

**DEVAR Inc.**



# Model d-RTTI User Manual

# Introduction

The Model d-RTTI is a room temperature indicator/transmitter that provides an accurate indication of ambient temperature with a numeric readout and a 4 to 20 mA output signal. In this manual you will find an overview of how to configure and operate this device.

The Model d-RTTI includes the following features:

- 4 Digit Red LED Temperature Display
- Fahrenheit or Centigrade Operating Modes
- -40 to 180 °F or -40 to 82 °C Operating Ranges
- Precision RTD Temperature Sensor
- Field Configurable 4/20 mA Temperature Output
- True 2-Wire Operation
- Push-Button Configuration
- Fits Standard Single Gang Electrical Outlet Box
- Splash Resistant Front Panel

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# 1.0 General Description

The Model d-RTTI Digital, Room-Temperature, Transmitter-Indicator is designed to accurately sense and display ambient room temperature and provide a 4 to 20 mA output signal that is proportional to the measured temperature to within  $\pm 0.1$  °F.

The d-RTTI displays ambient room temperature across an operating range of -40°F to 180°F or -40°C to 82°C. The standard factory configuration scales the 4 to 20 mA output signal to represent a temperature span of 0 to 100°F. The user can easily reconfigure the unit in the field by using the three push button switches located on the backside of the device.

A precision 1000 ohm RTD sensor is used to detect the ambient temperature. An option is also available that will accept its input from an external 1000 ohm platinum RTD sensor.

The d-RTTI operates on a supply voltage of 10 to 28 Volts DC. This is a true two wire device with signal and power being provided over a single pair of wires.

# 2.0 Physical Description

The d-RTTI enclosure consists of a beige 4.7" high by 2.8" wide by 3/8" thick plastic plate. Captivated mounting screws and a gasket seal are provided to attach the unit to a single-gang electrical outlet box. The sealed front faceplate provides a measure of splash resistance for applications where wash down is required. The internal RTD temperature sensor is mounted on the backside of the black anodized aluminum heatsink that protrudes from the front of the unit. The heatsink ensures temperature compliance with the ambient environment. The temperature is indicated on a seven-segment, 0.4-inch high, red LED display, with a temperature resolution of one tenth of a degree. The three buttons labeled **FUNC**, **INCR**, and **NEXT** are located on the backside of the d-RTTI and allow the user to set the operating parameters. Compression screw-terminals on the rear provide connection points for the 4 to 20mA output wires and the optional remote sensor. *Refer to figures 1 and 2.*

### 3.0 Startup Sequence

The start up sequence occurs after applying power to the unit. The sequence is: all segments lit “**8.8.8.8.**”; then “**type**”, followed by “**rtti**”; then “**ver**”; followed by two numbers **ddmm** and **yyyy** that represent the day, month, and year of the revision; and then “**run**”. After the startup sequence is complete the detected temperature is displayed and the unit is operational.

### 4.0 Configuration

To enter the configuration mode press all three buttons while powering up the unit or, while the d-RTTI is operational, press and hold all three buttons for approximately five seconds. The unit will enter the startup sequence by lighting all segments “**8.8.8.8.**” and then displaying “**COnF**”. Pressing any button at this point will produce the first Configuration Prompt on the list of configurable operating parameters below.

Configuration Parameters	
Prompt	Operation
<b>F . [</b>	Selects whether the temperature will be displayed in °F or °C
<b>H I</b>	Selects the temperature value that will produce a 20 mA output
<b>L O</b>	Selects the temperature value that will produce a 4 mA output
<b>OFFS</b>	Adds a small amount of offset or zero shift to the displayed temperature; this value is normally set to zero but can be used to make fine adjustments to the temperature measurement

*Note: Figure 4 on page 9 presents this information in a flowchart*

## 4.1 Using the Buttons

Once in the configuration mode pressing the **NEXT** button steps you through each of the configuration prompts (**F • C**, **HI**, **LO** and **OFFS**). Pressing the **FUNC** button selects the indicated function and displays its current value. For **F • C** the display will indicate either °C or °F, pressing either the **INCR** or **NEXT** button will toggle the between the two. For **HI**, **LO** or **OFFS** a four digit number will appear with the leftmost digit blinking. Pressing the **INCR** button will change the value of the blinking digit. Pressing the **NEXT** button will change which digit blinks. Once the parameter has been configured press the **FUNC** button a second time to save the currently displayed value and continue to the next configuration prompt.

## 4.2 Select Temperature Scale

The Temperature Scale function is used to set the temperature scale to either °F or °C. At the **F • C** prompt press the **FUNC** button to select the item then use the **INCR** or **NEXT** button to toggle between the two choices. Press the **FUNC** button again to enter the selection and move on to the next prompt.

## 4.3 Set Top of Range

The Top of Range function is used to set the temperature value that corresponds to an output signal of 20 milliamps. At the **HI** prompt press the **FUNC** button to select the item. A four-digit number will appear with the leftmost digit blinking. Press the **INCR** button to change the value of the blinking digit. Press the **NEXT** button to change which digit blinks. Edit the number then press the **FUNC** button again to enter the selection and move on to the next prompt.

## 4.4 Set Bottom of Range

The Bottom of Range function is used to set the temperature value that corresponds to an output signal of 4 milliamps. At the **LO** prompt press the **FUNC** button to select the item. A four digit number will appear with the leftmost digit blinking. Press the **INCR** button to change the value of the blinking digit. Press the **NEXT** button to change which digit blinks. Edit the number then press the **FUNC** button again to enter the selection and move on to the next prompt.

## 4.5 Set Offset

The Set Offset function is used to shift the temperature reading up or down by a small amount as a fine temperature adjustment. At the **OFFS** prompt press the **FUNC** button to select the item. A three digit number will appear with the leftmost digit blinking. Press the **INCR** button to change the value of the blinking digit. Press the **NEXT** button to change which digit blinks. Edit the number then press the **FUNC** button again to enter the selection. After the **FUNC** button is pressed the Startup Sequence will complete and the unit will go into the operating mode. The maximum offset adjustment is  $\pm 10$  degrees.

## 5.0 Error Messages

Setting the **HI** or **LO** value to a number that falls outside of the operating range of the instrument will cause **Err** to be displayed and the unit will return to the edit screen so that the number can be re-entered.

Setting the 4 to 20 mA output span ( $span = HI - LO$ ) to a value of less than 35 °F or 20 °C will cause **SPAN Err** to be displayed, press any button to return to the **HI** prompt so that the error can be corrected.

Setting the **OFFS** value to a number greater than  $\pm 10$  will cause **Err** to be displayed and the unit will return to the edit screen so that the number can be re-entered.

## 6.0 Specifications

### GENERAL

Display:	4 Digit LED with 0.4 inch high, red characters
Housing:	Splash resistant faceplate with rear gasket seal
Material:	ABS Plastic faceplate with polycarbonate window
and	black anodized aluminum heat sink
Junction Box	Die Cast, Gray Painted, Aluminum (Option -H)
Field Wiring	Screw Compression Term Block (Max Torque: 7 lb/in)
Sensor:	1000 Ohm Platinum RTD, Conforms to DIN
Standard	EN 60751, Class A
Open RTD:	Output goes upscale

Temp. Range: -40 to 180 °F (-40 to 82 °C)  
RFI Immunity: Rated class 3-C

### **DISPLAY**

Range: -40 to 180 °F or -40 to 82 °C  
Accuracy:  $\pm 0.5$  °F ( $\pm 0.9$  °C) at 77 °F (25 °C)  
Thermal Effect: Zero Shift:  $\pm 0.002$  X (Reading-77 °F)  
Span Shift:  $\pm 0.004$  X (Reading-77 °F)

### **MILLIAMP OUTPUT**

Range: 4 to 20 mA  
Accuracy:  $\pm 0.7$  °F ( $\pm 0.4$  °C) + 0.1% of Span  
Thermal Effect: Zero: Display Shift  $\pm 0.01\%$  of Span per °F  
Span: Display Shift  $\pm 0.01\%$  of Span per °F  
Supply: 10 to 28 VDC  
Max Load:  $R_{ohms} = (V_{supply} - 10V) / 0.020A$   
Supply effect: 0.01% of Span per Volt  
Load Effect: 0.05% of Span per 300 Ohm Change

### **DEFAULT CALIBRATION**

Display: -40 to 180 °F  
Loop: 4 to 20 mA Represents 0 to 100 °F

### **FIELD CALIBRATION**

Display: -40 to 180 °F or -40 to 82°C  
Output Loop: The **HI** and **Lo** Milliamp outputs must be set to represent temperatures within the displayable range (-40 to 180 °F or -40 to 82°C)  
Output Limits: Maximum milliamp span: 220 °F or 122 °C  
Minimum milliamp span: 35 °F or 20 °C  
Maximum offset adjustment:  $\pm 10$ °F,  $\pm 5.5$ °C  
Method: Three push buttons on back of panel

### **PRODUCT CODING**

Standard Unit: **d-RTTI** (Default Calibration)  
Custom Cal: **d-RTTI - [Temp at 4 mA / Temp at 20 mA]**

Options: **-R** No Internal Sensor, unit accepts input from external 1000 Ohm plt RTD via TB.  
**-H** Add gray painted die cast aluminum housing.



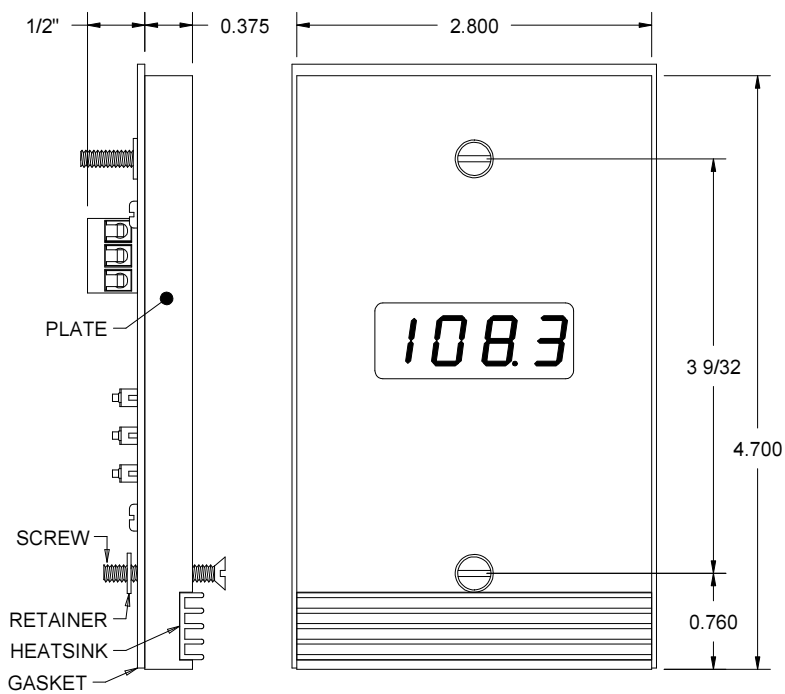


Figure 1. General Dimensions

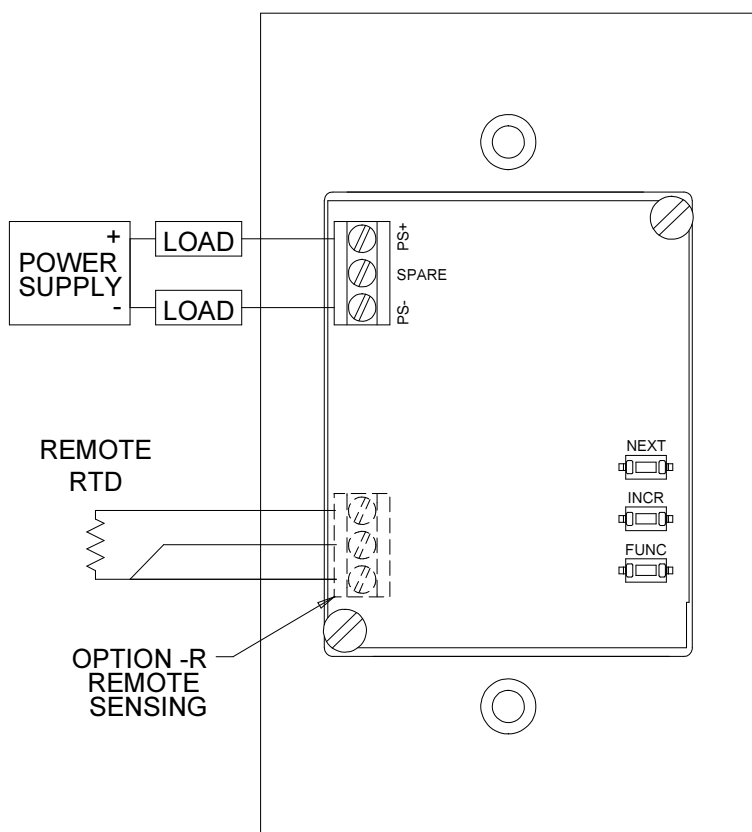


Figure 2. Rear Panel Wiring

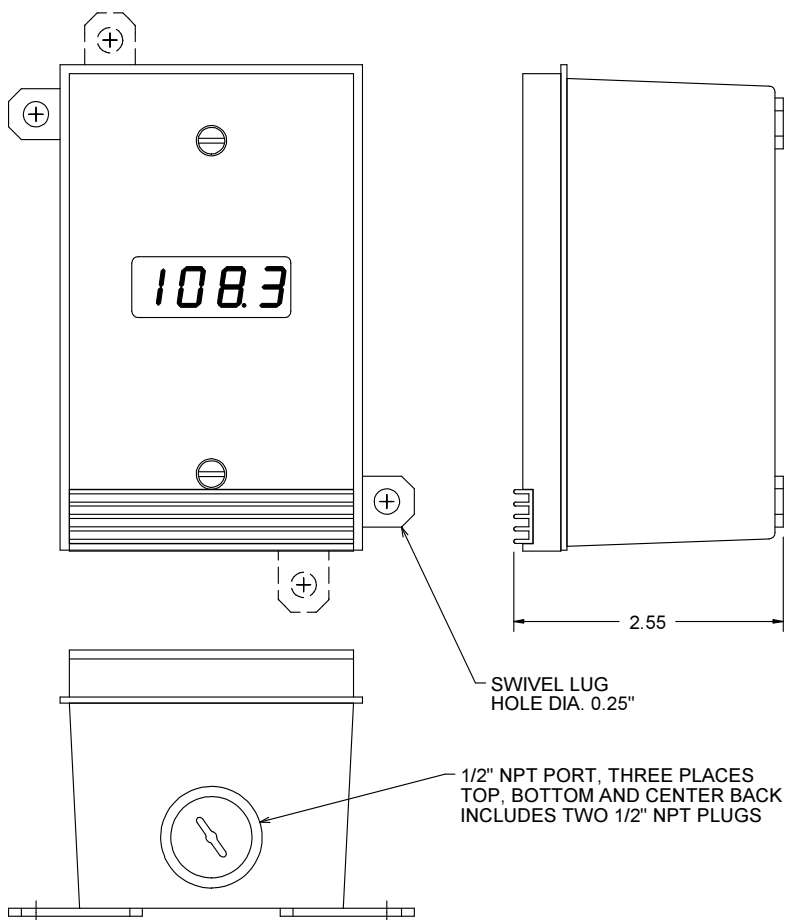


Figure 3. Option H (gray paint, die cast aluminum, housing)

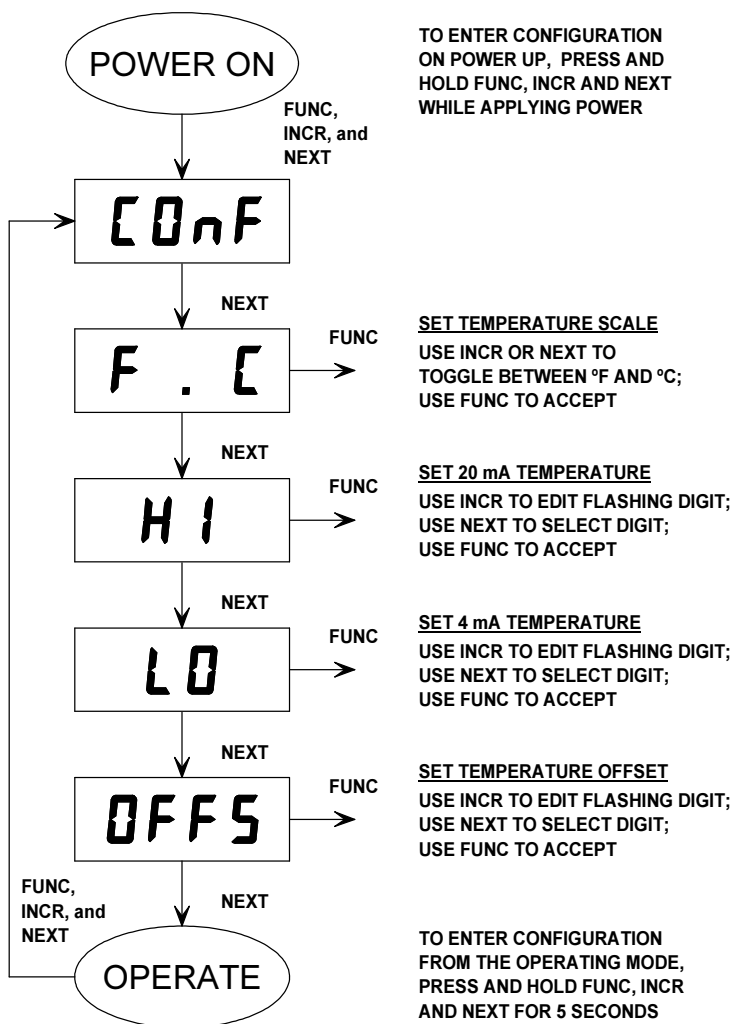


Figure 4. Configuration Flow Chart

## **WARRANTY**

DEVAR INC. WARRANTS THIS PRODUCT AGAINST FAILURE AS A RESULT OF DEFECTS IN MATERIAL OR WORKMANSHIP FOR A PERIOD OF TWO YEARS. Should this product prove to be defective in material or workmanship during the warranty period, Devar Inc. will, at its discretion, repair or replace the defective item at no charge to the customer. Products that are damaged by accident, misuse, fire, water, lightning or other acts of nature are not covered under this warranty. Also not covered, is damage, due to shipping, installation, incorrect wiring or any other cause not related to a product defect. Unauthorized product modification, repair or attempted repair, or serial number modification will void the warranty.

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