pt 100 ohm + type K/J/R/E/T

THERMOMETER

Model : TM-936

Your purchase of this 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

* 2 in 1, Pt 100 ohm thermometer + Thermocouple type J/K/R/E/T) thermometer.
* Microcomputer circuit with high performance.
* Wide temperature measuring range.
* Build in 蚓 & 蚌 select button on the front panel.
* 0.1 degree resolution for Pt 100 ohm & type K/J/T/E.
* Data hold function for storing the desired value .
* Memory function to record the maximum & minimum reading.
* Build in a REL button, useful for relative measurement.
* Sensor select button on the front panel, easy to change different type probe.
* 4 wires PT 100 ohm probe input, 0.00385 alpha coefficient, meet DIN IEC 751, high precision.
* Thermocouple probe accept 5 different types : type K, type J, type R, type T, type E.
* RS 232 data output, easy to connect with computer.
* Optional data acquisition software for data record.
* Auto power off saves battery life.
* Built-in low battery indicator.
* Heavy duty & compact housing case with stand.
* Powered by 006P DC 9V battery.

2. SPECIFICATIONS

2-1 General Specifications

Display	51 mm x 32 mm supper large LCD display, 15 mm (0.6") digit size.
Sensor Type	*1. Platinum Pt 100 ohm* (0.00385 alpha coefficient, meet DIN IEC 751)
	2. Thermocouple probe @ Thermocouple type K @ Thermocouple type J @ Thermocouple type T @ Thermocouple type E @ Thermocouple type R
Functions	蚓, 蚌, Data hold, Memory (Max., Min.), Relative measurement,
Resolution	0.1 degree or 1 degree.
Circuit	Exclusive microcomputer circuit, the software build in linearity correction function instead of the traditional hardware circuit.
Probe Input Socket	*Pt 100 ohm probe :* DIN type 4 pin socket.
	Thermocouple couple probe : Standard 2 pin thermocouple socket.
Sampling Time	Approx. 1 second.
Hold Function	To freeze the display reading value.
Memory Recall	Memorize the Maximum, Minimum reading.
Offset Adjustment	Available for thermocouple thermometer, adjustment by pushing button on front panel.
Over Indication	Show " - - - - ".
Data Output	RS232 PC serial interface.

Power Supply	Alkaline or heavy duty type, DC 9V battery, 006P, MN1604 (PP3) or equivalent.
Power Consumption	Approx. DC 11 mA.
Operating Temperature	0 to 50 蚓 (32 to 122 蚌).
Operating Humidity	Less than 80% RH.
Size	195 x 68 x 30 mm (7.6 x 2.6 x 1.2 inch).
Weight	220 g/0.48 LB.
Standard Accessory	Operational manual..... 1 PC.
Optional & accessories Temp. Probe *(Refer page 12, page 13)*	*Thermocouple couple (Type K) probe :* Model : TP-01, TP-02A, TP-03, TP-04.
	Pt 100 ohm probe : Model : TP-100
	RS232 cable Model : UPCB-02
	Application software, windows version. Model : SW-U801-WIN

2-2 Electrical Specifications

A. Thermocouple (type K/J/R/E/T) Thermometer

Sensor Type	**Reso-lution**	**Range**	**Accuracy**
Type K	0.1 ℃	-50.0 to 1300.0 ℃	(0.2 % + 0.5 ℃)
		-50.1 to -100.0 ℃	(0.2 % + 1 ℃)
	0.1 ℉	-58.0 to 2372.0 ℉	(0.2 % + 1 ℉)
		-58.1 to -148.0 ℉	(0.2 % + 1.8 ℉)
Type J	0.1 ℃	-100.0 to 1150.0 ℃	(0.2 % + 0.5 ℃)
		-50.1 to -100.0 ℃	(0.2 % + 1 ℃)
	0.1 ℉	-58.0 to 2102.0 ℉	(0.2 % + 1 ℉)
		-58.1 to -148.0 ℉	(0.2 % + 1.8 ℉)
Type T	0.1 ℃	-50.0 to 400.0 ℃	(0.2 % + 0.5 ℃)
		-50.1 to -100.0 ℃	(0.2 % + 1 ℃)
	0.1 ℉	-58.0 to 752.0 ℉	(0.2 % + 1 ℉)
		-58.1 to -148.0 ℉	(0.2 % + 1.8 ℉)
Type E	0.1 ℃	-50.0 to 900.0 ℃	(0.2 % + 0.8 ℃)
		-50.1 to -100.0 ℃	(0.2 % + 1 ℃)
	0.1 ℉	-58.0 to 1652.0 ℉	(0.2 % + 1.5 ℉)
		-58.1 to -148.0 ℉	(0.2 % + 1.8 ℉)
Type R	1 ℃	0 to 600 ℃	(1 % + 5 ℃)
		601 to 1700 ℃	(1.5 % + 5 ℃)
	1 ℉	32 to 1112 ℉	(1 % + 10 ℉)
		1113 to 3092 ℉	(1.5 % + 10 ℉)

Remark :

a. Accuracy value is specified for the meter only.

b. Accuracy is tested under the ambient temperature within 23 5℃.

c. Linearity Correction :
Memorize the thermocouple's curve into the intelligent CPU circuit,

B. Platinum PT 100 ohm Thermometer

Resolution	Range	Accuracy
0.1 蚓	-200.0 to 850.0 蚓	(0.2 % + 0.5 蚓)
0.1 蚌	-328.0 to 1562.0 蚌	(0.2 % + 1.0 蚌)

Remark :

a. Accuracy value is specified for the meter only.

b. Accuracy is tested under the ambient temperature within 23 5蚓.

c. Linearity Correction :
Memorize the Pt 100 ohm's curve into the intelligent CPU circuit.

d. Pt 100 probe input, 0.00385 alpha coefficient, meet DIN IEC 751.

e. Input socket : DIN 4 pin socket.

f. 4 wires Pt 100 ohm probe (model : PT-100) is optional, refer to page 13.

3. FRONT PANEL DESCRIPTION

Fig. 1

3-1 Display
3-2 Power Button
3-3 Hold Button
3-4 REC Button
3-5 Sensor Button
3-6 REL Button
(Down Button)
3-7 蚓/蚌 Button (Up Button)
3-8 RS232 Output Socket
3-9 Battery Compartment/Cover
3-10 Thermocouple
(Type J/K/R/E/T) Input Socket
3-11 Pt 100 ohm Input Socket
3-12 Stand

4. THERMOCOUPLE (Type K/J/T/E/R) MEASURING PROCEDURE

4-1 Measuring Procedures

1) Power on the meter by pressing the " Power Button " (3-2, Fig. 1).
2) Select the sensor type (Type K/J/T/E/R) by pressing " Sensor Button " (3-5, Fig. 1). The display will show the symbol of K, J, R, E, T.
3) Insert the temp. probe plug into the " Thermocouple Input Socket " (3-10, Fig. 1).
4) Select the " ℃ " " ℉ " display unit by pressing " ℃/℉ Button " (3-7, Fig. 1).
5) Display will show the temperature reading that measured from the probe.

4-2 Measuring Consideration

1) When insert the probe plug into the temp. input socket, please make sure the polarity correct.
2) The temperature difference between thermocouple probe and thermometer will cause an inaccurate measuring result. Therefore, for the best measuring and accuracy performancy of a thermocouple thermometer, whenever change a probe or plug a new probe in the thermometer, thermal equivalent between probe plug and meter's input socket is a necessary condition. Thermal equivalent procedure may take few minutes and apply only when the probe has been exposed to an ambient temperature different from the thermometer.

5. PT 100 ohm MEASURING PROCEDURE

1) Power on the meter by pressing the " Power Button " (3-2, Fig. 1).
2) Pressing the " Sensor Button " (3-5, Fig. 1), until the LCD show the mark of " Pt3850 "
3) During the power on, Plug the Pt 100 temp. probe (TP-100, optional) into the " Pt 100 ohm Input Socket " (3-11, Fig. 1)
4) Select the " 蚓 " " 蚌 " display unit by pressing " 蚓/蚌 Button " (3- 7, Fig. 1).
5) Display will show the temperature reading that measured from the probe.

6. DATA HOLD, RECORD, RELATIVE, and AUTO POWER OFF DISABLE

6-1 Data Hold

1) During the measurement, pressing the " Hold Button " (3-3, Fig. 1) will hold the measured value & the LCD will show " HOLD " symbol.
2) Press the " Hold Button " again to exit the data hold function.

6-2 Data Record (Maximum, Minimum reading)

1) The DATA RECORD function displays the maximum and minimum readings. To start the DATA RECORD function by pressing the " REC Button " (3-4, Fig. 1) once. " REC " symbol will appear on the LCD display.
2) When the " REC " symbol on the display :
   (a) Press the " REC Button " (3-4, Fig. 1) once, the " Max " symbol along with the maximum value will appear on the display.
   (b) Press the " REC Button " again, the " Min " symbol along with the minimum value will appear on the display.
   (c) To exit the memory record function, press the " REC Button " continuously for at least 2 seconds. The display will revert to the current reading.

6-3 Relative measurement

1) During the measurement, the circuit will memorize the last measured value by pressing the " REL Button " (3-6, Fig. 1) once, display will show zero value & a " REL " symbol appear on the LCD.
2) The new measured temp. values will deduct above memorized " Last measured values " automatically.
3) It will cancel the relative measurement function by pressing the " REL Button " once again, at same time the " REL " marker will disappear.

Considering :

When meter in the " Data Hold " & " Data Record " condition, the Relative function can't be activated.

6-4 Auto Power Off disable

The instrument build-in " Auto Power off " in order to prolong battery life. The meter will switch off automatically if none of the buttons are pressed within approx. 10 minutes.

" Auto Power Off " function is inactive only when execute the " Data Record " procedures (refer to 6-2, page 9).

7. BATTERY REPLACEMENT

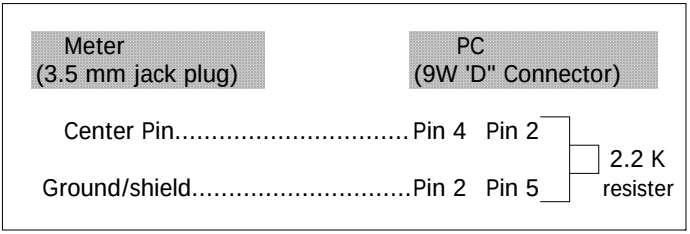
1) When the left top corner of LCD display show " ", it is necessary to replace the battery.
   However within specification measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
2) Open the " Battery Cover " (3-9, Fig. 1) away from the instrument and remove the battery.
3) Install a 9 V battery (Alkaline or Heavy duty type) and replace the cover.

8. RS232 PC SERIAL INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-8, Fig. 1).

The connector output is a 16 digit data stream which can be utilized to the user's specific application.

A 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 For example : *If the display reading is 1234, then D8 to D1 is :* *00001234*	
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	
	蚓 = 01	蚌 = 02
D13	1	
D14	4	
D15	Start Word	

RS232 FORMAT : 9600, N, 8, 1

10. OPTIONAL ACCESSORIES & PROBES

PT-100 ohm Probe	Model : TP-100, TP-100A * -50 蚓 to 400 蚓 (-58 蚌 to 752 蚌), DIN plug, 4 pins/4 wires, Class A, Cooperate with an 0.00385 alpha coefficient, * Meet DIN IEC 751. * Accuracy : (0.15 + (0.002 x T))蚓 * Dimension Sensing head - 152 mm tube Probe length : 245 mm.
Thermocouple Probe (Type K)	Model : TP-01 * Measure Rage : -40 蚓 to 250 蚓, -40 蚌 to 482 蚌. * Ultra fast response naked-bead thermocouple, general purpose application.
Thermocouple Probe (Type K)	Model : TP-02A * Measure Range : -50 蚓 to 900 蚓, -50 蚌 to 1650 蚌. * Dimension: 10 cm tube, 3.2 mm Dia.
Thermocouple Probe (Type K) Surface Probe	Model : TP-04 * Measure Range : -50 蚓 to 400 蚓, -50 蚌 to 752 蚌. * Dimension: 10 cm tube, 8 mm Dia.
Thermocouple Probe (Type K)	Model : TP-03 * Measure Range : -50 蚓 to 1200 蚓, -50蚌 to 2200 蚌. * Size : Temp. sensing head - 15 mm Dia. Probe length : 120 mm.

RS232 cable	Model : UPCB-02 * RS232 cable for connecting between the meter & the computer.
Software	Model : SW-U801-WIN, Windows version. * Software apply as the performance of data logging system & data recorder...
Carrying Case	Model : CA-52A Soft carrying case with sash (260 X 110 X 55 mm)
Carrying Case	Model : CA-03, Vinyl soft carrying case.
Carrying Case	Model : CA-06, Hard carrying case.