°C Maximum.) (Reading not guaranteed below -200°C.)	N: -270 to +1300°C	R: 0 to +1768°C	C: 0 to +2320°C	A/D Conversion Type
				A/D Conversion Time	40 channels per second
Resolution	0.5°C or 0.5°F			Operating Temperature	0 to 60°C (32 to 140°F)
Accuracy	+/- 0.5°C typical (J, K, N, T)			Relative Humidity	5% to 95% non-condensing
*NOTE: Model F and later support the Extended Range Type J (X).					

3 CONFIGURATION

SLOT 2	SOFTWARE CONFIGURATION	
	Catalog #: FOREIGN	FOREIGN MODULE
FRGN	Module ID : 3	
	%I Ref Adr : %I0001	Byte 1 : 00000001
	%I Size : 16	Byte 2 : 10000010
	%Q Ref Adr : %Q0001	Byte 3 : 00
	%Q Size : 0	Byte 4 : 00
	%AI Ref Adr : %AI001	Byte 5 : 00
	%AI Size : 16	Byte 6 : 00
	%AQ Ref Adr : %AQ001	Byte 7 : 00
	%AQ Size : 0	Byte 8 : 00
		Byte 9 : 00
		Byte 10 : 00
		Byte 11 : 00
		Byte 12 : 00
		Byte 13 : 00
		Byte 14 : 00
		Byte 15 : 00
		Byte 16 : 00

Figure 3 - Foreign Module Configuration

To reach this screen, select I/O Configuration (F1), cursor over to the slot containing the module and select Other (F8), and Foreign (F3).

Table 2 – Configuration Parameters								
%AI Size	%I Size	Byte						
		1	2	3	4	5		
16	16	1	(see chart)	0:0.5°C	0	00: J	03: T	06: S
				1:0.5°F		01: K	04: E	07: B
						02: N	05: R	08: C 09: X

Byte 2 sets digital filtering, Byte 3 sets temperature units, and Byte 5 sets the thermocouple type.

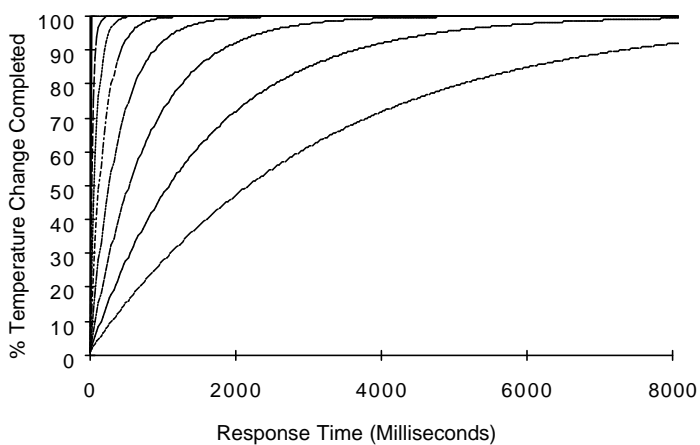


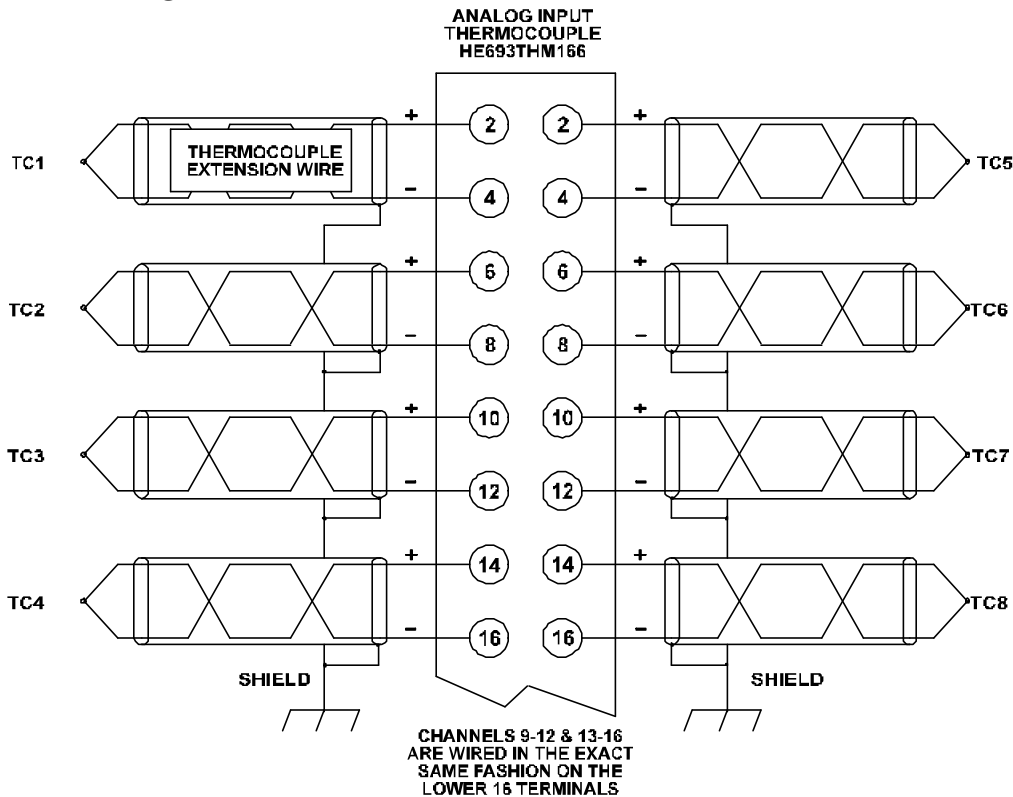
Figure 4 - Digital Filtering

The effect of digital filtering (set with Byte 2) on module response to a temperature change. (% temp change completed vs. time).

Table 3 – Temperature Scaling	
Byte 3	Formula
0	°C = %AI / 2
1	°F = %AI / 2

Temperature values are written to the %AI registers in 0.5°C or 0.5°F increments, depending upon the value of Byte 3.

4 WIRING



5 INSTALLATION AND SAFETY

Special care must be taken with grounded junction sensors to avoid applying a voltage potential to the thermocouple junction.

Extension wire of the proper Thermocouple type must be used. Keep total wire resistance less than 100Ω to maintain rated accuracy.

Route extension wiring in its own conduit. Shielded, twisted pair extension wiring offers best noise immunity.

If shielded wiring is used, a good earth ground connection is critical.

Recommended wire size for terminal strip is 24 AWG.

Adhere to the following safety precautions whenever any type of connection is made to the module.

Connect the green safety (earth) ground first before making any other connections.

When connecting to electric circuits or pulse-initiating equipment, open their related breakers. Do not make connections to live power lines.

Make connections to the module first; then connect to the circuit to be monitored.

Route power wires in a safe manner in accordance with good practice and local codes.

Wear proper personal protective equipment including safety glasses and insulated gloves when making connections to power circuits.

Ensure hands, shoes, and floor are dry before making any connection to a power line.

Make sure the unit is turned OFF before making connection to terminals. Make sure all circuits are de-energized before making connections.

Before each use, inspect all cables for breaks or cracks in the insulation. Replace immediately if defective.

6 TECHNICAL ASSISTANCE

For manual updates and assistance, contact Technical Support at the following locations:

North America:

(317) 916-4274

www.heapg.com

email: techsppt@heapg.com

Europe:

(+) 353-21-4321-266

www.horner-apg.com

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