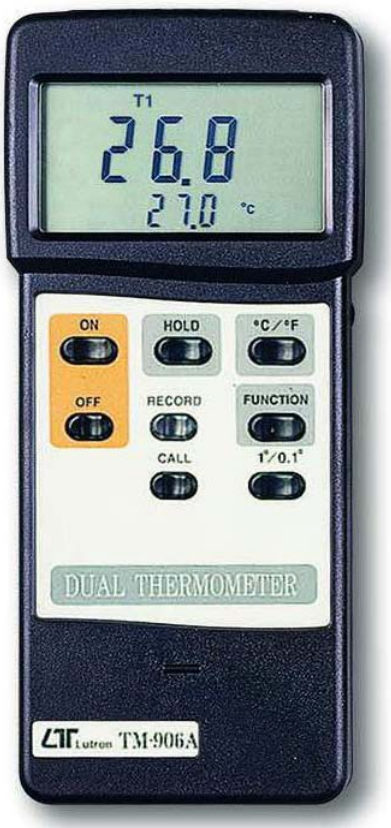
RS-232

DUAL THERMOMETER

Model : TM-906A



Your purchase of this DUAL 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.

QUALITY ASSURED FIRM ISO 9001 SGS

UKAS QUALITY MANAGEMENT 005

OPERATION MANUAL

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1. FEATURES

* Microprocessor circuit assures high accuracy and provides special functions and features.
* Super large LCD display, easy reading.
* Dual function meter's display.
* Heavy duty & compact housing case.
* Records Maximum, Minimum readings with RECALL.
* Data hold.
* Operates from OO6P DC 9V battery.
* RS 232 PC serial interface.
* Multi functions, dual channel temp. input, differential temp. measurement, 蚓/蚌, 0.11degree, data hold.
* Meet any standard type K(NiCr-NiAl) probe.
* Fitted with standard type K input measuring socket.
* Build in temperature linearity compensation circuit, high accuracy and wide measurement.
* Build in precision cold junction compensation circuit.
* Thermocouple sensor for Temp. measurement, fast response time.
* Used the durable, long-lasting components, including a strong, light weight ABS-plastic housing case.
* Wide applications: use this anemometer to check air conditioning & heating systems, measure air velocities, wind speeds, temperature...etc.

2. SPECIFICATIONS

2-1 General Specifications

Circuit	Custom one-chip of microprocessor LSI with thermocouple linearity correction circuit.
Display	Dual function meter's display, 13 mm(0.5"), Super large LCD display with annuciator.
Measurement	Two channel temp. input (T1, T2), differential temp. measurement(T1 -T2), 蚓/蚌, 0.11degree.
Measurement Range	- 50蚓 to 1230蚓/ - 58蚌 to 1999蚌.
Polarity	Automatic switching, '-' indicates negative polarity.
Sensor Type	Thermocouple K(NiCr-NiAl).
Input Impedance	10 Meg ohm.
Sampling Time	Approx. 3 seconds.
Memory Recall	Records Maximum, Minimum readings with RECALL.
Data Output	RS 232 PC serial interface.
Over input indication	Indication of "- - - -".
Operating Temperature	0 蚓 to 50 蚓(32 蚌 to 122 蚌).
Operating Humidity	Max. 80% RH.

Power Supply	006P DC 9V battery(Heavy duty type).
Power Current	Approx. DC 6.2 mA.
Weight	275 g/0.61 LB (included batteries & probe)
Size	Main instrument: 180 x 72 x 32 mm(7.1 x 2.8 x1.3 inch).
Accessories Included	Instruction Manual ..... 1 PC.
Optional Accessories	Temperature probe, carrying case. (not included, please see ref. page 9)

2-2 Electrical Specifications (23 5 蚓)

TEMP. RANGE		RESOLUTION		ACCURACY
蚓	-50 蚓 to 1230 蚓	0.1 蚓	-50 蚓 to 199.9 蚓	(0.75% + 1 蚓)
		1 蚓	-50 蚓 to 1000 蚓	
			1001 蚓 to 1230 蚓	
蚌	-58 蚌 to 1999 蚌	0.1 蚌	-50 蚌 to 199.9 蚌	(0.75% + 2 蚌)
		1 蚌	-50 蚌 to 1999 蚌	
蚓	T1 - T2			(0.75% + 1 蚓)
蚌	T1 - T2			(0.75% + 2 蚌)
* The above accuracy specification applies only to the instrument itself and allowance must be made for limits of error permitted in thermocouple.				

3. FRONT PANEL DESCRIPTION

Fig. 1

3-1 Display
3-2 Power On button
3-3 Data Hold Button
3-4 蚓/ 蚌 button
3-5 Power Off button
3-6 Memory "Record" Button
3-7 Memory "Call" Button
3-8 Function Button (T1, T2, T1-T2)
3-9 10.1Button
3-10 Battery Compartment /Cover
3-11 T1 Input Socket
3-12 T2 Input Socket
3-13 RS-232 Output Terminal

4. MEASURING PROCEDURE

4-1 Temperature Measurement

(1) Push the "Power Off Button"(3-2, Fig. 1) to let the instrument power "ON".

The instrument has built-in "Auto Power Shut-off" in order to prolong battery life. To eliminate the " Auto power off " function, select the memory record function during measurement, by pressing the " RECORD " button (3-6, fig.1).

(2) Determine temperature unit to ℃ or ℉ by push the "℃/ ℉ push button"(3-4, Fig. 1) Then the display will show the temperature unit of "℃" or "℉".

(3) Determine the display resolution to 0.1or 1by push 10.1Button(3-9, Fig. 1)

(4) One probe measurement:
Insert one temp. probe plug into the socket T1(3-11), then push the "Function Button"(3-8, Fig. 1) until the display show the marker "T1" Display will show the temperature reading that measured from the probe.

(5) Two probe(dual channel) & differential measurement:
a. Insert first temp. probe plug into the "T1 Socket" (3-11, Fig. 1).
b. Insert second temp. probe plug into the "T2 Socket" (3-12, Fig. 1).
c. The main display(upper display) will show the temperature reading of first probe(T1) & the lower display will show the temperature reading of second probe(T2), if push the "Function Button"(3-8, Fig. 1) until the display show the marker "T1".
d. The main display(upper display) will show the temperature reading of second probe(T2) & the lower display will show the temperature reading of first probe(T1), if push the "Function Button"(3-8, Fig. 1) until the display show the marker "T2".

e. The main display(upper display) will show the differential temperature reading of the first & second probe(T1 - T2) & the lower display will show the temperature reading of first probe(T1), if push the "Function Button"(3-8, Fig. 1) until the display show the marker "T1 - T2".

4-2 Data Hold

(1) During the measurement, Push the "Data Hold Button"(3-3, Fig. 1) will hold the display values & LCD will show the "D.H" marker.

(2) Push the "Data Hold Button" again will release the data hold function.

4-3 Data Record(Max., Min. reading)

(1) The DATA RECORD function displays the maximum, and minimum readings. To start the DATA RECORD function, press the "Record Button"(3-6, Fig. 1) once. "REC" marker will appear on the LCD display.

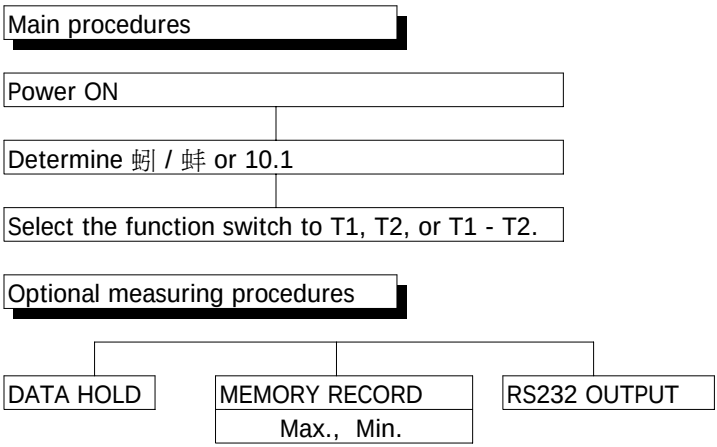
(2) With the "REC" marker on the display.

(a) Push the "CALL Button"(3-7, Fig. 1) once, then the "Max" marker along the maximum values will appear on the LCD display.

(b) Push the "CALL Button" once, then the "Min" marker along the minimum values will appear on the LCD display.

(c) When running the "Record" function
Then push the "Record Button" once again will stop the "Record" function.
After stop the "Record" function, the marker of "REC", "Max", "Min" will disappear.

4-4 Following are the block diagrams for quick measuring procedures



5. MEASURING CONSIDERATION

* When insert the probe plug into the temp. input socket T1(3-11) or T2(3-12), please taking care to observe the correct polarity.
* When the probe plug is first inserted into the thermometer socket(T1,T2), or if the probe is changed, the plug must be allowed to stabilize at temperature of the socket, which is in thermal contact with cold junction compensation device, for greatest accuracy is to be achieved. This will take a couple of minutes and only applies if the probe plug has previously been exposed to an ambient temperature different to that thermometer.

6. RS232 PC INTERFACE

The instrument features an RS232 output via 3.5 mm Terminal (3-13, 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.

Meter (3.5 mm jack plug)	PC (9W 'D" Connector)
Center Pin	Pin 2
Ground/shield	Pin 5

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 to D4	Upper Display reading, D1=LSD, D4=MSD
D5 to D8	Lower Display reading, D5=LSD, D8=MSD
D9	Decimal Point(DP) for Upper display. 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP
D10	Decimal Point (DP) for lower display 0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP

D11 & D12	Anunuciator for Upper Display		
	00 =No Symbol	07 = mg/L	14 =mS
	01 =C	08 = m/s	15 =Lux
	02 =F	09 = Knots	16 =Ft-cd
	03 = %	10 = Km/h	17 =dB
	04 = % RH	11 = Ft/min	18 =mV
	05 = % PH	12 = mile/h	
	06 = % O 2	13 = uS	
D13	Anunuciator for Lower Display		
	0 = No Symbol	1 =C	2 = F
D14	Reading Polarity for the Display		
	0 = Both upper & lower display value are "+". 1 = Upper "-", Lower "+". 2 = Upper "+", Lower "-". 3 = Both upper & lower display value are "-".		
D15	Start Word		

7. BATTERY REPLACEMENT

(1) When the left corner of LCD display show "LBT", 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(3-10, Fig. 1) away from the instrument 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.

8. OPTIONAL TEMPERATURE PROBE & & OTHER ACCESSORIES

Thermocouple Probe (Type K) TP-01	* Measure Rage: -40 蚓 to 250 蚓, -40 蚌 to 482 蚌. * Max. short-tern operating Temperature: 300 蚓 (572 蚌). * It is an ultra fast response naked-bead thermocouple suitable for many general purpose application.
Thermocouple Probe (Type K), TP-02A	* Measure Range: -50 蚓 to 900 蚓, -50 蚌 to 1650 蚌. * Dimension: 10cm tube, 3.2mm Dia.
Thermocouple Probe (Type K), TP-03	* Measure Range: -50 蚓 to 1200 蚓, -50 蚌 to 2200 蚌. * Dimension: 10cm tube, 8mm Dia.
Surface Probe (Type K), TP-04	* Measure Range: -50 蚓 to 400 蚓, -50 蚌 to 752 蚌. * Size : Temp. sensing head - 15 mm Dia. Probe length - 120 mm.