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Instruction Manual
d-RTTI-N4

DIGITAL TEMPERATURE
TRANSMITTER

Rev. A

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1.0 General Description

The Model d-RTTI-N4 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 ±0.7°F.

The Model d-RTTI-N4 displays ambient temperature across an operating range of -40 to 180°F or -40 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 pc board.

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-N4 operates on a supply voltage of 10 to 28 Volts DC. It 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-N4 polycarbonate enclosure measures 3.2" high by 4.3" wide by 2.6" deep and consists of a white base and transparent cover with a NEMA 4X rating. The RTD temperature sensor is housed in a stainless steel probe that protrudes 2-3/8" from the bottom of the enclosure which makes the overall height of the unit 5.6". Signal wiring access is provided by either a cable grip or ½" conduit fitting, both rated NEMA 4X. *Refer to figure 5.*

Ambient temperature is indicated on a seven-segment, 0.4-inch high, red LED display, with a temperature resolution of one tenth of a degree. Three buttons labeled ***FUNC***, ***INCR***, and ***NEXT*** are located on the backside of the pc board and allow the user to set the operating parameters. Compression screw terminals, also located on the backside of the pc board, provide connection points for the 4 to 20mA output and the optional remote sensor. *Refer to figure 2.*

3.0 Startup Sequence

The start up sequence occurs after applying power to the unit. The sequence starts with all the segments (***8.8.8.8***) turned on, then *"**type**"* followed by "***rtti***", then "***ver***" followed by ***ddmm*** and ***yyyy***, indicating the revision date, and finally ending with "***run***". After the startup sequence is complete the unit is operational and the detected temperature is displayed.

4.0 Configuration

To enter the configuration mode press all three buttons while powering up the unit or, while the unit 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 listed below.

Configuration Parameters	
Prompt	**Operation**
F . C	Selects whether the temperature will be displayed in °F or °C
H I	Selects the temperature value that will produce a 20 mA output
L O	Selects the temperature value that will produce a 4 mA output
OFFS	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 1 on page 6 presents the configuration procedure 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 °F or °C, pressing either the ***INCR*** or ***NEXT*** button will toggle the choice 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. The maximum offset adjustment is ±10 degrees. After the ***FUNC*** button is pressed the Startup Sequence will complete and the unit will go into the operating mode.

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 ±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 External Probes

The RTD sensor should be a nominal 1000 Ohms at 32°F, wired in a three wire configuration, and conform to the specification DIN EN 60751 (according to IEC 751), with a class A tolerance rating and a nominal temperature coefficient of 3850 ppm/°K. The RTD lead wires should be of equal length and an effort should be made to minimize their resistance. Lead resistance will create a gain error. For any value of lead resistance, the error is negligible at mid span, about 70°F, and will grow proportionally to the -40°F and 180°F endpoints. The effect is approximately 0.05°F per ohm of lead resistance at the endpoints.

7.0 Specifications

GENERAL

Display:	4 Digit LED with 0.4 inch high, red characters
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), Maximum continuous operating range -40 to 175°F
RFI Immunity:	Rated class 3-C (0.25% of span) per SAMA PCM 33.1-1978 (15 volts/meter field strength, 440 to 450 MHz frequency band)

MECHANICAL

Housing:	Ratings: NEMA 4X, Flammability to UL 508, UV resistance to UL508, Halogen free, Good chemical resistance Materials: Polycarbonate, Polyurethane gasket, Polyamide cover screws
Probe	Nylon fitting, 304 Stainless Steel tube, Epoxy seal
Cable Grip	Size: 0.25” - 0.31” (6.3 - 9.7mm) cable diameter
Rating:	NEMA 4X Material: Nylon, neoprene
Conduit Fitting	Size: ½ inch NPT, For use with threaded Rigid Metal (RMC) and Intermediate metal (IMC) conduit systems
Material:	Steel (zinc electroplate), Neoprene gasket
Weight	½ pound

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 × (Reading-77°F)
Span Shift:	±0.004 × (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 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 CONFIGURATION

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

FIELD CONFIGURATION

Display:	-40 to 180°F or -40 to 82°C
Output Loop:	The ***HI*** and ***LO*** Milliamp outputs can be set to represent temperatures within the displayable range of -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°F or ±5.5°C
Method:	Three push buttons on back of panel

PRODUCT CODING

Standard:	**d-RTTI-N4** (with factory default configuration and nylon cable grip)
Custom Cal:	**d-RTTI-N4-[Temp at 4 mA / Temp at 20 mA]** (e.g. d-RTTI-N4-30/120°F)
Options:	-M42 Replace cable grip with 1/2 inch conduit fitting -M36 Add 2 inch pipe mounting bracket -M31S Add 3 inch SnapTrack mounting bracket -M31D Add DIN rail mount bracket

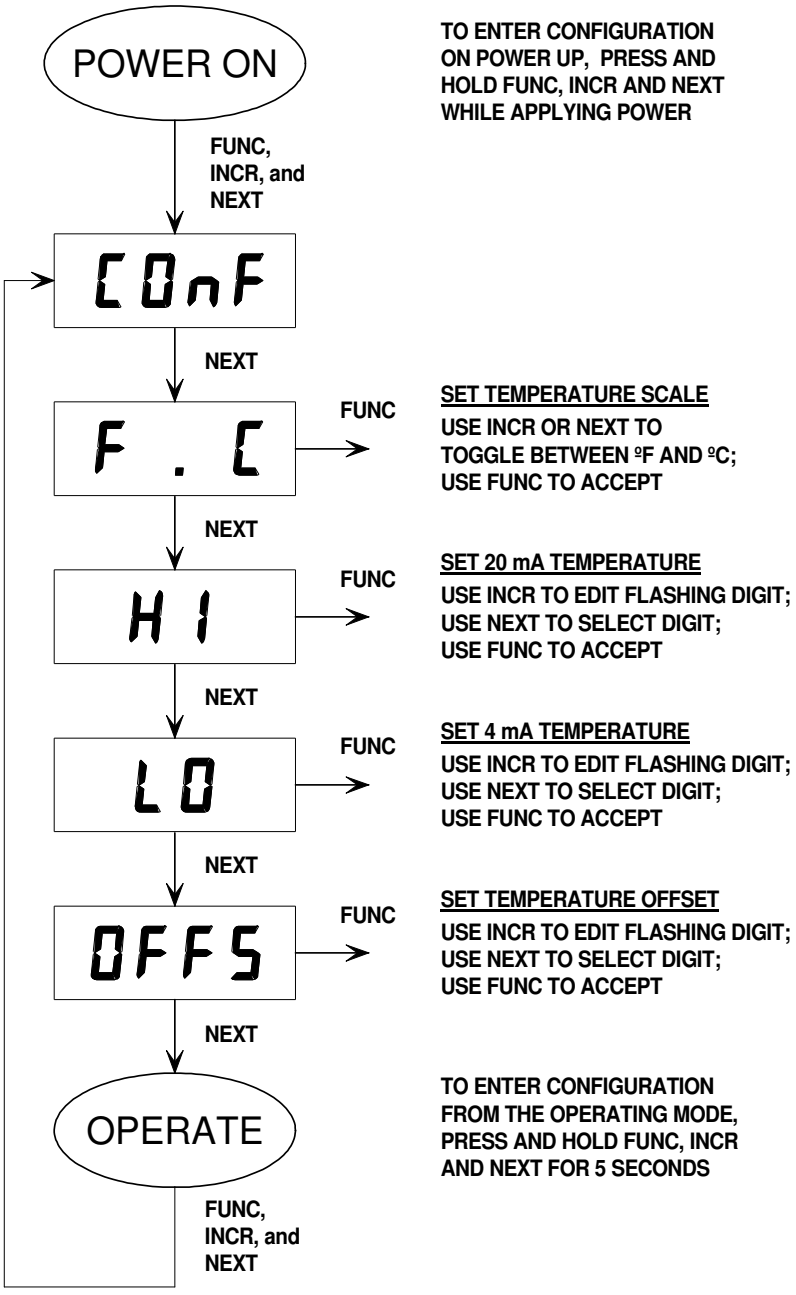

Figure 1: Configuration Flow Chart

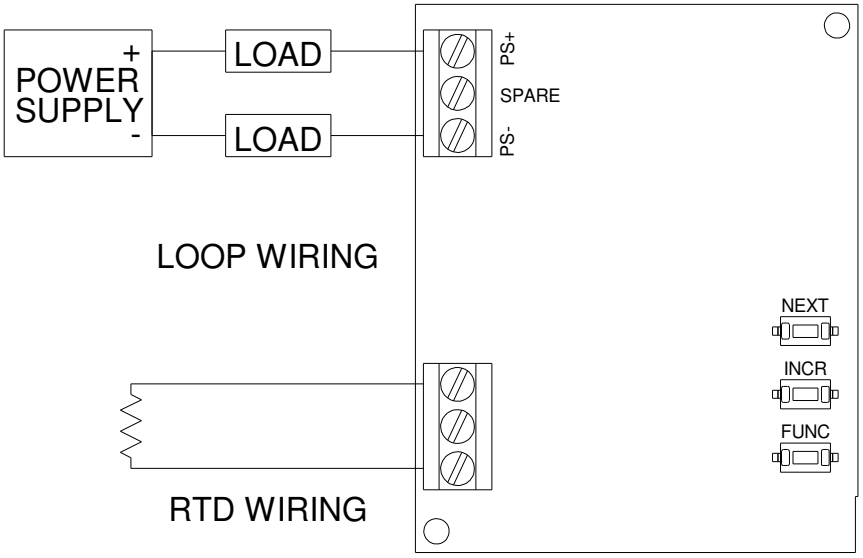

Figure 2: Wiring Terminals and Push Buttons

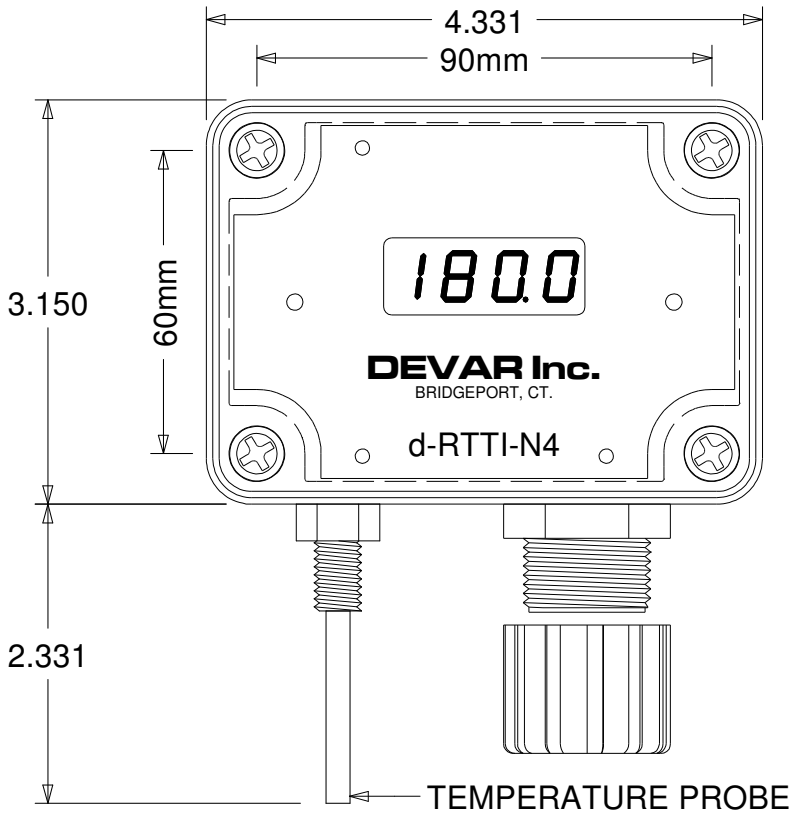

Figure 3: General Dimensions Front View

Note:
The flush mounting, hole pattern is 90mm x 60mm, (see figure 3). The holes for the mounting screws are located below the cover screws. The hole diameter is 4.4mm (0.173”) with a screw head clearance of 8.4mm (0.331”) and a wall thickness of 10.0mm (0.393”), (see figure 4).

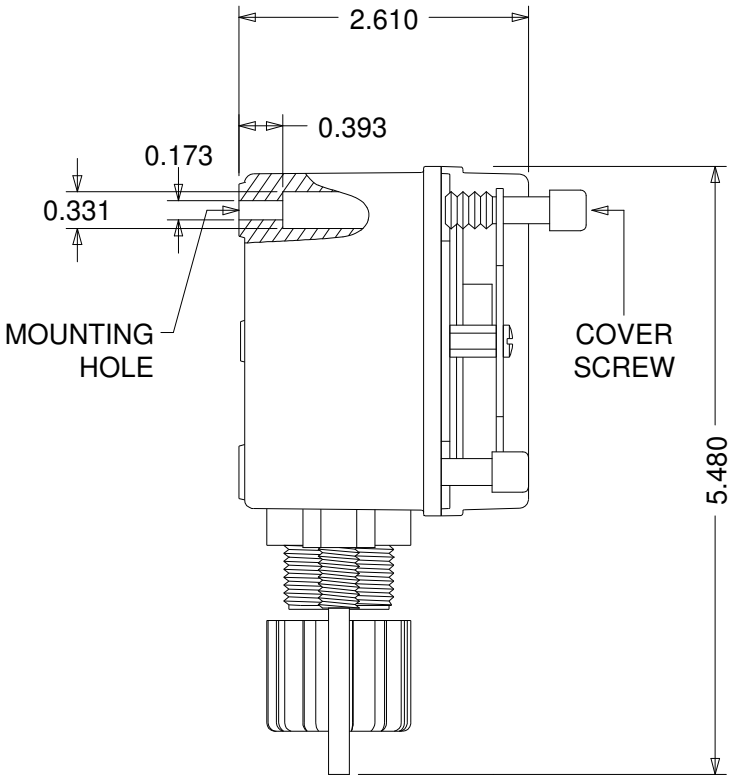

Figure 4: General Dimensions Side View

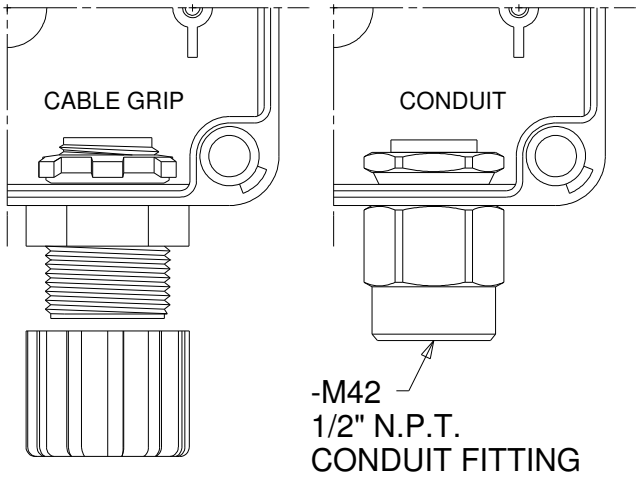

Figure 5: Cable Grip and optional Conduit Fitting

Installation Note

A proper positioning of the room temperature transmitter is required for accurate temperature measurements. There are many things to consider when selecting the location of the transmitter. For one thing, there are often significant temperature differences at different locations in the room. Also consider the heat given off by electrically powered devices, hot and cold water pipes, heating and cooling ducts and vents, the temperature of interior and exterior walls, the location of windows and doors, and the heating caused by direct sunlight. The orientation of the transmitter is also important. When mounting the d-RTTI-N4 the probe should always be facing down from the bottom of the enclosure.

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.