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RBT 372L Three-Wire ISOLATED Resistance Bulb Transmitter

RBT 374L Three-Wire NON-ISOLATED Resistance Bulb Transmitter

Instruction Manual

Low Power

1.0 INTRODUCTION

These instructions refer to the above models. Supplementary sheets are attached if the unit has special options or features. For detailed specifications, see page 4 or refer to the Data Bulletin. All ADTECH instruments are factory calibrated and supplied with a label detailing the calibration. Adjustments are normally not necessary. A simple check must be performed to verify calibration before installation to ensure that it matches the field requirement.

2.0 GENERAL DESCRIPTION

The ADTECH Model RBT 372L and RBT 374L Low Power Three-Wire RTD Transmitters provide high accuracy conversion of resistance bulb sensor input signals to a standard dc process signal such as 0-5 VDC or 1-5 VDC.

This model consumes very low power, typically 3.5 mA dc and is specially designed for remote battery or solar-panel-powered applications.

The RBT 372L provides 600 volts ac or 1000 volts dc isolation from the input to output/power supply, whereas the RBT 374 is non- isolated.

The primary features of the RBT 374L and RBT 372L are:

- Low operating power, 3.5 mA typical.
- Wide range—Covers the entire range of 100 ohm Platinum or 120 ohm Nickel RTD's—jumper selectable.
- Provide linearization of Platinum and Nickel Rtd's.
- Zero elevation or suppression up to 100% of the major range with a 16 position switch.
- Field adjustable via plug in jumpers and potentiometers.
- High accuracy, repeatability, and ambient effect stability.
- RFI resistant.
- NO INTERACTION of ZERO and SPAN.
- Small size—DIN mounting package provides. Only 1"w x 3.1"h x 3.6"d.

3.0 INSTALLATION

The instrument is supplied in a non-metallic general purpose DIN rail mount enclosure as standard. NEMA 4 and 7 enclosures are optionally available. Installation area/location must agree with the supplied instruments including operating temperature and ambient conditions. For detailed mounting and installation refer to page 4 inside.

Electrical Connections

The wire used to connect the instrument to the control system Input / Output should be twisted pair(s) and sized according to normal practice. Shielded cable is not normally necessary (if used, the shield must be grounded at terminal 1 of the ADTECH instrument and left floating at the sensor).

A six position compression terminal block is provided for the I/O and power connections. A housing ground terminal is not required due to non-metallic housing.

Controls

Instrument controls consist of the following:

- Two 16 position rotary switches for **COARSE** ZERO and COARSE SPAN control.
- One 4 position jumper for selection of major range.
- One 2-position jumper for input ZERO control.
- Multiturn ZERO and SPAN controls.
- One 4 position Jumper for RTD type.

Multiturn controls are accessible from the front of the unit.

4.0 MAINTENANCE

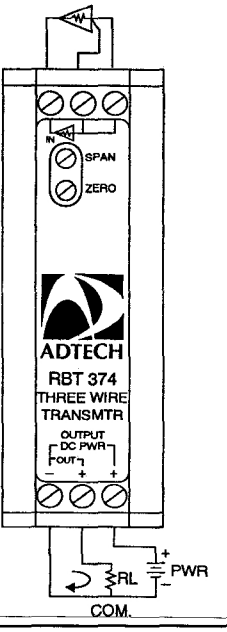
These instruments are electronic and require no maintenance except periodic cleaning and calibration.

If the unit appears to be mis-operating, field wiring and/or associated circuits should be checked. MOST problems are traced to these areas.

If the problem appears to be the instrument, it may be checked as installed or removed for a bench check as detailed in sections 6.0 and 7.0.

5.0 CONNECTIONS

Standard connections are shown below and on the instrument face plate, Data Bulletin or on attached supplementary sheets.



NOTE 1: RBT 372L & RBT 374L Connections are identical.

NOTE 2: See 2-Wire and 4-Wire RTD connection on page 2.

6.0 CONFIGURATION

All ADTECH units are factory calibrated per P.O. instructions. Usually, a complete recalibration is not required unless you want to change input type, output type, or the range of the unit. A calibration sticker located on the unit identifies the model, calibration and options present. If a simple recalibration is required to the same range, proceed with 6.1. For recalibration to a different range proceed as below.

A. Open the case to gain access to the unit's pc boards. The larger pc board is the input pcb and the smaller pc board is the output/power pcb. Jumpers found in input tables are found on the input pcb.

B. Follow Table 4 to verify the correct output zero setting.

C. To determine the major range setting calculate:

1. Input Span (ohm) = RTD full scale – RTD zero scale.
2. Input Zero (ohm) = RTD zero scale – RTD at 0°C.
3. The Major range is the number from Table 1 that is just larger (in magnitude of the two calculations above. Set the jumper in Table 1 to the major range determined.

D. Set the desired RTD Type from Table 3. If the measured temperature range starts below 0°C then set Jumper J1=B for elevation, otherwise set J1=A for suppression. See Table 2 for J1 location information.

E. Use table 4 to select the output zero range.

6.1 CALIBRATION

A. Make sure the unit I / O wiring is properly connected and that the correct power source per the label is also connected. The instrument must be at normal power for a minimum of 2 minutes before proceeding to B.

B. The input signal source must be adjustable from 0 to 100% in steps of 10% or at least 25%. The source should be either precalibrated or an accurate meter must be used to monitor the input.

C. The output may be monitored as a current or as a voltage across a resistor shunt, e.g. 1-5 vdc across 250 ohms.

D. If the RTD is measuring temperatures below 0°C (32°F) follow step E, otherwise skip step E and go to step F.

E. Apply an input corresponding to the zero input. Turn the **FINE** ZERO (see Note 1) control fully counterclockwise. Turn the **COARSE** ZERO switch(SWI) to a position where the output level just goes above the zero output level (4 mA). Turn the **COARSE** Zero Switch back one number less than the previous position (but not less than zero). Skip to step G.

F. Apply an input corresponding to the zero input. Rotate the **FINE** ZERO control fully clockwise. Turn the **COARSE** ZERO switch to a position where the output level just goes below the zero output level (4 mA). Turn the **COARSE** Zero Switch back one number less than the previous position (but not less than zero).

G. With the input set to the zero input, adjust the **FINE** ZERO control for zero output (4.00 mA) and the desired accuracy.

Note 1: Fine adjustments are on front of the module.

H. Apply an input corresponding to the full scale input. Turn the **FINE** SPAN control fully counterclockwise. Turn the **COARSE** SPAN switch(SW2) to a position where the output level just exceeds the full scale output level (20 mA). Turn the **COARSE** SPAN switch back one number less than the previous position (but not less than 0).

I. With a 100% input signal applied to input, adjust the **FINE** SPAN control for the full scale output (20 mA) and the desired accuracy.

J. Repeat steps L and N until the readings remain within the desired calibration accuracy.

K. Check the instrument at the 25-50-75% input settings.

L. Close the case.

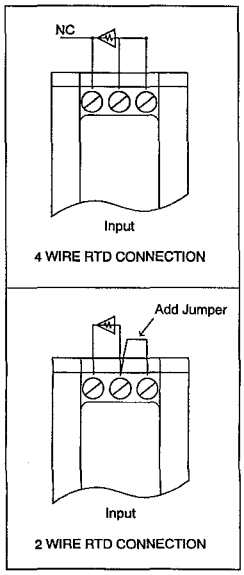
7.0 FIELD TROUBLE SHOOTING GUIDE (300L Series)

This section offers a simple, first level trouble-shooting aid for an apparent instrument malfunction.

SYMPTOM	CORRECTIVE ACTION
No output	1. Check the input and output connections carefully. 2. Check that the power supply polarity is correct and that the output loop power is present on the indicated terminals. 3. Check that the input source is correct and that it changes magnitude between zero and full scale values when so adjusted. 4. Make sure the output load is over 10kΩ and that the correct meter range is selected. All external checks are complete. Problem seems to be internal.

Troubleshooting beyond the above may be difficult without special equipment. We do not recommend attempting repair of the unit in the field. ADTECH offers a very responsive repair policy.

OTHER CONNECTIONS



8.0 TABLES

TABLE 1
MAJOR RANGE

20 ohms	J2-C
80 ohms	J2-B
400 ohms	J2-A
Reserved	J2-D

Jumper J2 is on the larger pcb.

TABLE 2
INPUT ZERO CONTROL

Suppression	J1-A
Elevation	J1-B

Jumper J1 is on the larger pcb.

TABLE 3
RTD TYPE

Platinum	J3=A, B
Nickel	J3=C, D

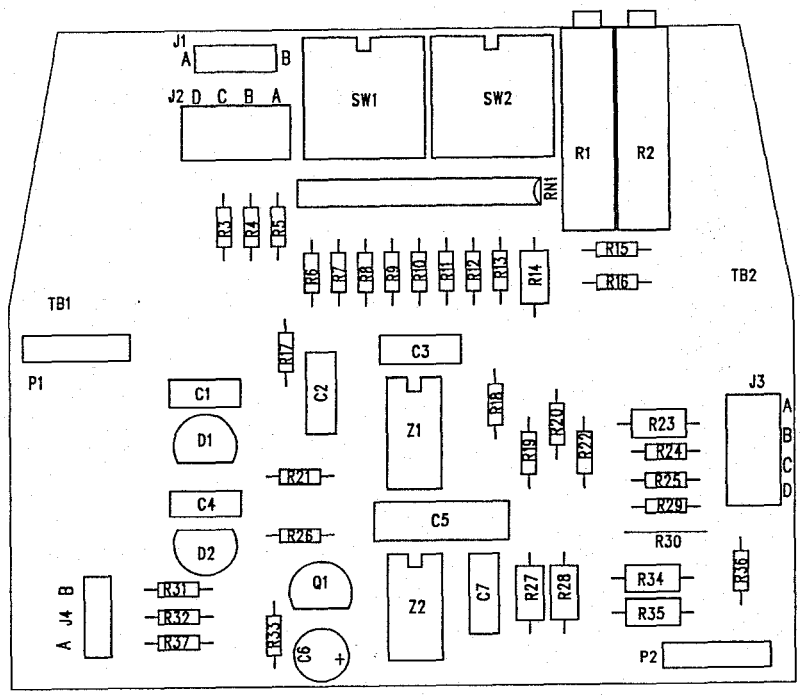
Jumper J3 is on the larger pcb.

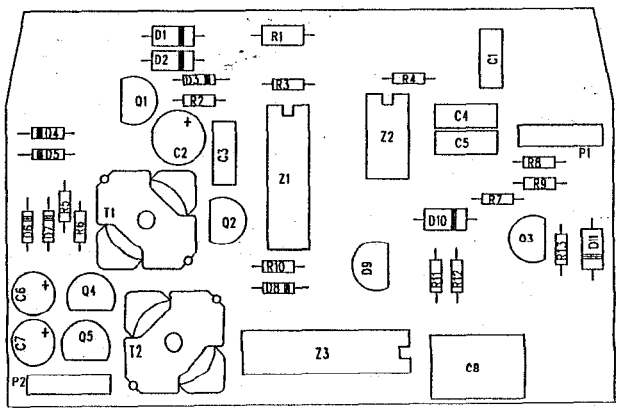
TABLE 4
OUTPUT RANGE

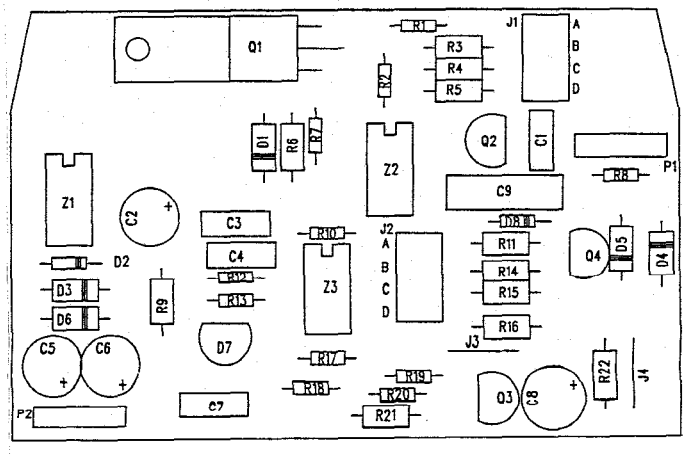
1–5 vdc	J4-A
0-5 vdc	J4-B

Jumper J4 is on the larger pcb.

8.1 PCB LAYOUT







RBT 372L Three-Wire ISOLATED

RBT 374L Three-Wire NON-ISOLATED

SPECIFICATIONS

INPUT/OUTPUT

INPUT SIGNALS

a. Resistance bulb sensor: 2, 3, or 4 wire types.
b. 1 to 400 ohm resistance spans: standard
c. Zero Suppression: up to 100% of the major range selected in 16 divisions of the coarse zero adjustment switch.
d. Span: from 0 - 100% full scale—switch selectable. The coarse span switch adds 16 divisions to each major range. .
e. Lead Compensation: 1% maximum error of differential lead resistance.

OUTPUT SIGNALS

0-5 VDC, 1-5 VDC

OUTPUT LOAD (RL) = 10k Ω min.

PERFORMANCE

a. **Calibrated Accuracy:** ± 0.1%
b. **Independent Linearity:** ± 0.025% maximum, ± 0.01% typical
c. **Conformance to RTD curves:** 0.15% maximum
d. **Repeatability:** ± 0.005% maximum, ± 0.002% typical
e. **Zero TC:** $\pm\left(\frac{0.05}{\text{input span (ohms)}} + 0.005\right)$ % of span/°C max.
f. **Span TC:** ± 0.008% of span max/°C
g. **Load Effect:** ± 0.005% zero to full load
h. **Output Ripple:** 10 mv P/P maximum
i. **Response Time:** 110 milliseconds (10 to 90% step response)
j. **Bandwidth:** (-3 db): 3.2 Hz
k. **Temperature Range:** -25° to 185°F (-31° to 85°C) operating
-40° to 200°F (-40° to 93°C) storage
l. **Power Supply Effect:** ± 0.005% over operating range
m. **For RBT 372 Isolation:** Input/output, 1000 vdc or 600 vac

Note: All accuracies are given as a percentage of span

POWER

a. 7 to 42 vdc, 3.5 mA typical, 5 mA max.

MECHANICAL

a. **Electrical Classification:** general purpose
b. **Connection:** Barrier terminal strips
(0.325" spacing, No. 6 screws)
c. **Controls:** One 4 position jumper for major range
Two 16 position rotary switches for **COARSE** ZERO and SPAN control
Two multiturn potentiometers for **FINE** ZERO and SPAN control
d. **Mounting:** DIN, Surface, Snap-Track, or NEMA 4 or 7
e. **Weight:** Net Unit: 4 oz. (115 grams)
Shipping: Nominal 7 oz. (200 grams)

OPTIONS

Option Number	Description
H 13 through H 22	Mounting

10.0 OUTLINE MOUNTING