

RTD - HEAD
and
RTD - HEAD - ISO

RESISTANCE TEMPERATURE DETECTOR INPUT IN-HEAD TRANSMITTERS

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1.0 INTRODUCTION

The RTD HEAD is a head - 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 RTD-HEAD is a non isolated unit which requires a minimum loop voltage of 8V at 20mA for correct operation.

The RTD-HEAD - ISO 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.

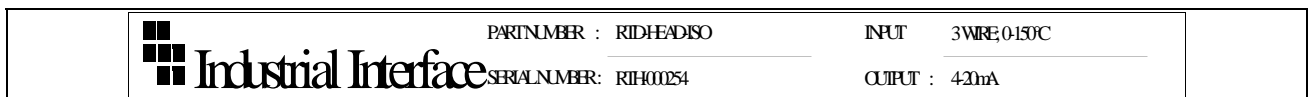


Fig. 1 - Serial Number Label

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 shown diagrammatically in section 4 - the RTD is wired to the 3 way connector, whilst the 4-20mA loop is connected to the 2 way connector. Polarity is marked on the circuit board.

3.1 Loop Supply Voltage

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

4.0 RECONFIGURING THE INSTRUMENT

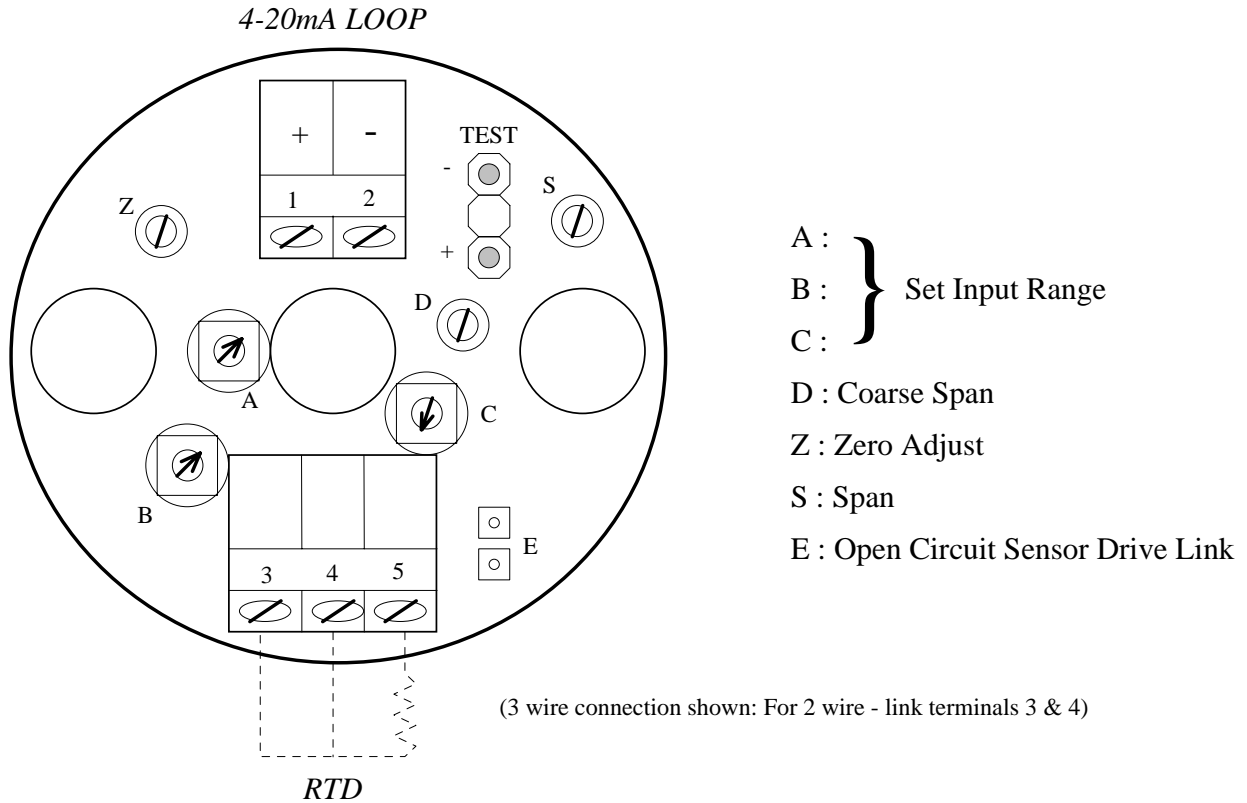
RTD-HEAD USER MANUAL

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.

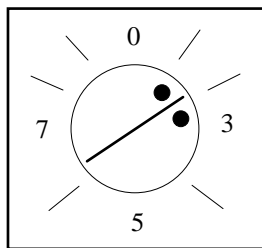
This section details the steps required to reconfigure the unit after which recalibration will be necessary.

Using switches A, B and C (as shown in fig. 2) set the desired temperature range and loop drive on open circuit sensor detection.

Fig. 2 - Connection, calibration & configuration data.



Switches A, B & C: Input Range



N.B. Only Switch Position 0
Is Always Marked.

(Diagram above shown in position 2)

Switch Positions

<u>Range (deg. C)</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 + 650	0	0	7

Link E: Open Circuit Sensor Drive



For downscale drive (<4mA) leave unbridged as in (a) above
For upscale drive (<20mA) bridge with solder as in (b) above

Test Terminals:

These 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 3.

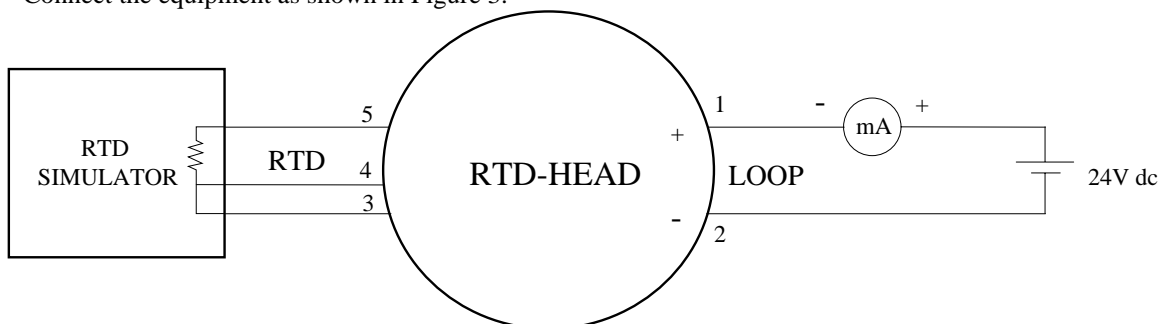


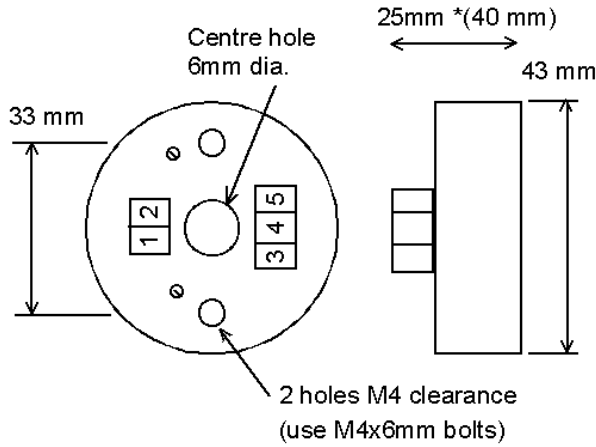
Fig. 3 - Calibration Circuit

- 2) Referring to Figure 2, if configuration has been changed coarse range potentiometer D must first be adjusted:
 - (i) Set input to full scale
 - (ii) Turn span potentiometer (marked S on circuit board) fully anti-clockwise to obtain minimum output current. Then adjust 6 turns clockwise
 - (iii) Adjust D to give nominal 20mA output ($19\text{mA} < \text{output} > 21\text{mA}$)
- 3)
 - (i) Set input to low scale and adjust zero potentiometer (marked Z on circuit board) to give 4mA
 - (ii) Set input to full scale and adjust span potentiometer (marked S on circuit board) 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 ($11.98\text{mA} \leq I_L \leq 12.02\text{mA}$).

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6.0 INSTALLATION

The RTD-HEAD is designed for mounting in terminal heads to DIN 43729 form B. The physical dimensions of both the standard and isolated versions together with installation data are given below:



Installation Data _____

Mounting	In head
Orientation	Any
Connections	45° Screw clamp with pressure plate
Conductor size	0.5-4.0 mm ²
Insulation stripping	10mm
Screw Terminal Torque	0.4Nm max.
Weight	18g *(36g)

* = Isolated version RTD-HEAD-ISO

Terminal No	Function
1	Output loop +ve
2	Output loop -ve
3	RTD Common
4	RTD Common
5	RTD +ve

7.0 SPECIFICATIONS

All specifications are at 20°C operating ambient 24V loop supply and ≤10Ω loop resistance unless otherwise stated.

Accuracy and response

Calibration accuracy at zero and full scale	± 0.3°C ± 0.05% full scale
Linearity	± 0.1% full scale
Zero drift	± 50ppm full scale/°C
Gain drift	± 100ppm/°C
Gain dependence on loop resistance, R _L	± 5ppm/Ω 0 ≤ R _L ≤ 600 Ω

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Response time (90% of step change) 40ms typical

Power Supply, Isolation and Operating Ambient

Operating voltage 8(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

*RTD HEAD ISO only