

TURO

PT100 to RS232

TURO TECHNOLOGY PTY LTD



Turo PT100 to RS232

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Revision History

Turo PT100 to RS232

Date	Revision	Description
16 Nov 2009	R2	Operation -> Update Rate Added table of commands
27 April 2009	R1	

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1 Function

The circuit configures a 4 wire connection to a PT100 temperature sensing element and sends a temperature value in degrees C to the RS232 output

The circuit comprises 2 printed circuit boards. The microprocessor is mounted on the lower board. The analogue circuits are mounted on the upper board.

2 Board Connections

For normal operation 3 connectors are used: Power Input, PT100 connection and RS232 output. Figures *PT100 to RS232* and *PT100 Wiring* show the pin outs and wiring:

Power Input: 7 to 20 volts

RS232: 3 wire connection, 19200 baud, 8 bit, 1 stop bit, no parity

PT100: 6 pin connector comprising 2 excite, 2 sense and 2 screen

The 0 volt of the power, ground of the RS232 and screen of the PT100 are connected internally. It is important that the screen is not connected to anything apart from the pins of X5 – so the connector screen pins (1 and 6) should be connected to the screen of the cable that goes to the PT100 and to nothing else.

The connectors are MOLEX-22-27-20x1 types, where x is either 2, 3 or 6.

The lower board has a USB B Mini connector and a miniature push button switch. These are not used in normal operation.

3 Operation

3.1 Turn On

When power is applied normal operation begins in this sequence:

Display firmware version and copyrite.

No activity for up to 10 seconds (system is initialising and calibrating).

Temperature value is displayed 10 times at the update rate.

No activity for between 5 and 10 seconds (system is calibrating).

... sequence repeats with temperature displayed 10 times, then no activity, etc

After power is applied the circuit needs to stabilise. This may take several minutes.

3.2 Update Rate

The update rate is initially set at 1 Hz. This can be changed using the RS232 connection. Using a terminal program such as Hyperterminal configured as per the Specifications, the following commands should be sent:

1. Type either the character 'Z' or '^z' (control + 'z'). This will stopped stop the temperature being updated and print out "Abort".

2. Type “Rxx” followed by Enter, where “xy” is either 1 or 2 numerals. The valid range of “xy” is “9” to “99” and specifies the update interval in 100’s of milliseconds. Invalid values may produce unforeseen results.

Example:

Enter	Response	Action
‘^z’	“Abort”	data output is stopped
“R18”	data begins	a delay of up to 10 seconds while internal calibration takes place then data comes out at 1.8 second intervals

The update rate is stored in non-volatile memory so that if power is removed and at a later time restored, the update rate will resume at the same value as just prior to power removal.

4 Temperature Calculation

The circuit measures resistance and then calculates temperature. The resistance/temperature equation used is:

$$R_T = R_0(1 + AT + BT^2)$$

where

$$A = 3.9083 \text{ E-3}$$

$$B = -5.775 \text{ E-7}$$

The measured resistance can be viewed by entering OO via the RS232 (“OO\r\n”, representing Output Ohms). To return to temperature output, enter OT (“OT\r\n” representing Output Temperature). On power up, the unit defaults to OT.

5 Calibration

The system is nominally adjusted, but it should to be calibrated when a new PT100 sensor is connected. This will require post processing of the temperature.

6 Mounting

The mounting posts have metric M3 threads centred on a 40.64mm x 60.96mm (1.60 x 2.40 inches) layout.

7 Commands

Unless otherwise stated, commands are case insensitive

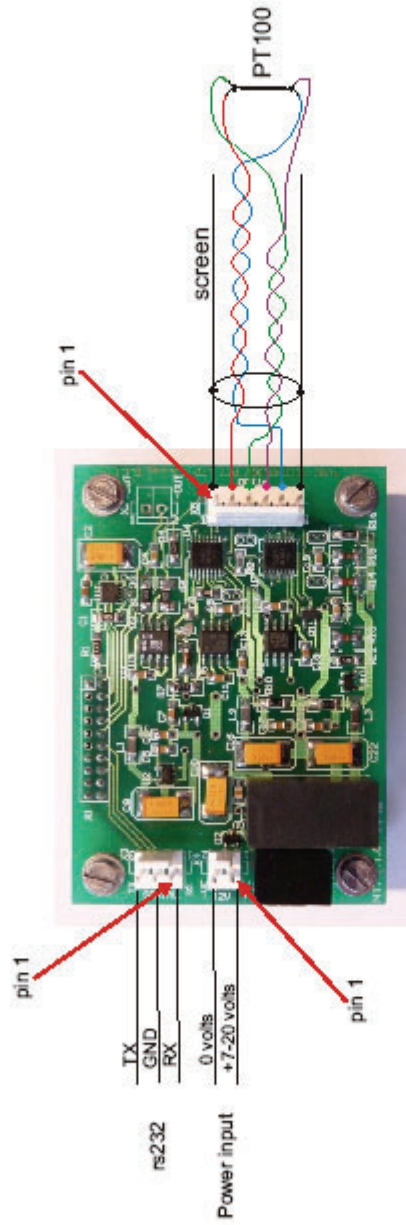
Command	Function
"OO"	Set output to ohms
"OT"	Set output to temperature ° C
"Rx" or "Rxy"	Set update interval. 'x' and 'y' are numerals covering the range 9 to 99 in 100's of milliseconds.
'Z'	Abort – stops data being output. This command is case sensitive.
'^z'	This is Control + 'z'. Abort - stops data being output. This command is case sensitive.

8 Specifications

Temperature sensor requirement	PT100, IEC751, 4 wire
Temperature range	-2° to +35° C
Circuit accuracy, after calibration and stabilisation	±0.05°C equivalent
Resolution	0.01°C
Maximum lead resistance, any combination among the leads	200 Ohm
RS232 Output	19200 baud, 8 bits, 1 stop, no parity
Supply voltage	7 to 20 volts
Supply current typical/max	65/80 mA

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T5uway, 4 wire PT100 to rs232



PCB Connectors are:
MOLEX - 22-27-2021 - HEADER
MOLEX - 22-27-2031 - HEADER
MOLEX - 22-27-2061 - HEADER

mating to:
MOLEX - 22-01-2025 - CRIMP HOUSING
MOLEX - 22-01-2035 - CRIMP HOUSING
MOLEX - 22-01-2065 - CRIMP HOUSING



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