User Manual for the
HE693RTD600,
HE693RTD601

Resistance Temperature Device Input Module

20 August 2014 **MAN0073-12**

PREFACE

This manual explains how to use the Horner APG's Resistance Temperature Device Input Module.

For user manual updates, contact Horner APG, Technical Support Division, at (317) 916-4274 or visit our website at www.heapg.com.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

Horner APG, LLC, Inc. ("HE") warrants to the original purchaser that the Resistance Temperature Device Input module manufactured by HE is free from defects in material and workmanship under normal use and service. The obligation of HE under this warranty shall be limited to the repair or exchange of any part or parts which may prove defective under normal use and service within two (2) years from the date of manufacture or eighteen (18) months from the date of installation by the original purchaser whichever occurs first, such defect to be disclosed to the satisfaction of HE after examination by HE of the allegedly defective part or parts. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE AND OF ALL OTHER OBLIGATIONS OR LIABILITIES AND HE NEITHER ASSUMES, NOR AUTHORIZES ANY OTHER PERSON TO ASSUME FOR HE, ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS Resistance Temperature Device Input module. THIS WARRANTY SHALL NOT APPLY TO THIS Resistance Temperature Device Input module OR ANY PART THEREOF WHICH HAS BEEN SUBJECT TO ACCIDENT, NEGLIGENCE, ALTERATION, ABUSE, OR MISUSE. HE MAKES NO WARRANTY WHATSOEVER IN RESPECT TO ACCESSORIES OR PARTS NOT SUPPLIED BY HE. THE TERM "ORIGINAL PURCHASER", AS USED IN THIS WARRANTY, SHALL BE DEEMED TO MEAN THAT PERSON FOR WHOM THE Resistance Temperature Device Input module IS ORIGINALLY INSTALLED. THIS WARRANTY SHALL APPLY ONLY WITHIN THE BOUNDARIES OF THE CONTINENTAL UNITED STATES.

In no event, whether as a result of breach of contract, warranty, tort (including negligence) or otherwise, shall HE or its suppliers be liable of any special, consequential, incidental or penal damages including, but not limited to, loss of profit or revenues, loss of use of the products or any associated equipment, damage to associated equipment, cost of capital, cost of substitute products, facilities, services or replacement power, down time costs, or claims of original purchaser's customers for such damages.

To obtain warranty service, return the product to your distributor with a description of the problem, proof of purchase, post paid, insured and in a suitable package.

ABOUT PROGRAMMING EXAMPLES

Any example programs and program segments in this manual or provided on accompanying diskettes are included solely for illustrative purposes. Due to the many variables and requirements associated with any particular installation, Horner APG cannot assume responsibility or liability for actual use based on the examples and diagrams. It is the sole responsibility of the system designer utilizing the Resistance Temperature Device Input module to appropriately design the end system, to appropriately integrate the Resistance Temperature Device Input module and to make safety provisions for the end equipment as is usual and customary in industrial applications as defined in any codes or standards which apply.

Note: The programming examples shown in this manual are for illustrative purposes only. Proper machine operation is the sole responsibility of the system integrator.

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CHAPTER 1: DESCRIPTION

1.1 Product Description

1.1.1 The RTD Input Modules allow RTD temperature sensors to be directly connected to the PLC without external signal processing (transducers, transmitters, etc.). All analog and digital processing of the RTD signal is performed on the module, and temperature values in 0.5°C or 0.5°F increments (RTD600) or 0.125°C, 0.1°C or 0.1°F (RTD601) increments are written to the 90-30 %AI input table. All modules feature six channels, and support PT-90 (MIL-7990); PT-100E, PT-100C, and PT-100Z; Ni-120, Cu-10, Cu-50, Cu-53, Cu-100, Pt-1000, TD5R and Linear Resistance.

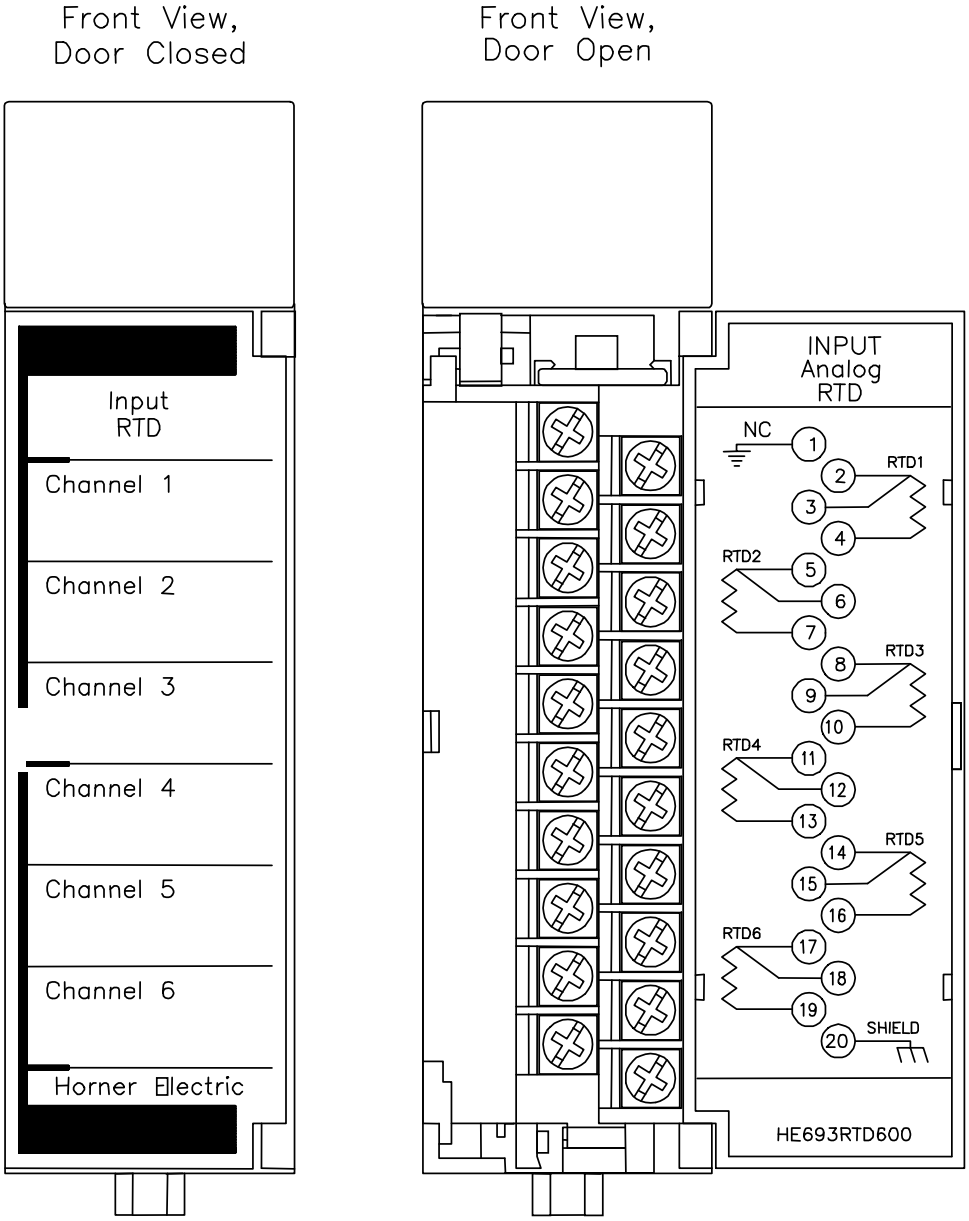

Figure 1.1 – Front View

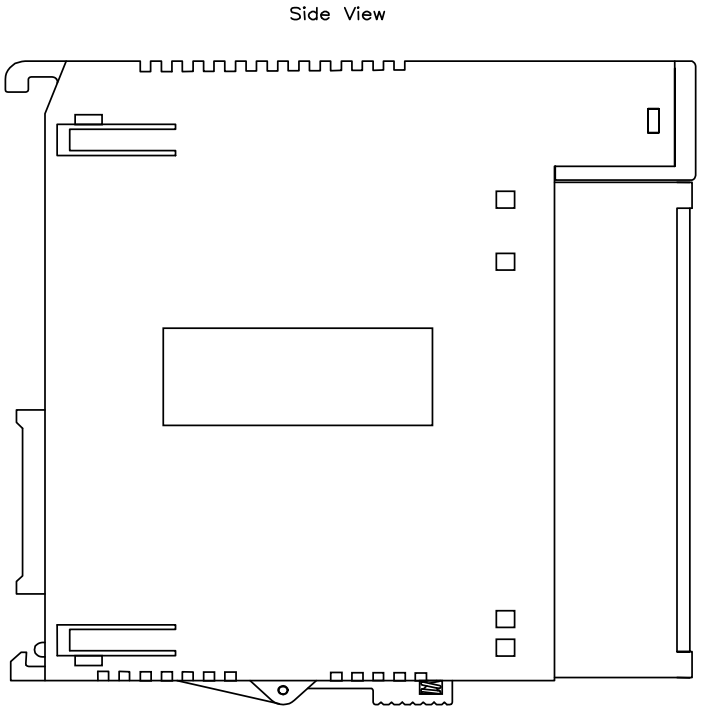

Figure 1.2 – Side View

1.2 Specifications

Table 1.1 - HE693RTD600/601 Specifications					
Power Consumption (Typical)		75mA @ 5VDC	**Number of Channels**	6	
Types Supported	**Pt-100E** alpha=.00385	-100 to 850°C	**I/O Points Required**	6%AI	
	Pt-100C alpha=.003902	-100 to 650°C	**Input Impedance**	>1000 Meg Ω	
	Pt-100Z alpha=.03906	-200 to 300°C	**Fault Protection**	Zener Diode Clamp	
	Pt-1000	-100 to 850°C	**A/D Conversion Type**	16 bit, Integrating	
	Cu-10	-200 to 260°C	**Update Time**	50 Channels per second	
	Cu-50	0 to 100°C	**Average RTD current, PT-100**	330 microamps	
	Cu-53	-200 to 260°C	**Channel to Channel Tracking**	0.1°C	
	Cu-100	-200 to 200°C	**Resolution**	0.5°C or 0.5°F	0.125°C, 0.1°C,or0. 1°F
	Ni-120	-100 to 270°C	**Accuracy**	± 0.5°C typical, ± 1.0°C for Cu-10 and TD5R	
	Linear	0 to 200Ω	**Operating Temperature**	0 to 60°C (32° to 140°F)	
	TD5R	-40 to 150°C	**Relative Humidity**	5% to 95% non-condensing	
	Pt-90 (MIL-7990)	-50 to 200°C	**Platform Support (Hardware Revision)**	Rev R and Prior	Later Revisions
				90-30 Only	90-30 and RX3i Platforms

CHAPTER 2: CONFIGURATION

2.1 General

2.1.1 Chapter Two describes the procedures and set-up for I/O configuration using LogicMaster™ software.

2.2 Configuration

1. Upon entering the LogicMaster™ 90 Software, select '**LogicMaster Configuration Package**' **(F2)** from the menu.

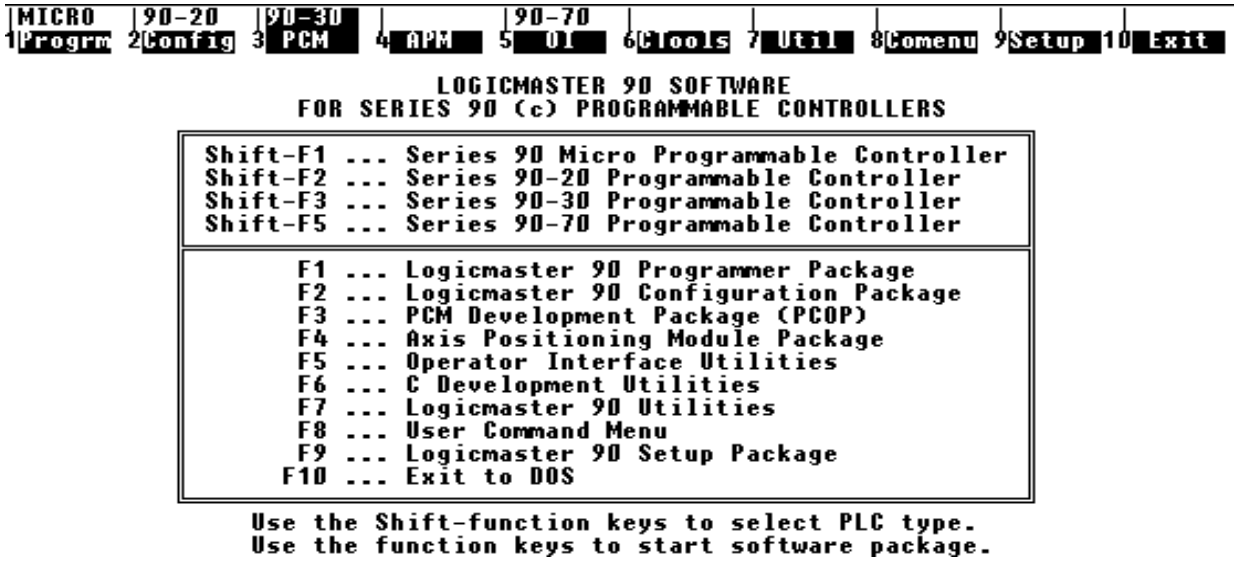

Figure 2.1 – Default Screen

2. To reach the configuration screen, select '**I/O Configuration**' **(F1)**, from the menu

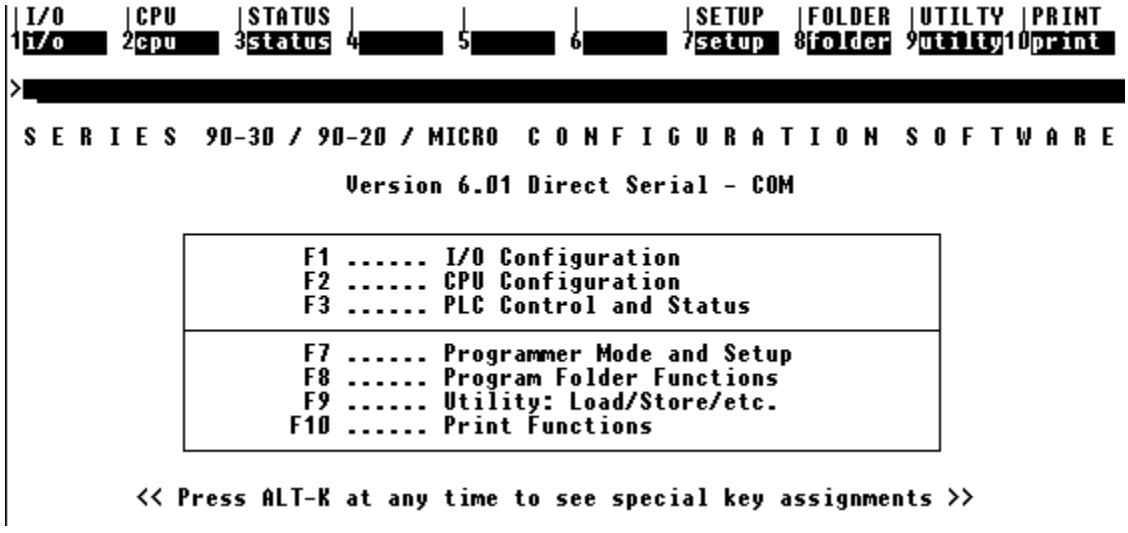

Figure 2.2 – Configuration Screen

3. Move cursor to the designated slot containing the module and select '**Other**' **(F8).**

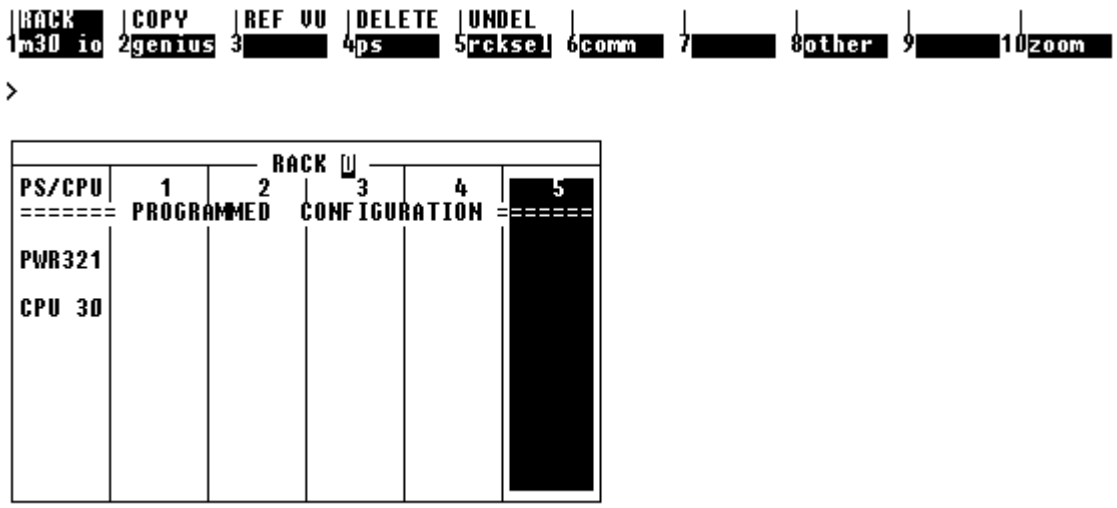

Figure 2.3 – Rack Configuration

4. From the following screen, select '**Foreign**' **(F3).**

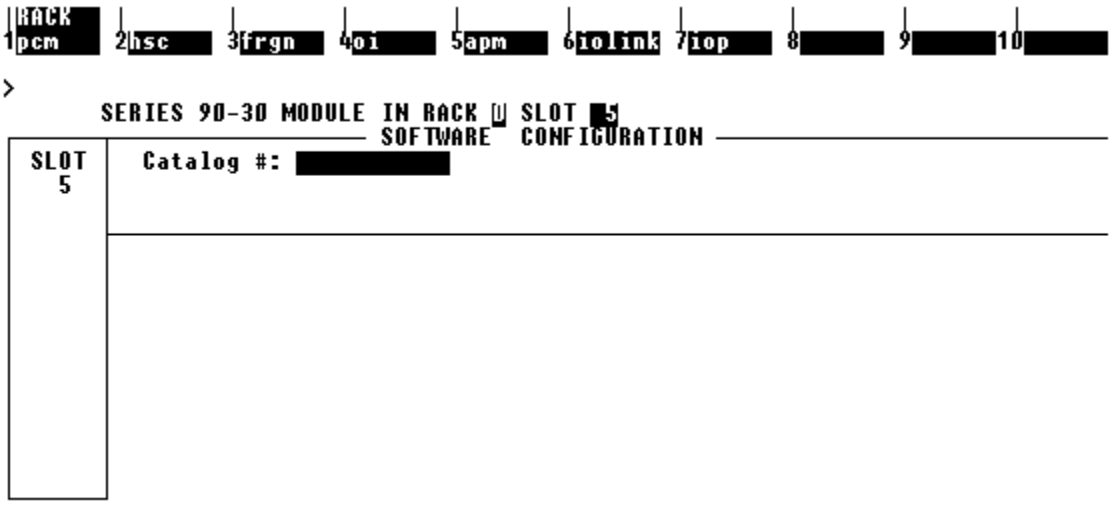

Figure 2.4 – Slot Configuration

5. The screen (shown in Figure 2.5) should appear:

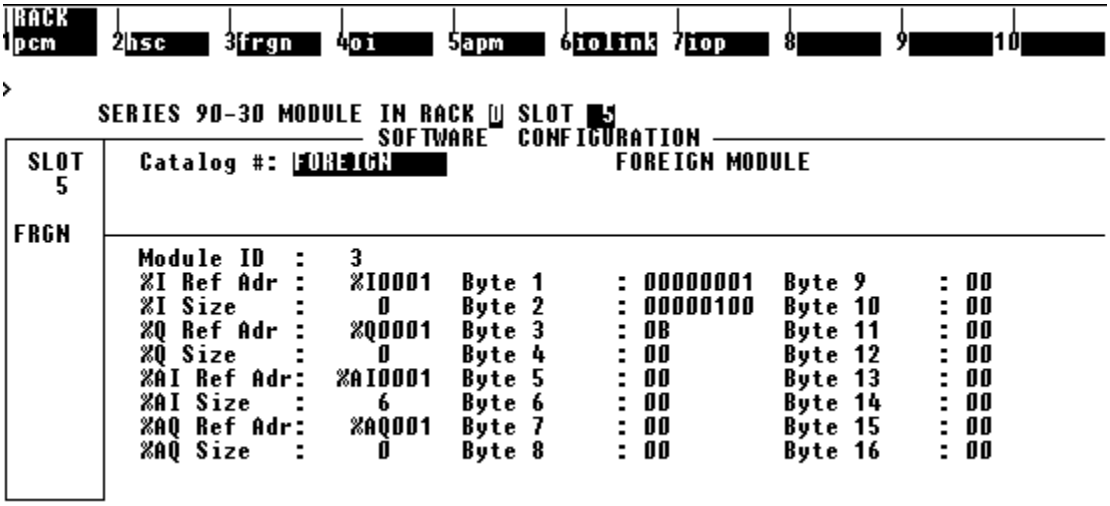

Figure 2.5 – Module Configuration

2.2.1 Configuration Parameters

2.2.1.1 Tables 2.1 and 2.2 indicate the five necessary parameters for configuring the HE693RTD600 and the HE693RTD601 respectively. The parameters include % AI Size, Byte 1, Byte 2, Byte 3, and Byte 4.

2.2.1.2 Change the various bytes (1-4) and set %AI to ‘6’ to reach the desired set-up.

Table 2.1 – Configuration Parameters for RTD 600

%AI Size	Byte 1	Byte 2	Byte 3	Byte 4
6	0001	0000 thru 0111 (see chart)	00=Pt-100E	00=0.5°C 01=0.5°F
			01=Ni-120	
			02=Pt-100C	
			03=Cu-10	
			04=LIN100	
			05=Pt-1000	
			06=TD5R	
			07=Pt-100Z	
			08=Cu-50	
			09=Cu-53	
			0A=Cu-100	
			0B=Pt-90	

Table 2.2 – Configuration Parameters for RTD601				
%AI Size	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**
6	0001	0000 thru 0111 (see chart)	00=Pt-100E 01=Ni-120 02=Pt-100C 03=Cu-10 04=LIN100 05=Pt-1000 06=TD5R 07=Pt-100Z 08=Cu-50 09=Cu-53 0A=Cu-100 0B=Pt-90	00=0.125°C 01=0.1°C 02=0.1°F

2.2.2 Digital Filtering

2.2.2.1 The effect of digital filtering (on the HE693RTD600/601module) in response to a temperature change is graphically represented in Figure 2.6. (*%temp change completed vs. time*). Byte 2 sets the amount of digital filtering.

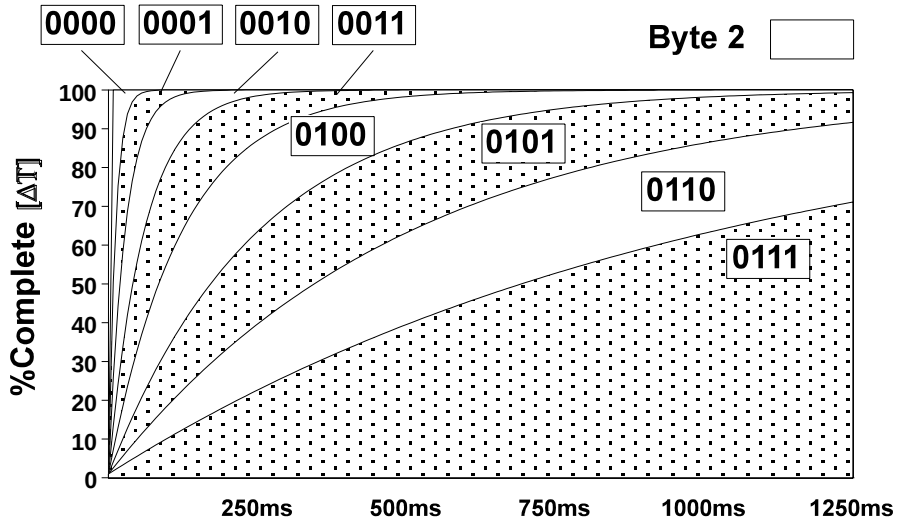

Figure 2.6 - The Effects of Digital Filtering

2.2.3 Temperature Scaling

2.2.3.1 The Resistance Temperature Device reports values to the %AI table in 0.5, 0.125, or 0.1 increments in either °C or °F. Conversion to actual degrees can be calculated using Table 2.3.
Note: the module configuration depends on the parameter assigned to Byte 4.

Table 2.3 - Temperature Scaling	
Module Configuration	**Temperature Conversion**
0.5°C	°C=%AI/2
0.5°F	°F=%AI/2
0.125°C	°C=%AI/8
0.1°C	°C=%AI/10
0.1°F	°F=%AI/10
LIN100 reports 128 counts per 1Ω.	

Examples:

If %AI2 equals Channel 2 on the RTD module, and %AI2 equals 1,000, the temperature reading is T=100°C (format .1°C).

If %AI2equals 1,000 and Byte 4 equals 00 (.125°C or 1/8), the temperature is T=125°C.

NOTES

CHAPTER 3: WIRING & INSTALLATION

3.1 Wiring Diagram for the RTD Terminal Block Connection

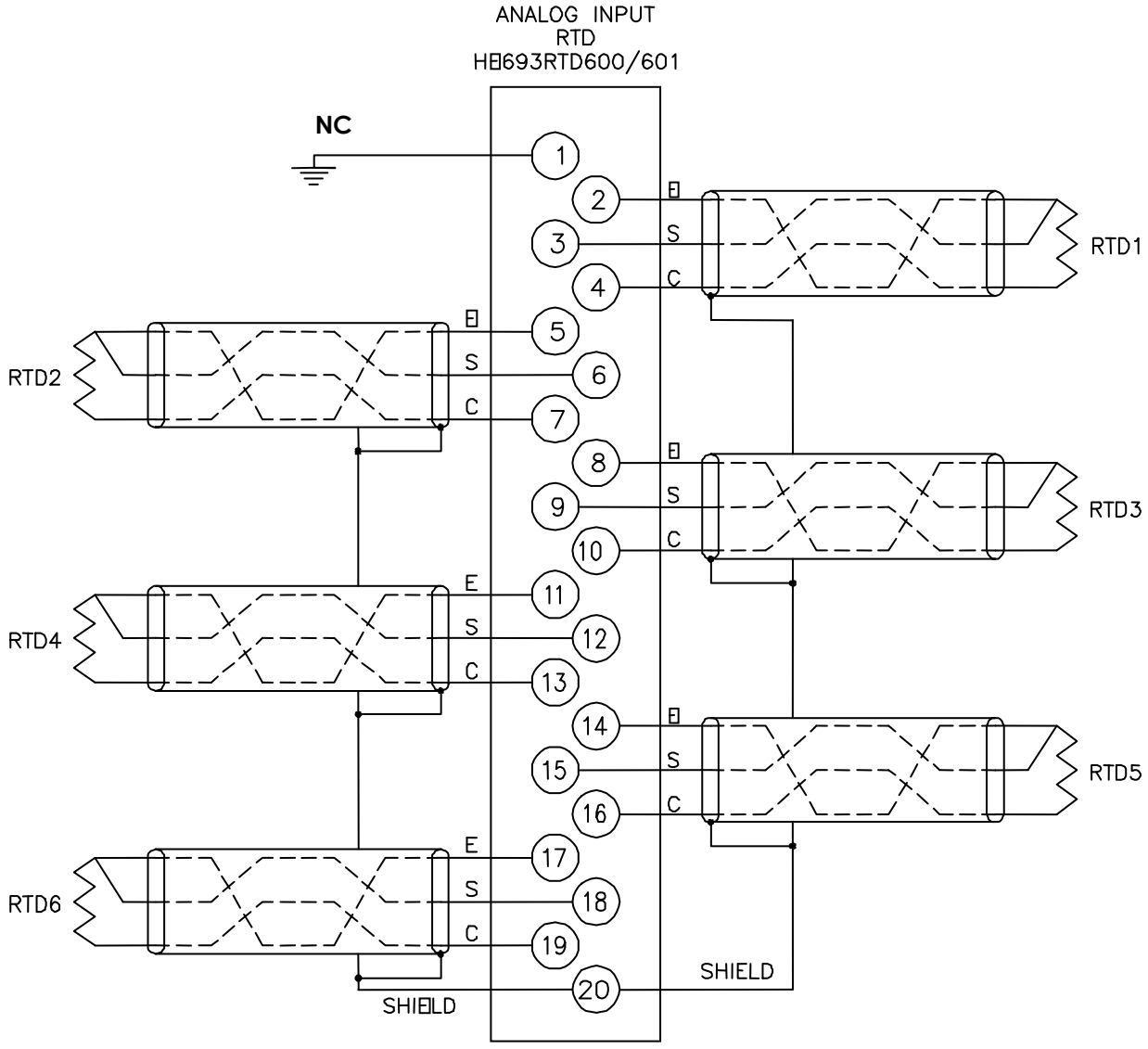

Figure 3.1 – Wiring Diagram

3.1.1 Three-Wire Connection

3.1.1.1 Figure 3.2 shows how to make a three-wire connection with an RTD module. (Refer to Figure 3.1.)

Figure 3.2 – Three-Wire Connection

3.1.2 Two-Wire Connection

3.1.2.1 Figure 3.3 shows how to make a two-wire connection with an RTD module. (Refer to the Figure 3.1.)

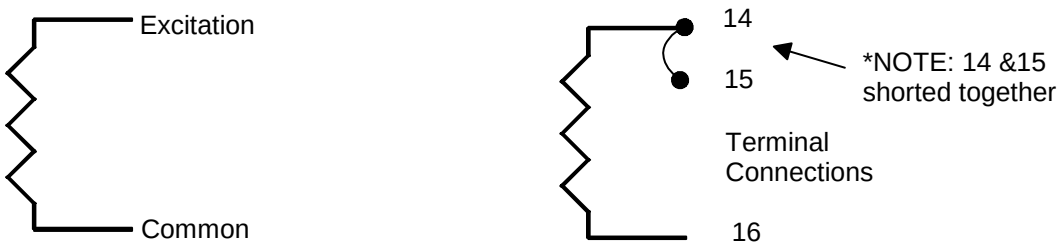

Figure 3.3 – Two-Wire Connection

NOTE: Two-wire RTDs are supported, but accuracy may vary.
Four-Wire RTDs are <u>NOT</u> supported

3.2 Installation Requirements

a. Wiring should be routed in its own conduit.
b Shielded, twisted wiring offers the best noise immunity.
c. If shielded wiring is used, a good earth ground connection (on one end only) is critical.
c. If shields are connected at the module end, terminals 1 or 20 may be used as the shield ground point.
d. The lead resistance of each wire should be no more than 50Ω.
e. All unused channels should be shorted together and connected to pins 1 or 20.