



MANUAL

Pt100 conversion board

Specifications

Board type	Type A*	Type B*
Usable temperature range	0-50 °C	0-100 °C
Max. RTD temperature	180 °C	
Output voltage range	1-5 V	
Voltage/temperature relationship	1 V @ 0 °C 0.08 V/°C	1 V @ 0 °C 0.04 V/°C
RTD configuration	Three-wire	Four-wire
Supply voltage	85-265 V _{AC}	
Internal voltage	24 V _{DC}	
Max. power consumption	500 mW + external equipment	

* The board type is specified on top of the board, as illustrated in Figure 1.

Overview

An overview of the transducer board is shown in Figure 1. The connection diagram is shown in Figure 1. Up to 5 W power can be drawn from the board for external equipment.

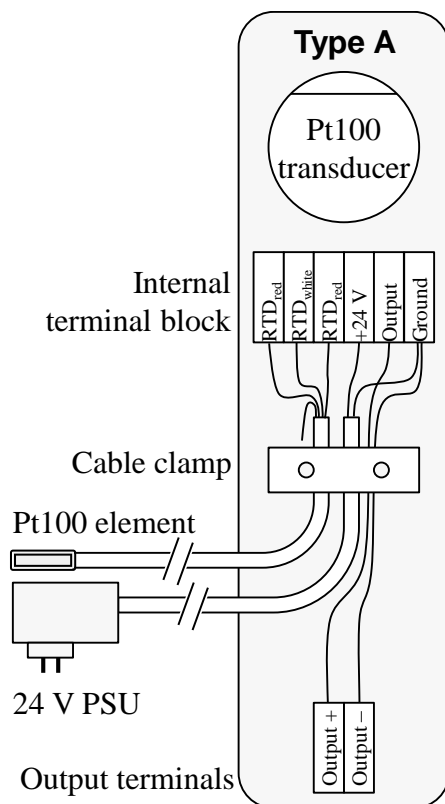


Figure 1: Board overview

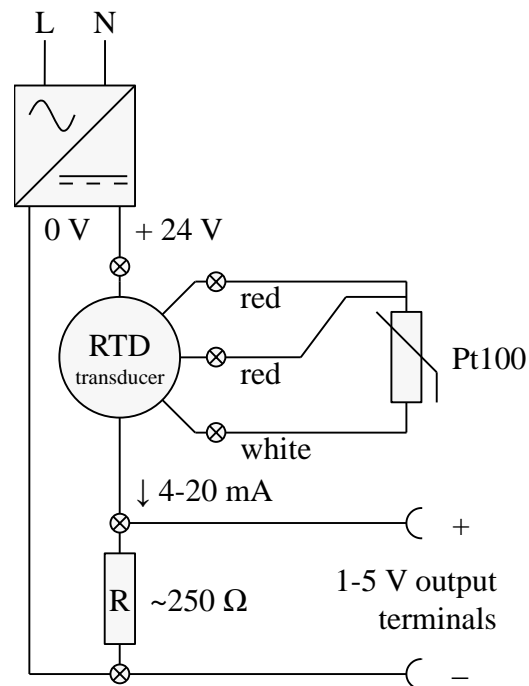


Figure 2: Electrical connection diagram (three-wire configuration)



Usage

1. Connect a voltmeter or DAQ hardware to the 1-5 V output terminals.
2. Insert the power supply into a wall outlet (mains).
3. The voltage-represented-temperature of the RTD will soon be available on the output terminals.

Theory

A Resistance Temperature Detector (RTD) is a sensor used to measure temperature. A Pt100 element is a RTD that uses platinum (Pt) as the resistor element. This chemical element is preferred because of the stable and linear resistance/temperature relationship over a wide temperature range.

A Pt100 element is calibrated so that a temperature of 0 °C yields a resistance of exactly 100 Ω . Most platinum based RTDs have a temperature coefficient of 0.385 $\Omega/^{\circ}\text{C}$, meaning e.g. that a positive temperature change from 0 to 10 °C will increase the resistance by 3.85 Ω , giving a total resistance of 103.85 Ω .

Pt100 elements are very accurate resistors and the connection leads will then be a source of measurement error. It's then important that the connection leads are compensated for or canceled out with a three-wire or four-wire configuration. This is why RTDs have four connection leads, which is internally coupled as in Figure 3.

In a three-wire configuration the lead resistance is canceled out. A diagram of a three-wire configuration in a Wheatstone bridge is shown in Figure 4.

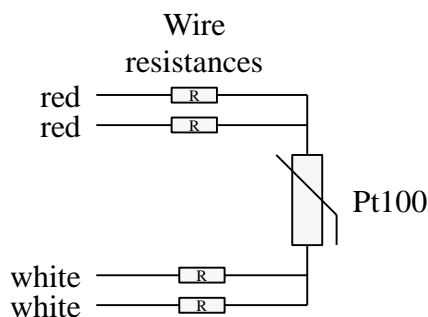


Figure 3: Four connection leads on a RTD element

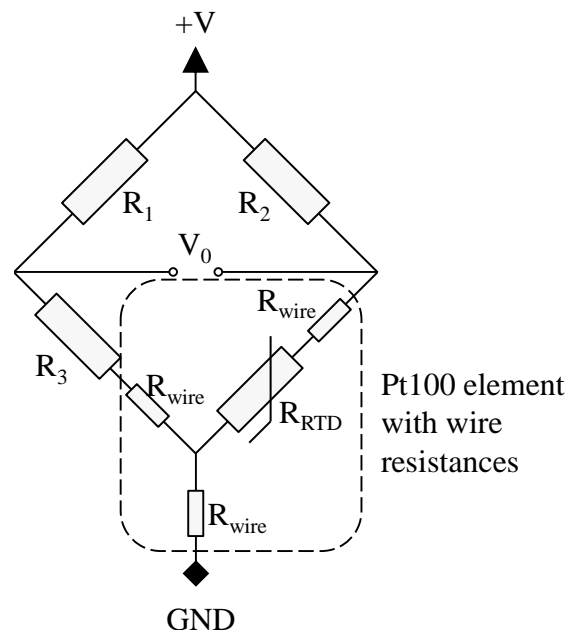


Figure 4: RTD three-wire connection in a Wheatstone bridge