GENERAL

The Model 380E2 Differential RTD Module accepts two RTD inputs and provides a millivolt output that is proportional to the differential temperature of the RTD's. The output of the module can be connected to the input of a Model 380D2 Millivolt Transmitter to provide a process current output signal. The combination of these two modules produces a system that accepts differential input spans from 5 to 180 Ohms and provides a current output range of either 4 to 20 or 10 to 50 mA. Excitation currents for this wide range of input spans are covered in three field selectable ranges. Refer to Figure 1 for a block diagram of the Model 380E2/380D2 system.

SPECIFICATIONS

**Input:**
- Two, 100 Ohm resistance bulbs

**Differential Span:**
- 5 to 180 Ohms (field changeable)
- Range A: 60 to 180 Ohms
- Range B: 20 to 60 Ohms
- Range C: 5 to 20 Ohms

**Excitation Current:**
- Range A: 0.21 mA (nominal)
- Range B: 0.66 mA (nominal)
- Range C: 2.1 mA (nominal)

**Output:**
- 10 to 50 mV dc, depending on the differential span

**Output Load:**
- 200 K Ohms, minimum

INSTALLATION

The differential resistance bulb to current conversion requires the use of two modules: Model 380E2 and Model 380D2. The modules should be located adjacent to each other in the card cage enclosure. Using the card cage enclosure instructions as a reference (Service Instruction, SD3801), set the keys as follows:

<table>
<thead>
<tr>
<th>MODEL</th>
<th>LEFT KEY</th>
<th>RIGHT KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>380E2</td>
<td>V (vertical)</td>
<td>V (vertical)</td>
</tr>
<tr>
<td>380D2</td>
<td>H (horizontal)</td>
<td>V (vertical)</td>
</tr>
</tbody>
</table>

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If the modules are not factory calibrated (as a system), refer to the CALIBRATION section of this instruction. If the modules are factory calibrated, insert them into their respective slots in the card cage enclosure and make the electrical connections shown in the connection diagram. The measuring system is designed to handle 100 Ohm resistance bulbs, either 2 or 3 wire. If 3 wire bulbs are used, the compensating wire is not connected.

CALIBRATION

INPUT SPAN

Determine the differential resistance span required and place jumper wires J1 and J2 on the Model 380E2 module as follows:

<table>
<thead>
<tr>
<th>INPUT SPAN</th>
<th>JUMPER POSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>60 to 180 Ohms</td>
<td>A</td>
</tr>
<tr>
<td>20 to 60 Ohms</td>
<td>B</td>
</tr>
<tr>
<td>5 to 20 Ohms</td>
<td>C</td>
</tr>
</tbody>
</table>

Note

Both jumpers (J1 and J2) must be in the same range, otherwise a large offset will occur at the output of the Model 380E2 module.

OUTPUT RANGE

Determine which output range is required (4 to 20 mA or 10 to 50 mA). A jumper wire (J1) on the foil side of the Model 380D2 module determines the output current range:

4 to 20 mA: J1 OUT
10 to 50 mA: J1 IN

PROCEDURE

1. Connect the two modules as shown in the connection diagram. The output current must be measured to at least 0.1% accuracy.

2. The output current increases with increasing resistance of RTD1 or decreasing resistance of RTD2. It is recommended that RTD2 be set at its minimum value and vary RTD1 over a range that is equivalent to the differential span. In the remainder of this procedure, the value of RTD2 will be considered fixed and RTD1 will vary between the minimum and maximum input differential.

3. Span (S) and zero (Z) jumpers on the Model 380D2 change the adjustment range of the span and zero potentiometers. If the span and/or zero potentiometers reach full travel before calibration is reached, the jumpers can be cut to increase the adjustment range. Do not cut these jumpers unless necessary, as better resolution is obtained with the smaller spans. Refer to Service Instruction, SD380D for details.

4. Set RTD1 to the minimum value.

5. Adjust the ZERO potentiometer on the Model 380D2 for the minimum output value for the range selected.

6. Set RTD1 to the maximum value.
7. Adjust the SPAN potentiometer on the Model 380D2 for the maximum output value for the range selected.

8. Repeat steps 4 through 7 as required.

MAINTENANCE

Except for annual cleaning and periodic calibration checks, these instruments require no routine maintenance.

If the system is not operating properly, remove both modules and give them a full bench checkout. The schematic diagram of the Model 380E2 is provided at the rear of this instruction. The schematic of the Model 380D2 Millivolt Transmitter is contained in Service Instruction, SD380D.

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DUAL RESISTANCE BULBS

![Block Diagram](image)

**FIGURE 1 Block Diagram**

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Terminal strip on Series 380 rock enclosures.

NOTES:
1. The output increases with increasing of RTD 1 or decreasing resistance of RTD 2.
2. See the SPECIFICATIONS section for load limits.

FIGURE 2 Connection Diagram
In early units CR2 deleted and CR1 ACROMAG P/N 1001-112

+12.4V

R7
301A

CR1 ACROMAG
1001-083

CR2 ACROMAG
1001-083

R1, R6 - 56.2kΩ
R2, R5 - 26.1kΩ
R3, R4 - 6.04kΩ

Note: All resistors are 1%, 1/2W
Both J1 & J2 must be in the same range (field selectable)