

**TECAL ACCU-TEMP II THERMOMETER
OPERATING INSTRUCTIONS
SOFTWARE VERSION 7.1**

Supplied Accessories

1 Mains Cord
1 Operating Instructions (English)
1 RS232 Cable

When unpacked, inspect for physical damage and report any defects immediately in writing, retaining packaging materials for inspection. Before placing into service, ensure mains voltage is correct. Instruments are normally supplied for 120Volts 60Hz. Other voltages may also be selected according to the chart in the Maintenance section. Be sure to also change the fuse to the correct type and rating.

SAFETY

This apparatus is designated Safety class 1 as defined in the IEC publication 1010-1 (Amendment 1).

CE MARKING

This apparatus complies with the CE marking directive, 93/68/EEC, and is in compliance with the following standards:

Generic Emission Standard	EN5081-1
Conducted Emissions	EN55022 Class B
Radiated Emissions	EN55022 Class B
Generic Immunity Standard	EN5082-1
Conducted Immunity (Power Lines)	prEN60 1000-4-4 1kV
Conducted Immunity (Signal Lines)	prEN60 1000-4-4 500V
Radiated Immunity	prEN60 1000-4-3 3V/m
Electrostatic Discharge Immunity	prEN60 1000-4-2 8kV
Electrical Safety Standard	IEC1010-1 (Amend 1)

INSTALLATION

The Tecal Accu-Temp II Thermometer is designed to be either free bench-standing, or rack-mounted. If rack-mounting is required, then the mounting kit should be ordered and the instruction supplied with the kit should be followed. The Tecal Accu-Temp II dimensions are 5.5"H x 10"W x 16"D.

When connected to a mains supply, the mains cord provided with the equipment should be used, and connected only to a mains supply with a suitable earth connection. Before connection to the mains supply, ensure that the correct voltage is set, and the fuse is of the correct rating.

MAINTENANCE

Normally no maintenance is required other than cleaning with a moist cloth. Avoid aggressive detergents or solvents.

CAUTION: Before any maintenance, repair, or exchange of parts or fuses, the instrument must be disconnected from the mains supply and all other power sources. In the event of a fault occurring, the instrument should be returned to our factory, or Agent, for rectification. A mains fuse is fitted to the mains inlet socket on the rear panel, and should be replaced if necessary. The Instrument should only be serviced/repared by a competent engineer and only design approved replacement parts used.

CAUTION: Disconnect the mains lead and all connecting leads, before removing the fuse holder. Replace only with the correct fuse type, i.e. according to the following chart.

LINE VOLTAGE Selection	Range Vac 47-63Hz	Fuse (250V) IEC 127 5 x 20 mm
100V	90-110V}	630mA (T)
120V	108-132V}	
220V	198-244V}	315mA (T)
240V	216-264V}	

Maximum Input Power: 25VA

BATTERIES

The thermometers may be used either directly connected to the mains supply or, for portable applications, run from the internal batteries. Approximately 8 hours continuous operation from a full charge is possible. The battery charger is built into the instrument and charging commences immediately when the mains supply is connected, illuminating the LINE LED on the front panel. The batteries used are of the sealed lead acid type; continuous trickle charging causes no harm to the batteries and we always recommend running from the mains supply when possible, thus ensuring the batteries are always fully charged and ready for portable applications. The charger will automatically switch to trickle charge or fast charge mode depending upon the battery state.

LOW BATTERY indication is displayed when the batteries have approximately 10% charge left. When this indication appears, the thermometers should be connected to a mains supply as soon as convenient, as approximately 50 minutes operating time remains. To extend the battery life, the backlight can be turned off via the **OPT** menu. Operating time without backlight is approximately 14 hours.

TECHNICAL SPECIFICATION

DISPLAY: LCD Graphics Panel, 240 x 64 dot, with LED backlight contrast control via front panel keyboard.

INPUTS: 2 channels for PRTs via 6 pin Lemo sockets. Techne part# 7032842

INPUT IMPEDENCE > 10M Ω
Max. input Voltage $\pm$ 40Vdc, 28Vrms
Common Mode Rejection 50Vrms

The inputs are linearised and user selectable to the following standards:-

EN6071=100 Ohm, Ra=3850

USER: Up to 20 probes may be configured to customer entered constant, A B, C, and R0 values. For I.PRT (CVD) and ITS90 coefficients for PRT's.

A Standby current is always passed through the sensors.

UNCERTAINTY OF MEASUREMENT:

Sensor	Range °C	Resistance Ω	Current	Resolution °C, °F, K	Uncertainty @ 20°C $\pm$ 5°C
Pt100	-200 to -100	10 to 60	0.5 mA	0.001	0.010 °C
Pt100	-100 to +670	60 to 460	0.5 mA	0.001	0.010 °C

2 channels for thermocouples via 4mm sockets. A range of thermocouple plugs with binding posts are available as accessories, contact us for more details.

The Inputs are linearised for the following thermocouple Types B,E,J,K,L,N,R,S,T,U,Au/Pt and in accordance with the following Standard, NIST 175, ITS 90. Types C & D to ASTM E988

Reference Junction compensation may be selected for the following modes:-

Automatic:- Internal Reference Junction range 0 to +40°C

External:- Via Pt100 sensor connected to channel A or B range 0 to +100°C

OFF:- Turns the Reference Junction OFF = 0°C

UNCERTAINTY OF MEASUREMENT

TYPE	RANGE °C	RESOLUTION °C °F or K	DISPLAY RESOLUTION µV	UNCERTAINTY @ 20°C ± 5°C 1 YEAR	UNCERTAINTY @ 20% ± 5°C 60 Days	TEMPERATURE COEFFICIENT /°C
B	+250 to +1820	0.01	1.0	± (0.025% Rdg + 0.006%FS) *	± (0.02% Rdg + 0.006% FS) *	7 ppm Rdg + 6 ppm FS
C	0 to +2315	0.01	1.0	± (0.075% Rdg + 0.005%FS)	± (0.05% Rdg + 0.005% FS)	7 ppm Rdg + 6 ppm FS
D	0 to +2315	0.01	1.0	± (0.075% Rdg + 0.005%FS)	± (0.05% Rdg + 0.005% FS)	7 ppm Rdg + 6 ppm FS
E	-200 to +1000	0.01	1.0	± (0.026% Rdg + 0.004%FS)	± (0.01% Rdg + 0.004% FS)	7 ppm Rdg + 6 ppm FS
J	-210 to +1200	0.01	1.0	± (0.03% Rdg + 0.005%FS)	± (0.008% Rdg + 0.005% FS)	7 ppm Rdg + 6 ppm FS
K	-200 to +1372	0.01	1.0	± (0.035% Rdg + 0.006%FS)	± (0.01% Rdg + 0.006% FS)	7 ppm Rdg + 6 ppm FS
L	-200 to +500	0.01	1.0	± (0.03% Rdg + 0.005%FS)	± (0.008% Rdg + 0.005% FS)	7 ppm Rdg + 6 ppm FS
N	-200 to +1300	0.01	1.0	± (0.035% Rdg + 0.005%FS)	± (0.01% Rdg + 0.005% FS)	7 ppm Rdg + 6 ppm FS
R	-50 to +1768	0.01	1.0	± (0.02% Rdg + 0.015%FS)	± (0.005% Rdg + 0.015% FS)	7 ppm Rdg + 6 ppm FS
S	-50 to +1768	0.01	1.0	± (0.02% Rdg + 0.015%FS)	± (0.005% Rdg + 0.015% FS)	7 ppm Rdg + 6 ppm FS
T	-200 to +400	0.01	1.0	± (0.025% Rdg + 0.015%FS)	± (0.005% Rdg + 0.015% FS)	7 ppm Rdg + 6 ppm FS
U	-200 to +600	0.01	1.0	± (0.025% Rdg + 0.015%FS)	± (0.005% Rdg + 0.015% FS)	7 ppm Rdg + 6 ppm FS
Au/Pt	0 to +1000	0.01	1.0	± (0.02% Rdg + 0.015%FS)	± (0.005% Rdg + 0.015% FS)	7 ppm Rdg + 6 ppm FS

* Apply to readings above 600°C

The above figures apply to values with Reference Junction switched off.

Reference Junction uncertainty when used in automatic mode (INT) is better than 0.1°C at +20°C with a deviation of typically 0.01°C/°C over the range 0 to 100°C.

CALIBRATION: Digital security code protected. Default number set 9252

BATTERIES: 1 x Sealed Lead Acid Battery 6V 2.8AH to power digital circuit and display
1 x Sealed Lead acid Battery 6V 1.2 AH to power analogue circuit
1 x Lithium Battery T068AA for data logging memory
Operating time after full charge 8 hours with backlight, 14 hours without backlight

WORKING TEMPERATURE: 0...50°C rel. humidity less than 90% non condensing

STORAGE TEMPERATURE: -20...+55°C

MAINS SUPPLY: 100/120/220/240 Volts +10% -13%
47...63Hz. 80VA

DATA LOGGING: Up to 4000 single channel values may be stored with date and time.

MATHS: Computes Max/Min values, Mean values, peak to Peak values, and standard deviation. Values all computed from values stored in log.

ANALOGUE OUTPUT: (OPTION) This is a factory fitted option comprising of a single BNC socket fitted to the rear panel. The output is scaled 1mV/°C. a 12 bit D/A converter is used and the resolution is 0.1°C. The output refers to the value on the display. Accuracy ± (0.5% Rdg + 0.5%FS)
This option is designed primarily for following trends and is not intended to be used when accurate measurements are required.

GENERAL

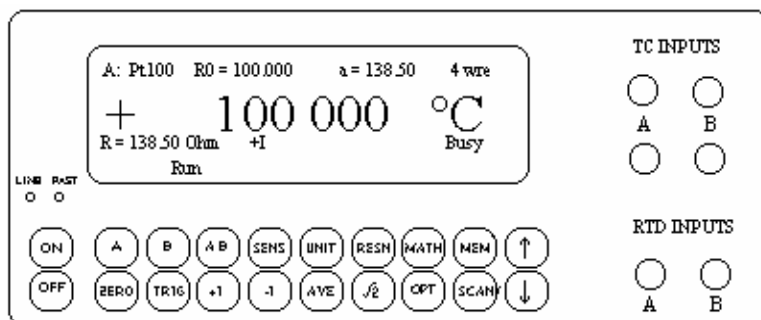
The Tecal Accu-Temp II Thermometer comes ready for immediate use, with rechargeable batteries and built-in charger.

The instruments are switched on and off using the left hand buttons, marked appropriately. Connecting the mains cord automatically enables the battery charging circuit and charges the batteries at the required rate. The LED marked "LINE" will illuminate to show that mains power has been connected to the thermometer, and the LED marked "FAST" will light when the batteries are low and the charger is charging at a high rate. The charger will automatically reduce the charging current to a trickle charge as the batteries reach approximately 80% of full capacity. Continuous trickle charging will not affect the batteries, and we recommend that the Tecal Accu-Temp II Thermometer be used with the mains supply connected whenever possible.

To measure temperature, a suitable probe should be connected to input A or B. The measured temperature will be displayed in large units and the actual resistance or voltage measured will be displayed in smaller units below, together with the measuring current mode selected. In addition, the probe configuration and channel details will be displayed along the top of the display.



FRONT PANEL KEYS



DISPLAY CONTRAST: To change this display contrast, press and hold down either the ↑ or ↓ key; the contrast will vary and may be selected for optimum viewing. The contrast and the viewing angle are changeable, and it may be desirable to alter the contrast from time to time as your reading position alters.

A selects channel A to the display

B Selects channel B to the display

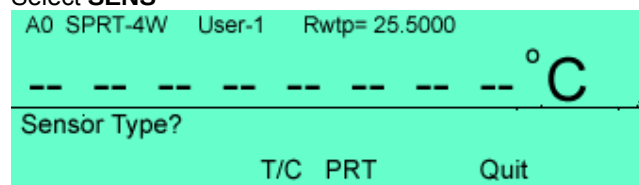
A-B Displays the difference between probe A and probe B
in this case the millivolt/resistance reading will not be shown.



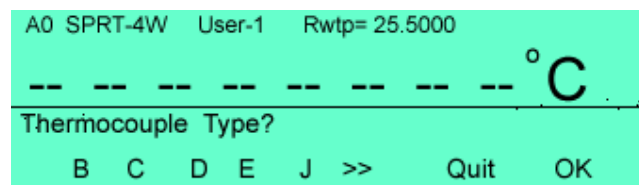
SENS The following sensors may be configured depending upon the model.

Model	Tecal Accu-Temp II
Pt25	No
Pt100	Yes
Thermocouples	Yes

Select **SENS**



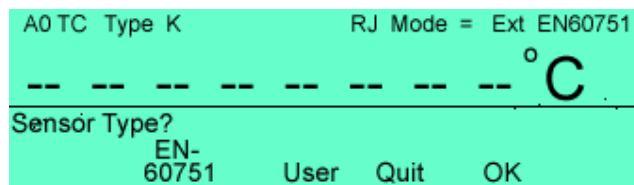
To configure for thermocouples select **T/C** and the following screen will be displayed



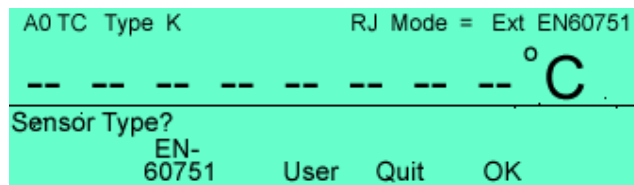
Select from one of the thermocouple options and press **OK** the next screen will help you configure the reference junction



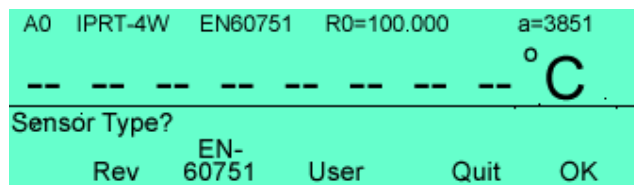
From this screen you can choose from 3 Reference junction modes: **Off** switches the RJ Off. **Int** selects the internal RJ and automatically compensates displaying the true temperature. **Ext** switches to the external RJ mode, and a PRT should be connected to the RTD input of the channel being configured; this PRT can then be used to accurately measure the reference junction temperature. When selecting the Ext option a choice of PRT types is available.



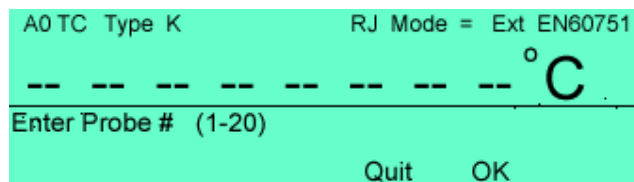
To configure the input for PRT input from the **SENS** screen, select **PRT**.



Select EN-60751 to select the Industrial PRT standard linearization for Pt100, the coefficients may be reviewed by pressing the **Rev** Key but cannot be changed.



To select other coefficients and to configure for Pt25 press the **User** key.



Enter the probe number and press **OK** if the probe number selected has already been configured, then press Quit to return to the main measurement menu. If you select a probe number that has no coefficients assigned to it then you will be prompted to enter the probe coefficients.

R0: 0.0000 Ohm	User - 1 is empty
A: +0.00000e+00	Enter new
B: +0.00000e+00	Coefficients
C: - +0.00000e+00	
I-PRT CvD	S-PRT ITS90
Quit	

To enter probe coefficients a choice of either **CvD** (Calendar van Duesen) or **ITS90** coefficients is available.

Select **CvD** and the coefficients should be entered in the following screen

R0 : 0.0000 Ohm	
A: +0.00000e+00	
B: +0.00000e+00	
C: +0.00000e+00	
Edit Coefficients:	A0 SPRT User-1
R0 A B C Quit OK	

Select **ITS90** and the coefficients should be entered in the following screen

Rwtp: 25.50000 Ohm	An: +0.000000e+00
Ap: +3.908300e-03	Bn: +0.000000e+00
Bp: -5.775000e-07	
Cp: -4.183000e-12	
Edit Coefficients:	A0 SPRT User-1
Rwtp Ap Bp Cp >> Quit OK	

Once a probe has been configured it can be recalled from the **SENS** menu and reconfigured if required using the **Rev** option.

AN IMPORTANT feature of the Tecal Accu-Temp II thermometer is that each channel may be configured with any sensor type so that RTD's may be compared against thermocouples. Pt100 against Pt100 etc.

UNIT This key changes the units of the temperature display, each key press will change the units to the next available in the order °C °F K

RESN When the thermometer first powers up the display defaults to a resolution of 0, this resolution can be increased to 0.01 and 0.001 by pressing the **RESN** key pressing again returns the resolution to 0.

MATH Pressing the MATH key enables you to select and review the statistical values of stored data log values. Press **Log Stats** and the following values will be displayed, **Max** and **Min** values, **Mean** value, **Peak to peak** value, and **Standard deviation**. The number of samples these values are derived from is also displayed.

Analysis of current log		(A0	Deg C)
Number of samples 5			
Min:	841.156	max:	841.210
Mean:	841.179	Ptp:	0.054
SD:	0.0236	Quit OK	



WARNING: STATS will only be calculated and displayed from values held in the log, and will only be displayed when the stored log values are all for the same channel. If different channel readings have been stored the STATS is invalid. It is also important to be aware that changing the probe characteristics settings during logging will invalidate any STATS displayed.
A minimum of 2 readings in this log is required to complete the STATS.

SCAN Selecting this option enables the scanner to be configured and values logged.

```
A0 SPRT-4W  User-1  Rwtp= 25.5000
+      841.566  °C
Scanner is: Off      Memory is: Off
Scan   Timer   Mem   Quit
```

Press **SCAN** this screen enables you to turn the scan sequence ON or OFF and to select one of the 4 available scanning sequences SL1 to SL4; the scanning lists may also be edited.

```
A0 SPRT-4W  User-1  Rwtp=25.5000
----- °C
Scanning List is: Off
SL1 SL2 SL3 SL4 Edt Off Quit OK
```

To select a scanning list press SL1 to SL4, to turn off the scanning press Off. With the scanning list selected it is now possible to edit the list press the Edt key

```
A0 SPRT-4W  User-1  Rwtp= 25.5000
Scanning list edit: SL1
AO BO < > Add Del Quit OK
```

The channels included in the scanning sequence can now be selected by pressing the **Add** key or deleted with the **Del** key; the highlighted channel will be added or deleted. To select a different channel use the **< >** keys NOTE: if scanner cards are fitted then an additional 4 channels will be available per scanner card. Press **OK** to return to previous screen.

From the **SCAN** main menu select **TIMER** to set the cycle and time intervals.

```
A0 SPRT-4W  User-1  Rwtp= 25.5000
Cyc=10 Delay=00:00:00 Rate=00:00:00
< > Clear Edit Quit OK
```

To select the parameter to change, use the < > keys and the selected parameter will flash. Press **Clear** to clear current value set, and **Edit** to change the selected parameter. To set the number of scan cycles press **Edit** and then key in the number of cycles required, 1 to 9999. To set as continuous scan press **Clear**. Using the > key select **Delay** and **Edit** key in the required delay time between scans hh:mm:ss this will also be the delay time before the first scan starts. Press **OK** to confirm set time and > to select the reading rate. Press **Edit** and key in the reading rate hh:mm:ss this will be the time between each measurement. Note: allow sufficient time for temperature to be measured and have regarding for stabilisation time of measured sample. Press **OK** to confirm, and **Quit** to exit to main measurement screen

```

A0 SPRT-4W  User-1  Rwtp=25.5000

Input = +0.0000 Ohm  +I
          Hold  SLi      0/2
  
```

The thermometer is now set in the Hold mode and the scan sequence is started by pressing the **TRIG** key. A timer will show in place of the Hold and will count down to the measurement scan start.

DATA LOGGING

To configure the data logging from the main measurement screen select **SCAN** and **Mem**

```

A0 SPRT-4W  User-1  Rwtp= 25.5000

Memory is: Off?
          Rev  New  On  Off  Quit  OK
  
```

To set up a new log press **New** confirm that you wish to clear the current log and then press **On** to activate the logging function press **OK** to confirm and **Quit** to return to measurement screen. The instrument will be in the measurement hold state and to trigger the measurement start press the **Trig** key. All measured values will now be stored in the Log. The logging function can be used in conjunction with canner sequences.

To review the logged values press **SCAN** and **Rev**

Log#	Ch#	Temp(degC)	Date	Time
1	A0	835.260	19/ 08/05	11:00:00
2	B0	213.023	19/ 08/05	11:01:00
3	A0	835.262	19/ 08/05	11:02:00
4	B0	213.033	19/ 08/05	11:03:00
5	A0	835.254	19/ 08/05	11:04:00
6	B0	213.043	19/ 08/05	11:05:00

The values can be scrolled Up and Down using the Arrow keys
To exit this screen press **OK** (CAL) key

"Hold Samples = 0/20 "

ZERO This key zeros the displayed value and "Zero" appears in the bottom left hand corner of the display. NOTE: The Zero offset will be cancelled if the measuring channel is changed, if the calibration menu is entered, or if the sensor configuration is changed.

TRIG The **TRIG** key operates in two modes. These may be set using the **OPT** menu. The default mode enables the **TRIG** key to be used as a run/hold button, and Run appears on the display above the key. Pressing **TRIG** holds the display, and Hold will appear on the display. It will also be noticed that the flashing "Busy" blanks in the hold mode. Pressing **TRIG** a second time returns the instrument to the run mode. The second mode of operation may be set using the **OPT** menu. This enables the **TRIG** key to be set in single shot mode, i.e. when pressing the **TRIG** key one measurement is made and held on the display, and the busy sign flashes once. It should also be noted that even for large changes in temperature readings the new measurement will be valid, the specially designed measurement circuit ensures that the A/D converter is fully zeroed and stabilised before a new measurement is displayed.

When used in conjunction with the data logging function, the **TRIG** key is used to start the logging. Pressing the **TRIG** key again puts the instrument into a hold state and the measurement channels may now be changed. Restarting the measurement by pressing the **TRIG** key also resumes the data logging; the newly selected measurement channel now being stored. It is possible to store readings from channels A, B, or A-B. When in single measurement mode the instrument is normally in the hold state. Pressing the **TRIG** key initiates one measurement which will be stored in the log, the instrument then returns to the hold state.

+I This selects the measuring current in the positive direction. The measuring time is approx. 1.8 seconds per reading for channels A and B, and 3 seconds for A-B.

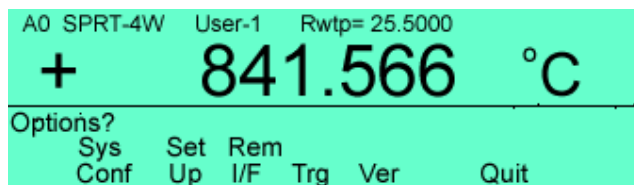
-I This selects the measuring current in the negative direction. Measuring time is approx. 1.8 seconds per reading for channels A and B, and 3 seconds for A-B.

AVE This automatically switches the measuring current from forward to reverse direction and displays the average of the 2 readings, thus eliminating any errors due to thermal emf. Measuring time approximately 5.2 seconds per reading for channels A and B and 10.2 seconds per reading for A-B

√2 Current is reduced through the measuring probes by $\sqrt{2}$ (half power) enabling any probe self heating to be determined. The best method of use for this option is to first allow the sensor to reach a steady temperature and note the value; it will take some time for the sensor to stabilise. Select $\sqrt{2}$ current and immediately press the ZERO key, the reduced current through the probe will reduce the heating effect on the probe, and any value displayed will represent the

temperature change due to the reduced current. The advantages of using the ZERO key in this way are twofold; firstly, any errors in the measuring amplifiers due to a change in current are removed, and secondly, from a calculation point of view, the change in reading will be displayed without further calibration being required.

OPT Selects the various instrument configurations. The following options are offered:



Sys Conf displays information regarding the instrument configuration

Set Up

BACKLIGHT may be turned on/off press **OK** to confirm setting.
BEEPER may be turned on/off press **OK** to confirm setting.
TIME Current set time is displayed, to change press **Chg** and enter the new time. Hours/minutes/seconds format is used. Press **OK** to confirm settings.
DATE Current set date is displayed, to change press **Chg** and enter the new date. Days/Month/year format is used. Press **OK** to confirm settings.

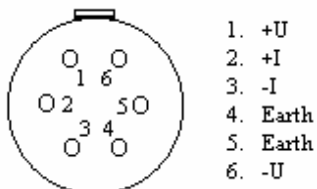
REM I/F If an interface card is fitted, pressing this key will display the various settings available to that interface i.e. Baud rates, address etc. If no interface is fitted then a "No Option Available" message is displayed.

Trg: The trigger mode can be changed; selecting **Sng** enables the **TRIG** key to be used as a single trigger. Only one measurement will be made and held on the display. Selecting **Run** enables the Run/Hold mode. Pressing the **TRIG** key holds the reading with the current value held on the display. Press **TRIG** again and the measurement is in **Run** mode with continuous measurements being displayed.

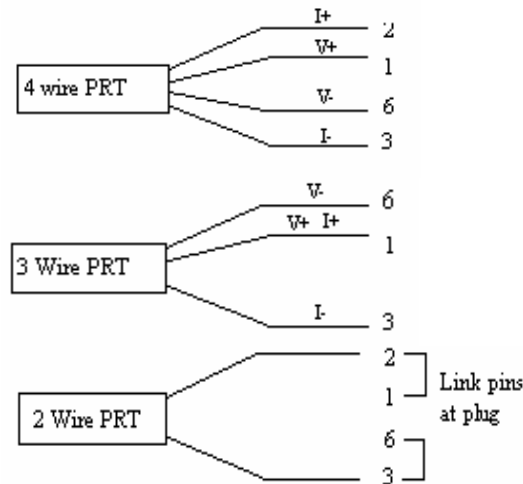
Ver Displays the Model and software versions

RTD INPUTS

There are 2 LEMO sockets for the Pt100 inputs, and the connections are as fig 11. For the best performance we recommend 4 wire sensors, but the Tecal Accu-Temp II series thermometers are able to measure with 2, 3, and 4 wire sensors. The sensors may be plugged into either channel A or B. The connection plug for the PRT sensors is Techne part# 7032842



Probe Connection



THERMOCOUPLE INPUTS

When measuring thermocouples care should be taken to achieve the best results. The inputs are via 4mm sockets and a range of thermocouple plugs are available for connection. The input sockets are copper, and are behind the front panel to avoid the external effects of draughts. The reference junction may be set in three different modes, the first is automatic (INT) and Pt100 sensors are attached to the upper input sockets and monitor their temperature automatically applying the corrections. The accuracy of the internal reference is approximately $\pm 0.3^{\circ}\text{C}$; to achieve more accurate results, an external reference may be used (Ext). When using an external reference the Pt100 input is used to sense the external reference temperature. The accuracy of this is as for Pt100 measurement, $\pm 0.01^{\circ}\text{C}$. In addition to this there will be some errors due to the configuration of the external reference but, generally with care, it is possible to achieve better results when using the external reference mode. Finally, the reference junction may be switched off (OFF) and in this mode the thermometer assumes a reference junction temperature of 0°C . This mode of operation is used when an external automatic reference is used such as our RJ## series. Again, using this mode of operation gives slightly better results than will be achieved when using the internal reference.

CAUTION

When measuring thermocouples with the Tecal Accu-Temp II series thermometers it should be remembered that the temperature may be read to 0.01°C , and this is equivalent to approximately $0.4\mu\text{V}$ per digit with a type K thermocouple. Care must therefore be taken to avoid exposing the instrument inputs to draughts or a heat source such as sun shining on the front panel. To obtain the best results the instrument should be placed in a temperature controlled room and switched on for at least half an hour before measurements are made. Running on battery power without the mains supply connected will also be of benefit. When connected to the mains the batteries will be charged and additional heat generated inside the instrument. Great care should also be taken to ensure that the correct materials are used when making connections and avoid unnecessary joints of different materials as these again will cause small errors.

We offer a range of thermocouple connectors for use with the Tecal Accu-Temp II thermometer as well as a range of automatic reference junctions and an external reference enclosure with integral Pt100 sensor; please ask our sales staff for more information.

CALIBRATION

The Tecal Accu-Temp II series of precision thermometers has been designed to give long service and permanence of calibration, together with a low cost of ownership. Attention to detail in the design stage has produced an instrument that is quick and simple to recalibrate with the minimum of equipment. Prior to calibration the unit should be placed in a temperature controlled environment for a minimum of 4 hours. Care could be taken to use good quality test leads, thus avoiding any thermal emf, together with resistance standards of known value. To select the **Cal** option, press the **MEM** key and then select the **Cal** option from the menu. The calibration counter number will be displayed. A second menu choice will be given - **Cal** or **Prt**. The **Prt** option will print the calibration constants to the screen. This is used as a diagnostic tool to ensure that there is no corruption of these constants. Select the **Cal** option and you now enter the calibration routine. The display will ask for a passcode to be entered, the default passcode number is **9252**, enter this number and press **OK**. The display will then give you the option of changing the passcode to your own personal number, if you select **Yes** you will then be asked to enter your chosen number via the keypad ending by pressing **OK**. Any number between 0 and 9999 is valid. You will then be asked to confirm your number. Once the new number is accepted the calibration counter will increment 1. The display will then give a choice of calibration RTD, T/C, RJA, RJB, it is preferable to calibrate the RTD ranges first.

RTD CALIBRATION

Select this option by pressing RTD. Select Pt100, the display will then prompt you to connect 100 ohm resistance standard to channel A. When connected press **OK** and you will be prompted to enter the exact value of the standard. Once the value is entered and the **OK** pressed you will be asked to confirm the value by pressing **OK** again. The instrument will then calibrate itself against this standard storing the calibration constants in the memory. Next you will be asked to connect a 400 ohm resistance standard and repeat the above. Finally you will be prompted to connect a 250 ohm resistance standard and again repeat the above. Once this calibration is completed the display will return to the main menu. For model Tecal Accu-Temp II you now have the option to calibrate the Pt25 range. Follow the display instructions using the 100 Ω 25.5 Ω and 62.5 Ω standards.

THERMOCOUPLE CALIBRATION

Select this option by pressing the T/C key in the calibration menu. Connect an mV source to the thermocouple input of channel A using low thermal copper leads and connectors. The display will prompt you to set the input to 0mVdc and press **OK**. Next +75mVdc should be supplied and **OK** pressed. Finally -75mVdc should be supplied and again the **OK** pressed. These three values will calibrate the complete thermocouple range of the instrument. The display will again return to the main calibration screen and the reference junction should now be calibrated.

RJ CALIBRATION

The reference junction of both channel A and channel B should be calibrated. Select RJA, insert a Pt100 standard thermometer in the 4mm negative (lower) input socket of channel A, and allow the temperature to stabilise; it is necessary to use a sensor that fits securely into this socket. Once the temperature of the socket has stabilised, and a steady temperature reading is obtained, enter the temperature into the instrument. The screen will now prompt you to enter the block temperature. Confirm the value and press **OK**. Repeat this procedure for channel B, moving the sensor to the negative input socket in channel B.

Once both channels have been calibrated you may exit the calibration menu with the **QUIT** key.

EQUIPMENT REQUIRED

1 Resistance Standard Value 100 Ohms
1 Resistance Standard Value 250 Ohms
1 Resistance Standard Value 400 Ohms

1 mV source -75 ... 0 ... +75 mV
1 Pt100 sensor and measuring instrument
1 Calibration Lead

The Value of the resistance standards should be known with an uncertainty $\pm 5\text{ppm}$ or better
Suitable resistance standards are available for calibration together with a calibration connection lead, please consult our sales staff.

ENVIRONMENT

We expect the Tecal Accu-Temp II series thermometers to give long and trouble free service but, as with everything, there will come a time when you wish to replace it. Techne will continue to develop new instruments and to update the design of existing models and, therefore, will be able to offer an instrument suitable for your needs.

When disposing of the batteries care should be taken to comply with current legislation concerning their disposal. If in doubt the batteries can be returned to our factory for safe disposal. In addition to the 2 sealed lead acid batteries there is also 1 nickel cadmium battery which supports the logging memory.

WARNING



DO NOT DISPOSE OF BATTERIES IN FIRE
DO NOT SHORT CIRCUIT
DO NOT PUNCTURE, OPEN, DISMANTLE OR
OTHERWISE MECHANICALLY INTERFERE WITH THE
BATTERIES.
DO NOT SWALLOW

Additional Products From Techne Inc

Dry Block calibrators

Liquid Calibration baths

Fluidized baths

Process, multifunction & documenting calibrators

Secondary Platinum resistance thermometers

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High temperature furnaces and ovens

**Phone, fax or e-mail for further information on the above or for a copy of our
general catalog:**

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