

Pt 100 ohm, Type J/K/R/E/T, RS-232

PRECISION 0.01 degree THERMOMETER

AKTAKOM Model : ATE-2002



Your purchase of this PRECISION THERMOMETER marks a step forward for you into the field of precision measurement.

Although this THERMOMETER is a complex and delicate instrument, its durable structure will allow many years of use if proper operating techniques are developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

TABLE OF CONTENTS

1. FEATURES.....	1
2. SPECIFICATIONS.....	1
2-1 General Specifications.....	1
2-2 Electrical Specifications.....	2
3. FRONT PANEL DESCRIPTION.....	3
3-1 Display.....	3
3-2 Hold Button.....	3
3-3 Record Button.....	3
3-4 Recall Button.....	3
3-5 Sensor Select Button.....	3
3-6 Rel. (Relative) Button.....	3
3-7 Power On/Off Switch.....	3
3-8 0.1°/0.01° Button.....	3
3-9 Offset VR.....	3
3-10 C°/F° Button.....	3
3-11 Thermocouple Socket.....	3
3-12 Pt 100 ohm Probe Socket.....	3
3-13 RS-232 Output Socket.....	3
3-14 Battery Cover/Compartment.....	3
4. MEASURING PROCEDURES.....	4
5. RS232 PC SERIAL INTERFACE.....	5
6. REPLACEMENT OF BATTERY.....	6
7. OPTIONAL ACCESSORIES.....	6

1. FEATURES

- * Professional thermometer with high accuracy & 0.01° resolution.
- * Accept multi type temp. probe input : platinum Pt 100 ohm, thermocouple type K/J/T/E/R.
- * With 0.01 ° high resolution both for Platinum & Thermocouple probe input.
- * Pt 100 probe input cooperate with an 0.00385 alpha coefficient, meet DIN IEC 751.
- * Cooperate with 4 wires Pt-100 ohm probe, high precision.
- * Wide range display from -100 to 1370 °C (type k).
- * Build in °C & °F select button on the front panel.
- * Build in 0.01° & 0.1° select switch on the front panel.
- * Super large LCD with unit display, easy readout.
- * Data hold function for stored the desired value on display.
- * Sensor select button on the front panel, easy to change different type probe.
- * Memory function to record the maximum & minimum reading with recall.
- * Build the REL. button, useful for relative measurement.
- * RS232 computer interface.
- * Built-in low battery indicator.
- * Optional heavy duty & compact housing case, designed for easy carry out.

2. SPECIFICATIONS

2-1 General Specifications

Display	62 mm x 34 mm supper large LCD display, 13 mm (0.5") digit size.
Sensor type	6 types : 1. Platinum PT 100 ohm (0.00385 alpha coefficient, meet DIN IEC 751) 2. Thermocouple type K. 3. Thermocouple type J. 4. Thermocouple type T. 5. Thermocouple type E. 6. Thermocouple type R.
Functions	°C, °F, 0.01°/0.1°, Data hold, relative measurement.
Resolution	0.01°C/0.1°C, 0.01°F/0.1°F.
Circuit	Use the software to make linearity correction instead the traditional hardware circuit.
Probe input socket	<i>Pt 100 ohm probe :</i> DIN 4 pin socket. <i>Thermocouple couple probe :</i> Standard 2 pin type K socket.
Sampling Time	Pt 100 ohm probe – Approx. 1.5 sec, Others – Approx. 2.5 sec.
Hold Function	To freeze the display reading value.
Memory Recall	Memorize the Maximum, Minimum reading with recall.
Over Indication	Show " - - - - ".
Data Output	RS232 PC serial interface.

Power Supply	Heavy duty or Alkaline type, DC 9V battery, 006P, MN1604 (PP3) or equivalent.
Power Consumption	Approx. DC 15 mA.
Operating Temperature	0 to 50 °C (32 to 122 °F).
Operating Humidity	Less than 80% RH.
Meter Size	HWD 180x72x32 mm (7.1x2.8x1.3 inch).
Meter Weight	285 g/0.62 lb.
Standard Accessory	Operational manual..... 1 PC.
Optional Accessories	* Type K Thermocouple probe.....TP-01, TP-02A, TP-03, TP-04 * Pt 100 ohm probePT-100 * Carrying case....CA-06, CA-03, CA-05A * SoftwareSW-U101-WIN * RS232 cable.....UPCB-01
Ref. page	

2-2 Electrical Specifications (23 ± 5 °C)

Type	Reso- lution	Range	Accuracy
Platinum Pt 100 ohm	0.01 °C	-199.99 to 199.99 °C	±(0.1% + 0.2°C)
	0.1 °C	200.0 to 850.0 °C	
	0.01 °F	-199.99 to 392.00 °F	±(0.1% + 0.4°F)
	0.1 °F	392.0 to 1562.0 °F	
Thermo- couple type K	0.01 °C	-100.00 to 100.00 °C	±(0.1% + 0.8°C)
	0.1 °C	100.0 to 1370.0 °C	
	0.01 °F	-148.00 to 212.00 °F	±(0.1% + 1.4°F)
	0.1 °F	212.0 to 2498.0 °F	
Thermo- couple type J	0.01 °C	-90.00 to 100.00 °C	±(0.1% + 0.8°C)
	0.1 °C	100.0 to 900.0 °C	
	0.01 °F	-130.00 to 212.00 °F	±(0.1% + 1.4°F)
	0.1 °F	212.0 to 1652.0 °F	
Thermo- couple type T	0.01 °C	-100.00 to 100.00 °C	±(0.1% + 0.8°C)
	0.1 °C	100.0 to 400.0 °C	
	0.01 °F	-148.00 to 212.00 °F	±(0.1% + 1.4°F)
	0.1 °F	212.0 to 752.0 °F	
Thermo- couple type E	0.01 °C	-80.00 to 90.00 °C	±(0.1% + 0.8°C)
	0.1 °C	90.0 to 779.9 °C	
	0.01 °F	-112.00 to 194.00 °F	±(0.1% + 1.4°F)
	0.1 °F	194.0 to 1435.8 °F	
Thermo- couple type R	0.1 °C	0 to 600.0 °C	±(0.1% + 0.8°C)
	1 °C	600 to 1770 °C	
	0.1 °F	32.0 to 112.0 °F	±(0.1% + 1.4°F)
	1 °F	112 to 3218 °F	

Remark :

* The accuracy is specified for the meter only.

* The above spec. accuracy are tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.

3. FRONT PANEL DESCRIPTION

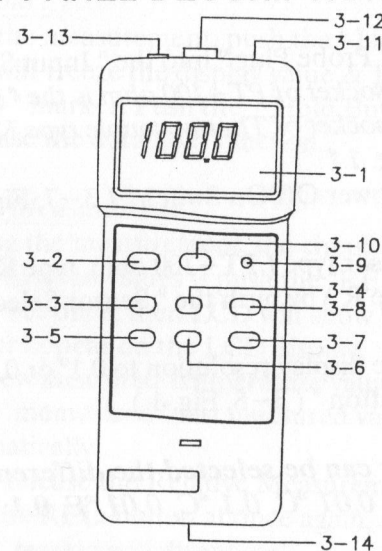


Fig. 1

- 3-1 Display
- 3-2 Hold Button
- 3-3 Record Button
- 3-4 Recall Button
- 3-5 Sensor Select Button
- 3-6 Rel. (Relative) Button
- 3-7 Power On/Off Switch
- 3-8 0.1°/0.01° Button
- 3-9 Offset VR
- 3-10 C°/F° Button
- 3-11 Thermocouple Socket
- 3-12 Pt 100 ohm Probe Socket
- 3-13 RS-232 Output Socket
- 3-14 Battery Cover/Compartment

4. MEASURING PROCEDURE

- 1) Connect the " Probe Plug " into the " Input Socket ".
 - * *The input socket of PT-100 ohm is the " 3-12, Fig. 1 ".*
 - * *The input socket of Thermocouple type K/J/T/E/R is the " 3-11, Fig. 1 ".*
- 2) Select the " Power Off/On Switch " (3-7, Fig. 1) to " On " position.
- 3) Select the sensor type (PT-100 ohm, type K, type J, type T, type E, type R) by push the " Sensor Select Button " (3-5, Fig. 1).
- 4) Determine the display resolution to 0.1° or 0.01° by pushing " $0.1^{\circ}/0.01^{\circ}$ Button " (3-8, Fig. 1).
 - * *The meter can be selected the different resolution 0.01°C , 0.1°C , 0.01°F , 0.1°F , 1°C , 1°F .*
 - The relation of resolution/range/different sensor type, please refer the " 2-2 Electrical Specifications ", page 2.*
 - * *Push the " $0.1^{\circ}/0.01^{\circ}$ Button " once again, the display will get the alternation of high resolution and the low resolution.*

5) Data Hold :

During the measurement, push the " Hold Button " (3-2, Fig. 1) will freeze the display value & LCD will show the " HOLD " marker. Push the " Hold Button " once again will release the data hold function.

6) Relative Measurement

@ During the measurement, the circuit will memorize the last measured values if push the "REL. Button " (3-9, Fig. 1) at once, then LCD will show "0" & a " REL " marker appear on the LCD display.

@ The new measured temperature values will deduct above memorized " last measured value " automatically.

@ It will release the Relative Measurement function if push the REL. button at once again, at same time the "REL" marker will disappear.

Considering:

When marking the " Data Hold " & " Data Record " measurement, the Relative function is prohibited.

6) Data Record (Max. and Min. reading)

The Data Record function displays the maximum and minimum readings. To start the Data Record function, press the " Record Button " (3-3, Fig. 1) once.

" REC " symbol will appear on the LCD display.

With the " REC " symbol on the display :

- a) Push the " Recall Button " (3-4, Fig. 1) once, the " Max " symbol along with the maximum value will appear on the display.
- b) Push the " Recall Button " again, the " Min " symbol along with the minimum value will appear on the display.
- c) To exit the memory record function, push the " Record Button " once again. The display will revert back to the current reading.

7) Offset Value adjustment

@ Caused by the environment temperature change or other reasons.... The measuring value of the thermocouple sensor input (type K/J/T/E/R) may exist the drift of small digits.

@ If find that the measuring values exist deviation of small digits especially when measure the low temperature, then can adjust the " Offset Adjust VR " to make the compensation until get the correct reading exactly.

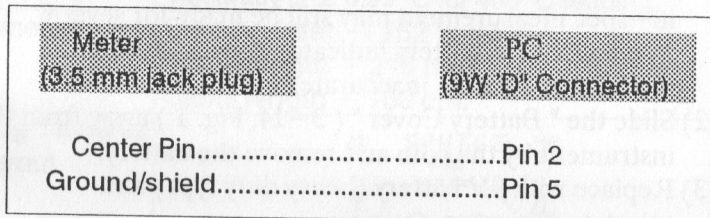
The offset adjustment procedures are following:

- a) Plug in a type k thermocouple probe to the input socket & Set the " Sensor Select Button " (3-5, Fig. 1) to the " Type K". Now the meter is measured the environment Temperature value.

- b) Use the fingers to hold on the "REL Button " (3-6, Fig. 1) together with the " Sensor Select Button " (3-5, Fig. 1) until the right down corner of LCD display show the "A" mark, use the screw driver to adjust the " Offset VR" (3-9, Fig. 1) until the display reading same as the environment temp. value exactly. Release the "REL Button " & the "Sensor Select Button ", then the function will return to normal condition.

5. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm terminal (3-12, Fig. 1). The connector output is a 16 digit data stream which can be utilized to the user's specific application. An RS232 lead with the following connection will be required to link the instrument with the PC serial input.



The 16 digit data stream will be displayed in the following format :

D15 D14 D13 D12 D11 D10 D9 D8 D7 D6 D5 D4 D3 D2 D1 D0

Each digit indicate the following status :

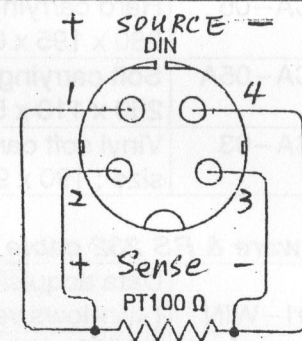
D0	End Word
D1 & D8	Display reading, D1 = LSD, D8 = MSD <i>For example :</i> <i>If the display reading is 1234, then D8 to D1 is : 00001234</i>
D9	Decimal Point(DP), position from right to the left 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D10	Polarity 0 = Positive 1 = Negative
D11 & D12	Annunciator for Display °C = 01 °F = 02
D13	1
D14	4
D15	Start Word

6. REPLACEMENT OF BATTERY

- 1) When LCD display show the "  " marker, It is necessary to replace the battery. However, in-spec measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Slide the " Battery Cover " (3-14, Fig. 1) away from the instrument by the coin and remove the battery.
- 3) Replace with 9V battery (heavy duty type) and reinstate the cover.
- 4) Make sure the battery cover is secured after change the battery.

7. OPTIONAL ACCESSORIES

7-1 Pt-100 ohm Probe, Model : TP-100

Model	TP-100
Features	Cooperate with an 0.00385 alpha coefficient, meet DIN IEC 751.
0 °C resistance	100 ohm.
Measuring Range	-50 ° C to 400 ° C. -58 ° F to 752 ° F.
Plug	DIN plug, 4 pins/4 wires.
Class	Class A.
Accuracy	$\pm (0.15 + (0.002 \times T))^\circ \text{C}$. T : measuring temperature. <i>For example :</i> Accuracy is $\pm 0.15^\circ \text{C}$ for 0°C reading. Accuracy is $\pm 0.35^\circ \text{C}$ for 100°C reading. Accuracy is $\pm 0.95^\circ \text{C}$ for 400°C reading.
Dimension	Sensing head - 152 mm tube, Probe length - 245 mm. Cable length - 100 cm.
Plug Terminal Layout	

7-2 Type K thermocouple Probe

Thermocouple Probe (Type K)	Model : TP-01 * Measure Range : -40°C to 250°C , -40°F to 482°F . * Ultra fast response naked-bead thermocouple, general purpose application.
Thermocouple Probe (Type K)	Model : TP-02A * Measure Range : -50°C to 900°C , -50°F to 1650°F . * Dimension: 10 cm tube, 3.2 mm Dia.
Thermocouple Probe (Type K) Surface Probe	Model : TP-04 * Measure Range : -50°C to 400°C , -50°F to 752°F . * Dimension: 10 cm tube, 8 mm Dia.
Thermocouple Probe (Type K)	Model : TP-03 * Measure Range : -50°C to 1200°C , -50°F to 2200°F . * Size : Temp. sensing head – 15 mm Dia. Probe length : 120 mm.

7-3 Carrying case

Model : CA-06	Hard carrying case 280 x 195 x 65 mm
Model : CA-05A	Soft carrying case with sash 260 x 110 x 55 mm.
Model : CA-03	Vinyl soft carrying case size : 190 x 90 x 55 mm.

7-4 Software & RS 232 cable

Model : SW-U101-WIN	Data acquisition software (windows version)
Model : UPCB-01	RS232 cable