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 ±0.1 ºF.

The d-RTTI displays ambient room temperature across an operating range of -40ºF to 180ºF or -40ºC to 82ºC. The standard factory configuration scales the 4 to 20 mA output signal to represent a temperature span of 0 to 100ºF. 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 devices 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 the 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 \textit{ddmm} and \textit{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.

<table>
<thead>
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<th>Configuration Parameters</th>
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<tbody>
<tr>
<td><strong>Prompt</strong></td>
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<td><strong>F . C</strong></td>
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<tr>
<td><strong>H I</strong></td>
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<tr>
<td><strong>LO</strong></td>
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<tr>
<td><strong>OFFS</strong></td>
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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 ±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 ºF or 20 ºC 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 ±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 ºF (-40 to 82 ºC)
RFI Immunity: Rated class 3-C

**DISPLAY**

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

**MILLIAMP OUTPUT**

Range: 4 to 20 mA  
Accuracy: ±0.7 °F (±0.4 °C) + 0.1% of Span  
Thermal Effect: Zero: Display Shift ± 0.01% of Span per °F  
            Span: Display Shift ± 0.01% of Span per °F  
Supply: 10 to 28 VDC  
Max Load: \[ R \text{ ohms} = \frac{(V \text{ supply} - 10V)}{0.020A} \]  
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: ±10 degrees  
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 platinum RTD  
        -H Add Die Cast, Gray Painted, Aluminum Housing
Figure 1. General Dimensions
Figure 2. Rear Panel Wiring
Figure 3. Option H (gray paint, die cast aluminum, housing)
TO ENTER CONFIGURATION ON POWER UP, PRESS AND HOLD FUNC, INCR AND NEXT WHILE APPLYING POWER

SET TEMPERATURE SCALE
USE INCR OR NEXT TO TOGGLE BETWEEN °F AND °C; USE FUNC TO ACCEPT

SET 20 mA TEMPERATURE
USE INCR TO EDIT FLASHING DIGIT; USE NEXT TO SELECT DIGIT; USE FUNC TO ACCEPT

SET 4 mA TEMPERATURE
USE INCR TO EDIT FLASHING DIGIT; USE NEXT TO SELECT DIGIT; USE FUNC TO ACCEPT

SET TEMPERATURE OFFSET
USE INCR TO EDIT FLASHING DIGIT; USE NEXT TO SELECT DIGIT; USE FUNC TO ACCEPT

TO ENTER CONFIGURATION FROM THE OPERATING MODE, PRESS AND HOLD FUNC, INCR AND NEXT FOR 5 SECONDS

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.