LONWORKSTM MODULE
THERMOCOUPLE OR RTD INPUT

This instruction contains installation and servicing procedures for the LonWorks module(s) listed in the table below. Acromag, Inc. manufactures the module(s). The table provides the module description, the Moore part number, and the equivalent Acromag model number.

<table>
<thead>
<tr>
<th>MODULE DESCRIPTION</th>
<th>MOORE P/N</th>
<th>ACROMAG MODEL NUMBER</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Channel TC or RTD Input Module</td>
<td>27005-4</td>
<td>550L3-502-TEMPMR-10-NCR</td>
</tr>
</tbody>
</table>

Two major sections are found in this Instruction. General information on a LonWorks module ordered from Moore is located in this section. The Acromag User's Manual for the module is the second section.

Go to the Acromag section of this Instruction to install or calibrate a module. For product support or repair, read the following paragraphs. These statements supersede or amend similar information in the Acromag section.

PRODUCT SUPPORT

Product support can be obtained from a Technical Information Center (TIC). Each regional TIC is a customer service center that provides direct telephone support on technical issues related to the functionality, application, and integration of all products supplied by Moore. Regional TIC contact information is provided in the following table. Your regional TIC is the first place you should call when seeking product support information. When calling, it is helpful to have the following information ready:

- Caller ID number or name and company name - When you call for support for the first time, a personal caller number is assigned. Having the number available when calling for support will allow the TIC representative taking the call to use the central customer database to quickly identify the caller's location and past support needs.

- Product part number or model number and version

- If there is a problem with product operation:
  - Whether or not the problem is intermittent
  - The steps performed before the problem occurred
  - Any error messages or LED indications displayed
  - Installation environment

Customers that have a service agreement (ServiceSuite or Field Service Agreement) are granted access to the secure area of our Web site (www.mooreproducts.com/techservices). This area contains product support information. To log on, you will be prompted to enter your username and password.
TIC North America also offers a free faxback service called FaxRequest. You can dial-in to this service to access documents such as press releases, product information sheets, and training schedules. The service is completely automated and available 24 hours a day. To access this service, call the FaxRequest number listed in the tables below. The first document you should request is the directory (document number 9999). This document is updated as new documents are added. Each document has a number code assigned to it that you enter along with your fax number (area code entry is always required). Upon completing your entry, the FaxRequest computer automatically calls your fax machine and sends the requested documents.

<table>
<thead>
<tr>
<th>TIC NORTH AMERICA</th>
<th>Tel: +1 215 646 7400, extension 4842, option 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fax:</td>
<td>+1 215 283 6343</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:ticgroup@mpco.com">ticgroup@mpco.com</a></td>
</tr>
<tr>
<td>FaxRequest:</td>
<td>+1 215 646 7400, extension 4842, option 2</td>
</tr>
<tr>
<td>Bulletin Board Service:</td>
<td>+1 215 283 4968</td>
</tr>
<tr>
<td>Hours of Operation:</td>
<td>8 a.m. to 6 p.m. eastern time</td>
</tr>
<tr>
<td>Secure Web Site:</td>
<td><a href="http://www.mooreproducts.com/techservices">www.mooreproducts.com/techservices</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIC ASIA</th>
<th>Tel: +65 299 6454</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fax:</td>
<td>+65 299 6053</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:lohho@mpco.com">lohho@mpco.com</a></td>
</tr>
<tr>
<td>Hours of Operation:</td>
<td>9 a.m. to 6 p.m. Singapore time</td>
</tr>
<tr>
<td>Secure Web Site:</td>
<td><a href="http://www.mooreproducts.com/techservices">www.mooreproducts.com/techservices</a></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TIC EUROPE</th>
<th>Tel: +44 1935 470172</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fax:</td>
<td>+44 1935 706969</td>
</tr>
<tr>
<td>E-mail:</td>
<td><a href="mailto:uktic@mpco.com">uktic@mpco.com</a></td>
</tr>
<tr>
<td>Hours of Operation:</td>
<td>8:30 a.m. to 5:15 p.m. GMT/BST</td>
</tr>
<tr>
<td>Secure Web Site:</td>
<td><a href="http://www.mooreproducts.com/techservices">www.mooreproducts.com/techservices</a></td>
</tr>
</tbody>
</table>
RETURN FOR REPAIR
This section modifies the General Maintenance section in the Acromag User’s Manual.

During the warranty period, remove a failed instrument from service and proceed as follows to return it to Moore for repair. For out of warranty repair, return the module to either Moore or Acromag.

TO RETURN EQUIPMENT

- Call Moore Products Co. at (215) 646-7400, ext. 4RMA (4762) weekdays between 8:00 a.m. and 4:45 p.m. Eastern Time. If outside of North America go to www.mooreproducts.com for the address and telephone and FAX numbers of your nearest Moore Products Co. subsidiary. Ask for an RMA (Return Material Authorization) number and be sure to mark the RMA number prominently on the outside of the shipment.

  When calling for an RMA number, provide the reason for the return. If returning equipment for repair, failure information (e.g., error code, failure symptom, installation environment) will be requested. A purchase order number will also be needed.

MATERIAL SAFETY DATA SHEET

- A Material Safety Data Sheet (MSDS) must be included with each item being returned that was stored or used anywhere hazardous materials were present.

PACKAGING

- Package assembly in original shipping materials. Otherwise, package it for safe shipment or contact the factory for shipping recommendations.

  An electronic module must be placed inside a static shielding bag to protect it from electrostatic discharge.

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Moore Products Co. assumes no liability for errors or omissions in this and any attached documents or for the application and use of information included in this and any attached documents. The information herein is subject to change without notice.

Procedures in this document have been reviewed for compliance with applicable approval agency requirements and are considered sound practice. Neither Moore Products Co. nor these agencies are responsible for repairs made by the user.
Model 550LX-502-TEMPMR-10, DC-Powered, Temperature Input (with Alarm Output), LONWORKS™ Module
Thermocouple or RTD Input

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</tbody>
</table>

INTRODUCTION:

These instructions cover the model types listed in Table 1 below. Supplementary sheets are attached for units with special options or features.

Table 1:

<table>
<thead>
<tr>
<th>Series/Network</th>
<th>-Function</th>
<th>-Inputs</th>
<th>-Power</th>
<th>-Cert.</th>
</tr>
</thead>
<tbody>
<tr>
<td>550L1</td>
<td>-502</td>
<td>-TEMPMR</td>
<td>-10</td>
<td>-NCR</td>
</tr>
<tr>
<td>550L3</td>
<td>-502</td>
<td>-TEMPMR</td>
<td>-10</td>
<td>-NCR</td>
</tr>
</tbody>
</table>

Notes (Table 1):
1. Consult the factory for current information on agency (e.g. Canadian Standards Association, etc.) approvals.

DESCRIPTION:

The Series 550L is a member of the Acromag SmartPack family. It can be field-configured as either a thermocouple (T/C) input or a resistance temperature detector (RTD) input, and measures temperature over the entire industrial temperature range for the sensor used. Network variable updates may occur due to changes in input level and/or at specified time intervals. The module uses a high resolution, low noise, Sigma-Delta ADC to convert the input signal into a network variable value. In addition, the module also has a built-in local alarm output with an LED to indicate the state of the relay.

All SmartPack modules are designed for harsh industrial environments. They feature RFI and EMI protection, a wide operating temperature range, and isolation between power, network, and I/O. They are DC powered, DIN-rail mountable, and available with either a twisted pair (TP/RF-78) or free topology (TP/FT-10) transceiver. Up to 64 modules can be connected on a single network segment. Multiple segments may be connected using repeaters to increase the number of modules and distance.

SmartPacks are interoperable with LONWORKS products from other manufacturers that use standard network variable types (SNVTs). Module calibration, configuration, and network management are performed using a Windows™ configuration program on a PC.

IMPORTANT SAFETY CONSIDERATIONS

It is very important for the user to consider the possible adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This is especially important where economic property loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed between the Buyer and Acromag, that this is the Buyer's responsibility.

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8500-464-B95M011
**SPECIFICATIONS:**

**DEFINITION:** This DC-powered, SmartPack temperature input module conditions either a single thermocouple input or a single RTD input. Corresponding temperature values are accessible through several different network variables using standard network variable types (SNVT). Isolation is provided between the sensor input, the network, the relay contacts and power. Additionally, a mechanical relay provides a local alarm function. This module is DIN-rail mounted.

**MODEL/SERIES:** 550 (Color coded with a White label)

**NETWORK (Designated by ‘LX’ of 550LX Model prefix):**

- Protocol: LonTalk®
- **L1:** TP/XF-78 Twisted Pair
  - **Speed:** 7.81 kb per second.
  - **Media:** Unshielded twisted pair, UL Level IV, No. 22 gauge wire.
  - **Distance:** Up to 6500 feet (2000 meters).
  - **Nodes per Network Segment:** 64 (0 to +70°C), 44 (-25 to +85°C). A LONWORKS router configured as a repeater is required for more than 64 nodes.

- **L3:** TP/FT-10 Free Topology
  - **Speed:** 7.81 kb per second.
  - **Media:** See Cable Type in Table 2 below.
  - **Distance:** See Table 2 below.

**Table 2: Free Topology Specifications**

<table>
<thead>
<tr>
<th>Cable Type</th>
<th>Maximum module-to-module distance</th>
<th>Maximum total wire length for SmartPack Modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>Belden 85102</td>
<td>1640 ft (500 m)</td>
<td>1540 ft (500 m)</td>
</tr>
<tr>
<td>Belden 8471</td>
<td>1312 ft (400 m)</td>
<td>1540 ft (500 m)</td>
</tr>
<tr>
<td>Level IV, 22 AWG</td>
<td>1312 ft (400 m)</td>
<td>1540 ft (500 m)</td>
</tr>
<tr>
<td>JY (Si) Y 2x2.0.8</td>
<td>1050 ft (320 m)</td>
<td>1540 ft (500 m)</td>
</tr>
</tbody>
</table>

- **Nodes per Network Segment:** 64. A LONWORKS router configured as a repeater is required for more than 64 nodes.

**FUNCTION:** Code number used to represent the module’s firmware functionality.

- **-502:** See the network variables section for a description of the module’s standard network variable types and operation.

**INPUT:** This unit has a single temperature input that can be configured to accept a thermocouple or an RTD input. Zero and Full-Scale calibration of each input is done over the network. There are no potentiometers to adjust.

- **-TEMPxx:** Thermocouple and RTD Inputs. Note: The 'xx' represents the relay type - see Output Relay below.

**Thermocouple:** User configured to one of eight T/C types, see Table 3 below. This module provides linearization, T/C reference junction compensation (CJC), and open circuit, T/C Break Detection.

- **Input bias current:** ±30nA maximum, includes T/C Break Detection current.
- **Break Detection:** An open T/C sensor can be configured to give either an upscale or downscale (high or low) proportional output.
- **Input Overvoltage Protection:** ±10V DC, differential.
- **Thermocouple Reference:** Less than ±0.2°C at 25°C. Ambient temperature effect of the CJC is ±0.01°C/°C typical.
- **Thermocouple Linearization:** Linearized to within ±0.25°C of the NIST tables. Linearization is done in firmware per T/C type for both the input and reference.
- **Accuracy:** Listed in Table 3. The accuracy includes module repeatability, terminal point conformity, T/C linearization, and reference junction error, but does not include sensor error.
- **Resolution:** ±0.1°C
- **Ambient Temperature Effect:** ±0.003% of input span per °F (±0.005% of input span per °C), or ±0.3uV per °F (±0.5uV per °C), whichever is greater.

- **Specification includes the combined effects of zero and span over temperature.**

**Input Filter Bandwidth:** -3dB at 3Hz, typical.

**Table 3: Thermocouple: Types, Ranges and Accuracy**

<table>
<thead>
<tr>
<th>Input Type</th>
<th>°C Range</th>
<th>Accuracy (typical)</th>
<th>T/C Material</th>
<th>ISA/ANSI Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210 to 760</td>
<td>±0.5°C</td>
<td>+Iron,</td>
<td>white red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Constantan</td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>-200 to 1372</td>
<td>±0.5°C</td>
<td>+Chromel,</td>
<td>yellow red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Alumel</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>-260 to 400</td>
<td>±0.5°C</td>
<td>+Copper,</td>
<td>blue red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Constantan</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>-50 to 1768</td>
<td>±1.0°C</td>
<td>+Pt13% Rh,</td>
<td>black red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Constantan</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>-50 to 1768</td>
<td>±1.0°C</td>
<td>+Pt10% Rh,</td>
<td>black red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Constantan</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>-200 to 1000</td>
<td>±0.5°C</td>
<td>+Chromel,</td>
<td>purple red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Constantan</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>260 to 1820</td>
<td>±1.0°C</td>
<td>+Pt10% Rh,</td>
<td>grey red</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-Pd6% Rh,</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>-230 to -170</td>
<td>±1.0°C</td>
<td>+Nicrosil,</td>
<td>orange red</td>
</tr>
<tr>
<td></td>
<td>-170 to 1300</td>
<td>±0.5°C</td>
<td>-NISIL</td>
<td></td>
</tr>
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</table>
RTD: User configured to one of four RTD types, see Table 4 below. This module provides sensor excitation, linearization, lead wire compensation, and sensor break detection.

**Input Configuration:** Two, three, or four wire (Kelvin or compensation loop) RTD types.

**Excitation Current:** Platinum and Nickel: 0.5mA typical, Copper: 2.0mA typical.

**Lead Wire Compensation:** Inherent for 3-wire and 4-wire RTD's only.

**Maximum Lead Resistance:** All lead wires must be of equal size and length (balanced).
- Platinum: 25Ω per lead maximum.
- Nickel: 20Ω per lead maximum.
- Copper: 10Ω per lead maximum.

**Lead Resistance Effect:**
- Platinum: 2.5°C/Ω of unbalance, typical.
- Nickel RTD: 1.4°C/Ω unbalance typical.
- Copper RTD: 2.5°C/Ω unbalance typical.

**RTD Linearization:** Linearized to within ±0.25°C of reference tables. Linearization is done in firmware per RTD type.

**Break Detection:** RTD sensor failure, can be configured to give either an upscale or downscale (high or low) proportional output.

**Accuracy:** Listed in Table 4. The accuracy includes module repeatability, terminal point conformity and RTD linearization, but does not include sensor error.

**Resolution:** ±0.1°C

**Ambient Temperature Effect:** ±0.003% of input span per °C (±0.005% of input span per °C), or ±0.6µV per °C (±0.8µV per °C), whichever is greater.

**Specification:** Includes the combined effects of zero and span over temperature.

**Input Filter Bandwidth:** 3dB at 3Hz, typical.

<table>
<thead>
<tr>
<th>Table 4: RTD: Types, Ranges and Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Type</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>U</td>
</tr>
<tr>
<td>V</td>
</tr>
<tr>
<td>Y</td>
</tr>
<tr>
<td>Z</td>
</tr>
</tbody>
</table>

**Output Relay:** (xxxxMR): One independent SPDT

**Mechanical Relay (MR):** High reliability electromagnetic relay with Form C (Normally Open and Normally Closed) SPDT contacts. Note: To control a higher amperage device, such as a pump, an interposing relay may be used (see Drawing 4501-501).

**Isolation:** Input, contacts, network and power are isolated from each other for common-mode voltages up to 250VAC, or 354V DC off DC power ground, on a continuous basis (will withstand 1500VAC dielectric strength test for one minute without breakdown for all combinations except between the input and network circuits which will withstand 1000VAC dielectric strength test for one minute without breakdown). The 1500V AC dielectric strength test complies with test requirements outlined in ANSI/ISA-582.01-1988 for the voltage rating specified.

**Power:** Connect an external DC power supply to the Power (P) and (-) terminals. Currents specified are maximum values with the module transmitting on the network and relay energized. An internal diode provides reverse polarity protection.

**-10:** +10 to 36VDC, current draw is a function of supply voltage (refer to Table 5 below).

<table>
<thead>
<tr>
<th>Table 5: Supply Current</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supply Voltage</strong></td>
</tr>
<tr>
<td>----------------------</td>
</tr>
<tr>
<td>10V</td>
</tr>
<tr>
<td>12V</td>
</tr>
<tr>
<td>15V</td>
</tr>
<tr>
<td>24V</td>
</tr>
<tr>
<td>36V</td>
</tr>
</tbody>
</table>

**CAUTION:** Do not exceed 36VDC peak, to avoid damage to the module.

**Power Supply Effect:**

**DC Volts:** Less than ±0.001% of input span change per volt DC, for rated power supply variations.

**60/120 Hz Ripple:** Less than 0.01% of input span per volt peak-to-peak of power supply ripple.
LED Indicators:
- **Power LED (Green):** Indicates power applied to unit.
- **Relay LED (Red):** ON when relay is energized.
- **Service LED (Red):** LED blinks at a 1/2 Hz rate for an unconfigured node. LED OFF for a properly functioning node. LED ON for failed node.
- **Status LED (Yellow):** (See Figure 1) LED remains ON indefinitely upon receiving an "offline" network management command. LED remains OFF upon receiving an "online" network management command (normal operation). LED blinks at a 2.5Hz rate for 10 seconds upon receiving a "wink" network command. LED flashes quickly three times every second to indicate a sensor fault condition as defined by the sensor fault variable.

**Figure 1: Status LED Behavior**

1. **Offline/Online Commands:**
   - **ON**
   - **OFF**
   - **Infinite**
   - **Offline Command**
   - **Online Command**

2. **Wink Command:**
   - **ON**
   - **OFF**
   - **10 Seconds**
   - **200 mS**
   - **200 mS**

3. **Fault Sequence:**
   - **ON**
   - **OFF**
   - **1 Second**
   - **Fault Removed**
   - **Continues Until**
   - **16ms**
   - **60ms**
   - **mS**
   - **mS**

**Reset/Service Toggle Switch:**
- **Reset Position:** Allows the module to be reset to power up conditions (toggle right).
- **Service Position:** Causes the Neuron chip inside the node to transmit its unique 48-bit ID and 8-byte program ID string (toggle left).

**Ambient Temperature Range:** 15°F to +185°F (-10°C to 85°C), L1 (44 nodes): +32°F to +185°F (0°C to 70°C), L2 (34 nodes): -13°F to +185°F (-25°C to 85°C).

**Reference Test Conditions:** Input: All T/C types at 10mV spans (Example: Type J, 0°C to 185°C), RTD: Platinum, 0 to 100°C, Nickel, 0°C to 60°C, Copper, 0 to 250°C. Output: 0% to 100%, Network (78kV/S); 77°F (25°C); +15VDC supply.

**Conversion Rate:**
- Sensor Input: 5 conversions per second.
- Temperature Reference: 5 conversions per second.

**Response Time:** 200mS, typical for a network variable value to reach 98% of the final value for a step input.

**Noise Rejection:**
- **Normal Mode:** 40dB at 60Hz, 100Ω input unbalance, typical.
- **Common Mode:** 130dB at 60Hz, 100Ω input unbalance typical.

**RFI Resistance:** Less than ±0.5% of input span effect with RFI field strengths of up to 10V/meter at frequencies of 27MHz, 151MHz, and 467 MHz.

**EMI Resistance:** Less than ±0.25% of input span effect with switching solenoids or commutator motors.

**Surge Withstand Capability (SWC):** Input/Output terminations are rated per ANSI/IEEE C37.90-1978. Unit is tested to a standardized test waveform that is representative of surges (high frequency transient electrical interference), observed in actual installations.

**Mounting:** (0) Mounting: General Purpose Housing with integrated DIN-Rail Mount. Supports "G" & "T" rails: "G" Rail (32mm), Type EN50035; "T" Rail (35mm), Type EN50022. Refer to Drawing 4501-493 for outline and clearance dimensions. Shipping Weight: 1 pound (0.45 Kg) packed.

**Construction:**
- Circuit Boards: Military grade FR-4 epoxy glass circuit board.
- Circuit Board Coating: Fungus resistant acrylic conformal coat on analog input circuit board.
- Terminals: Compression type, wire size 14 AWG maximum.
- Case: Self-extinguishing NYLON Type 6.6 polyamide thermoplastic UL94 V-2, color black. General Purpose, NEMA Type 1 enclosure.

**CERTIFICATION:** Consult the factory for current information on the availability of agency (e.g. Canadian Standards Association, Factory Mutual, etc.) approvals.

-NCR: No Certification Required.

**INSTALLATION:**

The module is packaged in a general purpose type of enclosure. Use an auxiliary enclosure to protect against unfavorable environments and locations. Maximum operating ambient temperatures should be within -13°F to 167°F (-25°C to +75°C) for satisfactory performance. The module is factory calibrated and ready for installation. Connect as shown in Connection Drawing 4501-492.

**Mounting:** Mount module assembly - refer to Drawing 4501-493 for mounting and clearance dimensions.

**DIN Rail Mounting:** Use suitable fastening hardware to secure the DIN rail to the designated mounting surface. A module, can be mounted to either the "T" or "G" Rail. Installation of the module to the rail depends on the type of DIN rail used. Units can be mounted side-by-side on 1.6 inch centers, if required.
"T" Rail (35mm), Type EN50022: To attach a module to this style of DIN rail, angle the top of the unit towards the rail and locate the top groove of the adapter over the upper lip of the rail. Firmly push the unit towards the rail until it snaps solidly into place. To remove a module, insert a screwdriver into the lower arm of the connector and pull downward while applying outward pressure to the bottom of the unit.

"G" Rail (32mm), Type EN50035: To attach a module to this style of DIN rail, angle the unit so that the upper groove of the adapter hooks under the top lip of the rail. Firmly push the unit towards the rail until it snaps solidly into place. To remove a module, pull the lower part of the unit outward until it releases from the rail, lift unit from rail.

Electrical Connections:

The wire size used to connect the unit to the control system is not critical. All terminal strips can accommodate wire from 14-26 AWG. Strip back wire insulation 1/4-inch on each lead before installing into the terminal block. Input wiring may be shielded or unshielded twisted pair. Network wires should be twisted pair. Since common mode voltages can exist on signal wiring, adequate wire insulation should be used and proper wiring practices followed. It is recommended that network and power wiring be separated from the signal wiring for safety, as well as for low noise pickup.

1. Power: Connect power per Drawing 4501-492. These modules operate from DC power supplies only. Power supply voltage is not critical and normally should be from 10.0V to 36VDC. The supply voltage must not exceed 36 Volts, even momentarily. Variations in power supply voltage above the minimum required has negligible effect on module accuracy. This device includes reverse polarity protection. Refer to "POWER" in the preceding SPECIFICATIONS section for current requirements.

2. Network: Connect network per Drawing 4501-492. Note: Network circuit is isolated from input and power circuits. See NETWORK specifications for the maximum number of nodes per network segment.

3. Grounding: The module housing is plastic and does not require an earth ground connection.

4. Input: Connect input per Drawing 4501-492 and observe proper polarity (see label for input type). If unit is factory calibrated, the calibration label indicates range of input. NOTE: The input circuit is electrically isolated from the network/power circuits, allowing the input to operate up to 250V AC, or 354VDC off ground, on a continuous basis.

5. Output Contacts: Wire contacts as shown in Drawing 4501-492. See label on unit for contact rating. Refer to Drawing 4501-527 for suggestions on contact protection.

Electromechanical Relay Contact Protection: To maximize relay life with inductive loads, external protection is required. For DC inductive loads, place a diode across the load (1N4006 or equivalent) with cathode to (+) and anode to (-). For AC inductive loads, place a Metal Oxide Varistor (MOV) across the load. See Drawing 4501-527.

NETWORK VARIABLES:

To provide interoperability, standard network variable types are used for all external interface and configuration variables. Drawing 4501-491 illustrates the 550L's network variable types.

Network variables within the External Interface Section are intended to be bound, polled, or written by other nodes on the network. These variables are maintained in RAM. Network variables within the Configuration Section are intended to be accessed by a network management tool to configure and calibrate the module. These variables are maintained in EEPROM and are limited to 10,000 write cycles. In addition, values written into configuration network variables do not take effect until the module is reset. Reset can occur as the result of powering-up, toggling the RESET switch, or issuing a "reset" network management command to the module.

nci_sen_type: Temperature Sensor Type (T/C or RTD)

Declaration
eeprom_network_input SNVT_char_ascii nci_sen_type;

Description
This configuration input network variable contains the ASCII selection character that specifies the sensor type. Table 6 contains the supported thermocouple and RTD sensor types. Linearization (and junction compensation on T/C types) is performed for the specified sensor. This variable is maintained in EEPROM, and does not take effect until the module is reset.

Initial Factory Value
'J': Type J-Thermocouple

Table 6: Sensor Selection

<table>
<thead>
<tr>
<th>Selection Character</th>
<th>Sensor Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>'J' or 'j'</td>
<td>T/C: Type J</td>
</tr>
<tr>
<td>'K' or 'k'</td>
<td>T/C: Type K</td>
</tr>
<tr>
<td>'T' or 't'</td>
<td>T/C: Type T</td>
</tr>
<tr>
<td>'R' or 'r'</td>
<td>T/C: Type R</td>
</tr>
<tr>
<td>'S' or 's'</td>
<td>T/C: Type S</td>
</tr>
<tr>
<td>'E' or 'e'</td>
<td>T/C: Type E</td>
</tr>
<tr>
<td>'B' or 'b'</td>
<td>T/C: Type B</td>
</tr>
<tr>
<td>'N' or 'n'</td>
<td>T/C: Type N</td>
</tr>
<tr>
<td>'U' or 'u'</td>
<td>RTD: Pt 100 (DIN/IEC/ JIS 1989), 1.385</td>
</tr>
<tr>
<td>'V' or 'v'</td>
<td>RTD: Pt 100 (Old JIS 1981), 1.3915</td>
</tr>
<tr>
<td>'Y' or 'y'</td>
<td>RTD: Cu 10 (Minco 16-9), 1.4272</td>
</tr>
<tr>
<td>'Z' or 'z'</td>
<td>RTD: Ni 120(Minco 7-120), 1.672</td>
</tr>
</tbody>
</table>
nci_sen_mode: Temperature Sensor Mode

Declaration
eeprom network input SNVT_state nci_sen_mode;

Description
This multi-function configuration input network variable sets the thermocouple break response to UP or DOWN, sets the thermocouple reference to ON or OFF (OFF during T/C input calibration) and, for RTD inputs, sets the proportional output response for a RTD break, to either UP or DOWN. This variable is maintained in EEPROM, and does not take effect until the module is reset.

RTD break is inherent when one or more of the RTD leads is opened (broken) due to the RTD excitation current supplied by the module. The direction the output ends up at is a function of which lead or leads of the RTD input circuit fail. If a lead break condition occurs, this configuration network variable forces the proportional output response to be either UP (to an overrange value) or DOWN (to an underrange value). The direction is a function of the need in the field application.

<table>
<thead>
<tr>
<th>bit 0</th>
<th>T/C Break: 1=UP, 0=DOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>bit 1</td>
<td>Reserved for future use</td>
</tr>
<tr>
<td>bit 2</td>
<td>T/C Reference: 0=OFF, 1=ON</td>
</tr>
<tr>
<td>bit 3</td>
<td>RTD Break: 0=DOWN, 1=UP</td>
</tr>
<tr>
<td>bit 4</td>
<td>Reserved for future use</td>
</tr>
</tbody>
</table>

Initial Factory Value
bit0: 1 (T/C Break UP)
bit2: 1 (T/C Reference ON)
bit3: 1 (RTD Break UP)

nvo_temp_out: Temperature Output

Declaration
network output SNVT_temp nvo_temp_out;

Description
This output network variable contains the latest linearized value of the thermocouple or RTD input in units of SNVT_temp (1 °C resolution). The update rate for this variable is controlled by nci_update_time and/or nci_deadband. The maximum update rate, regardless of the source of control, is limited to 5 updates per second.

Power-up/Reset Value
0°C until first measurement occurs.

nci_callo: Calibration Low Variable

Declaration
eeprom network input SNVT_temp nci_callo;

Description
This configuration input network variable is used, in conjunction with the Calibration High Variable, to calibrate the T/C and RTD conditioning circuits, each circuit calibration procedure is independent and is done separately. The temperature sensor type (T/C or RTD), determines the circuit being calibrated by these commands. See Table 5 or 6 in the Calibration section for typical cal-low input values. See the Calibration section for a complete description of its use. This variable is maintained in EEPROM, and does not take effect until the module is reset.

Initial Factory Value
0°C

nvo_sen_fault: Temperature Sensor Fault

Declaration
network output SNVT_lev_disc nvo_sen_fault

Description
This discrete output network variable contains the status of the input sensor (T/C or RTD) lead break condition. If a lead break has occurred the output network variable nvo_sen_fault will propagate a value of ST_ON and, any other value indicates that no sensor lead failure has occurred.

Power-up/Reset Value
ST_OFF

nci_calhi: Calibration High Variable

Declaration
eeprom network input SNVT_temp nci_calhi;

Description
This configuration input network variable is used, with the Calibration Low Variable, to calibrate the T/C and RTD conditioning circuits. See Table 5 or 6 in the Calibration section for typical cal-high input values. See the Calibration section for a complete description of its use. This variable is maintained in EEPROM and does not take effect until the module is reset.

Initial Factory Value
700°C (for default range ‘J’), see Table 5 or 6 per input type.
nvo_pvout: Process Variable Output

**Declaration**

network output SNVT_lev_percent nvo_pvout;

**Description**

This output network variable contains the latest value of the thermocouple input in units of SNVT_lev_percent. The variables nci_zero_temp and nci_fs_temp determine what temperatures correspond to 0 and 100% of span (Note: minimum span is 100°C). See Figure 2 for the relationship between temperature and percent-of-span output for the thermocouple input. The update rate for this variable is controlled by nci_update_time and/or nci_temp_db. The maximum update rate, regardless of the source of control, is limited to 5 updates per second.

**Power-up / Reset Value**

0% until first measurement occurs.

<table>
<thead>
<tr>
<th>SNVT_lev_percent</th>
<th>% of span</th>
</tr>
</thead>
<tbody>
<tr>
<td>25000</td>
<td>125</td>
</tr>
<tr>
<td>20000</td>
<td>100</td>
</tr>
<tr>
<td>15000</td>
<td>75</td>
</tr>
<tr>
<td>10000</td>
<td>50</td>
</tr>
<tr>
<td>5000</td>
<td>25</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>-5000</td>
<td>-25</td>
</tr>
</tbody>
</table>

---

nci_zero_temp: Zero Temperature Value

**Declaration**

eeprom network input SNVT_temp nci_zero_temp;

**Description**

This configuration input network variable contains the value in °C that corresponds to 0% of span. The value of nvo_pvout scales linearly between nci_zero_temp and nci_fs_temp. See Figure 2 for the relationship between temperature and percent-of-span output for the thermocouple or RTD input. This variable is maintained in EEPROM, and does not take effect until the module is reset.

**Initial Factory Value**

0.0 °C

nci_fs_temp: Full Scale Temperature Value

**Declaration**

eeprom network input SNVT_temp nci_fs_temp;

**Description**

This configuration input network variable contains the value in °C that corresponds to 100% of span. The value of nvo_pvout scales linearly between nci_zero_temp and nci_fs_temp. See Figure 2 for the relationship between temperature and percent-of-span output for the thermocouple or RTD input. This variable is maintained in EEPROM, and does not take effect until the module is reset.

**Initial Factory Value**

1000.0 °C

nci_temp_db: Temperature Sensor Deadband

**Declaration**

eeprom network input SNVT_temp nci_temp_deadband;

**Description**

This configuration input network variable specifies the deadband, or the amount of change in the input necessary to cause an update of nvo_temp_out, nvo_res_out, and nvo_pvout. Deadband can be specified as either positive or negative. Negative values are automatically converted to positive values. Specifying a value of zero will cause an update every 0.2 second. To disable "change-by" updates, specify a large value such as 2000 °C. This variable is maintained in EEPROM and does not take effect until the module is reset.

**Initial Factory Value**

5.0 °C

---

**Figure 2: Temperature Sensor (T/C or RTD) Temperature/Percent-of-Span Relationship**

Equations (Temperature Sensor = T_s):

\[
\text{% of Span} = \frac{T_s - \text{nci_zero_temp}}{\text{nci_fs_temp} - \text{nci_zero_temp}} \times 100
\]

\[
\text{SNVT_lev_percent} = \frac{T_s - \text{nci_zero_temp}}{20000} \times \text{nci_fs_temp} - \text{nci_zero_temp}
\]

\[
\text{SNVT_lev_percent} = \% \text{ of Span} \times 200
\]
nci_update_time: Update Time

Declaration
eeprom network input SNVT_elapsed_tm nci_update_time;

Description
This configuration input network variable specifies the period of time between updates of nvo_temp_out, nvo_cal_out, and nvo_pos_out. Internal resolution is 0.2 seconds. The maximum allowable time expressed in DD:HH:MM:SS:LL format is 00:03:38:27:000. Anything greater will be clipped at 00:03:38:27:000. To disable periodic updates, set the day (DD) member to 65535, or all members to 0. This variable is maintained in EEPROM and does not take effect until the module is reset.

Initial Factory Value
DD=65535, HH=0, MM=0, SS=0, LL=0: Periodic updates disabled.

nci_highlimit: Alarm High Limit (Setpoint) Configuration Variable

Declaration
eeprom network input SNVT_temp nci_highlimit;

Description
This configuration input network variable specifies the high limit setpoint value for the thermocouple or RTD input. Its range is -274.0 °C to +6279.5 °C (Resolution: 0.1°C). A high limit is exceeded when the thermocouple or RTD input is greater than or equal to the specified limit value. This variable is maintained in EEPROM, and does not take effect until the module is reset.

Initial Factory Value
+6279.5 °C

nci_lowlimit: Alarm Low Limit (Setpoint) Configuration Variable

Declaration
eeprom network input SNVT_temp nci_lowlimit;

Description
This configuration input network variable specifies the low limit setpoint value for the thermocouple or RTD input. Its range is -274.0 °C to +6279.5 °C (Resolution: 0.1°C). A low limit is exceeded when the thermocouple or RTD input is less than or equal to the specified limit value. This variable is maintained in EEPROM, and does not take effect until the module is reset.

Initial Factory Value
-274.0 °C

nci_limit_db: Alarm Limit Deadband

Declaration
eeprom network input SNVT_temp nci_lim_deadband;

Description
This configuration input network variable specifies the deadband for the thermocouple or RTD input. Its range is 0 °C to +6279.5 °C (Resolution: 0.1 °C). Note: A negative deadband is not valid. If a negative value is entered, it is converted to a positive value in the module. Note also, the deadband value is independent of the setpoint value. For a typical thermocouple or RTD input, the deadband should be set in the (+)0.5 to (+)20 °C range. If the module is used in a controller application, the deadband can be set as required in the application. Deadband does not alter the threshold at which a limit becomes exceeded, rather it functions to keep the limit exceeded until the signal returns to a level beyond a specified dropout value. Alarm action is momentary (Non-Latching)—that is, the alarm will reset to its non-alarm state as soon as the signal is outside of the selected deadband. See Drawing 4501-500. For high limits, the limit remains exceeded until the thermocouple or RTD input has returned below its threshold value, minus the deadband. For low limits, the thermocouple or RTD input must return above its threshold value, plus the deadband. If large deadbands are used, the thermocouple or RTD input may not be able to return within limit and the alarm will not be automatically reset to its non-alarm state. If this happens, the module will require that a reset command be issued (via software or by the reset switch), or that a power off/on cycle reset occur to transfer the output to its non-alarm state. This variable is maintained in EEPROM, and does not take effect until the module is reset.

Initial Factory Value
0.0 °C

nci_op_mode: Alarm Operating Mode Configuration Variable

Declaration
eeprom network input SNVT_state nci_op_mode;

Description
This configuration input network variable specifies the FailSafe or Non-FailSafe mode of operation. FailSafe refers to the operation when the relay is energized in the normal input range, and de-energized when the input value exceeds the setpoint value, or the module's power is lost. Non-FailSafe refers to the operation when the relay is de-energized in the normal range of input, and energized when the input value exceeds the setpoint value. This variable is maintained in EEPROM and does not take effect until the module is reset. NOTE: The LED is on when the relay is energized.

bit0: FailSafe/Non-FailSafe - 0=FailSafe, 1=Non-FailSafe.
bit1...bit15: Reserved for future use.

Initial Factory Value (all bits cleared)
bit0: 0 (FailSafe Operating Mode)
nvo_statefb: Alarm State Feedback Variable

Declaration
network output SNVT_lev_disc nvo_statefb;

Description
This output network variable is used to determine the present state of the alarm relay. A value of ST_ON indicates the relay is energized. ST_OFF indicates the relay is not energized.

Power-up/Reset Value
ST_OFF

nvo_tref_temp: Tref Output

Declaration
network output SNVT_temp nvo_tref_temp;

Description
This output network variable contains the latest value of the internal temperature reference in units of SNVT_temp (1 °C resolution). The update rate for this variable is determined by the nci_tref_time variable. Note: This output network variable is only active when the module is configured for thermocouple sensor types. For RTD sensor types the output is always 0 °C.

Power-up/Reset Value
0 °C until first measurement occurs.

nvo_tref_pvout: Tref Process Variable Output

Declaration
network output SNVT_lev_percent nvo_tref_pvout;

Description
This output network variable contains the latest value of the internal temperature reference in units of SNVT_lev_percent (1 part in 20000 resolution). Scaling has been chosen to be 0 °C to 100°C corresponds to 0 to 100 %. Negative temperature yields a negative percentage. See Figure 3 for the relationship between temperature and percent-of-span output for the temperature reference. The update rate for this variable is determined by the nci_tref_time variable. Note: This output network variable is only active when the module is configured for thermocouple sensor types. For RTD sensor types the output is always 0 %.

Power-up/Reset Value
0% until first measurement occurs.

nci_tref_callo: Tref Calibration Low Variable

Declaration
eeprom network input SNVT_temp nci_tref_callo;

Description
This configuration input network variable contains the value corresponding to the nominal 25°C reference temperature. See the Calibration section for a complete description of its use. This variable is maintained in EEPROM and does not take effect until the module is reset.

Initial Factory Value
25°C (2990) nominally

nci_tref_time: Temperature Reference Update Time

Declaration
eeprom network input SNVT_elapsed_tm nci_tref_time;

Description
This configuration input network variable specifies the period of time between updates of nvo_tref_temp and nvo_tref_pvout network variables. Internal resolution is 0.2 seconds. The maximum allowable time expressed in DD:HH:MM:SS:LL format is 00:03:38:27:000. Any thing greater will be clipped at 00:03:38:27:000. To disable periodic updates, set the day (DD) member to 65535, or all members to 0. This variable is maintained in EEPROM and does not take effect until the module is reset.

Initial Factory Value
DD=0, HH=0, MM=0, SS=1, LL=0 (update once per second)

nvo_res_out: Resistance Output

Declaration
network output SNVT_res nvo_res_out;

Description
This output network variable represents the resistance in Ohms at the input of the module configured for a RTD. The output is linear over a range of 0.0Ω to 500.0Ω (resolution 0.1Ω). The output is calibrated, is linear with resistance and has lead resistance compensation. Updates of this network output variable occurs when either the input changes by a specified deadband value, or periodically as determined by a timer value. The maximum update rate, regardless of the source of control is limited to 5 updates per second.

Power-up/Reset Value
0.0Ω until first RTD measurement occurs
CALIBRATION:

General: This section is divided into two parts:
Part A: Analog Input Calibration
Part B: Percent of Span Scaling (configuration).

Part A involves calibrating the temperature output range of the module for each input type and the T/C ambient temperature sensor.
Part B involves setting the zero and full-scale temperature values to correspond to 0 and 100% of span.

PART A: ANALOG INPUT CALIBRATION

All twelve sensor input ranges and the T/C temperature reference are calibrated at the factory. No additional calibration is normally required. If it becomes necessary to calibrate the module, follow the procedures outlined below. The T/C reference, each T/C type and each RTD type have separate and independent calibration procedures. Please note, to activate changes to any calibration and/or configuration network variables the module will have to be reset.

Thermocouple Input: Each of the eight TC input types require a separate calibration. For reference, this procedure will use a Type J thermocouple. Two network variables provide a means of software trimming the end points of the input range.

Equipment Required

1. Input mV source adjustable from -10mV to +80mV DC and capable of being set to an accuracy to the 0.1°C (equivalent millivolts), and have a source resistance of 100Ω or less.
2. Network management tool capable of reading and writing the module's network variables.

Procedure

2. Set sensor type by writing the character "J" or "J" into the nci_sensor network variable.
3. Set the temperature reference to OFF by setting the nci_sensor_mode network variable, bit2 to a '0'. Note: Setting the temperature reference to OFF simplifies the calibration procedure. It allows the use of a millivolt source and the use of copper wires between the input source and the module's input terminals during calibration. Later in the procedure, the Tref will be set to ON.
4. Set the T/C break response to UP or DOWN using the nci_sensor_mode network variable (bit0), per application requirements. Note: the RTD break response, bit3, is of no concern for T/C sensor types and can be set to either a 1 (default) or a 0.
5. Set the update time for the T/C output to 200ms by writing 00:00:00:00:200 to nci_update_time.
6. Reset the module either through software or by toggling the reset switch.
7. Apply 0.000mV to the input, see Table 7.
8. Write the SNVT_temp value, 0.0°C (2740), to the nci_calho network variable.
9. Apply +39.130mV (700.0°C, Type J) to the input (see Table 6 for values for other T/C types).
10. Write the SNVT_temp value, 700.0°C (9740) to the nci_calhi network variable.

<table>
<thead>
<tr>
<th>Table 7: Thermocouple Calibration Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Type</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>J</td>
</tr>
<tr>
<td>K</td>
</tr>
<tr>
<td>T</td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>S</td>
</tr>
<tr>
<td>E</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>N</td>
</tr>
</tbody>
</table>

11. (Optional) Write new values to the nci_temp_db and nci_update_time variables as required.
12. Reset the module. Activates the new nci_calho and nci_calhi values.
13. To verify calibration, apply a mV signal representing a temperature in degrees C, within the range of the T/C configured for. Refer to the thermocouple reference tables (°C).
14. Read the nvo_temp_out network variable. The value should represent the temperature to within the accuracy specified in the Specifications section of this manual.
15. Up to this point the T/C reference compensation has been turned OFF (reference Step 2 above). Set the temperature reference to ON by setting the nci_sensor_mode network variable, bit2, to a 1 at this time.
16. Reset the module. This will validate the input T/C reference temperature compensation. Disconnect the copper wires from the input and connect the T/C directly to the input terminals on the module. The T/C circuit in now calibrated.

Temperature Reference: Before calibrating the temperature reference, the T/C input must be calibrated first. Refer to the calibration procedure below to verify the calibration of the T/C reference circuit (CJC). Field adjustment of the temperature reference circuit is limited to the offset adjustment at an ambient temperature of 25°C, ±10°C. The high ambient temperature calibration point is determined at the factory and the only default value, set at the factory, will be used by the module. To obtain the highest accuracy, use only J, K or T-type thermocouple wire when calibrating the temperature reference.

Equipment Required

1. Ice-point temperature reference. To simulate a thermocouple input, a thermocouple calibrator, an ice-bath or other suitable temperature reference must be used.
2. Short length (10-20 inches) of J, K or T-type thermocouple wire (this example is for J-type wire).
3. Network management tool capable of reading and writing the module’s network variables.

**Procedure**

1. Calibration connections - refer to Drawing 4501-494
   (Temperature Reference Circuit Calibration Connections).
2. Set sensor type by writing the character ‘J’ or ‘j’ into the nci_sensor network variable.
3. Set the temperature reference to ON by setting the nci_sen_mode network variable, bit2 to a ‘1’. Note: leave all other bits as found in this network variable.
4. Set the update time for the T/C output to 200ms by writing 00:00:00:00:00:200 to nci_update_time.
5. Set the update time for the T/C reference output to 200ms by writing 00:00:00:00:200 to nci_tref_time.
6. Reset the module to configure module per above.
7. Set the thermocouple calibrator to 0.0°C (0.0mV if using a T/C ice point reference), or use the water/ice mixture as shown in the calibration connection drawing.
8. Read the nvo_temp_out network variable, note value. If the temperature reading is 0.0°C ± 0.1°C the temperature reference is calibrated and this procedure can be terminated at this point. If the temperature reading is not 0.0°C ± 0.1°C, calibration of the temperature reference is required. Readings can be either positive or negative and to demonstrate the calibration procedure the following to examples are given.
   Example A: nvo_temp_out reads +0.5°C.
   Example B: nvo_temp_out reads -0.3°C.
9. Read the nvo_tref_temp network variable, note value.
   As an example, lets say a reading of +25.8°C is read.
10. Calculate the corrected reference temperature value for your unit. Per the examples, the corrected temperature value would be calculated as follows:
    Example A: 25.3°C (25.8°C minus 0.5°C)
    Example B: 26.1°C (25.8°C plus 0.3°C)
   Using the values, that you calculated for your unit, write the corrected temperature value into the nci_tref_callo network variable.
11. Reset the module. This activates the new nci_tref_callo value.
12. Read the nvo_temp_out network variable, it should now read 0.0°C ± 0.1°C, otherwise, return to Step 8.
13. The calibration of the T/C reference circuit is now complete.

**RTD Input:** Each of the four RTD input types require a separate calibration. It is only necessary to calibrate the RTD types being used. If you change RTD types, you will need to recalibrate for the new type. Two network variables provide a means of software trimming the end points of the input range.

**Equipment Required**

1. High precision resistance decade source must be adjustable over the entire input range of the sensor and settable to an accuracy of 0.05 Ω or better.
2. Network management tool capable of reading and writing the module’s network variables.

**Procedure:**

1. Calibration connections - refer to Drawing 4501-492.
2. Set sensor type by writing the character "U" or "u" (Pt385) into the nci_sensor network variable.
3. Set the RTD break response to UP or DOWN using the nci_sen_mode network variable (bit3). Bit0 and bit2 are of no concern for an RTD configuration.
4. Set the update time for the RTD output to 200ms by writing 00:00:00:00:200 to nci_update_time.
5. Reset the module either through software or by toggling the reset switch.
6. Apply 100.0Ω to the input, see Table 8.
7. Write the SNVT_temp value, 0.0°C (2740), to the nci_callo network variable.
8. Apply +390.380 (850.0°C, 100Ω Platinum, Pt385, α = 1.385) to the input (see Table 8 below for values for other RTD types).
9. Write the SNVT_temp value, 850.0°C (11240) to the nci_callo network variable.

<table>
<thead>
<tr>
<th>Table 8: RTD Calibration Values</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Input Type</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>U Pt385</td>
</tr>
<tr>
<td>V Pt385</td>
</tr>
<tr>
<td>Y Cu10</td>
</tr>
<tr>
<td>Z Ni120</td>
</tr>
</tbody>
</table>

10. (Optional) Write new values to the nci_temp_db and nci_update_time variables as required.
11. Reset the module. This activates the new nci_callo and nci_calhi values.
12. To verify calibration, apply a resistance value, representing a temperature in degrees C, within the range of the RTD. Refer to the appropriate RTD temperature table (°C).
13. Read the nvo_temp_out network variable. The value should represent the temperature to within the accuracy specified in the specifications section of this manual. Calibration of the RTD circuit is now complete.
PART B: PERCENT OF SPAN SCALING

For compatibility with other SmartPack modules, a temperature range can be expressed as a percentage-of-span using process network variable nvo_pvout. Two network variables are provided for establishing what temperatures, within the thermocouple’s range or RTD’s range, correspond to 0% and 100%. For reference, this procedure will use a Type J thermocouple configured to output 0% at 200 °C, and 100% at 400 °C. The span for this case is 200 °C.

Equipment Required

Network management tool capable of reading and writing the module’s network variables.

Procedure

1. Set sensor type by writing the character “J” or “j” into the nci_sen_type network variable.
2. Set the temperature reference to ON by setting the nci_sen_mode network variable, bit2 to a “1”
3. Set the T/C break response to UP or DOWN using the nci_sen_mode network variable, bit2 to a “1” (ON) or a “0” (OFF), per application requirements. Note: On RTD inputs, set the sensor break response to UP or DOWN using the nci_sen_mode network variable, bit3 to a “1” (ON) or a “0” (OFF), per application requirements.
4. Reset the module to configure module per above.
5. Write 200°C, to the nci_zero_temp network variable.
6. Write 400°C, to the nci_fs_temp network variable.
7. Reset the module. This activates the new nci_zero_temp and nci_fs_temp values.
8. The value of nvo_pvout network variable scales linearly between 200 °C and 400 °C representing the range from 0 to 100%.

GENERAL MAINTENANCE:

This module contains solid-state components and requires no maintenance, except for periodic cleaning and calibration verification. When a failure is suspected, a convenient method for identifying a faulty module is to exchange it with a known good unit. It is highly recommended that a non-functioning module be returned to Acromag for repair, since Acromag makes use of tested and burned-in parts, and in some cases, parts that have been selected for characteristics beyond that specified by the manufacturer. Further, Acromag has automated test equipment that thoroughly checks the performance of each module.
SERIES 550L THERMOCOUPLE / RTD INPUT MODULE
APPLICATION AND ELECTRICAL CONNECTIONS