DESCRIPTION
The Model 656-1 Programmable Transmitter has been designed to provide a 4-20 mA output that is linear and proportional to the temperature detected by the 100Ω Platinum RTD (DIN Std. 43760). Range is programmed by utilizing a four way DIP switch. Zero is adjustable from -100˚F to +100˚F, span can be adjusted according to the input table. See Table 1. The unit will accept either 2 or 3 wire RTD inputs. The current output signal is applied to the same two wires used to power the device.

Exclusive design criteria has permitted manufacturing a unique device that allows zero and span calibration independently, without the influence of one on the other. 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
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 1. The connection of the sensor can be performed with two or three wires.

PHYSICAL DATA
Input  Pt100Ω, α = 0.00385, 2 or 3 wire.
Output: 4 to 20 mA.
Transmitter Type: Two-Wire.
Zero Adjustment: -100 to 100˚F (-73 to 37˚C).
Span Adjustment: 100 to 1200˚F (40 to 650˚C).
Sensor Current: 1 mA.
Input Configurations: Two or Three-wire.
Line Resistance Influence: 0.05% of f.s./Ω (100Ω max. balanced on each lead).

RTD Break, Open: Upscale.
Current Limitation: 25 mA.
Loop Resistance: 625Ω @ 24 VDC.
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 ±0.1˚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: 0.03% of f.s./˚C (0.09˚F).
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).

Figure 1: Wiring Diagram
The two-wire connection is performed by connecting the sensor to terminals A and D and connecting terminal A to the terminal B. The three-wire connection is performed by connecting the sensor to terminals A, B and D.

**Loop Resistance**
The voltage required for the 4-20 mA signal is dependent on and proportional to the loop resistance of the circuit (RLoad). See Figure 2 below for the minimum supply voltage required for a given loop resistance.

![Figure 2](image)

**Setting the Range**
1. With the transmitter removed from the DIN rail and not powered, snap off the front face plate by inserting a screwdriver into the slot under the right edge of the front plate and prying upward. Note the dip switches are visible through a rectangular cutout in the heat sink. See Figure 3.

![Figure 3: Dip Switch Configuration](image)

2. Set dip switches 1 thru 4 to the value of the desired span (See Table 1 for ranges). Up position for ON and down position for OFF.

3. After configuring the dip switches, 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.

4. 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.

5. 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.

6. Switch off power supply and remove wires.

**Maintenance/Repair**
After final installation of the Model 656-1RTD Programmable 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

©Copyright 1999 Dwyer instruments, Inc  
Printed in U.S.A. 9/99  
FR# R1-440930-00