RTD Input Module

Product Specifications and Installation Data

1   DESCRIPTION

The HE693RTD720 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 0.125°C, 0.1°C, 0.5°C, 0.1°F or 0.5°F increments are written to the 90-30 %AI input table. The module features six channels, and supports PT-100 (platinum, 100Ω at 0°C), Ni-120 (nickel, 120Ω at 0°C), Cu-10 (Copper, 10Ω at 25°C) or Pt-1000 (platinum, 1000Ω at 0°C). This module has been specially coated and potted for environmental considerations.
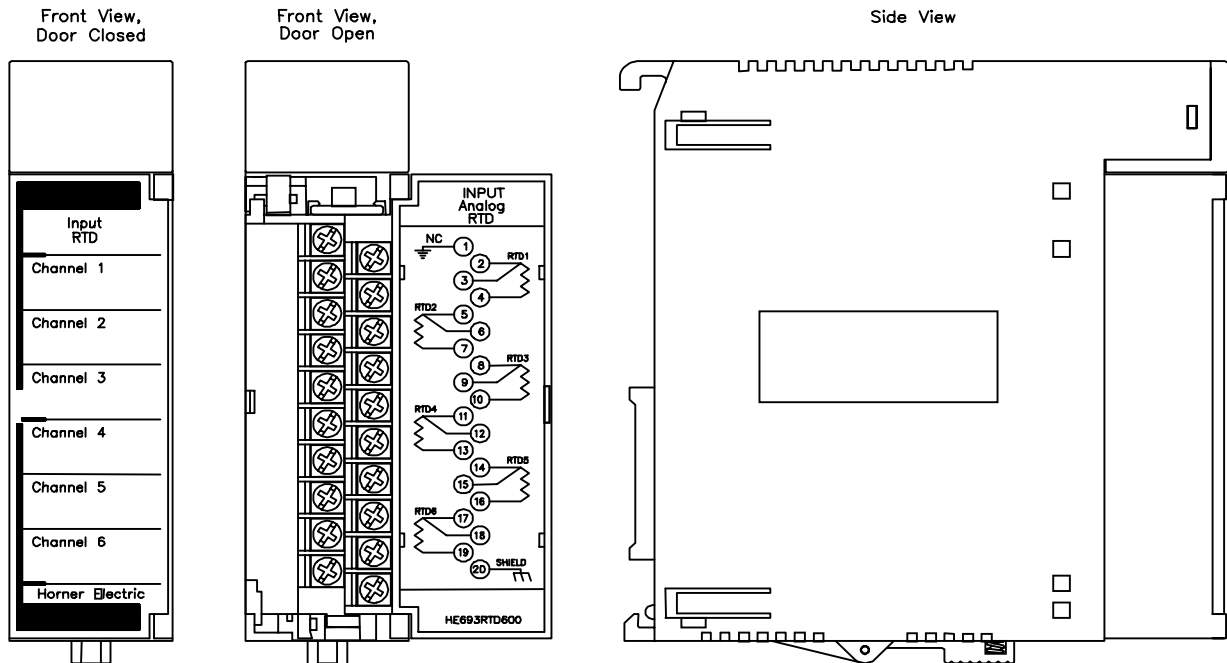
2   INSTALLATION

Figure 1 – HE693RTD720

3   SPECIFICATIONS

Table 1 – RTD720 Specifications			
Power Consumption (typical)	75mA @ 5VDC	**I/O Points Required**	6%AI
Number of Channels	6	**Input Impedance**	>1000 Megohms
Types Supported **Pt-100E**	-100 to 850°C	**Fault Protection**	Zener Diode Clamp
Pt-100C	-100 to 650°C	**A/D Conversion Type**	18 bit, Integrating
Ni-120	-100 to 270°C	**Update Time**	50 Channels per second
Cu-10	-200 to 260°C	**Average RTD current, Pt-100**	330 microamps
Pt-1000	-100 to 850°C	**Channel to Channel Tracking**	0.1°C
Resolution	0.125°C, 0.1°C, 0.5°C, 0.1 °F or 0.5°F	**Operating Temperature**	0 to 60°C (32 ti 140°F)
Accuracy	±0.5°C, typical	**Relative Humidity**	5% to 95% non-condensing

4   CONFIGURATION

4.1   Configuration Procedure

```
SERIES 90-30 MODULE IN RACK 0 SLOT 2
                 SOFTWARE  CONFIGURATION
 SLOT   Catalog #: FOREIGN                  FOREIGN MODULE
  2

 FRGN
        Module ID  :   3
        %I Ref Adr :  %I0001   Byte 1  : 00000001   Byte 9   : 00
        %I Size    :     0     Byte 2  : 00000100   Byte 10  : 00
        %Q Ref Adr :  %Q0001   Byte 3  : 00         Byte 11  : 00
        %Q Size    :     0     Byte 4  : 00         Byte 12  : 00
        %AI Ref Adr:  %AI001   Byte 5  : 00         Byte 13  : 00
        %AI Size   :     6     Byte 6  : 00         Byte 14  : 00
        %AQ Ref Adr:  %AQ001   Byte 7  : 00         Byte 15  : 00
        %AQ Size   :     0     Byte 8  : 00         Byte 16  : 00
```

Figure 2 – Foreign Module Configuration Screen

To reach the Foreign Module Configuration screen:

a. Select I/O Configuration (F1).
b. Cursor over to the slot containing the module and select Other (F8), and Foreign (F3).
c. Set parameters (refer to Table 1).

4.1.1   Configuration Parameters

Table 1 indicates the five necessary parameters for configuring the HE693RTD720 (refer to Figure 1). Change the various bytes (1-4) and set %AI to "6" to reach the desired set-up.

Table 2 – Configuration Parameters for RTD720					
%AI Size	**Byte 1**	**Byte 2**	**Byte 3**	**Byte 4**	**Byte 5**
6	0001	0000 thru 0111 (see chart)	00=Pt-100 01=Ni-120 02=Pt-100 03=Cu-10 04=Reserved 05=Pt-200	00=0.5°C 01=0.5°F 02=0.125°C 03=0.1°C 04=0.1°F	00 through 0A See dwell table.

4.1.2   Digital Filtering (Byte 2)

Figure 3 indicates the effect of digital filtering (set with Byte 2 from Table 1) on module response to a temperature change. *(% temp change completed vs. time).*
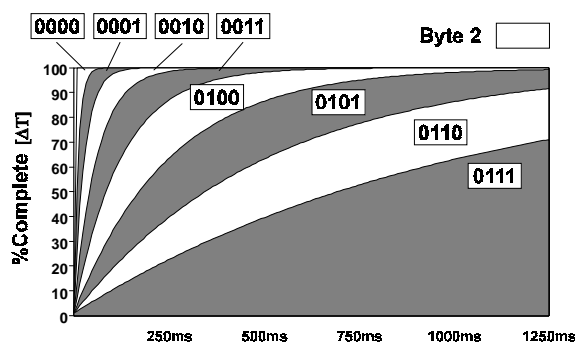

Figure 3 – Digital Filtering

4.1.3   Temperature Scaling (Byte 4)

The RTD module reports values to the %AI table in 0.125 or 0.1 increments in either °C or °F (set with Byte 4 from Table 1). Conversion to actual degrees is shown in Table 2.

Table 3 – Temperature Scaling	
Module Configuration	**Temperature Conversion**
0.125°C	°C = %AI / 8
0.1°C	°C = %AI / 10
0.1°F	°F = %AI / 10
0.5°C	°C = %AI / 2
0.5°F	°F = %AI / 2
Note: The above values occur during normal operation. If a wiring fault occurs, refer to Table 5.	

4.1.4 Channel Dwell Time (Byte 5)

The RTD720 module multiplexes a single excitation current source between the six channels to improve channel to channel temperature tracking and to lower the average RTD current to reduce RTD self-heating errors. Each channel is normally driven for 22 milliseconds. For some applications such as electronic RTD simulators and other time dependent RTD sources, the channel dwell time can be insufficient. Byte 5 of the configuration can be used to increase this time as shown in Table 4. Longer channel dwell times increase the total scan time proportionally.

Table 4 – Channel Dwell Time vs. Byte 5 Value	
Byte 5	Seconds
00	0.022
01	0.044
02	0.088
03	0.175
04	0.350
05	0.700
06	1.400
07	2.800
08	5.600
09	11.20
0A	22.40

5 WIRING

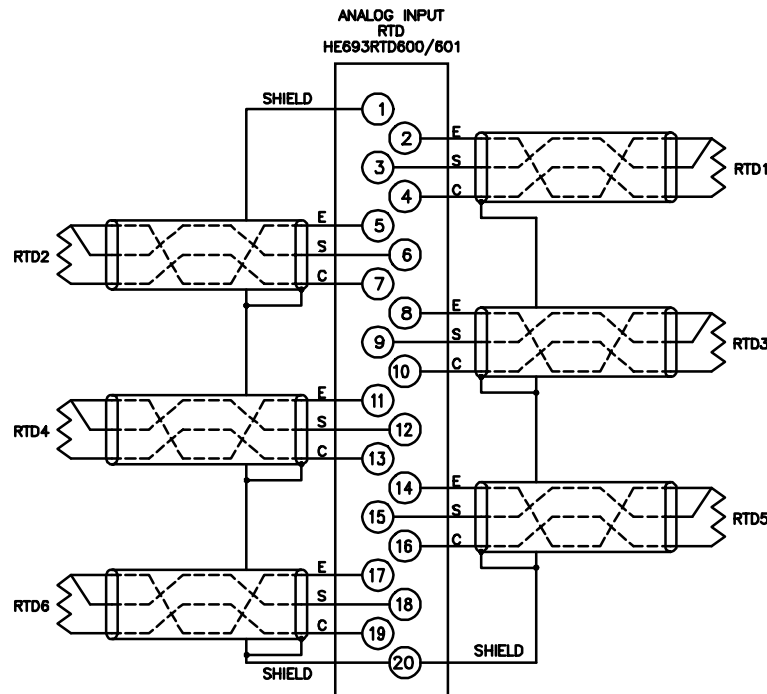### 5.1.1 Wiring Diagram

Figure 4 – Wiring Diagram

5.1.2 Wiring Installation Hints

Wiring must be routed in its own conduit.

Shielded, twisted wiring offers the best noise immunity.

If shielded wiring is used, a good earth ground connection (on one end only) is critical. If shields are connected at the module end, terminals 1 or 20 can be used as the shield ground point.

For proper RTD lead resistance compensation, the lead resistances must be matched and must be no more than 50 ohms each.
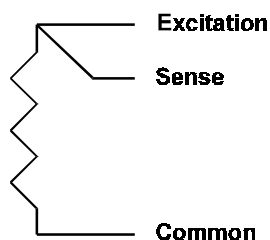
5.1.3 Wiring Fault Conditions

Figure 5 – Temperature Sensor

Figure 5 depicts a close-up view of the temperature sensor wiring. Consult Table 5 for wiring fault conditions.

Table 5 – Wiring Fault Conditions	
Fault Condition	**%AI Value**
Short Circuit	Low Limit
Excitation Open	Low Limit
Sense Open	Low Limit
Common Open	High Limit

6   TECHNICAL ASSISTANCE

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

7   REVISIONS TO THIS DATA SHEET

This version of the data sheet for the HE693RTD720 contains the following revisions and additions:

1. Revised temperature values in Section 1. (Added 0.5°C and 0.5°F.)
2. Revised Resolution and Accuracy parameters in Table 1.
3. Revised Byte 4 and Byte 5 parameters in Table 2.
4. Revised Temperature parameters in Table 3. (Added 0.5°C and 0.5°F.)
5. Revised Table 4 (Byte 5 parameters) and added "OA" parameter.