



# 8-Channel Thermocouple / Millivolt Input Module

HE800THM200 / HE-THM200\*

\* HE- denotes plastic case.

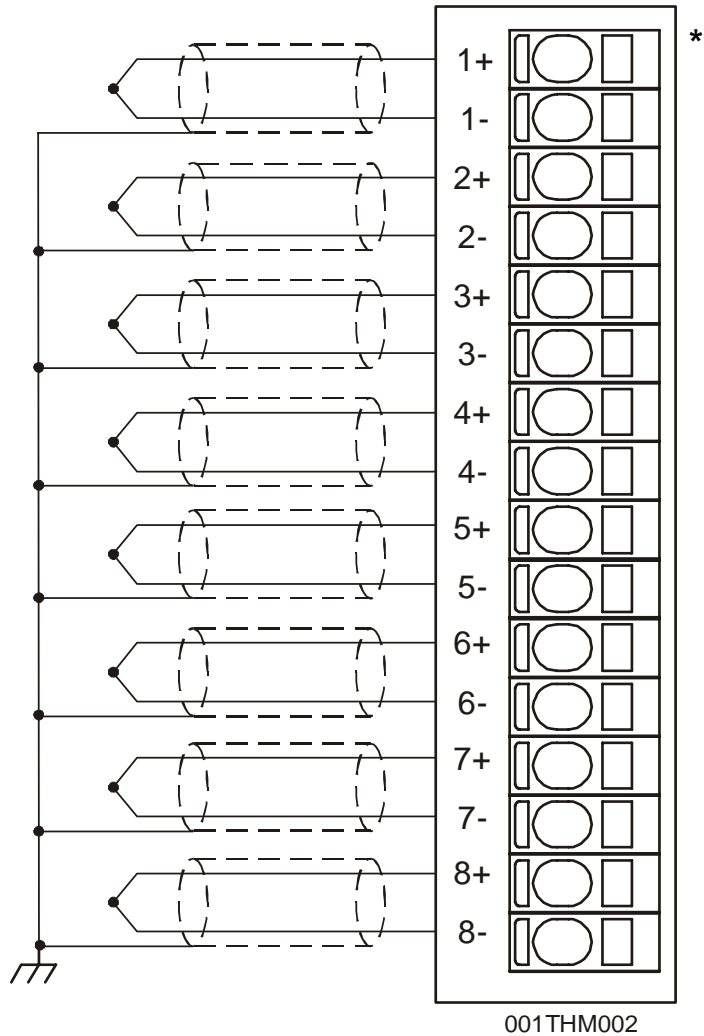


This datasheet also covers products starting with IC300.

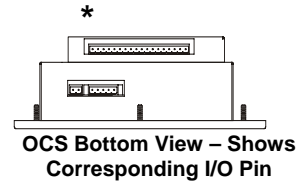
## 1 SPECIFICATIONS

	THM200		THM200		
Number of Channels	8	PLC Update Rate	Set by PLC Scan Rate		
Internal Resolution	0.05°C	Analog Input Points Required	8		
Differential Input Impedance	>20Meg Ohm clamped @ ±24VDC	Cold Junction Compensation	Internal		
A/D Conversion Type	Integrating	Maximum Sustained Differential O/L	Limited by Common Mode Range		
Required Power (Steady State)	1.2W W (50mA @ 24VDC)	Open Thermocouple Response	High Temperature		
Required Power (Inrush)	Negligible	Relative Humidity	5 to 95% Non-condensing		
Types Supported	J,K,T,E,C,R,S	Operating Temperature	0° to 60° Celsius		
Millivolt Ranges	±25mv, ±50mv, ±100mv	Weight	10 oz. (284 g)		
Millivolt Accuracy	0.1% Full Scale	<b>Accuracy</b>			
Common Mode Range	± 10VDC Max.	<b>Note:</b> Accuracy Specifications not guaranteed below -200°C.			
A/D Conversion Time	12 channels per second	Types <b>J,K,T, &amp; E</b>	Type <b>C</b>	Types <b>R &amp; S</b>	
		±1.8° F (±1°C)	± 3.6° F (± 2°C)	± 3.6° F (± 2°C)	
<b>Thermocouple Type:</b>	<b>J</b>	<b>K</b>	<b>T</b>	<b>E</b>	
Input Range Temperature	-210°C to 770°C (-346°F to 1418°F)	-270°C to 1380°C (-454°F to 2516°F)	-270°C to 410 °C (-454°F to 770°F)	-270°C to 1010°C (-454°F to 1850°F)	
	<b>C</b>	<b>R</b>	<b>S</b>		
	0°C to 233°C (32°F to 4226°F)	0°C to 1770°C (32°F to 3218°F)	0°C to 1770°C (32°F to 3218°F)		
CE UL	See Compliance Table at <a href="http://www.heapg.com/Support/compliance.htm">http://www.heapg.com/Support/compliance.htm</a>				

2 WIRING



001THM002



Pin	Signal
	THM200
1+	Thermocouple 1 +
1-	Thermocouple 1 -
2+	Thermocouple 2 +
2-	Thermocouple 2 -
3+	Thermocouple 3 +
3-	Thermocouple 3 -
4+	Thermocouple 4 +
4-	Thermocouple 4 -
5+	Thermocouple 5 +
5-	Thermocouple 5 -
6+	Thermocouple 6 +
6-	Thermocouple 6 -
7+	Thermocouple 7 +
7-	Thermocouple 7 -
8+	Thermocouple 8 +
8-	Thermocouple 8 -

### 3 CONFIGURATION

**Note:** The status of the I/O can be monitored in Cscape Software.

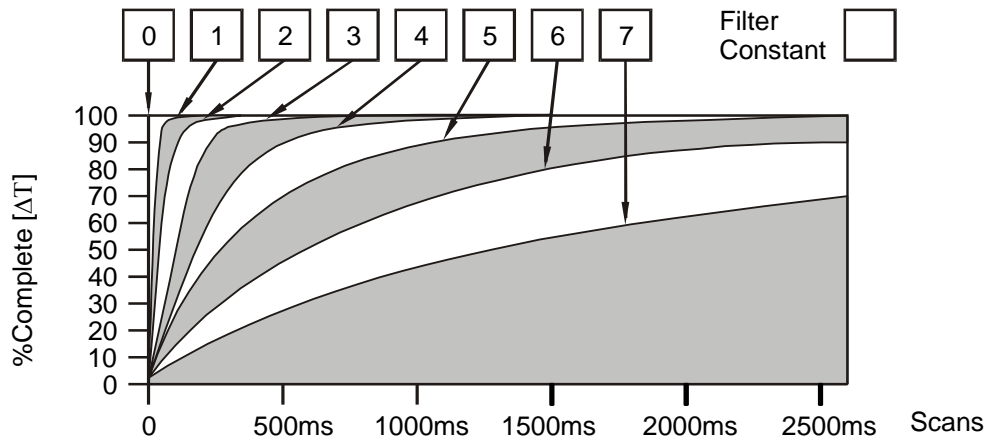
Preliminary configuration procedures that apply to SmartStack™ Modules are contained in the hardware manual of the controller you are using. Refer to the **Additional References** section in this data sheet for a listing of hardware manuals.

#### Module Setup Tab

- a) Sensor Type for each channel must match what is physically attached.
- b) Temperature Format may be set for various C° or F° ranges. (This does not apply to millivolt ranges.)
- c) Filter Constant sets the level of digital filtering according to the chart below.
- d) Reject Rate sets the frequency level for noise rejection at 50 or 60HZ.

#### I/O Map Tab

The I/O Map describes which I/O registers are assigned to a specific SmartStack™ Module and where the module is located in the point map. The I/O Map is determined by the model number and location within the SmartStack™. The I/O Map is not edited by the user.



**Digital Filtering.** The illustration above demonstrates the effect of digital filtering (set with Filter Constant) on module response to a temperature change.

## 4 INPUT AND OUTPUT CONVERSIONS

For a given module configuration, use the appropriate formula in the table to obtain the actual temperature (°C or °F) that is represented by the value in the %AI register.

Thermocouple Configuration	Temperature Conversion	
	Celsius	Fahrenheit
0.05°	°C = %AI / 20 *	°F = %AI / 20 *
0.1°	°C = %AI / 10 **	°F = %AI / 10 **
0.5°	°C = %AI / 2	°F = %AI / 2
* Maximum reading in 0.05°F or 0.05°C format is limited to 1638.3 because of %AI resolution.		
** Maximum reading in 0.1°F or 0.1°C format is limited to 3276.7 because of %AI resolution.		

The following table describes how real-world inputs are scaled into the controller. Given a known input voltage, the data value is configured by using the conversion factor from the table. The following formula is used: **Data = Voltage In (Vin) / Conversion Factor**

**Example:** The user selects a voltage of 25mV.

- 1) The known input voltage is 25mV.
- 2) Using the table, the conversion factor for the voltage range of ± 25mV is 0.00078125.
- 3) To determine the data value, the formula is used:  

$$\text{Data} = \text{Vin} / \text{Conversion Factor}$$

$$32000 = 25\text{mV} / 0.00078125$$

Conversion of Real-World Inputs to the Controller			
	%AI Value		
Selected Voltage Range	Voltage In (Vin) VDC	Data Out	Conversion Factor
± 25mv	-25mv	-32000	0.00078125
	0	0	
	+25mv	+32000	
± 50mv	-50mv	-32000	0.0015625
	0	0	
	+50mv	+32000	
± 100mv	-100mv	-32000	0.003125
	0	0	
	+100mv	+32000	

## 5 INSTALLATION / SAFETY

**Warning:** Remove power from the OCS controller, CAN port, and any peripheral equipment connected to this local system before adding or replacing this or any module

- a) All applicable codes and standards should be followed in the installation of this product.
- b) Shielded, twisted-pair wiring should be used for best performance.
- c) Shields are to be terminated to frame ground.
- d) In severe applications, shields should be tied directly to the ground block within the panel.
- e) Ungrounded thermocouple sensors are preferred due to their isolated electrical characteristics
- f) Interposing terminal strips between the sensor and the module can cause errors due to cold junction effect.
- g) If Interposing terminal strips must be used, use specially constructed terminal blocks, which match the material characteristics of the thermocouple sensor.
- h) Horner thermocouple input modules use a high impedance differential circuit to support the use of grounded or ungrounded thermocouples. For grounded thermocouples, the specified **Common Mode Range** allows for ground potential differences between the machine ground and the PLC ground within that range. For ungrounded or floating thermocouples the high impedance inputs are subject to common mode noise pickup. For noisy environments it is recommended that one side of all ungrounded thermocouples be grounded near the PLC. This does not affect open thermocouple detection or measurement accuracy and reduces the effect of common mode noise if present. This PLC side ground connection must not be used with grounded thermocouples or accuracy will be affected. Any thermocouple should be grounded in one place at most.

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the **Additional References** section in this document.)

When found on the product, the following symbols specify:



**Warning:** Consult user documentation.



**Warning:** Electrical Shock Hazard.

WARNING: To avoid the risk of electric shock or burns, always connect the safety (or earth) ground before making any other connections.

WARNING: To reduce the risk of fire, electrical shock, or physical injury it is strongly recommended to fuse the voltage measurement inputs. Be sure to locate fuses as close to the source as possible.

WARNING: Replace fuse with the same type and rating to provide protection against risk of fire and shock hazards.

WARNING: In the event of repeated failure, do not replace the fuse again as a repeated failure indicates a defective condition that will not clear by replacing the fuse.

WARNING: Only qualified electrical personnel familiar with the construction and operation of this equipment and the hazards involved should install, adjust, operate, or service this equipment. Read and understand this manual and other applicable manuals in their entirety before proceeding. Failure to observe this precaution could result in severe bodily injury or loss of life.

For detailed installation and a handy checklist that covers panel box layout requirements and minimum clearances, refer to the hardware manual of the controller you are using. (See the **Additional References** section in this document.)

- All applicable codes and standards need to be followed in the installation of this product.
- For I/O wiring (discrete), use the following wire type or equivalent: Belden 9918, 18 AWG or larger.

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 ADDITIONAL REFERENCES

The following information serves as a *general* listing of Horner controller products and other references of interest and their corresponding manuals numbers. Visit our website listed in the **Technical Support** section to obtain user documentation and updates.

<b>Note:</b> This list is <u>not</u> intended for users to determine which products are appropriate for their application; controller products differ in the features that they support. If assistance is required, see the <b>Technical Support</b> section in this document.	
<b>Controller</b>	<b>Manual Number</b>
XLE Series (e.g., HE-XExxx)	MAN0805
QX Series (e.g., HE-QXxxx)	MAN0798
NX Series (e.g., HE-NXxxx)	MAN0781
LX Series (e.g., LX-xxx; also covers RCS116)	MAN0755
Color Touch OCS (e.g., OCSxxx)	MAN0465
OCS (Operator Control Station) (e.g., OCS1xx / 2xx; Graphic OCS250)	MAN0227
Remote Control Station (e.g., RCS2x0)	
MiniOCS (e.g., HE500OCSxxx, HE500RCSxxx)	MAN0305
<b>Other Useful References</b>	
CAN Networks	MAN0799
Cscape Programming and Reference	MAN0313
Wiring Accessories and Spare Parts Manual	MAN0347
DeviceNet™ Implementation	SUP0326
Wiring Accessories and Spare Parts Manual	MAN0347

## 7 TECHNICAL SUPPORT

For assistance and manual up-dates, contact Technical Support at the following locations:

**North America:**  
(317) 916-4274  
[www.heapg.com](http://www.heapg.com)

**Europe:**  
(+) 353-21-4321-266  
[www.horner-apg.com](http://www.horner-apg.com)