Texmate NZ
intelligent control

TEMPERATURE (RTD) CONTROLLER

SC - RTD Setup Manual (R2/R2A/R2S/R2AS)

CONTENTS

1 INTRODUCTION

SC controllers interface smoothly with a wide range of PLC and monitoring systems. These sophisticated instruments are designed to relieve the PLC of processing overhead, reduce costs and extend the capability of the total system.

The SC - RTD is straightforward to use, and has a built-in LCD display and five front-panel buttons. The slim case is 35mm DIN-rail compatible, ensuring hassle-free mounting. Designed specifically for use in temperature applications using RTD sensors, the SC - RTD comes factory pre-calibrated for a 385 RTD input. Setup (or re-calibration) is simple, with on-screen, step-by-step instructions.

The SC - RTD is available as a standard R2 model, and can also be purchased with the addition of an analog output (R2A), a serial port (R2S), or both (R2AS).

2 SPECIFICATIONS

Input	2/3/4-wire RTD (385/392/120/Cn10)
Power supply	HV 85-265V AC/95-370V DC **or** LV 15-48V AC/10-72V DC
Relay outputs	2 programmable form A relays with hysteresis & delay on make.

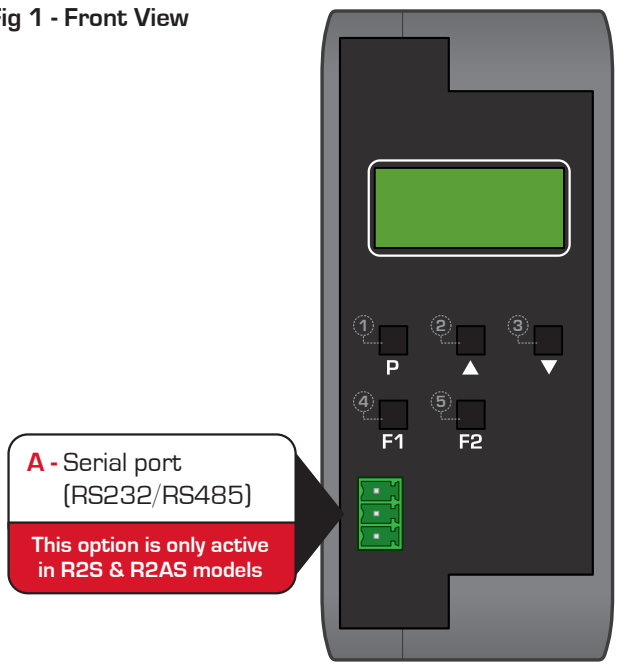
OPTIONAL OUTPUTS

Analog output	Isolated 16-bit 4-20mA/0-10V output (fully scaleable). Window programmable over any range within the full-scale range of the controller
Serial port	Isolated RS232 or RS485 *Modes:* Texmate ASCII, Modbus RTU slave, Ranger A output. *Data rates:* 300-38400. Odd, even or no parity.

Easy setup	Intuitive text prompts facilitate easy setup. Factory defaults are set to 50Hz, 385 RTD and degrees Celsius, reducing input setup time for many applications.
Calibration	Pre-calibrated for 385 RTD input. Can be recalibrated to suit 392, 120 or Cn10.
Security	Calibration and setpoint functions have independent security code access, and direct access to setpoint activation values is independently configurable.
Sampling rate	2.5Hz
Resolution	16-bit
Accuracy	0.05% of reading
Temp. drift	Typically 50ppm/°C
Case	101 x 45 x 119.5mm (H x W x D) Mounts on 35mm DIN rail

3 CASE DIAGRAMS

Fig 1 - Front View



BUTTON PRESS FUNCTIONS

①	**Program -** This button is used to save your settings and advance to the next step in the setup process.
②	**Up -** This button is typically used to scroll through options or increase values in the setup menu. Pressing this button from the operational display will allow you to view and/or reset the **Peak** value. See Section 8.
③	**Down -** This button is typically used to scroll through options or decrease values in the setup menu. Pressing this button from the operational display will allow you to view and/or reset the **Valley** value. See Section 8.
④	**Function 1 -** This button is used to access the **setup and calibration** menu. See Section 5.
⑤	**Function 2 -** This button is used to access the **setpoint setup** menu (see Section 6) and the **setpoint direct access** menu (see Section 7).

Fig 2 - Top View

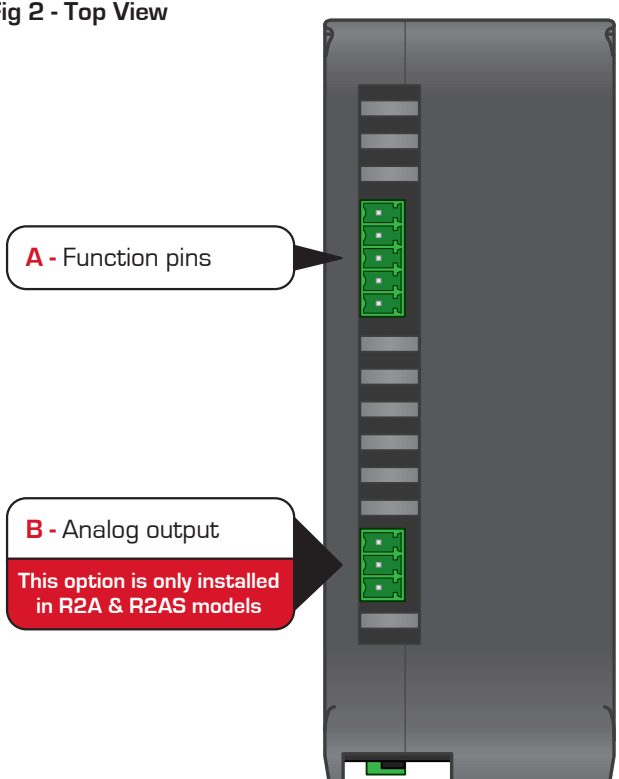
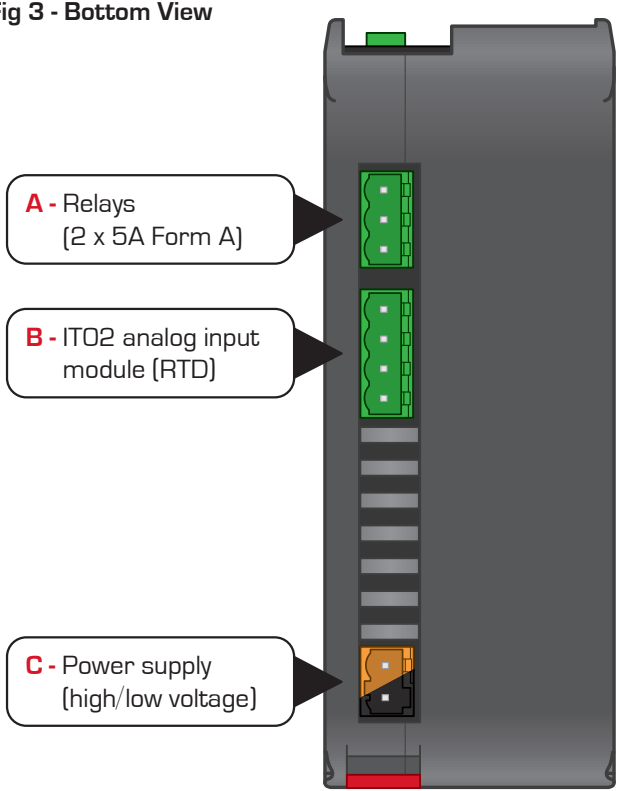


Fig 3 - Bottom View



4 WIRING

Before you begin:

Determine whether your controller is configured for low or high voltage power supply. Make sure to check the label on the unit against the colour of the power connector:

- **Black** = low voltage
- **Orange** = high voltage

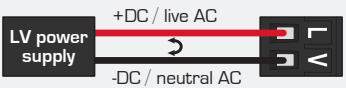
4.1 Connect your SC - RTD to the power supply

Refer to Section 3, Fig 3C

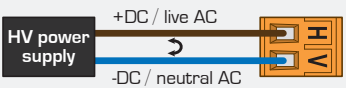
Wire your controller to your power supply as per the appropriate diagram below.

Remember to switch your power supply off before you begin wiring, and NEVER connect your low voltage controller to mains power.

Low voltage (LV) - *15-48V AC, 10-72V DC*



High voltage (HV) - *5-265V AC, 95-370V DC*



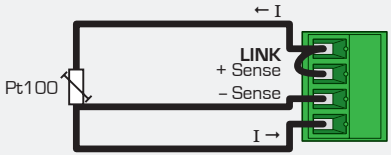
4.2 Wire your IT02 analog input module

Refer to Section 3, Fig 3B

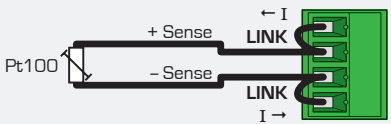
Wire your input module as shown below.

4-wire RTD

3-wire RTD



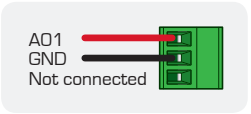
2-wire RTD



4.3 Wire your analog output (if fitted)

Refer to Section 3, Fig 2B

If your SC is an R2A or R2AS model, wire your analog output as shown.

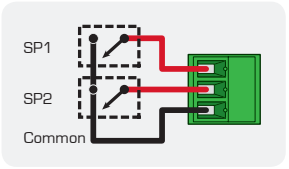


Otherwise, skip this step and continue to 4.4.

4.4 Wire your relays

Refer to Section 3, Fig 3A

Your SC - RTD has two 5A form A relays and two setpoints.

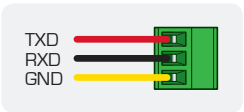


These can be individually programmed to operate within the total span range of the controller.

4.5 Wire your serial port (if active)

Refer to Section 3, Fig 1A

If your SC is an R2S or R2AS model, then your controller's front panel serial port is active, and should be wired as shown.

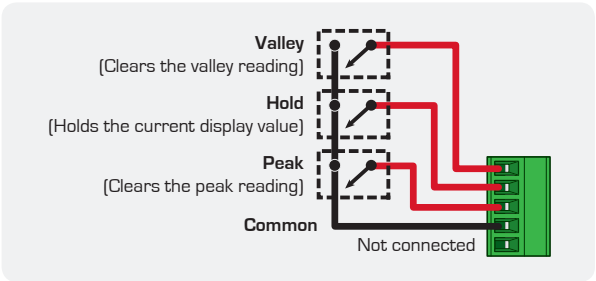


R2 and R2A models have an INACTIVE serial connector on the front panel.

4.6 Wire your function pins

Refer to Section 3, Fig 2A

Connect external switches as shown overleaf to enable a function to be performed when its switch is activated.



4.7 Power up your controller

Once you have completed the wiring process it is safe to switch on your power supply. Ensure that your display is functioning before you proceed.

5 SETUP & CALIBRATION

Enter the setup and calibration mode by pressing F1.

5.1 Enter PIN

A _ _ _ **ENTER CAL PIN NUMBER** scrolls across the bottom row and **0** appears in the top row. Use the ▲ and ▼ buttons to enter your security code (factory default 1). Then press P. If the correct PIN is entered then the setup is started at 5.2.

If an incorrect PIN number is entered, **_ _ _ INCORRECT PIN NUMBER - ACCESS DENIED** scrolls across the display and it returns to the normal operating mode.

You will be given the opportunity to change your PIN number at the end of this section (5.7). If you have forgotten your PIN number, see Section 9.

5.2 Input setup

Input defaults are set to 50Hz, RTD 385 sensor, 4 wires, degrees celsius, don't display units, 0.1 display resolution and no rounding. If this is the first time you have set up your SC - RTD and you do not need to change any of these factory default settings, then press P *at 5.2A to skip to 5.3.*

A _ _ _ **INPUT SETUP** scrolls across the bottom row and **Skip** appears in the top row. Press P to skip to 5.3, or the ▲ button and then P to **Enter** input setup.

B _ _ _ **MAINS FREQUENCY** scrolls across the bottom row and the currently selected mains frequency appears in the top row. Using the ▲ and ▼ buttons, select either **50Hz** or **60Hz**. Then press P.

C _ _ _ **SENSOR TYPE** scrolls across the bottom row and the currently selected sensor type appears in the top row. Using the ▲ and ▼ buttons, select: **RTD 385**, **RTD 392**, **RTD 120** or **Cn 10**. Then press P.

D **_ _ _ ENTER NUMBER OF SENSOR WIRES** scrolls across the bottom row and the currently selected number of wires appears in the top row. Using the ▲ and ▼ buttons, select **2**, **3** or **4**, and then press P.

E **_ _ _ SELECT TEMPERATURE SCALE** scrolls across the bottom row and the currently selected temperature scale appears in the top row. Using the ▲ and ▼ buttons, select **Deg C** or **Deg F**, and then press P.

F **_ _ _ DISPLAY UNITS** scrolls across the bottom row and the current display setting appears in the top row. Using the ▲ and ▼ buttons, select either **No** or **Yes**, and then press P.

G **_ _ _ DISPLAY RESOLUTION** scrolls across the bottom row and the currently selected display resolution appears in the top row. Use the ▲ and ▼ buttons to select either **0.1** or **1 deg**, and then press P.

H **_ _ _ DISPLAY ROUNDING** scrolls across the bottom row and the currently selected display rounding appears in the top row. Using the ▲ and ▼ buttons, select either: **None**, **2**, **5** or **10**. Then press P.

Rounding is quoted in display counts, not degrees. E.g. If your input signal is 5.3°C, the display will show: 5.3°C (rounding=None), 5.4°C (rounding=2), 5.5°C (rounding=5) or 5.0°C (rounding=10).

5.3 Calibration

A **_ _ _ CALIBRATE** scrolls across the bottom row and **Skip** appears in the top row. Your controller comes factory precalibrated for a Pt100 input. Press (P) to skip to 5.4, or the (▲) button and then (P) to **Enter** calibration.

B **_ _ _ APPLY LOW TEMPERATURE – – – – ENTER LOW DISPLAY VALUE** scrolls across the bottom row, and the currently selected low display value appears in the top row. Apply the required low temperature to the sensor. Using the (▲) and (▼) buttons, enter your required low input signal display value. Then press (P) to accept.

C **_ _ _ APPLY HIGH TEMPERATURE – – – – ENTER HIGH DISPLAY VALUE** scrolls across the bottom row, and the currently selected high display value appears in the top row.

Apply the required high temperature to the sensor. Using the ▲ and ▼ buttons, enter your required high input signal display value. Then press P to accept and return to the operational display.

If **_ _ _ CALIBRATION FAILED** scrolls across, then the controller did not detect any change in input signal during calibration. Check your signal and connections, and repeat the calibration procedure.

5.4 Averaging

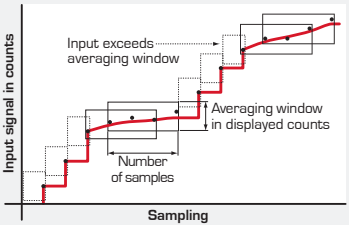
▸▸ 5.4 Quick Access from operating mode ▸▸
Short-press F1. Use ▲ & ▼ to enter PIN. Press P 3 times.

A **_ _ _ AVERAGING PARAMETERS** scrolls across the bottom row and **Skip** appears in the top row. Press P to skip to 5.5, or the ▲ button and then P to **Enter** averaging parameters setup.

Averaging

Your controller has input signal averaging, guaranteeing stable measurement.

If the input exceeds the averaging window value it will not average, ensuring fast response.



B **_ _ _ AVE SAMPLES** scrolls across the bottom row and the currently selected averaging appears in the top row. Using the ▲ and ▼ buttons, alter the number of input samples that the controller will average. Then press P.

Increasing the number of samples will stabilise measurement, but it will also slow down response rates.

C **_ _ _ AVE WINDOW** scrolls across the bottom row and the currently selected averaging window value appears in the top row. Using the ▲ and ▼ buttons, alter the signal averaging window. Then press P.

If your input signal contains large noise spikes, then you can increase the size the of averaging window to ensure that these pulses are still averaged. However, increasing the averaging window too far will reduce the ability of the controller to respond quickly to real changes in input signal.

5.5 Analog output setup

Please note that R2/R2S models do not have this option installed - these instructions are only relevant to R2A/R2AS users.

A **_ _ _ ANALOG OUTPUT SETUP** scrolls across the bottom row and **Skip** appears in the top row. Press [P] to skip to 5.6, or the [▲] button and then [P] to **Enter** analog output setup.

B **_ _ _ LOW SCALE VALUE FOR ANALOG OUTPUT** scrolls across the bottom row and the current low scale value appears in the top row. Use the [▲] and [▼] buttons to set the low scale value. Then press [P].

This sets the display value for cal low (as at 5.5E).

C **_ _ _ HIGH SCALE VALUE FOR ANALOG OUTPUT** scrolls across the bottom row and the current high scale value appears in the top row. Use the [▲] and [▼] buttons to set the high scale value. Then press [P].

This sets the display value for cal high (as at 5.5F).

D **_ _ _ CALIBRATE ANALOG OUTPUT?** scrolls across the bottom row and **Skip** appears in the top row. Press (P) now if you do not wish to calibrate at this stage.

To calibrate now, connect a mA or volt meter across the analog output connector (see 4.3). Then press (▲) and then (P) to **Enter** calibration mode.

! If you selected Skip in 5.5D:

Skip the rest of this section and continue to 5.6.

E **_ _ _ CAL LOW ANALOG OUTPUT** scrolls across and a calibration number appears. Calibrate your low analog output using the (▲) and (▼) buttons, and press (P).
The display value is shown in internal units (mA).

F **_ _ _ CAL HIGH ANALOG OUTPUT** scrolls across and a calibration number appears. Calibrate your high analog output using the (▲) and (▼) buttons, and press (P).
The display value is shown in internal units (mA).

5.6 Serial setup

Please note that R2/R2A models do not have an active serial port - these instructions are only relevant to R2S/R2AS users. Configuring an active serial port on your SC - RTD (as specified below) will allow you to connect your controller to a PC or another device.

A _ _ _ **SERIAL SETUP** scrolls across the bottom row and **Skip** appears in the top row. Press [P] to skip to 5.7, or the [▲] button and then [P] to **Enter** serial port setup.

B _ _ _ **SERIAL MODE** scrolls across the bottom row and the currently selected serial mode appears in the top row. Using the [▲] and [▼] buttons, select either: **ASCII**, **Modbus** (RTU) or **Ranger A**. Then press [P].

*Texmate **ASCII** is a simple protocol that allows connection to various Texmate PC configuration tools.*

***Modbus** is an industry standard RTU slave mode that allows connection to a wide range of devices, such as PC's or PLC's.*

***Ranger A** is a continuous output, used to drive remote displays and other instruments.*

C **_ _ _ BAUD RATE** scrolls across the bottom row and the currently selected baud rate appears in the top row. Using the ▲ and ▼ buttons, select either: **300**, **600**, **1200**, **2400**, **4800**, **9600**, **19200** or **38400**. Then press P.

D **_ _ _ PARITY** scrolls across the bottom row and the currently selected parity appears in the top row. Using the ▲ and ▼ buttons, select either: **None**, **Odd** or **Even**. Then press P.

E **_ _ _ SERIAL ADDRESS** scrolls across the bottom row and the currently selected serial address appears in the top row. Use the ▲ and ▼ buttons to alter the serial address. Then press P.

The serial address parameter is used to identify a particular device when it is used with other devices in a system. (It applies particularly to Modbus mode when used on a RS485 network.) The serial address of the controller must be set to match the serial address used in the master device.

▸▸ **More info on registers** ▸▸ See table (p26)

MODBUS REGISTERS - *These are all holding registers and should be accessed via function codes 3 and 6. Register addresses are displayed in the Modicon™ addressing format. i.e. Register 65=40065 (subtract 1 for direct addressing).*

16-BIT SIGNED	
Address	***Function***
40001	Alarm status (Bit 0= SP 1, Bit 1=SP 2)
40065	Hysteresis SP 1
40066	Hysteresis SP 2
40071	Make delay SP 1
40072	Make delay SP 2

32-BIT SIGNED (2x16-bit)	
LSW / MSW	***Function***
40513 / 40514	Process display
40525 / 40526	Peak
40527 / 40528	Valley
40535 / 40536	SP 1
40537 / 40538	SP 2
40587 / 40588	D/A scale low value
40591 / 40592	D/A scale high value

RANGER A - *This allows the SC to drive a remote display from the Rinstrum range. The following shows the output string format when Ranger A output is selected:*

<Start> <Sign> <Output Value> <Status> <End>

STRING CHARACTER(S)	
<Start>	STX character (ASCII 02)
<Sign>	Output value sign (space for + and dash for –)
<Output Value>	Seven character ASCII string containing the current output value and decimal point. *(If there is no decimal point, then the first character is a space. Leading zero blanking applies.)*
<Status>	Single character output value status: U=Under, O=Over, E=Error
<End>	ETX character (ASCII 03)

5.7 Edit calibration PIN

A **_ _ _ EDIT CAL PIN NUMBER** scrolls across the bottom row and **Skip** appears in the top row. Press (P) to skip and return to the operational display, or the (▲) button and then (P) to **Enter**.

B **_ _ _ ENTER NEW CAL PIN NUMBER** scrolls across the bottom row and the current PIN (default 1) appears in the top row. Using the (▲) and (▼) buttons, enter your new calibration PIN number. Then press (P) to exit and return to the operational display.

6 SETPOINT SETUP

Enter the setpoint setup mode by pressing and holding the F2 button for 3 seconds.

6.1 Enter setpoint PIN

A **_ _ _ ENTER SP PIN NUMBER** scrolls across the bottom row and **0** appears in the top row. Use the ▲ and ▼ buttons to enter your security code (factory default 1). Then press P. If the correct PIN is entered then the setup is started at 6.2.

If an incorrect PIN number is entered, **_ _ _ INCORRECT PIN NUMBER - ACCESS DENIED** scrolls across the display and it returns to the normal operating mode.

You will be given the opportunity to change your PIN number at the end of this section (6.3). If you have forgotten your PIN number, see Section 9.

6.2 Edit setpoints

A _ _ _ **EDIT SETPOINT** scrolls across the bottom row and **Skip** appears in the top row. Press (P) to skip to 6.3, or use the (▲) and (▼) buttons to select a setpoint to edit: either **SP 1** or **SP 2**. Then press (P).

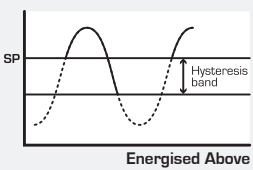
B _ _ _ **SP VALUE** scrolls across the bottom row and the last setpoint value entered appears in the top row. Using the (▲) and (▼) buttons, adjust the display value at which the setpoint will activate. Then press (P).

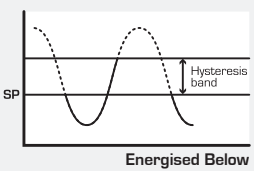
C _ _ _ **SP ACTIVATION** scrolls across the bottom row and the last selected setpoint activation appears in the top row. Using the (▲) and (▼) buttons, select the relay activation to operate **Above** or **Below** the setpoint value, and then press (P).

*Select **Above** for the relay to turn on above the setpoint value and off below it. Select **Below** for the relay to turn on below the setpoint value and off above it.*

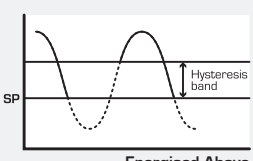
D **_ _ _ SETPOINT TYPE** scrolls across the bottom row and the last selected setpoint type appears in the top row. Using the ▲ and ▼ buttons, select either **Alarm** or **Control**. Then press P.

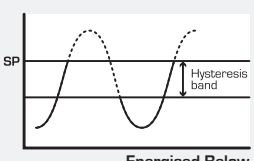
ALARM - The **setpoint value** controls the point at which the setpoint will activate. The **hysteresis value** controls the point at which the setpoint will deactivate.





CONTROL - The **setpoint value** controls the point at which the setpoint will deactivate. The **hysteresis value** controls the point at which the setpoint will reactivate.





E **_ _ _ HYSTERESIS VALUE** scrolls across the bottom row and the last selected value appears in the top row. Use the ▲ and ▼ buttons to alter the hysteresis value if required. Then press P.

*The hysteresis value defines the separation band between setpoint activation and deactivation. Hysteresis will operate as per the specified type setting (**Alarm** or **Control**) - see 6.2D.*

F **_ _ _ MAKE DELAY** scrolls across the bottom row and the last selected make delay value appears in the top row. Adjust the make delay value using the ▲ and ▼ buttons and then press P.

The make delay value defines the delay between setpoint activation and when the relay turns on. This value is in tenths of a second.

G **_ _ _ OPEN ACCESS TO SP VALUE** scrolls across the bottom row and the last selected direct access setting appears in the top row. Using the ▲ and ▼ buttons, select either **No** or **Yes**. Then press P.

When enabled, this option allows the setpoint value to be edited directly after pressing the P2 button, without needing to enter a PIN number or go through all of the other options. Each setpoint can individually have this option enabled or disabled.

! **If you selected SP1 in 6.2A:**

Skip 6.2H and continue to 6.2I now.

H **_ _ _ TRAIL SP1** scrolls across the bottom row and the last trailing setting appears in the top row. Using the ▲ and ▼ buttons, select **Off** or **On**. Then press P.

*Setting this option to **On** will cause SP 2 to become an offset value, which is effectively added to the value of SP 1.*

I **_ _ _ EDIT SETPOINT** scrolls across the bottom row and **Skip** appears in the top row.

You are now back at 6.2A. To edit another setpoint, follow the instructions from 6.2A-I again. If you do not wish to edit another setpoint, press P now to proceed to 6.3.

6.3 Edit setpoint PIN

A **_ _ _ EDIT SP PIN NUMBER** scrolls across the bottom row and **Skip** appears in the top row. Press (P) to skip and return to the operational display, or the (▲) button and then (P) to **Enter**.

B **_ _ _ ENTER NEW SP PIN NUMBER** scrolls across the bottom row and the current PIN (default 1) appears in the top row. Using the (▲) and (▼) buttons, enter your new setpoint entry PIN number. Then press (P) to exit and return to the operational display.

7 SETPOINT DIRECT ACCESS

If neither of the setpoints have their direct access option enabled then this feature will be disabled and the F2 button will not respond to a short button press. (See 6.2G.)

7.1 Setpoint direct access

A Begin by pressing the F2 button for less than 3 seconds. The setpoint name (**SP 1** or **SP 2**) will appear in the bottom row and the current setpoint value will appear in the top row. Using the ▲ and ▼ buttons, adjust the selected value. Then press P to accept the new setpoint value.

B If any other setpoints have the direct access option enabled then the same process is repeated for the next setpoint. Pressing P for the last enabled setpoint will exit and return to the operational display.

8 PEAK & VALLEY DISPLAY

To view the maximum (Peak) value - press the ▲ button for ½ a second. **Peak** appears in the bottom row and the current peak value appears in the top row (this is the maximum measured temperature value since the instrument was turned on or reset). Press P to return to the operational display.

To view the minimum (Valley) value - press the ▼ button for ½ a second. **Valley** appears in the bottom row and the current valley value appears in the top row (this is the minimum measured temperature value since the instrument was turned on or reset). Press P to return to the operational display.

To reset peak or valley - press both the ▲ and ▼ buttons together while the required parameter is being displayed. Peak and valley can also be reset via an external switch connected across the function pins - see 4.6.

9 RESET PIN NUMBERS

If you have forgotten your PIN number, follow the procedure below to reset both the calibration and setpoint setup PIN numbers to their factory default of 1.

9.1 Reset PIN numbers

A Press [▲], [▼] and [P] at the same time. (This key combination can be difficult to execute and you may need several tries to get it right.)

B When successful, a factory identification text will scroll across the display, followed by: **_ _ _ ALL PIN NUMBERS RESET TO 1**.

C Reset the default PIN numbers if required by following the instructions in 5.7 (for input setup) and 6.3 (for setpoint setup).

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Web: www.texmate.co.nz

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SC - RTD

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