



421-TW-RTD

RESISTANCE TEMPERATURE DETECTOR
ISOLATING TRANSMITTER

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1.0 INTRODUCTION

The 421-TW-RTD is a DIN rail mounted 2 - wire RTD transmitter which is user reconfigurable for many temperature ranges using PT100 RTD's to BS1904/DIN43760 in a 2 or 3 wire connection.

The output span is 4-20mA corresponding directly with the temperature measured - i.e. the RTD characteristics are linearized. The output can be monitored as a 4 - 20mA signal on the test terminals without breaking the loop.

Output drive on open circuit sensor detection is user selectable for either downscale (< 4mA) or upscale (> 20mA).

The 421-TW-RTD provides 1KV DC isolation between input and output together with enhanced noise rejection and requires a minimum loop voltage of 12V at 20mA for correct operation.

If input type and range is not specified at point of order then unit will be shipped in default configuration (0-100°C, 3 WIRE, DOWNSCALE).

2.0 UNPACKING

Please inspect the instrument carefully for signs of shipping damage. The unit is packaged to give maximum protection but we can not guarantee that undue mishandling will not have damaged the instrument. In the case of this unlikely event, please contact your supplier immediately and retain the packaging for our subsequent inspection.

2.1 Checking the Unit Type

Each unit has a unique serial number label (fig.1 below) on which full details of the configuration are given. These details should be checked to ensure conformance with your requirement.

		CE
PART NUMBER	421-TW-RTD	
PROCESS INPUT	3 WIRE PT100	
OUTPUT	4-20mA	
SUPPLY VOLTAGE	OUTPUT LOOP	
SUPPLY FREQ		
SUPPLY POWER		
OPTIONS	0-100 ⁰ C	
SERIAL No.	TWR97-123	

Fig. 1 - Serial Number Label

3.0 CONNECTIONS

Before proceeding, please check the information on the serial number label to ensure that the unit configuration is correct.

Connection details are given on the connection details label (fig 2 below) - the RTD is wired to terminals 1, 2 and 3, whilst the 4-20mA loop is connected to terminals 10 and 12.

3.1 Loop Supply Voltage

The voltage across the output loop terminals must not exceed 32V DC - otherwise damage to the instrument may result. The unit is protected against reverse polarity connection.

421-TW-RTD CONNECTIONS	
1.	RTD Common
2.	RTD Common
3.	RTD Positive
10.	Output -ve
12.	Output +ve
DO NOT EXCEED MAXIMUM TORQUE OF 0.4Nm	

Fig. 2 - Connection Details Label

4.0 RECONFIGURING THE INSTRUMENT

In many cases the instrument will have been factory configured to the required specifications, and calibrated, in which case this section can be ignored. If a particular configuration is not specified then the default (3 WIRE, 0 - 100°C) will be used.

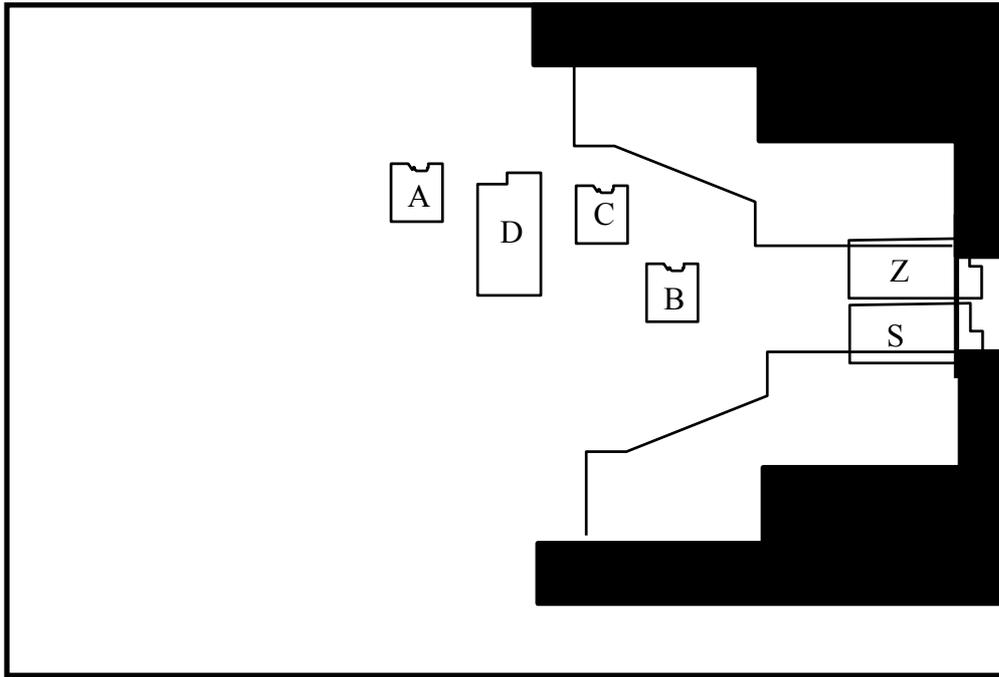
This section details the steps required to reconfigure the unit after which recalibration will be necessary.

First the instrument must be removed from the plastic enclosure. This is achieved by gently prising apart both sides of the grey plastic box, next to the connection terminals, and withdrawing the circuit board with the black terminal blocks.

Using switches A, B and C and links S4 and L4 (as shown in fig. 3) set the desired temperature range and loop drive on open circuit sensor detection.

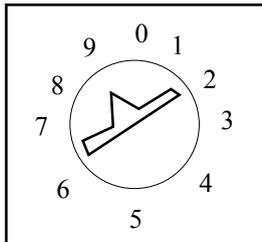
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Fig. 3 - Calibration & configuration data.



- A:
- B: Set Input Range
- C:
- D: Coarse Span
- Z: Zero Adjust
- S: Span

Switches A, B & C: Input Range



(Diagram above shown in position 9)

<u>Range (deg. C)</u>	<u>Switch Positions</u>		
	<u>A</u>	<u>B</u>	<u>C</u>
-25 to +25	1	6	0
-50 to +50	2	5	2
-50 to +150	2	2	5
-50 to +200	2	1	5
-75 to +75	8	9	9
-100 to +100	9	2	5
-150 to +300	4	4	6
-200 to +200	6	4	6
0 to +100	0	5	2
0 to +150	0	9	9
0 to +200	0	2	5
0 to +250	0	1	5
0 to +500	0	4	6
0 to +600	0	0	7

Link S4: Open Circuit Sensor Drive

For downscale drive (<4mA) leave S4 open

For upscale drive (<20mA) fit S4 link

Link L4: 2/3 Wire Connection

For 3 wire RTD leave L4 open

For 2 wire RTD fit L4

Test Terminals:

Terminals 7 and 9 allow signal monitoring using a milliammeter with resistance $\leq 10\Omega$ without breaking the loop.

To recalibrate the instrument continue with section 5.

5.0 RECALIBRATION

All units are factory calibrated: although the user may wish to recalibrate using a greater frequency, a two yearly recalibration interval is adequate for most applications. However, recalibration must be carried out after any change of configuration.

To recalibrate the unit an RTD simulator(or resistance box with PT100 tables), a 24V DC power supply and an accurate milliammeter/DMM are required:

- 1) Connect the equipment as shown in Figure 4.

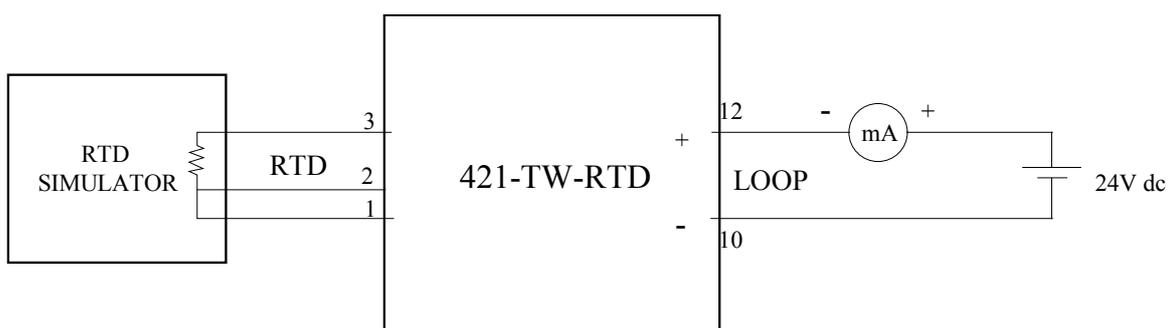


Fig. 4 - Calibration Circuit

- 2) Referring to Figure 3, if configuration has been changed coarse range potentiometer D must first be adjusted:
 - (i) Set input to full scale
 - (ii) Turn span potentiometer fully anti-clockwise to obtain minimum output current. Then adjust 6 turns clockwise
 - (iii) Adjust D to give nominal 20mA output ($19\text{mA} < \text{output} > 21\text{mA}$)

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- 3)
 - (i) Set input to low scale and adjust zero potentiometer, Z, to give 4mA
 - (ii) Set input to full scale and adjust span potentiometer, S, to give 20mA
 - (iii) Repeat (i) and (ii) as necessary

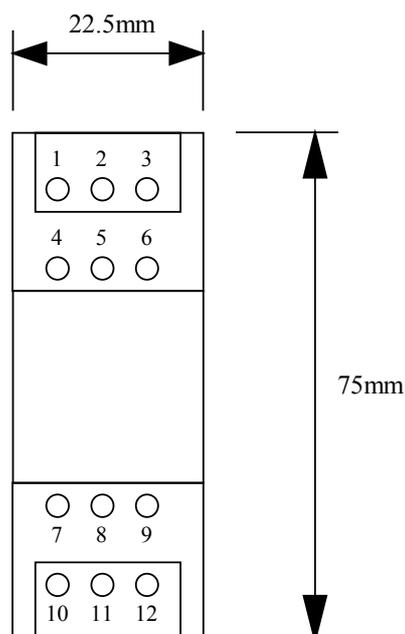
- 4) To confirm linearity, set input to mid scale and check that loop current is 12mA ($11.98\text{mA} \leq I_L \leq 12.02\text{mA}$).

6.0 INSTALLATION

The 421-TW-RTD is designed for mounting on 'Top hat' TS35 standard assembly rail to DIN 46277 part 3/EN50022/BS5584. The physical dimensions together with installation data are given below:

Installation Data _____

Mounting	DIN Rail T35
Orientation	Any
Connections	Screw Clamp With Pressure Plate
Conductor Size	0.5mm - 4.0 mm
Insulation Stripping	10mm
Screw Terminal Torque	0.4Nm Max.
Weight	100g (approx.)



<u>Terminal No</u>	<u>Function</u>
1	RTD Common
2	RTD Common
3	RTD +ve
7	Loop Monitor -
9	Loop Monitor +
10	Output Loop -ve
12	Output Loop +ve

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7.0 SPECIFICATIONS

All specifications are at 20°C operating ambient 24V loop supply and $\leq 10\Omega$ loop resistance unless otherwise stated.

Accuracy and response

Calibration accuracy at zero and full scale	$\pm 0.3^\circ\text{C} \pm 0.05\%$ full scale
Linearity	$\pm 0.1\%$ full scale
Zero drift	$\pm 50\text{ppm}$ full scale/ $^\circ\text{C}$
Gain drift	$\pm 100\text{ppm}/^\circ\text{C}$
Gain dependence on loop resistance, R_L	$\pm 5\text{ppm}/\Omega$ $0 \leq R_L \leq 600 \Omega$
Response time (90% of step change)	40ms typical

Power Supply, Isolation and Operating Ambient

Operating voltage	12 - 32V DC
Current	29mA max (upscale break detect)
Input to output isolation	1KV DC
Operating temperature range	-15 -70°C
Storage temperature range	-40 -100°C
Operating and storage humidity range	0-90% RH