

### I. Introduction:

This instrument is a digital thermometer for use with any K-type thermocouple as temperature sensor. Temperature indication follows National Bureau of Standards and IEC584 temperature/voltage table for K-type thermocouples. Its internal memory can keep up to 16241 records.(note1.) It uses RS232 interface to perform bi-directional communication with PC.

### II. Specifications:

**Numerical Display:** 4 digital Liquid Crystal Display

**Measurement Range:** -200°C ~ 1370°C -328°F ~ 2498°F

**Resolution:** -200°C~200°C 0.1°C; 200°C~1370°C 1°C  
-200°F~200°F 0.1°F; else 1°F

**Input Portection at Thermocouple Input:** 60V DC, or 24Vrms AC

#### Environmental:

- Operating Temperature and Humidity: 0°C ~50°C (32°F ~ 122°F); 0 ~ 80% RH
- Storage Temperature and Humidity: -10°C to 60°C (14°F ~ 140°F); 0 ~ 80% RH
- Altitude up to 2000 meters.

**Accuracy:** at ( 23 ± 5°C )

Range	Accuracy
-200°C ~ 200°C	±(0.2% reading + 1°C)
200°C ~ 400°C	±(0.5% reading + 1°C)
400°C~1370°C	±(0.2% reading + 1°C)
-328°F ~ -200°F	±(0.5% reading + 2°F)
-200°F ~ 200°F	±(0.2% reading + 2°F)
200°F ~ 2498°F	±(0.3% reading + 2°F)

#### Temperature Coefficient:

For ambient temperatures from 0°C ~ 18°C and 28°C ~ 50°C, for each °C ambient below 18°C or above 28°C add the following tolerance into the accuracy spec.

0.01% of reading + 0.03°C  
( 0.01% of reading + 0.06°F )

#### ▲ Note:

The basic accuracy Specification does not include the error of the probe. Please refer to the probe accuracy specification for additional details.

**Sample Rate:** 2.5 times per second

**Dimension:** 184×64×30mm

**Weight:** 210g Approx.

**Accessory:** K Type Bead Probe, Battery, Carrying Case, Instruction Menu, Soft Ware Package  
(Program, RS232 Connection Cable)

**Power requirement:** 9 Volt Battery, NEDA 1604 or JIS 006P or IEC6F22

**Battery Life:** Approx. 100hrs with alkaline battery

**AC Adapter:** 9VDC ±15% 100mA

**Plug Diameter:** 3.5mm×1.35mm

**Option :** AC Adapter

#### note1:

Every time you press "REC" button to start recording data and press "REC" button again to stop recording, there will be a data set in memory, you can store as many data sets as you want until memory is full.

### III. Symbol Definition and Button Location:

**■** : This indicates that the minus temperature is sensed.

**°C/°F** : Centigrade and Fahrenheit indication.

**ΔREL** : The reading is now under Relative Mode.

**K** : Thermocouple Type Indication

**MAX** : The Maximum value is now being displayed

**MIN** : The Minimum value is now being displayed

**⏻** : This indicates auto power off is enabled.

**⏻** : This indicates that the display data is being held.

**m-d** : month and day

**h:m** : hour and minute

**m:s** : minute and second

**y** : year

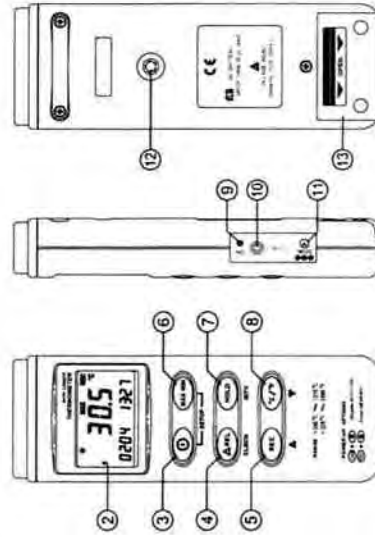
**⏻** : The Battery is not sufficient for proper operation.

**REC** : This indicates that the tester is recording. If it blinks, it indicates the memory is full.



#### Button Location:

- ① K type temperature sensor input connector
- ② LCD display
- ③ ON/OFF button
- ④ Relative readout button
- ⑤ Record button
- ⑥ MAX MIN function control button
- ⑦ HOLD button
- ⑧ °C, °F control button
- ⑨ Offset calibration screw
- ⑩ Digital output connector
- ⑪ AC power adapter connector
- ⑫ Tripod connector
- ⑬ Battery cabinet cover



## IV. Operation Instructions:

### 4.1 Power-Up

Press the power button to turn the thermometer ON or OFF. When the user power it on, the LCD will show how much memory space is available to use.

**For example:** It indicates that there are 16,000 records memory space available.

### 4.2 Connection the Thermocouples

For measurement, plug the thermocouple into the input connectors.

### 4.3 Selecting the Temperature Scale

When the meter was first power on, the default scale setting is set at Celsius (°C) scale. The user may change it to Fahrenheit (°F) by pressing "°C/°F" button and vice versa to Celsius. Next time you power on, the scale setting will be the same as which when you powered off last time.

### 4.4 Data-Hold Operation

The user may hold the present reading and keep it on the display by pressing the "HOLD" button. When the held data is no longer needed, one may release the data-hold operation by pressing "HOLD" button again.

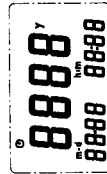
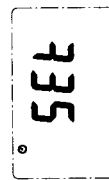
When the meter is under Data Hold operation, the "ΔREL", "max min" and "°C/°F" button are disabled. (When you press "ΔREL", "°C/°F" and "max min" button in HOLD mode, there will be two continuous beeps)

To exit the MAX/MIN mode, one may press and hold "MAX MIN" button for two seconds.

### 4.5 DataLogger:

When one press the "REC" button, the meter will start recording, press the "REC" button again will stop recording, if you want to clear the memory, power off the meter, then press and hold "REC" button and then press power button and hold at least 2 seconds, then release all buttons, then LCD will show "CLR" to clear the memory.

### 4.6 Clock Setup :

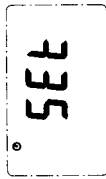


1: press and hold "MAX MIN" button and then power on the meter:

2: press "ΔREL"(clock):

3: press "REC" ▲ or "°C/°F" ▼ to increase or decrease number, press "ΔREL"(clock) to adjust next item. The adjusting order is year→month→day→hour→minute, then press "ΔREL" (clock) to finish adjusting. If you want abort during a setup process, press power button to cancel.

### 4.7 Recording Interval Setup :



1: press and hold "MAX MIN" button and then power on the meter:

2: press "HOLD"(INTV)

3: press "REC" ▲ or "°C/°F" ▼ to increase or decrease number, press "HOLD" (INTV) to adjust next item, then press "HOLD" (INTV) to finish. If you want abort during a setup process, press power button to cancel.

### 4.8 Relative Operation:

When one press the "ΔREL" button, the meter will memorize the present reading and the difference between the new reading and the memorized data will be shown on the display. Press the "ΔREL" button again to exit the Relative operation. When the meter is under relative operation, "°C/°F" button is disabled. (When you press "°C/°F" button in relative mode, there will be two continuous beeps)

### 4.9 MAX/MIN Operation:

When one press the "MAX MIN" button the meter will enter the MAX/MIN mode. Under this mode the maximum value, minimum value is kept in the memory simultaneously and updated with every new data.

When the MAX symbol is display, the Maximum is shown on the display.

Press "MAX MIN" again, then the MIN symbol is on the display and also the minimum reading.

Press "MAX MIN" again, MAX, and MIN will blink together. This means that all these data is updated in the memory and the reading is the present temperature.

One may press "MAX MIN" to circulate the display mode among these options.

When the meter is under "MAX MIN" operation, "ΔREL" and "°C/°F" button are disabled. (When you press "ΔREL" and "°C/°F" button in "MAX MIN" mode, there will be two continuous beeps)

To exit the MAX/MIN mode, one may press and hold "MAX MIN" for two seconds.

### 4.10 Auto Power Off:

By default, when the meter is powered on, it is under auto power off mode. The meter will power itself off after 30 minutes if no key operation and no RS232 communication and no recording. combination at power on can disable auto power off.

One may press and hold "HOLD" button and then power on the meter and there will be two successive beeps to indicate that auto power off is disabled and the ⏻ will not show up.

### 4.11 Low Battery Condition

When the battery voltage is under proper operation requirement, the 🔋 symbol will show on the LCD and the battery need to be replaced with new one.

### 4.12 Calibration Point:

input	Adjust VR	tolerance	P.S
0 °C	VR1	± 0.1 °C	Normally, performing offset Calibration with thermal stablised ice water through VR1 will give a very good calibration result.
190 °C	VR2	± 0.1 °C	
1000 °C	VR3	± 1 °C	
1900 °F	VR4	± 1 °F	

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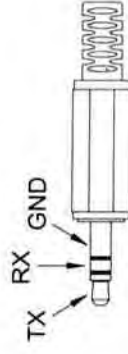


#### 4.13 Digital Output:

The Digital Output is a 9600bps N 81 serial interface.

The RX is a 5V normal high input port.

The TX is a 5V normal high output port.



The command of Digital Output is list below:

RS232 command	Function	Remarks
K(ASC 4BH)	Ask for model No.	Return 4 bytes
A(ASC 41H)	Inquire all encoded data	Return encoded 10 byte
H(ASC 48H)	Hold button	
M(ASC 4DH)	MAX/MIN button	
N(ASC 4EH)	Exit MAX/MIN mode	
R(ASC 52H)	REL button	
C(ASC 43H)	C/F button	
U(ASC 55H)	Dump all memory of thermometer	return 32768 bytes
P(ASC 50H)	Load recorded data	

- **Command K:**

Return 4 bytes. For example, when sends command "K" to meter, it will return "3" "0" "5", ASCII(13).

- **Command U:**

Return 32768 bytes .

- **Command P:**

Instead of returning all 32768 bytes, it only return recorded data .

- **Command H:**

Equivalent to one pushing on the HOLD button and no message is returned.

- **Command M:**

Equivalent to one pushing on the MAX/MIN button and no message is returned.

- **Command N:**

Equivalent to one pushing and hold the MAX/MIN button for two seconds to exit MAX/MIN mode.

- **Command R:**

Equivalent to one pushing on the REL button and no message is returned.

- **Command C:**

Equivalent to one pushing on the °C/°F button and no message is returned.

- **Command A:**

*1<sup>st</sup> BYTE:*

The first byte is the start byte , it value is 2.

*2<sup>nd</sup> BYTE:*

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
C/F	Low Bat	Hold	REL	MAX/MIN	REC		

bit 0: 1→recording mode, 0→not recording

bit 2 bit 1

0	0	→normal mode
0	1	→MAXIMUN mode
1	0	→MINIMUN mode
1	1	→calculate MAX/MIN in background mode .

bit3: no use.

bit4: 1→REL

bit5: 1→ HOLD, 0→not HOLD

bit6: 1→LOW BATTERY , 0→BATTERY NORMAL

bit7: 1→°C 0→°F

*3<sup>th</sup> BYTE:*

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
Auto Power Off	Memory full			resolution	sign	OL	OL

bit0: 1→main window value is OL, 0→not OL

bit1: 1→main window value is minus, 0→main window value is plus.

bit2: 1→4<sup>th</sup> byte and 5<sup>th</sup> byte represent ####, 0→4<sup>th</sup> byte and 5<sup>th</sup> byte represent ### #

bit6: 1→Memory is full. 0→Memory is not full.

bit7: 1→Auto power off enabled. 0→Auto power off disabled.

*4<sup>th</sup> BYTE:*

first two BCD code of main window value.

*5<sup>th</sup> BYTE:*

last two BCD code of main window value

*6<sup>th</sup> BYTE:*

BCD code of month.

*7<sup>th</sup> BYTE:*

BCD code of day.

*8<sup>th</sup> BYTE:*

BCD code of hours.

*9<sup>th</sup> BYTE:*

BCD code of minute.

*10<sup>th</sup> BYTE:* end byte, it value is 3, 1<sup>st</sup> and 10<sup>th</sup> are used to check frame error.

#### Appendix: Thermo couple probe specification

Model	Range	Tolerances	Description
TP-K01 Bead probe	-50°C to 200°C -58°F to 392 F	±2.2°C or ±0.75% (±3.6°F or ±0.75%)	with Teflon tape insulation Maximum insulating temperature : 260°C

#### TP-K01:

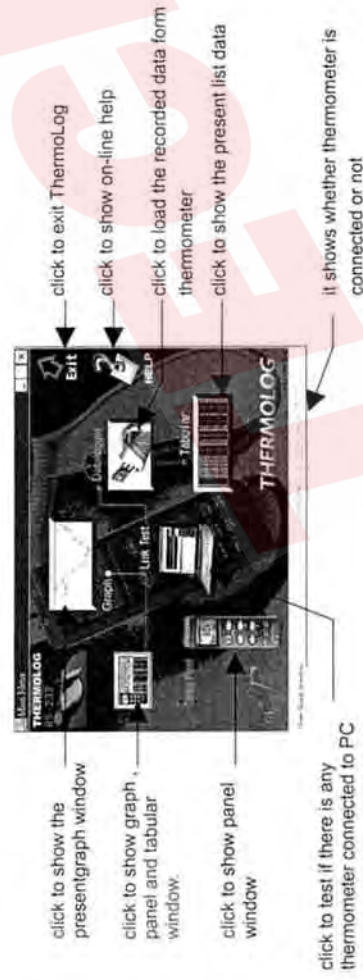
probe for general condition measurements, especially for complex and hard to reach places.



## V. Setup ThermoLog (Thermo DataLogger)—RS232 interface software:

- The ThermoLog package contains:
  1. One setup CD.
  2. Custom designed RS232 cable for THERMOLOG
- **System Required:**  
Windows 98/ NT 4.0/ NT2000/ XP.
- **Minimum Hardware Required:**  
486-100 MHz PC compatible , 16 MB RAM ;  
At least 5 MB hard disk space available to install THERMOLOG program. Recommended display resolution is 800X600.
- **Install ThermoLog:**
  1. We recommend close all other application before installing ThermoLog.
  2. Insert the ThermoLog CD-ROM into your CD drive. The ThermoLog installer should start automatically. If it does not, you can start it by running SETUP.EXE from the root drive of the CD-ROM.
  3. When installation is complete, it will copy ThermoLog.exe(executable file) and help file to your hard disk(default is c:\program files\Thermolog)
  4. For other operation instruction, please refer to the on-line help while executing ThermoLog.

### Main Menu



### Link Test :

Open Link Test window to search for thermometer connected to PC. When you start the THERMOLINK, this window will display first and search for thermometer. The result will be shown in the text box.

### Control Panel:

By opening the Control Panel Window, the user can control thermometer via the button in this window.

### DataLogger:

By opening the DataLogger Window, the user can load the recorded data from thermometer.

### Tabular:

By opening the Tabular window, the present data from the thermometer will be listed in a scrolling table. These data can be stored as a file or the table can be copy to other software such as EXCEL for further analysis.

### Graph:

Open Real-Time Graph window to show the present data in graph.

### Exit:

Terminates THERMOLOG program.

### Tray Icon:

When THERMOLOG is running , there will be an icon displayed on the Windows Tray area (see figure below), you can click this icon then it will show a pop-up menu.

