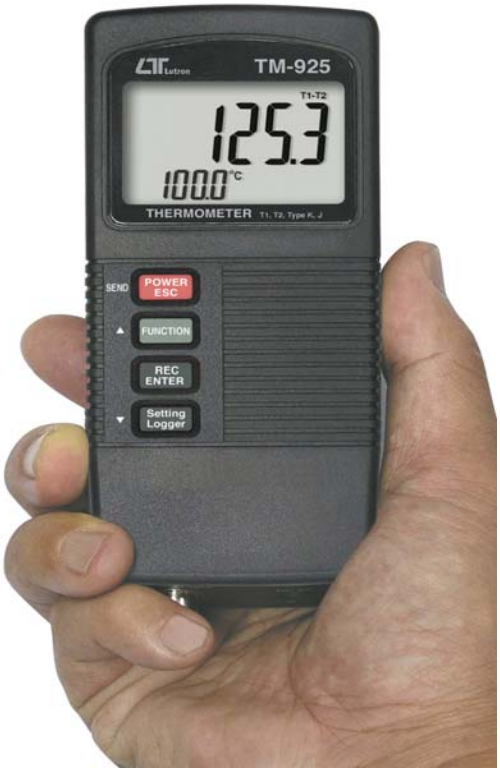
*T1, T2, T1-T2, Type K/J*

# TWO CHANNEL THERMOMETER

## Model : TM-925




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.

QUALITY ASSURED FIRM ISO 9001 SGS UKAS QUALITY MANAGEMENT 005

# OPERATION MANUAL

# TABLE OF CONTENTS

# 1. FEATURES

* Two channels thermometer, T1, T2, T1-T2, T1 only.
* Both type K/J temp. measurement, wide range.
* ℃/℉, 0.1 degree.
* Microcomputer circuit provides intelligent function and high accuracy.
* LCD with two display, easy readout.
* Manual and auto data logger, with flexible sampling time selection, can save max. 1,600 reading data.
* Records Maximum and Minimum readings with recall.
* Data hold function for freezing the desired value.
* Meter can default to accept type K or type J Temp. probe.
* Meter can default auto power off or manual power off.
* Meter can default the measuring unit to ℃ or ℉.
* Build in the input socket for DC 9V power adapter.
* RS232 PC serial interface.
* Few panel buttons, easy operation.
* Built-in low battery indicator.
* Heavy duty & compact housing case.

# 2. SPECIFICATIONS

### *2-1 General Specifications*

| | |
|---|---|
| Circuit | Custom one-chip of microprocessor LSI circuit. |
| Display | LCD size : 44 mm x 29 mm<br>dual function LCD display. |

| | | |
|---|---|---|
| Display Unit | ℃, ℉. | |
| Resolution | 0.1 ℃, 0.1 ℉. | |
| Channels | T1, T2, T1-T2, T1 only. | |
| Thermocouple type | Type K or Type J. | |
| Sampling Time of Data Logger | Manual | Push the data logger button once will save data one time. ** Se the sampling to 0 second.* |
| | Auto | 1, 2, 5, 10, 30, 60, 600, 1800, 3600 seconds. |
| Data Logger number | Max. 1,600-point Data logger | |
| Temperature Compensation | Automatic temp. compensation for the cold junction both type K/J thermometer | |
| Linear Compensation | Linear Compensation for the full range. | |
| Offset, Span Adjustment | Available for advanced calibration procedure. | |
| Probe Input Socket | Standard 2 pin thermocouple socket. | |
| Over Indication | Show "- - - - - ". | |
| Data Hold | Freeze the display reading. | |
| Memory Recall | Maximum & Minimum value. | |
| Sampling Time of display | Approx. 1 second. | |
| Power off | Auto shut off saves battery life or manual off by push button. | |
| Data Output | RS 232 PC serial interface. | |

| | |
|---|---|
| Operating Temperature | 0 to 50 ℃. |
| Operating Humidity | Less than 80% R.H. |
| Power Supply | 006P DC 9V battery<br>( Alkaline or Heavy duty type ). |
| | DC 9V adapter input.<br>** AC/DC power adapter is optional.* |
| Power Current | Approx. DC 5.5 mA |
| Weight | 196 g/0.43 LB. |
| Dimension | 135x60x33 mm, ( 5.3x2.4x1.3 inch ). |
| Accessories Included | Instruction manual..... 1 PC |
| Optional Accessories | * Type K thermocouple probe. TP-01, TP-02A. TP-03, TP-04<br>* AC to DC 9V adapter.<br>* RS232 cable, UPCB-02.<br>* USB cable, USB-01<br>* Data Acquisition software, SW-U801-WIN.<br>* Data Logger software, SW-DL2005.<br>* Carrying case, CA-52A. |

## *2-2 Electrical Specifications (23± 5 ℃)*

| Sensor Type | Reso-lution | Range | Accuracy |
|---|---|---|---|
| Type K | 0.1 ℃ | -50.0 to 1300.0 ℃ | ± ( 0.4 % + 0.8 ℃ ) |
| | | -50.1 to -199.9 ℃ | ± ( 0.4 % + 1 ℃ ) |
| | 0.1 ℉ | -58.0 to 2372.0 ℉ | ± ( 0.4 % + 1.5 ℉ ) |
| | | -58.1 to -327.8 ℉ | ± ( 0.4 % + 1.8 ℉ ) |
| Type J | 0.1 ℃ | -100.0 to 1100.0 ℃ | ± ( 0.4 % + 0.8 ℃ ) |
| | | -50.1 to -199.9 ℃ | ± ( 0.4 % + 1 ℃ ) |
| | 0.1 ℉ | -58.0 to 2012.0 ℉ | ± ( 0.4 % + 1.5 ℉ ) |
| | | -58.1 to -327.8 ℉ | ± ( 0.4 % + 1.8 ℉ ) |

* *Accuracy value is specified for the meter only.*

* *Type K probe TP-01 TP-02A, TP-03. TP-04 is the optional accessory, refer page*

* *Above specification tests under the environment RF Field Strength less than 3 V/M & frequency less than 30 MHz only.*

# 3. FRONT PANEL DESCRIPTION

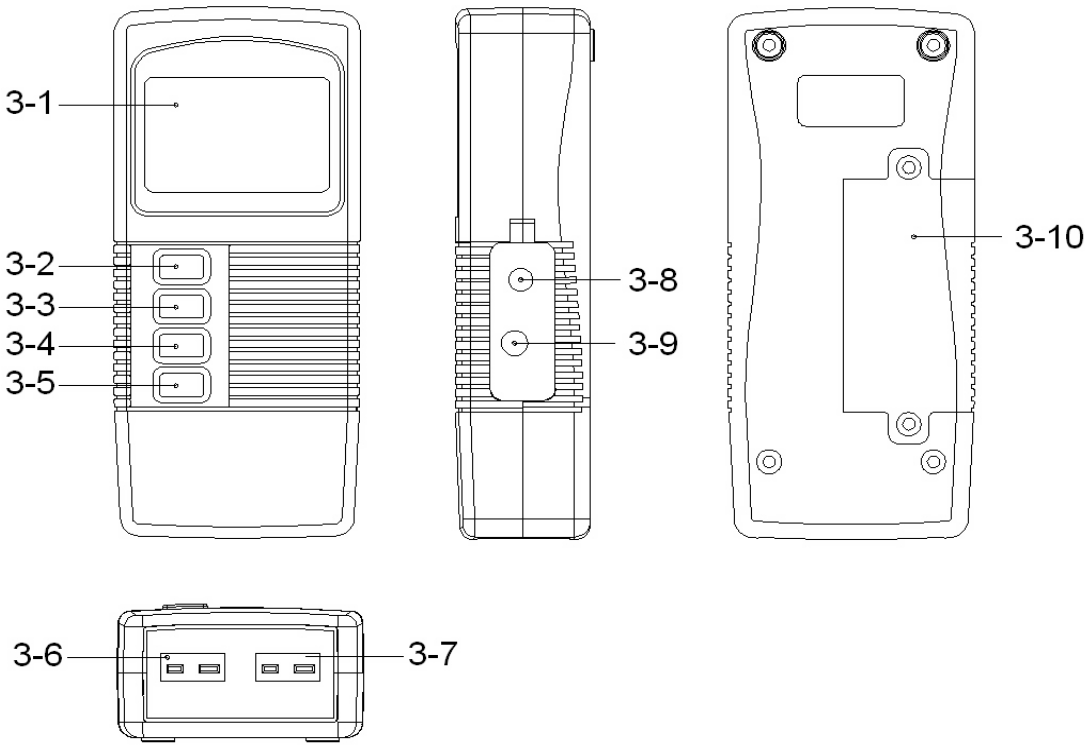



Fig. 1

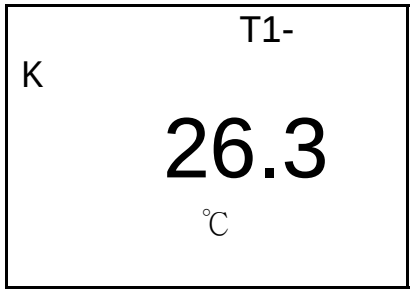
3-1 Display
3-2 Power/ESC/Send button
3-3 Function/Hold button ( Send quit/▲ button )
3-4 REC/Enter button
3-5 Setting/Logger button ( ▼ button )
3-6 T1 probe socket
3-7 T2 probe socket
3-8 DC 9V adapter socket
3-9 RS-232 output terminal
3-10 Battery compartment/Cover

# 4. GENERAL MEASURING PROCEDURE

Meter defaults :
* The temperature reading unit is ℃.
* Type K measurement
* Auto power off.
* The sampling time of data logger function is 2 seconds.

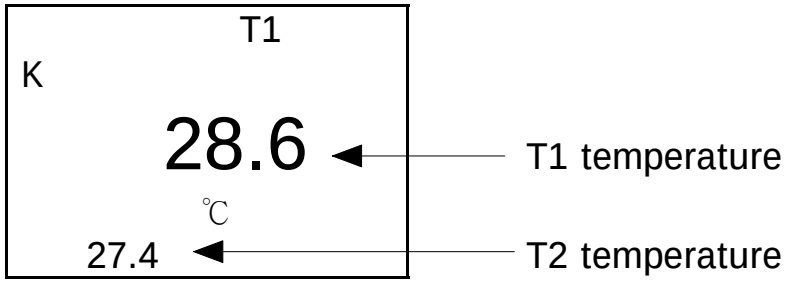
### *4-1 one probe ( single channel ) measurement*

1) Insert the " Temp. probe plug " into the " T1 probe socket " 3-6, Fig. 1 ).
2) Power on the meter by pressing the " Power button " ( 3-2, Fig. 1 ) once a while.
3) Press the " Function button " ( 3-3, Fig. 1 ) continuously until the LCD show the " T1- " symbol, release the finger from the button the display will show the temperature reading that sensing from the probe's head.

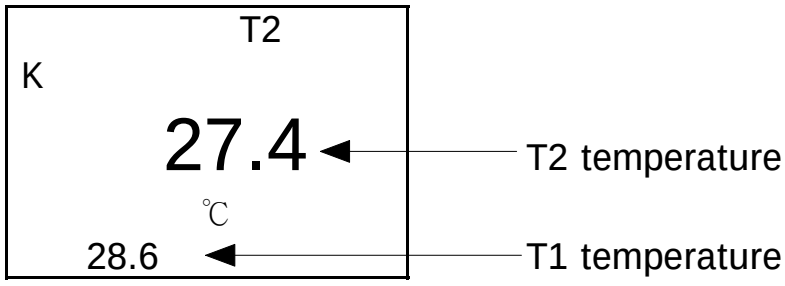


### *4-2 two probes ( dual channels ) measurement*

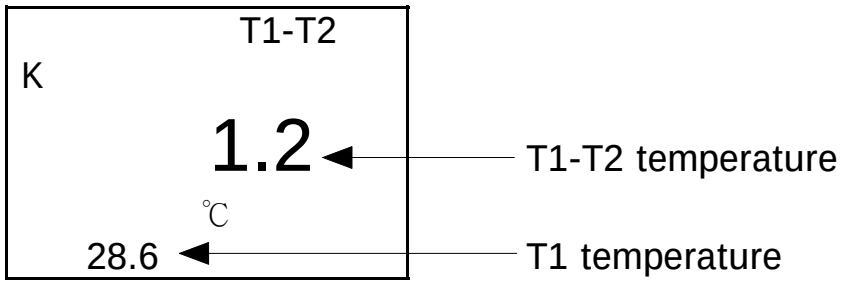
1) For two probes ( dual channels ) measurement, insert the first " Temp. probe plug " into the " T1 probe socket " ( 3-6, Fig. 1 ) and insert the second " Temp. probe plug " into the " T2 probe socket " ( 3-7, Fig. 1 ).
2) Power on the meter by pressing the " Power Button " ( 3-2, Fig. 1 ) once a while.
3) Press the " Function button " ( 3-3, Fig. 1 ) continuously until the LCD show the " T1 " symbol then release the finger from the button, the upper display will show the T1 temperature reading, the lower display will show the T2 temperature reading.




4) Press the " Function button " ( 3-3, Fig. 1 ) continuously until the LCD show the " T2 " symbol then release the finger from the button, the upper display will show the T2 temperature reading, the lower display will show the T1 temperature reading.



4) Press the " Function button " ( 3-3, Fig. 1 ) continuously until the LCD show the " T1-T2 " symbol then release the finger from the button, the upper display will show the T1-T2 temperature reading, the lower display will show the T1 temperature reading.




*Note :*

*1) If intend to change the measuring unit from ℃ to ℉, refer section 5-2, page 12.*

*2) If intend to change the measuring function from type K to type J, refer section 5-1, page 12.*

### *4-3 Data Hold*

During the measurement, press the " Hold Button " ( 3-3, Fig. 1 ) once will hold the measured value & the LCD will display a " HOLD " symbol.

* Press the " Hold Button " once again will release the data hold function.

### *4-4 Data Record ( Max., Min. reading )*

* The data record function records the maximum and minimum readings. Press the " REC Button " ( 3-4, Fig. 1 ) once to start the Data Record function and there will be a " REC " symbol on the display.

* With the " REC " symbol on the display :
  a) Press the " REC Button " ( 3-4, Fig. 1 ) once, the " REC MAX " symbol along with the maximum value will appear on the display.
     If intend to delete the maximum value, just press the " Hold button " ( 3-3, Fig. 1 ) once, the display will show the " REC " symbol only & execute the memory function continuously.
  b) Press the " REC button " ( 3-4, Fig. 1 ) again, the " REC. MIN. " symbol along with the minimum value will appear on the display.
     If intend to delete the minimum value, just press the " Hold button " ( 3-3, Fig. 1 ) once, then the display will show the " REC " symbol only & execute the memory function continuously.
  c) To exit the memory record function, just press the " REC " button for 2 seconds at least. The display will revert to the current reading.

### *4-5 Data Logger*

The data logger function can save 1,600 measuring data.

The data logger procedures are as following :

a) Press the " REC Button " ( 3-4, Fig. 1 ) once to start the Data Record function and there will be a " REC " symbol on the display.

b) **Auto Data Logger ( Sampling time should select to 1, 2, 5, 10, 30, 60, 600, 1800 or 3600 seconds )**

Press the " Logger button " ( 3-5, Fig. 1 ) once to start the Data Logger function. The REC symbol will flash per sample time period and save the data into the memory. Now the Date Logger function is executed.

**Manual Data Logger ( Sampling time should set to 0 second )**

Press the " Logger Button " ( 3-6, Fig. 1 ) once will save the data one time into the memory, at the same time the symbol " REC " will flash once a while.

**Memory full**

When execute the data logger function, if the upper display show " FULL " with flashing, it indicate the memory data already over 1,600 no. and the memory is full.

c) During the Data Logger function is executed, press the " Logger Button " ( 3-5, Fig. 1 ) once will stop the data logger function, the " REC " symbol will stop to flash.
If press the " Logger Button " ( 3-5, Fig. 1 ) once again will continuous the Data Logger function.

*Note :*

*1) If intend to change the data logger sampling time, please refer section 5-4, page 12.*

*2) If intend to know the space of balance data numbers into the memory IC, please refer section 5-5, page 13.*

*3) If intend to clear the saving data from the memory please refer section 5-6, page 13.*

# 5. ADVANCED SETTING PROCEDURE

Before executing advanced adjustment procedures, exit the " Hold function " and the Record " function.

a. Hold the " Setting Button " ( 3-5, Fig. 1 ) at least five seconds will enter the Advanced Setting Procedures.

b. One by one to press the " Setting Button " ( 3-5, Fig. 1 ) once a while to select the seven main function and show the text the lower display as :

**K.....**Change thermocouple type to type K or type J
**℃.....**Change the Temp ℃, ℉ unit
**OFF.....**Auto power ON/OFF management
**SP-t.....**Change the data logger sampling time
**SPACE..**To show the balance data numbers in the memory
**CLr.....**Clear the existing saving data from the memory
**Code.....**Code entering for the further calibration usage

***5-1 Change thermocouple type to type K or type J***

a. Use " ▲ button " ( 3-3, Fig. 1 ) to select " K " or " J ".
b. After select the desiring value ( K or J ), press the " Enter button " ( 3-4, Fig. 1 ) to save the data with default.

***5-2 Change the Temp ℃, ℉ unit***

a. Use " ▲ button " ( 3-3, Fig. 1 ) to select " ℃ " or " ℉ ".
b. After select the desiring value ( ℃ or ℉ ), press the " Enter button " ( 3-4, Fig. 1 ) to save the data with default.

***5-3 Auto power On/Off***

( Lower display show " OFF " )

a. Use " ▲ button " ( 3-3, Fig. 1 ) to select " YES " or " no ".
   ** YES : Auto power off.*
   ** no : Auto power disable,*
b. After select the desiring function ( YES or no ), press the " Enter button " ( 3-4, Fig. 1 ) to save the function with default.

***5-4 Change the data logger sampling time***

( Lower display show " SP-t " )

a. Use " ▲ button " ( 3-3, Fig. 1 ) to select data logger sampling time to
   **0, 1, 2, 5, 10, 30, 60, 600, 1800, 3600 seconds**
b. After the sampling time value is determined, press the Enter button " ( 3-4, Fig. 1 ) to save the sampling time with default.

***Note :***
***Set the sampling time to 0 second is used for the manual Data Logger function.***

**5-5 To show the balance data numbers in the memory**
( Lower display show " SPACE " )

The display will show the balance data no. that exist into the memory ( allow memorize data no. ).

**5-6 Clear the existing saving data from the memory**
( Lower display show " CLr " )

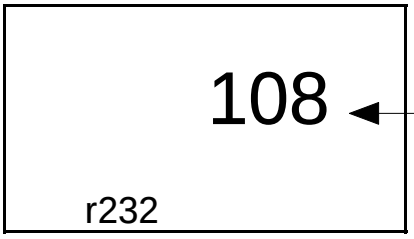
a. Use " ▲ button " ( 3-3, Fig. 1 ) to select " YES " or " no ".
   ** YES : It will execute the memory clear function..*
   ** no : It will be not to clear the memory.*
b. If select " YES ", press the " Enter button " ( 3-4, Fig. 1 ) again will clear the memory exactly.

**5-7 Code entering for the further calibration usage**
( Lower display show " CodE" )

The upper display will show 100.
The code setting is used for the further calibration usage.
It do not enter any new code, just press the " Enter button " ( 3-4, Fig. 1 ) will finish the Advanced Setting Procedure.

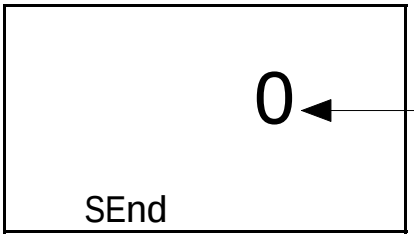
# 6. HOW TO SEND THE DATA OUT

1) To send the data out from the meter, cancel the " Hold function " and the " Record function " first.
2) Press the " Send Button " ( 3-2, Fig. 1 ) at least 5 seconds until the lower display show " r232 ", then release the button.




The total data logger no. that saved into the memory.

3) Push the " Send Button " ( 3-2, Fig. 1 ) once, the lower display will show " SEnd ", the upper no. will count up until reach the data logger storage no., at the same the storage data logger data will send out the meter from the " RS-232 output terminal " ( 3-9, Fig. 1 ).




Count up from 0 to the data logger storage no.

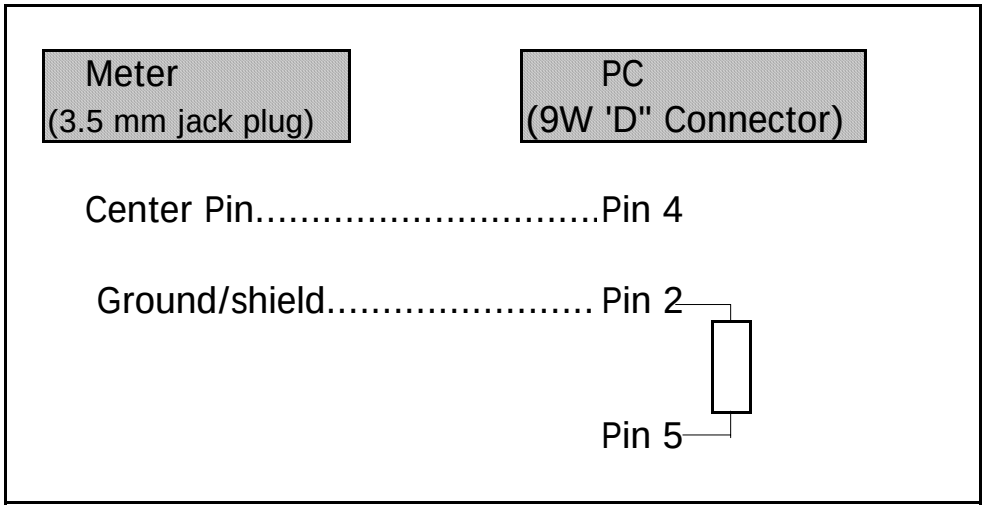
4) If intend up load the data to the computer, then should connect the optional RS232 cable/UPCB-01 or USB cable/USB-01 and cooperate the Data Logger software ( optional, Model : SW-DL2005 ).
5) Press the " Send quit button " ( 3-3, Fig. 1 ) will escape the data sending function.

# 7. RS232 PC SERIAL INTERFACE

The instrument has RS232 PC serial interface via a 3.5 mm terminal ( 3-9, Fig. 1 ).

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

A RS232 lead with the following connection will be required to link the instrument with the PC serial port.




The 16 digits 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

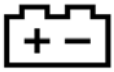
**Each digit indicates the following status :**

| | |
|---|---|
| D15 | Start Word |
| D14 | 4 |
| D13 | When send the upper display data = 1<br>When send the lower display data = 2 |
| D12 & D11 | Annunciator for Display |
| | ℃ = 01 ℉ = 02 |
| D10 | Polarity<br>0 = Positive 1 = Negative |
| D9 | Decimal Point(DP), position from right to the left<br>0 = No DP, 1= 1 DP, 2 = 2 DP, 3 = 3 DP |
| D8 to D1 | Display reading, D8 = MSD, D1 = LSD.<br>For example :<br>If the display reading is 1234, then D8 to D1 is : 00001234 |
| D0 | End Word |

**RS232 setting**

| | |
|---|---|
| Baud rate | 9600 |
| Parity | No parity |
| Data bit no. | 8 Data bits |
| Stop bit | 1 Stop bit |

# 8. BATTERY REPLACEMENT

1) When the left corner of LCD display show "  ", 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 ( Alkaline or Heavy duty type ) and reinstate the cover.
4) Make sure the battery cover is secured after changing the battery.

# 9. OPTIONAL ACCESSORIES

| | |
|---|---|
| RS232 cable<br>UPCB-02 | * Isolated RS232 cable.<br>* Used to connect the meter to the computer |
| RS232 cable<br>USB-01 | * USB Computer interface cable.<br>* Isolated USB cable. |
| Data Logger software<br>SW-DL2005 | * Software the used to download the data logger ( data recorder ) from the meter to computer. |

| | |
|---|---|
| Data Acquisition software SW-U801-WIN | * The SW-U801-WIN is a multi displays ( 1/2/4/6/8 displays ) powerful application software, provides the functions of data logging system, text display, angular display, chart display, data recorder high/low limit, data query, text report, chart report.. .xxx.mdb data file can be retrieved for EXCEL, ACESS.., wide intelligent applications. |

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