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2. TRANSMITTER CALIBRATION

2.1 Switch Setting

Inside the enclosure are located six DIP switches for coarse range, and two multi-turn potentiometers are located on the transmitter panel for fine-tuning.

Note: The DRA-TCI-2D is ordered for a specific T/C, and cannot be altered.

Note: The following tables indicate coarse ranges. It might occur that the proper range can be obtained with adjacent switch combinations.

2.1.1. Define the desired range limits:

- \( T_{\text{min}} \) - the temperature at which the output current is 4mA.
- \( T_{\text{max}} \) - the temperature at which the output current is 20mA.
- \( T_{\text{span}} \) - the difference between \( T_{\text{max}} \) and \( T_{\text{min}} \).

According to the following tables, set switches no. 4 to 6 for the Zero (\( T_{\text{min}} \)), and set switches 1 to 3 for the Span (\( T_{\text{span}} \)).

**Zero Table**

<table>
<thead>
<tr>
<th>SW.</th>
<th>Type</th>
<th>( T_{\text{min}} )</th>
<th>( T_{\text{max}} )</th>
<th>( T_{\text{span}} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>0 ~ 25</td>
<td>0 ~ 60</td>
<td>-45 ~ -15</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>25 ~ 45</td>
<td>60 ~ 85</td>
<td>-45 ~ -15</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>45 ~ 75</td>
<td>85 ~ 125</td>
<td>-15 ~ 5</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>75 ~ 110</td>
<td>125 ~ 175</td>
<td>5 ~ 40</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>110 ~ 150</td>
<td>175 ~ 220</td>
<td>40 ~ 74</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>150 ~ 200</td>
<td>220 ~ 265</td>
<td>74 ~ 112</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>200 ~ 250</td>
<td>265 ~ 300</td>
<td>112 ~ 158</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>250 ~ 300</td>
<td>300 ~ 350</td>
<td>158 ~ 210</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>300 ~ 350</td>
<td>350 ~ 400</td>
<td>210 ~ 262</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>350 ~ 400</td>
<td>400 ~ 450</td>
<td>262 ~ 314</td>
</tr>
<tr>
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<td>0</td>
<td>400 ~ 450</td>
<td>450 ~ 500</td>
<td>314 ~ 366</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>450 ~ 500</td>
<td>500 ~ 550</td>
<td>366 ~ 418</td>
</tr>
<tr>
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<td>0</td>
<td>500 ~ 550</td>
<td>550 ~ 600</td>
<td>418 ~ 470</td>
</tr>
<tr>
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<td>0</td>
<td>550 ~ 600</td>
<td>600 ~ 650</td>
<td>470 ~ 522</td>
</tr>
<tr>
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<td>0</td>
<td>600 ~ 650</td>
<td>650 ~ 700</td>
<td>522 ~ 574</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>650 ~ 700</td>
<td>700 ~ 750</td>
<td>574 ~ 626</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>700 ~ 750</td>
<td>750 ~ 800</td>
<td>626 ~ 678</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>750 ~ 800</td>
<td>800 ~ 850</td>
<td>678 ~ 730</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>800 ~ 850</td>
<td>850 ~ 900</td>
<td>730 ~ 782</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>850 ~ 900</td>
<td>900 ~ 950</td>
<td>782 ~ 834</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>900 ~ 950</td>
<td>950 ~ 1000</td>
<td>834 ~ 886</td>
</tr>
</tbody>
</table>

2.3. Calibration instrumentation:

- 24Vdc Power Supply
- T/C calibrator
- High accuracy DVM
- Small screwdriver

Connect the transmitter to be calibrated according to Fig. 3.

2.4. CALIBRATION STEPS

a. Set the calibrator to \( T_{\text{min}} \).
b. Adjust the Zero for 4mA.
c. Set the calibrator to \( T_{\text{max}} \).
d. Adjust the Span for 20mA.

Repeat steps a to d until satisfactory results are achieved.
2.4.1 Calibration example:

Needed: T/C Type K, ranged for: 200 to 500°C

Tmin: 200°C
Tspan: 500 – 200 = 300°C

1. Set the DIP switch to: 0,1,0,0,1,0 (sw1..sw6)
2. Set the calibrator for 200°C, calibrate “Z” to 4.000mA.
3. Set for 500°C and calibrate “S” to 20.000mA.
4. Repeat steps 2, 3 until satisfactory results are obtained.

3. DISPLAY CALIBRATION

The display calibration is performed by setting two jumpers and two trimmers (Zero and Span).

The display has 3½ digits, i.e., it can display from -1999 to 1999. Three decimal positions can be obtained using one of the two jumpers.

Jumper position over pins #1 to #5 sets the decimal point:
- No jumper - 1999
- Pins #1-#2 - 199.9
- Pins #3-#4 - 19.99
- Pins #4-#5 - 1.999

Jumper over pins #11 to #13 sets the display range according to:
- No jumper - 1000 to 1999
- Pins #12-#13 - 500 to 1000
- Pins #11-#12 - 200 to 500

3.1 CALIBRATION PROCEDURE

a. Set the transmitter to exactly 4-20mA.
b. Place the jumpers for desired range.
c. Adjust the display Zero trimmer for 000 at 4mA.
d. Adjust the display Span trimmer for desired span.
e. Adjust the display Zero trimmer for Tmin at 4mA.

Example:

required -100°C to +750°C. The span is 850°C.

Set the display (at -100°C) to 000 by the Zero potentiometer. Set the display (at +750°C) to 850 by the Span potentiometer.

4. CONNECTION DIAGRAM

Fig. 4

MECHANICAL DIMENSIONS, mm (in)

Fig. 6

6. SPECIFICATIONS

INPUT: Thermocouple type: B, E, J, K, R, S

BURNOUT PROTECTION: Upscale

MINIMUM INPUT: 4mV

SPAN: 0-20mA (25mA limited)

OUTPUT:

LOOP RESISTANCE: Rin+Rout = (Vsupply-12)/.02

ISOLATION: 1500 Vdc or peak ac

RESPONSE TIME: 160 msec (0-98%)

CALIBRATION:

Span Calibration: Three DIP switches and “Span” potentiometer
Zero Calibration: Three DIP switches and “Zero” potentiometer

COLD JUNCTION COMPENSATION ERROR: Typical: ±0.1°C for 0-5°C change (±0.5°C for B, R and S)

ACCURACY (linearity, hysteresis and repeatability):

± 0.1% of span for type K,
± 0.1% to ±0.2% for other thermocouple types, typical

TEST TERMINALS: 40 to 200 mV represent 4-20 mA

SUPPLY VOLTAGE: 12 - 40 Vdc, reverse polarity protected

SUPPLY AND LOAD VARIATION EFFECT: < ±0.05% of span for full change

CMR: 125dB typical dc to 60 Hz
DISPLAY: 0.3” 3½ digit back-illuminated, LCD
LCD DISPLAY RANGE: -1999 to 1999
DISPLAY CALIBRATION: Internal Zero & Span potentiometers.

TEMPERATURE STABILITY: ±0.01% of span /1°C

OPERATING TEMPERATURE: -20 to +70°C (-4 to 158°F)

STORAGE TEMPERATURE: -30 to +85°C (-22 to 185°F)

HUMIDITY: 5 - 95% relative humidity, non-condensing

HOUSING: Plastic polycarbonate

PROTECTION LEVEL:

Housing: According to IP-40
Terminals: According to IP-20

MOUNTING: Standard 35 mm DIN rail

WEIGHT: 200 grams (7 oz)