DESCRIPTION
The Series 653 Mini-Din Temperature Transmitters have been designed to provide a 4-20 mA output that is linear and proportional to the temperature detected by either a Type J thermocouple or 100Ω Platinum RTD (DIN Std. 43760). The current output signal is applied to the same two wires used to power the device. Cold junction compensation is performed by a highly accurate and stable semiconductor temperature sensor on all thermocouple models. The circuitry is housed in a rugged self-extinguishing plastic case suitable for direct mounting on DIN rails complying with DIN 46277-1 and DIN 46277-3 standards.

Electrical Connections
T/C Models
The transmitter must be powered with a voltage between 13 and 32 V, applied between the H(-V) and G(+V) terminals. See wiring diagram in Figure 1. The thermocouple is wired between terminals A (+TC) and B (-TC).

Figure 1: T/C Wiring Diagram

RTD Models
The transmitter must be powered with a voltage between 13 and 32 V, applied between the H(-V) and G(+V) terminals. See the wiring diagram in Figure 2. The connection

PHYSICAL DATA
Input: Type J thermocouple or Pt100Ω, α = 0.00385, 2 or 3 wire depending on model.
Output: 4 to 20 mA, linearized. Transmitter Type: 2-wire.
Sensor Current: 1mA for spans up to 200°C, 0.5mA for spans greater than 200°C (RTD models only).
Sensor Lead Influence: 0.015%/Ω (100Ω max. Balanced on each lead) (RTD models only).
Thermocouple Extension Wire Affect: 1µV/Ω (T/C models only).
RTD or Thermocouple Break, Open: Upscale.
Current Limitation: 25 mA.
Loop Resistance: 625Ω @ 24 VDC.
Cold Junction Compensation: Included on all T/C models.
Reverse Polarity Protection: 60 VDC maximum.
Response Time: 10 to 90% of span in 0.5 seconds.
Warm-Up Time: 3 minutes.
Calibration Accuracy: ±0.1% of f.s. or ±0.2°C (whichever is greater).
Linearity Error: ±0.15% of f.s. (includes hysteresis, linearization error and supply voltage variations).
RFI Immunity: ≤1% of f.s., 20 - 500 MHz @ 10V/m.
Thermal Drift: 0.02% of f.s./°C.
Power Supply: 13 to 32 VDC.
Ambient Operating Temperature: -4 to 158°F (-20 to 70°C).
Storage Temperature: -40 to 212°F (-40 to 100°C).
Relative Humidity: 0 to 90%, non-condensing.
Mounting: DIN Rail complying with DIN 46277-1 & 46277-3.
Weight: 1.8 oz (50 g).

STOCKED MODELS

<table>
<thead>
<tr>
<th>MODEL NUMBER</th>
<th>INPUT</th>
<th>RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>653-011</td>
<td>RTD, Pt100Ω</td>
<td>-58 to 122°F (-50 to 50°C)</td>
</tr>
<tr>
<td>653-013</td>
<td>RTD, Pt100Ω</td>
<td>32 to 212°F (0 to 100°C)</td>
</tr>
<tr>
<td>653-014</td>
<td>RTD, Pt100Ω</td>
<td>32 to 392°F (0 to 200°C)</td>
</tr>
<tr>
<td>653-017</td>
<td>RTD, Pt10Ω</td>
<td>32 to 1112°F (0 to 600°C)</td>
</tr>
<tr>
<td>653-023</td>
<td>T/C, Type J</td>
<td>32 to 212°F (0 to 100°C)</td>
</tr>
<tr>
<td>653-024</td>
<td>T/C, Type J</td>
<td>32 to 392°F (0 to 200°C)</td>
</tr>
<tr>
<td>653-027</td>
<td>T/C, Type J</td>
<td>32 to 1112°F (0 to 600°C)</td>
</tr>
</tbody>
</table>
of the sensor can be performed with two or three wires. The two-wire connection is performed by connecting the sensor to terminals A and C and connecting terminal A to the terminal B. The three-wire connection is performed by connecting the sensor to terminals A, B and C.

Loop Resistance
The voltage required for the 4-20 mA signal is dependent on and proportional to the loop resistance of the circuit (R_load). See Figure 3 below for the minimum supply voltage required for a given loop resistance.

Calibration
If necessary, it is easy to perform the calibration just by adjusting the zero and span.

T/C Models
1. Connect a precision resistance box or T/C calibrator, in place of the thermocouple. Wire the transmitter output in series with a current meter and connect to a suitable 24VDC power supply. Switch power on.

2. Set the resistance box or calibrator to the equivalent sensor resistance for the temperature you require for 4 mA output. Refer to Type J T/C tables for this data. Adjust the zero potentiometer (located on the side opposite the DIN rail) until your current meter reads 4 mA. No further adjustments are needed.

3. Set the resistance box or calibrator to the equivalent sensor resistance for the temperature you require for 20 mA output. Refer to Type J T/C tables for data. Adjust the span potentiometer (located on the side opposite the DIN rail) until your current meter reads 20 mA. No further adjustments are needed.

4. Switch off power supply and remove wires.

RTD Models
1. Connect a precision resistance box or Pt100 calibrator, in place of the Pt100 sensor, using the three wire connection. Wire the transmitter output in series with a current meter and connect to a suitable 24VDC power supply. Switch power on.

2. Set the resistance box or calibrator to the equivalent sensor resistance for the temperature you require for 4 mA output. Refer to Pt100 tables for a listing of the appropriate resistance at the given temperature. Adjust the zero potentiometer (located on the side opposite the DIN rail) until your current meter reads 4 mA.

3. Set the resistance box or calibrator to the equivalent sensor resistance for the temperature you require for 20 mA output. Refer to Pt100 tables for this data. Adjust the span potentiometer (located on the side opposite the DIN rail) until your current meter reads 20 mA. No further adjustments are needed.

4. Switch off power supply and remove wires.

Maintenance/Repair
After final installation of the Series 653 Temperature Transmitter, no routine maintenance is required. A periodic check of system calibration is recommended. These devices are not field repairable and should be returned to the factory if recalibration or other service is required. After first obtaining a Returned Goods Authorization (RGA) number, send the material, freight prepaid, to the following address. Please include a clear description of the problem plus any application information available.

Dwyer Instruments, Inc.
Attn: Repair Department
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