TURO

PT100 to RS232

TURO TECHNOLOGY PTY LTD

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Turo PT100 to RS232

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Revision History

Date	Revision	Description
15 Jan 2011	R3	Revision reflect small changes in Version 6.1 hardware and 3.1 firmware
		Section 2: X3 was previously X5
		Section 3.1: Different update rate
		Section 3.3: new section on stopping/starting
		Specifications: current is lower
16 Nov 2009	R2	Operation -> Update Rate
		Added table of commands
27 April 2009	R1	

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PT100 to RS232

CONTENTS

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

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 X3 – 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 at the default update interval of approximately 2 seconds.

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 0.5 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 "10" 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.

3.3 Stop/Start

Type 's' to stop outputting temperature data.

Type 'r' or "rxx" to restart running (where xx is the update interval, see above).

Type either the character 'Z' or '^z' (control + 'z'). This will stopped stop the temperature being updated and print out "Abort". 'Z' will not reset internal settings such run time calibration or update rates. '^z' will reset run time settings, which will be recalculated (run time calibrations) or set to defaults (eg update rate) when it is again set to run.

4   Temperature Calculation

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

$$R_T = R0(1 + AT + BT^2)$$

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

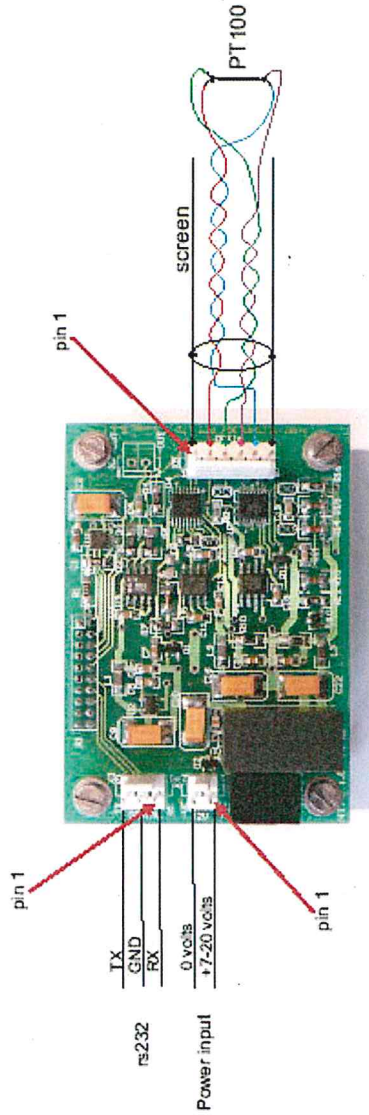Unless otherwise stated, commands are case insensitive

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.
'S'	This stops data from being output (use the 'R' command to restart.

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
Minimum 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 at 12 Volts typical	13 mA

PT100 to RS232

PT100 Wiring

Turo Technology Pty Ltd

Hobart, Australia

T5uway, 4 wire PT100 to rs232

pin 1

rs232
TX
GND
RX

Power input
0 volts
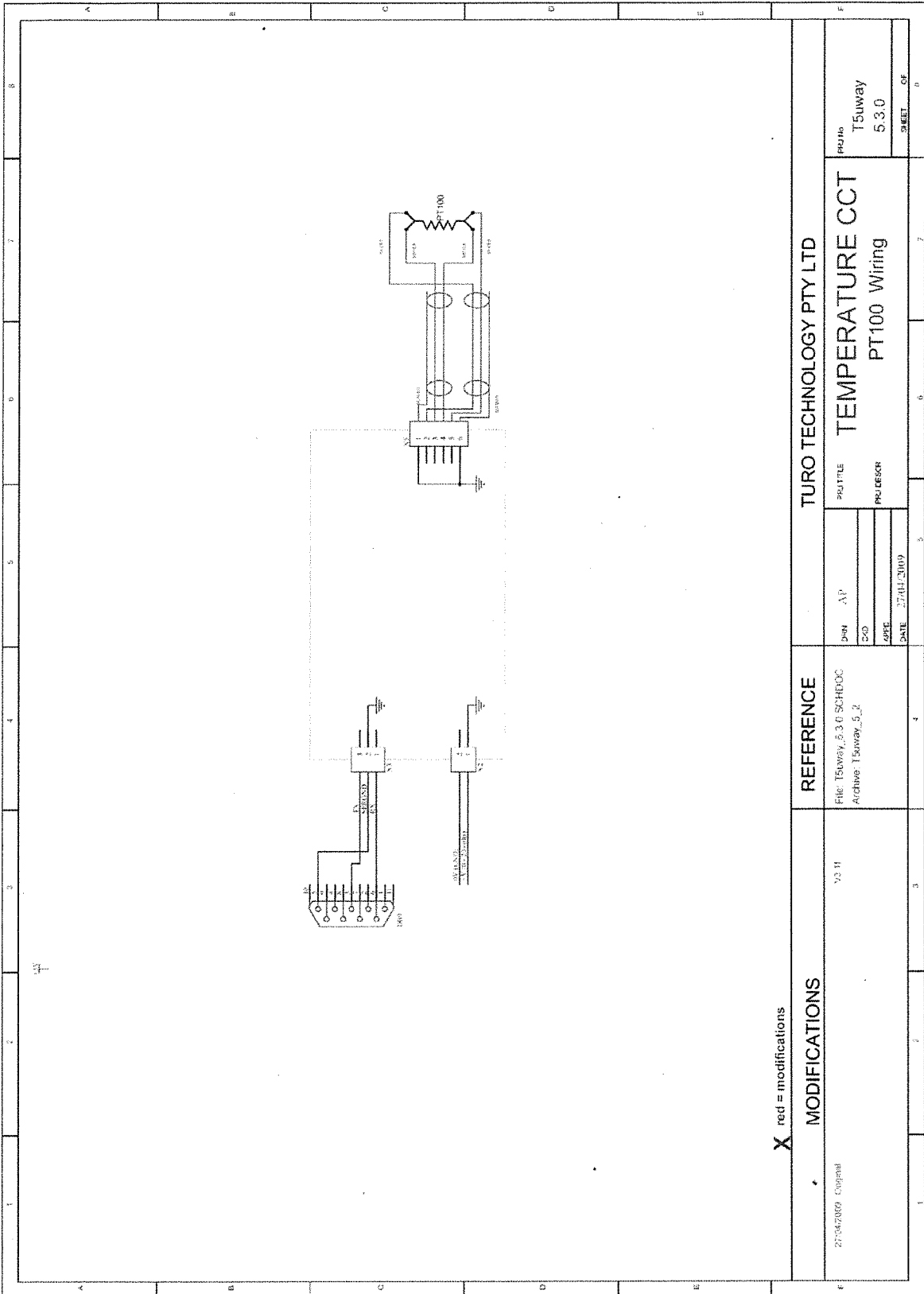+7-20 volts

pin 1

pin 1

screen

PT100

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
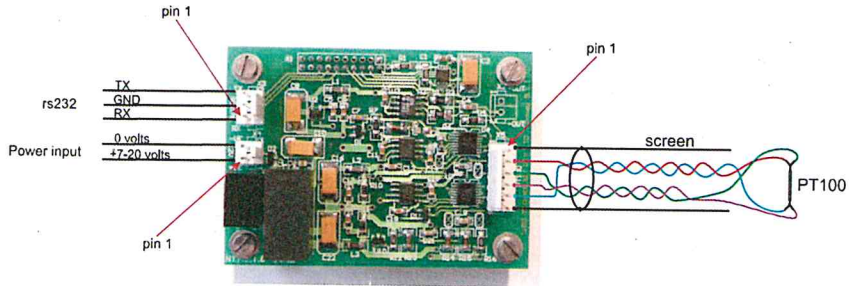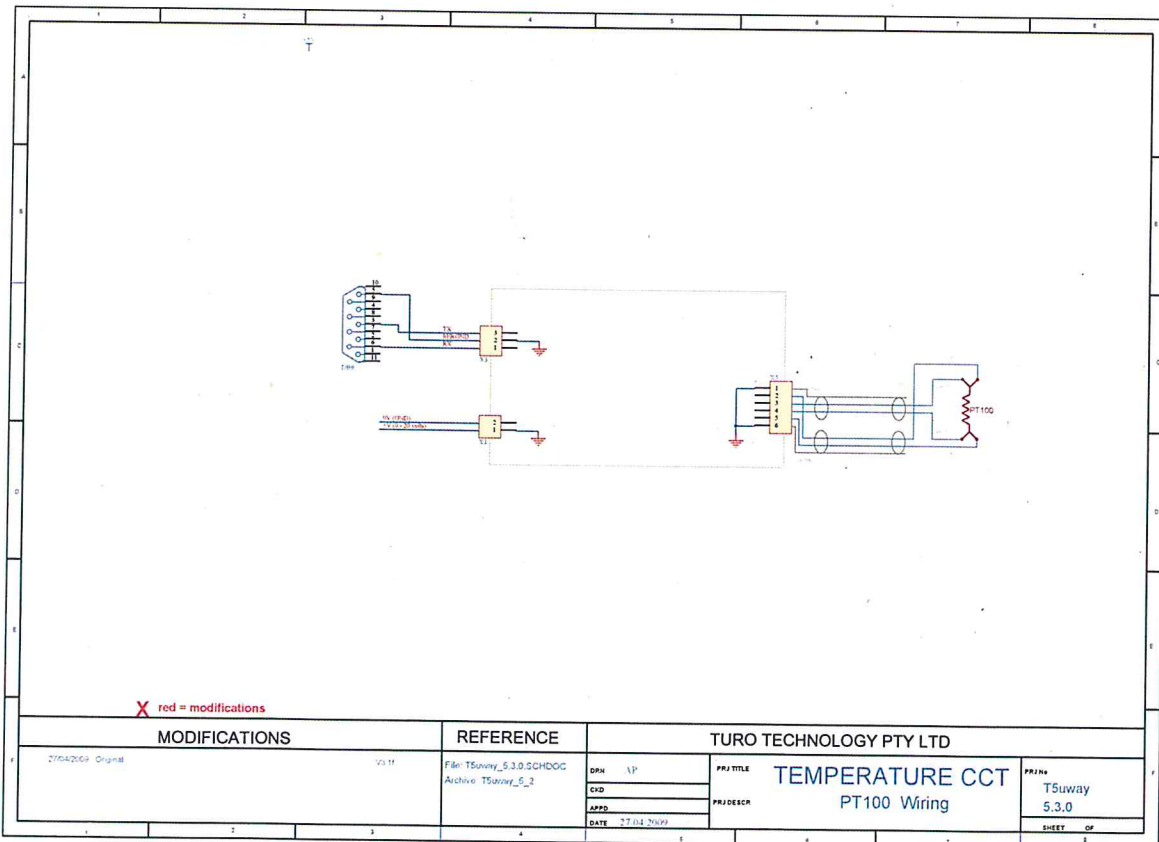MOLEX - 22-01-2035 - CRIMP HOUSING
MOLEX - 22-01-2065 - CRIMP HOUSING

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X red = modifications

MODIFICATIONS		REFERENCE	TURO TECHNOLOGY PTY LTD			
27/04/2009 Original	V3.11	File: T5uway_5.3.0.SCHDOC Archive: T5uway_6_2	DRN AP	PRJ TITLE TEMPERATURE CCT	PRJ No T5uway
			CKD		5.3.0
			APPD	PRJ DESCR PT100 Wiring	
			DATE 27.04.2009		SHEET OF