**DESCRIPTION**

The Model 381AT RFI protected Thermocouple Alarm Module provides output relay actuation at a preset input signal level. It accepts ISA type J, K, T, S, R, or E thermocouple inputs and offers a choice of standard or narrow input spans. The Alarm Module can be supplied with up to two output relays with separate trip point and deadband adjustments. Relay actuation can be changed from normal to reverse acting by cutting a jumper on the circuit board. An LED is provided at the front of the Alarm Module to provide visual indication when an output relay is energized.

The Alarm Module is acceptable for use in both standard Series 380 and RFI protected Series 381 Card Cage Enclosures. Standard Series 380 Enclosures are not RFI protected; input wiring is connected directly to the Alarm Module, bypassing an enclosure terminal strip. When used in an RFI protected Series 381 Enclosure, the Alarm Module must have its input wiring connected and temperature compensation sensor module relocated to a designated enclosure terminal strip.

**MODEL DESIGNATION**

<table>
<thead>
<tr>
<th>Sample Model Number</th>
<th>381 AT J 1 - 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermocouple Alarm</td>
<td></td>
</tr>
<tr>
<td>Thermocouple Type</td>
<td>J — Iron/Constantan, K — Chromel/Alumel, T — Copper/Constantan, S — Platinum/Rhodium/Platinum, R — Platinum/Rhodium/Platinum, E — Chromel/Constantan</td>
</tr>
<tr>
<td>Output Relay Type</td>
<td>1 — Standard, 2 — Hermetically sealed</td>
</tr>
<tr>
<td>Number of Trip Points</td>
<td>1 — Single (1 Relay), 2 — Dual (2 Relays)</td>
</tr>
</tbody>
</table>

**SPECIFICATIONS**

**INPUT**

<table>
<thead>
<tr>
<th>Signal Type</th>
<th>ISA type J, K, T, S, R, or E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>Factory wired for either of the following:</td>
</tr>
<tr>
<td></td>
<td>Standard: 5 to 50 mVdc</td>
</tr>
<tr>
<td></td>
<td>Narrow: 2 to 5 mVdc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TYPE</th>
<th>STANDARD SPAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-210°C to +1200°C</td>
</tr>
<tr>
<td>K</td>
<td>-270°C to +1373°C</td>
</tr>
<tr>
<td>T</td>
<td>-270°C to +400°C</td>
</tr>
<tr>
<td>S &amp; R</td>
<td>-50°C to +1760°C</td>
</tr>
<tr>
<td>E</td>
<td>-270°C to +1000°C</td>
</tr>
<tr>
<td>TYPE</td>
<td>NARROW SPAN</td>
</tr>
<tr>
<td>J</td>
<td>-85°C to +460°C</td>
</tr>
<tr>
<td>K</td>
<td>-120°C to +620°C</td>
</tr>
<tr>
<td>T</td>
<td>-130°C to +250°C</td>
</tr>
<tr>
<td>S &amp; R</td>
<td>-50°C to +1000°C</td>
</tr>
<tr>
<td>E</td>
<td>-100°C to +485°C</td>
</tr>
</tbody>
</table>

| Impedence | 200,000 Ohms minimum |
| Isolation | Input circuit is electrically isolated from the output and power circuits, permitting it to operate at up to 100 Vdc above ground. |
| Noise Rejection | Common Mode: 140dB @ 60 Hz with 100 Ohms unbalance |

**MOORE PRODUCTS CO., Spring House, PA 19477**
RFI SUPPRESSION ........................................ Module tested per SAMA PMC 33.1-1976. Specifications available upon request.
COLD JUNCTION COMPENSATION ................. Automatic compensation over whole range of ambient temperature specification.
THERMOCOUPLING BREAK INDICATION ........ Upscale standard, downscale selected by cutting 'UP' jumper on circuit board.

OUTPUT
Single Trip Point Models ............................. One Relay
Dual Trip Point Models ................................ Two Relays
Standard Relay ........................................... SPDT, 2A, 117 VAC or 28 VDC resistive load
Hermetically Sealed Relay ............................... SPDT, 3A, 117 VAC or 28 VDC resistive load

ADJUSTMENTS
Trip Point .............................................. One Relay - One 15-turn metal film potentiometer
Deadband ................................................... Two Relays - Two 15-turn metal film potentiometers

AMBIENT TEMPERATURE RANGE ....................... 0°C to +50°C (+32°F to +122°F)
RESPONSE TIME ........................................ 300 msec
ACCURACY ............................................... Repeats within 0.1% (0.2% for narrow span units) of span for constant conditions (25°C)
Temperature Effect .................................... 0.4%, test limit for 0°C to +50°C (+32°F to +122°F), ambient change

INSTALLATION

GENERAL
The Alarm Module can be installed in any slot of a standard Series 380 or RFI protected Series 381 Card Cage Enclosure. Each enclosure slot is identified by a number that matches a corresponding terminal strip. Refer to Service Instruction SD3801 which provides the physical and electrical characteristics of all Enclosures. Refer to user connection diagrams to determine alarm module location within an Enclosure.

Each slot of an Enclosure has safety keys which must be set before module installation. SD3801 gives a procedure for setting them. The Model 381AT Thermocouple Alarm Module requires the following key positions:

LEFT KEY: V (VERTICAL)
RIGHT KEY: H (HORIZONTAL)

All plug-in modules in a card cage share a common power supply. The output signals of these modules are referenced to one signal common which is also the negative bus of the power supply.
The input circuit of the Alarm Module is isolated from the output circuit. Each thermocouple may be independently grounded without the possibility of creating interfering ground loops.

WARNING
Ensure that power is removed from all wires being connected.

STANDARD 380 SERIES ENCLOSURE
Input and output wiring for an Alarm Module installed in a standard Series 380 Enclosure is shown in Figure 1. Note that the input wiring is connected directly to the input terminals on the Alarm Module; the output wiring is connected to the designated enclosure terminal strip.

RFI PROTECTED SERIES 381 ENCLOSURE
Input and output wiring for an Alarm Module installed in a RFI protected Series 381 Enclosure is shown in Figure 2. Note that both the input and output wiring are connected to the designated enclosure terminal strip. The input wiring is connected to terminals 1 (+) and 2 (-) of the terminal strip. The temperature compensation sensor module must be relocated from the alarm module input terminals to the enclosure input terminals 1 (+) and 2 (-), and 3 (L) in agreement with the input wiring.
STANDARD SERIES
380 CARD CAGE
ENCLOSURE TERMINAL
STRIP

1. RELAY CONTACTS RATED AT 3A, 117 VAC OR 24 VDC RESISTIVE LOAD.
2. CONTACTS SHOWN WITH OUTPUT RELAY DE-ENERGIZED. STANDARD UNITS ARE DE-ENERGIZED BELOW TRIP-POINT, AND REVERSE ACTING UNITS ARE DE-ENERGIZED ABOVE TRIP POINT.

FIGURE 1 Connection Diagram - Standard Series 380 Enclosure

FIGURE 2 Connection Diagram - RFI Protected Series 381 Enclosure
CALIBRATION

GENERAL

The Alarm Module is normally shipped factory calibrated for a specific user designated range. Such a module requires no additional adjustment and can be put into service immediately. Modules ordered without a specific calibration request must be calibrated by the user.

To assure continued accuracy, it is recommended to check the calibration after the first 30 days of operation and then at regular intervals dictated by the severity of the operating environment or whenever an inaccuracy is suspected.

Use the following procedure to perform periodic calibration checks or to calibrate the Module for a new range. Figure 3 shows the location of all jumper wires and trim-pots. An Acromag 320 Series reference or equivalent is required for calibration.

1. Determine which trip mode is required for the application, NORMAL or REVERSE acting. NORMAL refers to relay energized when input signal is above trip point (low fail-safe). REVERSE refers to relay energized when input signal is below the trip point (high fail-safe). Refer to FIGURES 3 and 4 and arrange J3 and J4 as required.

2. Determine which gain mode is required for the application. Refer to the table below for the proper positioning of jumper J1.

<table>
<thead>
<tr>
<th>Thermocouple Type</th>
<th>J1 In (for the following ranges)</th>
<th>Cut J1 (for the following ranges)</th>
</tr>
</thead>
<tbody>
<tr>
<td>J</td>
<td>-85°C to +460°C</td>
<td>-210°C to +1200°C</td>
</tr>
<tr>
<td>K</td>
<td>-150°C to +520°C</td>
<td>-210°C to +1000°C</td>
</tr>
<tr>
<td>T</td>
<td>-130°C to +250°C</td>
<td>-270°C to +573°C</td>
</tr>
<tr>
<td>S &amp; R</td>
<td>-60°C to +1000°C</td>
<td>-60°C to +1769°C</td>
</tr>
<tr>
<td>E</td>
<td>-100°C to +480°C</td>
<td>-270°C to +1000°C</td>
</tr>
</tbody>
</table>

3. Determine if up-scale or down-scale thermocouple break indication is required. Units are shipped with up-scale break indication (unless otherwise specified). If down-scale break indication is required, cut jumper J2 as shown in FIGURE 3.

4. Set the deadband controls for full CCW, this gives minimum deadband.

5. Proper calibration of the alarm trip point and deadband requires the use of an Acromag 320 Series reference or equivalent to help simulate a thermocouple input.

A. Feed a DC millivolt signal into the input terminals at the value desired for a trip.

B. Adjust the TRIP potentiometer until the relay operates. The associated LED will come on (when trip point is below input signal for NORMAL acting, or when trip point is above input signal for REVERSE acting).

C. Rock adjustment screw CW and CCW and get as close as possible to actual trip point. Clockwise rotation of the TRIP potentiometer increases the required trip point voltage.

D. If increased deadband is required, increase DB control. Clockwise rotation of the deadband pot will increase the deadband. Very input control and determine input values for drop-out and pull-in of relay. The difference of these values is the amount of deadband. Adjust deadband control and vary input until desired deadband is obtained.

E. Reset input to desired trip value and readjust trip for desired operating point. NOTE: If the deadband control is changed, the trip control should be readjusted.

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**FIGURE 3 Jumpers And Adjustments**

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MAINTENANCE

These instruments are solid state and require no mainte-
nance on a regular basis except for annual cleaning and
calibration verification. If the alarm is not operating prop-
erly, remove it and give it full bench check out. Most
problems are found in the field wiring or other circuits. If
the problem is traced to the unit itself, conventional elec-
tronic troubleshooting methods may be used.

WARRANTY

The Company warrants all equipment manufactured by it and bearing its name
plates, and all repairs made by it, to be free from defects in material and
workmanship under normal use and service. If any part of the equipment fails
described, and sold by the Company, proves to be defective in material or
workmanship and if such part is within twelve months from date of shipment
from the Company’s factory, returned to such factory, transportation charges
prepaid and if the same is found by the Company to be defective in material
or workmanship, it will be repaired or replaced, free of charge, i.e., by Company’s
factor. The Company assumes no liability for the consequence of its use or
misuse by Purchaser, its employees or others. A defect in the meaning of this
warranty in any part of said equipment shall not, when such part is capable
of being renewed, repaired or replaced, cause to condemn such equipment, this
warranty is express only of all other warranties, guaranties, obligations, or
statutory or implied warranties other than this, are hereby expressly negated
and excluded.

Warranty repair or replacement requires the equipment to be returned to one of
the following addresses:

Equipment manufactured or sold by MOORE PRODUCTS CO.
MOORE PRODUCTS CO.
Sunneystone Park
Spring House, PA. 19477

Equipment manufactured or sold by MOORE INSTRUMENT CO.
MOORE INSTRUMENTS LTD., LTD.
228 W. Main St., Brampton, Ontario, Canada

The warranty will be null and void if repair is attempted without prior authori-
tization by a member of the MOORE PRODUCTS CO. Service Department.