

SERIES 3000 THERMOMETER

OPERATING INSTRUCTIONS

**SERIES 3000 THERMOMETER
OPERATING INSTRUCTIONS
SOFTWARE VERSION 6.1**

Supplied Accessories

- 1 Mains Cord
- 1 Operating Instructions (English)

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 240Volts 50Hz. 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 (Amend 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 Series 3000 Thermometers are designed to be either free bench-standing, or for rack-mounting. If rack-mounting is required, then the mounting kit should be ordered and the instruction supplied with the kit should be followed. The 3000 series are ½19", 2.5U high.

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/repaired 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 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. LEMO type number for input plug: FGG1B.306.CLAD52

INPUT IMPEDENCE > 10MΩ
 Max. input Voltage ± 40Vdc, 28Vrms
 Common Mode Rejection 50Vrms

The inputs are linearised and user selectable to the following standards:-
 IEC751 R0=100Ohm, Ra=3850
 US/JIS R0=100 Ohm,Ra=3851
 EN-751 R0=100 Ohm, Ra=3850 in accordance with ITS90 standards
 USER Up to 20 probes may be configured to customer entered constant, A, B, C, and R0 values.
 A Standby current is always passed through the sensors.

UNCERTAINTY OF MEASUREMENT:

INPUT	RANGE °C	RESISTANCE Ohm	CURRENT	RESOLUTION °C °F K	UNCERTAINTY 1 year @ 20 ±5°C
Pt100	-200 ... -100	18 ... 60	1mA	0.001	0.02°C
	-100 ... +500	60 ... 280	1mA	0.001	0.01°C
	+500 ... +800	280 ... 450	1mA	0.001	0.02°C

2 channels for thermocouples (Model 3001) via 4mm sockets. A range of thermocouple plugs with binding posts is available as accessories, see price list.

The Inputs are linearised for the following thermocouple Types B,E,J,K,N,R,S,T 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 ON °C °F or K	DISPLAY RESOLUTION ON 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
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

* 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 0.3°C at +20°C with a deviation of typically 0.03°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: This is a factory fitted option comprising of a single BNC socket fitted to

(OPTION)

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 $\pm (0.5\% \text{ Rdg} + 0.5\% \text{ FS})$

This option is designed primarily for following trends and is not intended to be used when accurate measurements are required.

GENERAL

The series 3000 Thermometers come 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 Series 3000 Thermometers are 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.

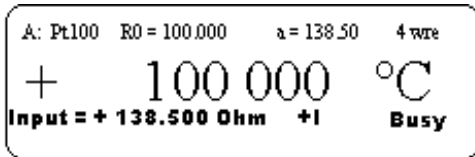


fig.1 Typical display

FRONT PANEL KEYS

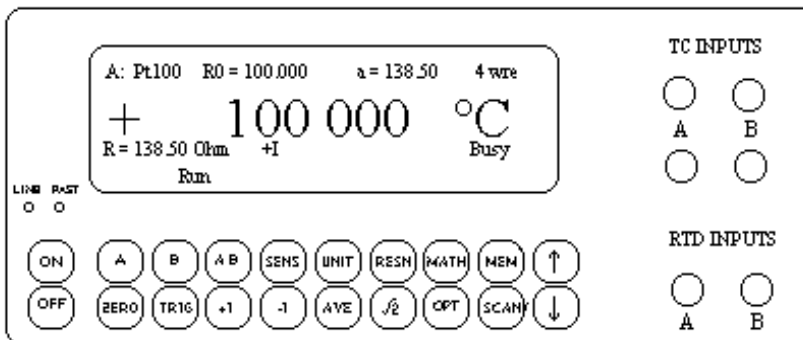


Fig. 2 : Front Panel Keyboard

DISPLAY CONTRAST: To change this display contrast, press and hold down either the \uparrow or \downarrow key the contrast will vary and may be selected for optimum viewing. The contrast and the viewing angle is changed 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.

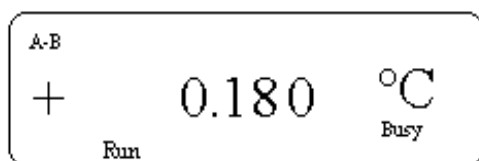


Fig.3: Display in A-B Mode

SENS A menu is displayed giving the choice of probe configurations, For the model 3002 there are 3 standards to choose from. IEC751, US/JIS, EN-751 in addition there is a fourth option *Usr* which allows the operator to store probe characteristics under a file number, up to 20 different probe characteristics may be stored. **NOTE** The status line at the top of the display will confirm the current sensor configuration. To change sensor configuration press **SENS** key and from the menu displayed select the option required by pressing the button immediately below. If the **Usr** (user) key is pressed a further menu will be displayed, the probe characteristics can then be entered together with a probe number. A maximum of 20 different probes may be stored in this way.

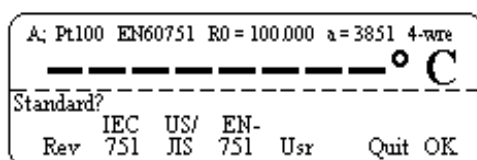


Fig. 4: Probe configuration menu

For the model 3001 the menu first offers a choice of Prt's or thermocouples, if Prt's are chosen than the menus are as above. With thermocouples selected a menu will offer a choice of thermocouple types, press the key below your chosen type to select it. The choice of reference junction configuration will then be offered **AUTO** or **EXT**, the most commonly used option is **AUTO** which selects the internal reference. It should be noted that there is a separate reference for each channel and that every effort has been made to ensure that the best possible performance for the reference junction is achieved. Should an external temperature be used for the reference then the **EXT** option should be selected and a Pt100 probe connected to the RTD input and temperature sensed by this probe will be used as the reference junction temperature. When the OFF option is chosen the Reference Junction is turned OFF and the values are referenced to 0°C.

AN IMPORTANT feature of the 3001 thermometer is that each channel may be configured with any sensor type so that RTD's may be compared against thermocouples.

SENSOR CONFIGURATION

The 3002 thermometers offer real flexibility, with 3 standard Pt100 linearisations plus a user option. These options may be selected as follows.

Press key **SENS** and menu will display the options:

IEC751: Linearises in accordance with IEC751 tables with $R_0=100\text{ohm}$ & $R_a=3850$

US/JIS: Linearises in accordance with US and JIS tables $R_0=100\text{ohm}$ & $R_a=3916$

EN-751: Linearises in accordance with ITS90 Standards $R_0=100\text{ohm}$ & $R_a=3851$

Usr Enables probe specific coefficients to be programmed and stored and recalled with probe identification serial number. The top line of the display shows the configuration of the probe selected, it is permitted to set channels A & B to different configurations. The information is displayed as follows:

Channel identification Standard selected R_0 R_a 3 or 4 wire.
(If A-B is displayed then this status line blanks)

To change a sensor configuration first select **Usr**, and enter probe number (1 to 20) and confirm with **OK** key. To review/edit the coefficients press the **Rev** button, the upper half of the display will show the probe coefficients R_0 , A, B, & C values. The lower half of the display enables these coefficients to be edited by selecting **Yes**, each value may now be changed individually by pressing the key directly below the option required. (e.g. press **R0** and you will be asked to enter the R_0 value). Confirm this selection with **OK**, at this point the value is not written to the memory and it is possible to return to the previous setting. Once all the coefficients have been edited press **OK** you will then be asked if these new coefficients should be stored in the memory, press **No** and you will exit the edit menu without storing the new values. Press **Yes** and the new coefficients will be stored. Press **Quit** to return to the measuring screen.

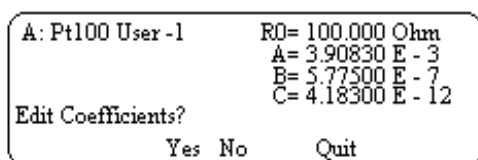


Fig.5: Review menu for probe characteristics

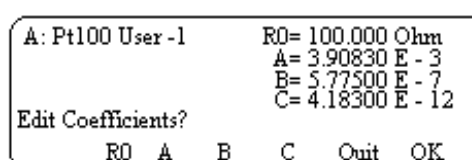


Fig.6: Edit menu for probe characteristics

UNIT This key changes the units of the temperature display, each key press will change the units to the next available in the order $^{\circ}\text{C}$ $^{\circ}\text{F}$ K

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

MATH This takes you into the maths function of the thermometer and allows statistical analysis of stored values to be displayed. (use the Log function to store these values) Press **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.

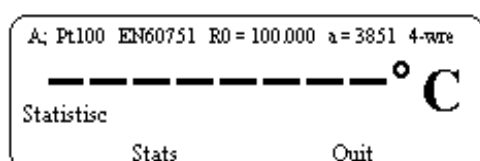


Fig 8. Stats Menu

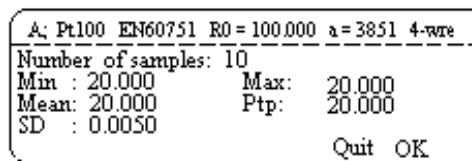


Fig.7 Display of statistics



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**.

MEM This key will take you into a menu with the options **Cal** or **Log**. The **Cal** option takes you into the instrument calibration routine and the **Log** into the data logging function.

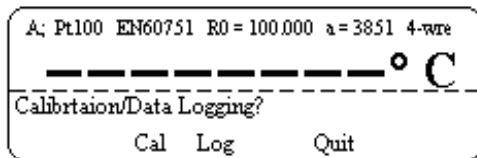
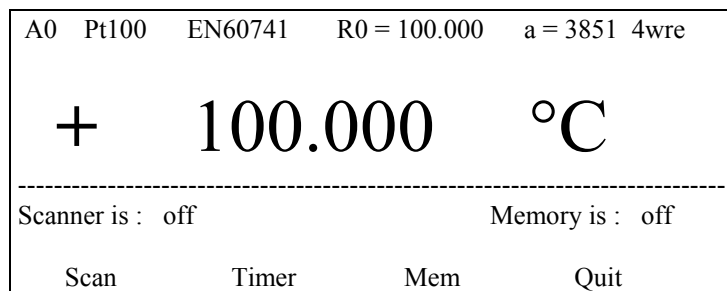


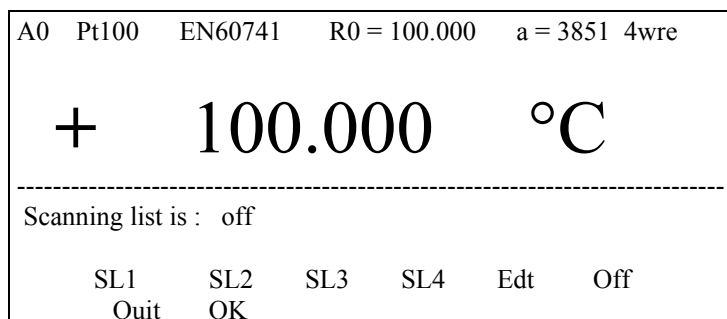
fig. 8: Mem menu

SCAN..DATALOG FUNCTIONS

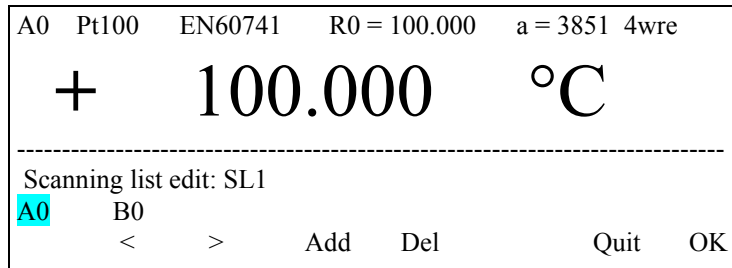
To set a scan sequence and store values in the datalog enter **SCAN** option the display will read



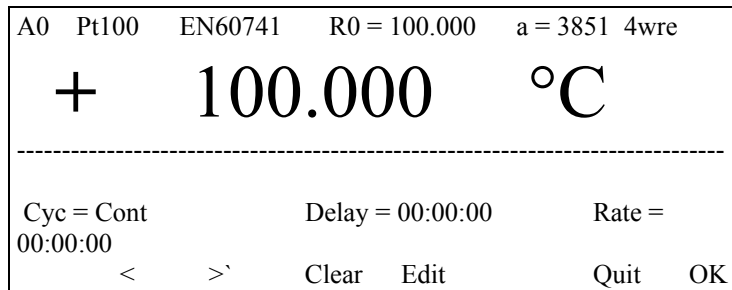
Select **Scan** from the menu to set up the scan sequence



Four different scanning lists labeled **SL1** to **SL4** may be set up to be stored and recalled for later use, Select the list to be edited using the **Edt** key



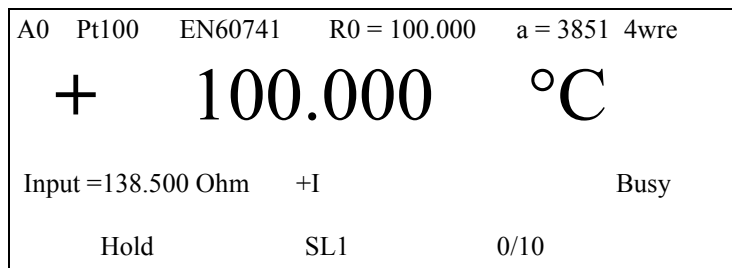
The channels available to add to the scanning list are designated A0 and B0 (A0...A4 , B0...B4 if the extended scanner option is fitted). The Flashing channel may be added with **Add** key or deleted with the **Del** key moving between the channels with the <> keys. Once a channel is added to the scan list the channel is highlighted, pressing the **OK** key stores that scanning sequence.



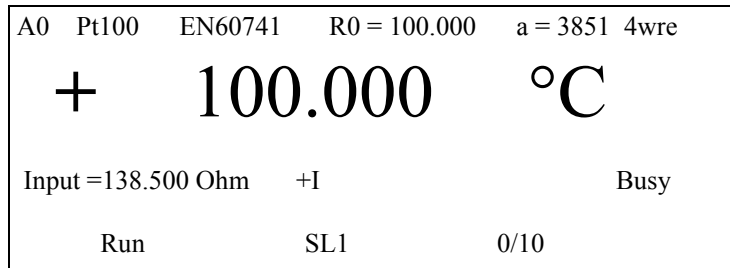
To set the number of scan cycles and the delay between cycles select the **Timer** and the above menus will be displayed. The changeable parameters will flash. To change the flashing parameter press **Edit** and enter the appropriate number of Cycles 0 to 9999 or continuous. Pressing the **Clear** key returns to the default setting. The following may be set **Cyc** - This is the number of scanning cycles any number between 1 and 9999, continuous can also be set. NOTE if the data logger is turned on then the number scan cycles is limit to 4000 readings. **Delay** - This sets the delay before the scanner cycle starts and may be set between 00:00:00 and 59:59:59. **Rate** - This sets the time between each channel selection and may be set between 00:00:00 and 59:59:59.

Example: Set Cyc to 10
Set Delay to 00:10:00
Set Rate to 00:00:40

The channels will be scanned 10 times with a start delay of 10 minutes and 40 seconds delay between each channel selection.



The measurement display will start in the measurement **Hold** position Press **TRIG** to start the scan cycle.



The display will first show the count down timer once the start time is reach the display will indicate run and the number of scans will be display. Once the set number of scans has completed the display will return to the Hold position until triggered again.

DATA LOGGING SETUP

To store values enter the **MEM** option and select **Log** select the **Set Up** option and the number of samples or readings to be stored will be displayed. To accept this number press **Yes**, to change the number press **No**, and then enter the number of samples you wish to store, (this number must be between 1 and 4000.) Press **OK**, you will then be asked to confirm your choice. Press **Yes**, the logging mode can switched on or off and the previous stored values scrolled to the display using the **Rev** option. The values will be displayed with log number, channel measured, the temperature value, date and time.

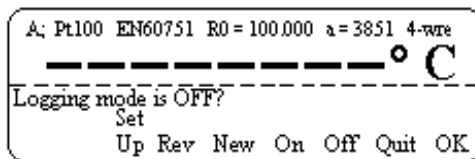


Fig.9 : Data logging Menu

Log#	CH#	Temp(degC)	Date	Time
1	A	20.000	01/05/97	10:00:00
2	A	20.000	01/05/97	10:02:00
3	A	20.000	01/05/97	10:04:00
4	A	20.000	01/05/97	10:06:00
5	A	20.000	01/05/97	10:08:00
6	A	20.000	01/05/97	10:10:00

Fig.10: Screen showing logged values

To scroll the pages use the left hand up/down arrow keys, and to exit the review screen press the **OK/MEM** key.

To clear the current logged values select **New** and the display will ask you to confirm that you wish to clear the current stored values. Press **Yes** or **No**. If **Yes** is pressed you will be requested to confirm your choice, press **Yes** to confirm. The logging mode may then be activated by pressing the **On** key. When the set-up is complete press **Quit** and return to the measurement mode. The bottom line of the display will show the data log status information:-

“Hold Samples = 0/20 ”

To trigger the measurements and store samples press the **TRIG** key. This line will now change to “Run Sample=#/20”, where # = the number of samples stored. When the set number of values are stored, the measurements return to the Hold state. Press the **TRIG** key again and the display will ask if you wish to clear the current log. Press **Yes** and confirm, the **TRIG** key will now start a new measure and store cycle.

The values logged will always relate to the channel on the display. It is possible to stop the logging function, change channels and restart logging using the **TRIG** key (see **TRIG** section below).

- 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 3.6 seconds for A-B.
- I** This selects the measuring current in the negative direction. Measuring time approx. 1.8 seconds per reading for channels A and B and 3.6 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 3.6 seconds per reading for channels A and B and 7.2 seconds per reading for A-B
- $\sqrt{2}$ 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

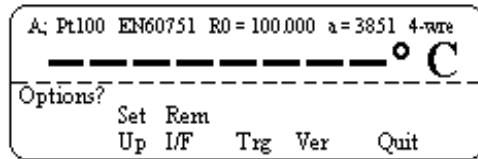


Fig.11: Options menu

Selects the various instrument configurations the following options are offered:

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.

SCAN This key displays the scanner option menu if fitted.

RTD INPUTS

There are 2 LEMO sockets for the Pt100 inputs and the connections are as fig 1. For the best performance we recommend 4 wire sensors, but the 3000 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 LEMO type FGG.1B.306.CLAD52

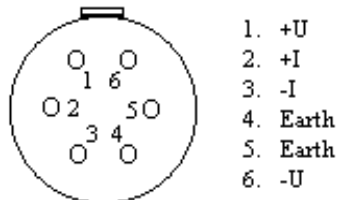
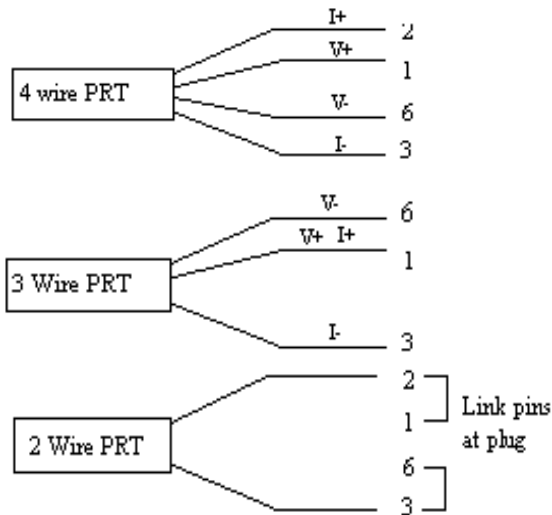


Fig.11: View of input socket

Probe Connection



THERMOCOUPLE INPUTS

When measuring thermocouples (Models 3000 & 3001) 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 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 3000 thermometer 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 3000 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 3000 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**. Any number between 0 and 9999 is valid. 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**. 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 the key below RTD, 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 calibration menu. At this point you have the option of calibrating the thermocouple range or pressing **QUIT** key to return to the measuring mode.

THERMOCOUPLE CALIBRATION

Select this option by pressing the T/C key in the calibration menu. Connect a 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 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 NEEDED

- 1 Resistance Standard Type RS3/100 Value 100 Ohms 1 mV source -75 ... 0 ... +75 mV
- 1 Resistance Standard Type RS3/250 Value 250 Ohms 1 Pt100 sensor and measuring instrument
- 1 Resistance Standard Type RS3/400 Value 400 Ohms
- 1 Calibration Lead Type TS01

The Value of the resistance standards should be known with an uncertainty ± 5 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 3000 series thermometers to give long and trouble free service but, as with everything,
there will come a time when you wish to replace it . CROPICO 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 CIRUIT
DO NOT PUNCTURE, OPEN, DISMANTLE OR OTHERWISE
MECHANICALLY INTERFERE WITH THE BATTERIES.
DO NOT SWALLOW

Additional Products From Cropico

DIGITAL OHMMETERS

RESISTANCE BRIDGES

RESISTANCE DECADE BOXES

RESISTANCE STANDARDS

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PRECISION WATTMETERS

INSULATION TEST SETS

UNIVERSAL CALIBRATORS

POWER ANALYSERS

HIPOT TESTERS

ELECTRICAL SAFETY TESTERS

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

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