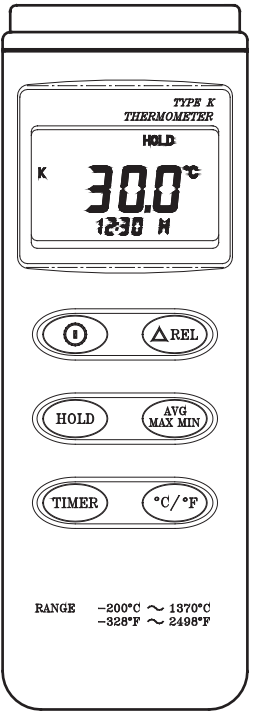
TECPEL

DTM-315

TYPE K THERMOMETER



Instruction Manual

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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.

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
Maximum Voltage at Thermocouple Input:
60V DC, or 24Vrms AC
Environmental:
o Operating Temperature and Humidity:
  0°C ~50°C (32°F ~ 122°F) ; 0 ~ 80% RH
o Storage Temperature and Humidity:
  -10°C to 60°C (14°F ~ 140°F); 0 ~ 80% RH
o Altitude up to 2000 meters.

Accuracy: at (23 ± 5°C)

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

Option:

Soft Ware Package(Program, RS232 Connection Cable),

AC Adapter

Power requirement:

9 Volt Battery, NEDA 1604 or JIS 006P or IEC6F22

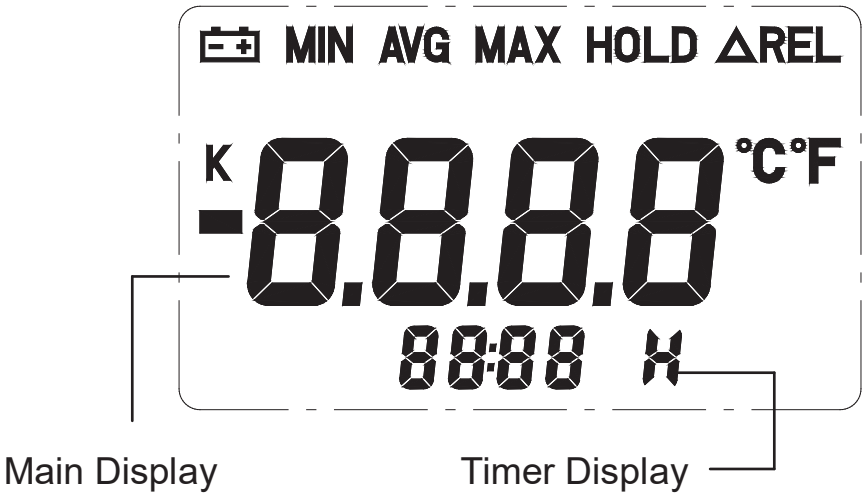
Battery Life:

Approx. 100hrs with alkaline battery

AC Adapter: 9VDC ±15% 100mA

Plug Diameter: 3.5×1.35mm

III. Symbol Definition and Button Location:



- : This indicates that the minus temperature is sensed.

H : It indicates that the timer is expressing in hours and minutes.

°C °F : Centigrade and Fahrenheit indication.

K : Thermocouple Type Indication

HOLD : This indicates that the display data is being hold.

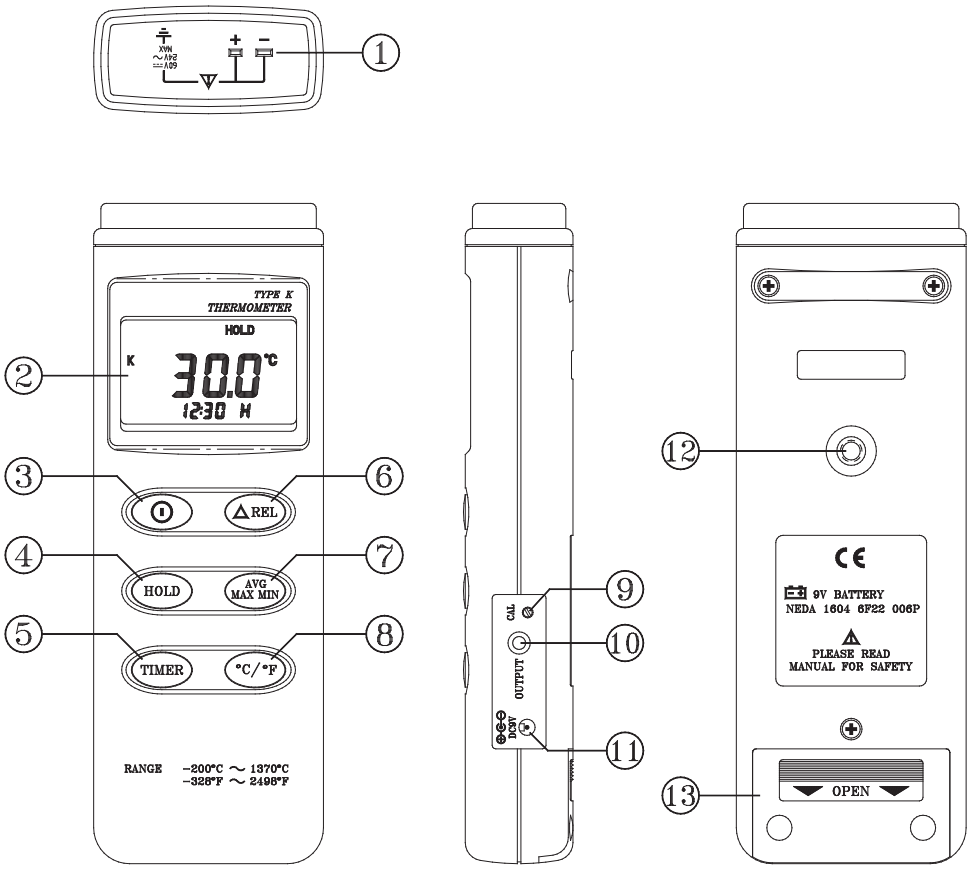
MAX : The Maximum value is now being displayed

MIN : The Minimum value is now being displayed

AVG : The Average value is now being displayed.

△REL : The reading is now under Relative Mode.

: The Battery is not sufficient for proper operation.



1) K type temperature sensor connector
2) LCD display
3) ON/OFF button
4) HOLD button
5) Timer function control button
6) Relative readout button
7) MAX MIN Average control 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 ⏻ key to turn the thermometer On or OFF

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.

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 hold 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 **"△REL",** AVG MAX MIN and " **°C/°F** " button are disabled.

4.5 Timer Operation:

One may start the timer by press the " **TIMER** " button. The counting can be stopped or continued by pressing it again.

When the counting exceed 59min 59sec, the time scale will be changed to hours and minutes and the " **H** " symbol will appear on the display.

The counting can be reset by press and hold " **TIMER** " button for 2 sec.

4.6 Relative Operation:

When one press the "△**REL**" 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 "△**REL**" button again to exit the Relative operation.

4.7 MAX/MIN/AVG Operation:

When one press the AVG MAX MIN button the meter will enter

the MAX/MIN mode. Under this mode the maximum value, minimum value and average value of latest 8 data 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 AVG MAX MIN again, then the NIN symbol is on the display and also the minimum reading.

Press AVG MAX MIN again, the AVG symbol is on the display and also the average reading.

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

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

When the meter is under AVG MAX MIN operation, "△**REL**" and **" °C/°F "** are disabled.

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

4.8 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 RS232 communication. Key combination at power on or RS232 communication 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.

4.9 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.

4.10 Calibration Point:

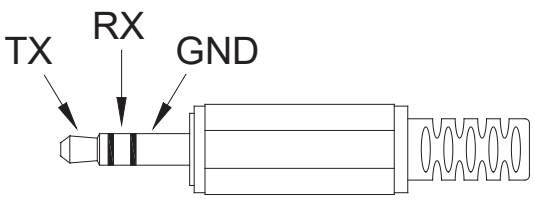
Room Temperature 23 ± 3°**C**

input	Adjust VR	tolerance
0 °C	VR1	± 0.1 °C
190 °C	VR2	± 0.1 °C
1000 °C	VR3	± 1 °C
1900 °F	VR4	± 1 °F

Normally, performing offset Calibration with thermal stabled ice water through VR1 will give a very good calibration result.

4.11 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.	Send 4 bytes
D(ASC 44H)	Ask for main display Range, Data, Unit	Send 22 bytes
B(ASC 42H)	Ask for secondary display Range, Data, Unit	Send 22 bytes
S(ASH 53H)	Ask Status	Send 13 bytes
H(ASC 48H)	Hold button	
T(ASC 54H)	TIMER button	
M(ASC 4DH)	AVG/MAX/MIN button	
N(ASC 4EH)	Exit AVG/MAX/MIN mode	
R(ASC 52H)	REL button	
C(ASC 43H)	C/F button	
A(ASC 41H)	Inquire all encoded data	Send encoded 8 byte

- **Command K:**

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

- **Command D:**

  Return data of main window.
  Range: □□□□□□ (unused)
  Data: ±9999.9,-OL,OL (7bytes include polarity and decimal point), Unit: C,F(5bytes)
  When the meter receive the D command, it will send :
  Range□Data□Unit.
  (where □ represent space (ASC(20H))
  For example:
  T1□□□□□□-199.9□□C□□□□
  (0x13) represent T1,- 199.9°C, The total byte number should be 7+1+7+1+5+chr(13)=22Bytes

- **Command B:**

  Return the counting of timer.

- **Command S:**

  Return the operation mode HOLD□MAX□REL, if the mode is not entered, the related characters will be left as space.

  For example:

  when the meter is under MAX display, the meter will return: □□□□□MAX□□□□

- **Command T:**

  Equivalent to one pushing on the HOLD button.

- **Command M:**

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

- **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:**

1nd BYTE:

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

2nd BYTE:

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

bit 2	bit 1	bit 0	
0	0	0	→normal mode
0	0	1	→MAXIMUN mode
0	1	0	→MINIMUN mode
1	0	0	→AVG mode

1 1 1 →calculate MAX/MIN/AVG in back-ground and lcd "MAX""AVG""MIN" will flash.

bit3: 1→0->K TYPE ,1→J TYPE(300 only has K type)

bit4: 1→REL

bit5: 1→ HOLD, 0→not HOLD

bit6: 1→LOW BATTERY , 0→BATTERY NORMAL

bit7: 1→C 0→F

3th BYTE:

bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
no use	no use	no use	Time unit	no use	X1_ X10	minus	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→4th byte and 5th byte represent #### , 0→4th byte and 5th byte represent ###.#

bit4: 1→sub window value is MM:SS, 0→sub window value is HH:MM

4th BYTE:

first two BCD code of main window value.

5th BYTE:

last two BCD code of main window value

6th BYTE:

first two BCD code of sub window value.

7th BYTE:

last two BCD code of sub window value.