

# Datalogger Thermometer TC0309

## Instruction Manual



**Perfect  
Prime**

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# 1. INTRODUCTION/ 2. SPECIFICATIONS

## INTRODUCTION

TC0309 is a 4-channel digital thermometer for use with 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 16,000 records per channel. (note1.) It uses RS232 interface to perform bi-directional communication with PC.

## IMPORTANT INFORMATION

Date and Time must be set correctly for the data logger function to work.

## SPECIFICATIONS

### NUMERICAL DISPLAY:

4 digital Liquid Crystal Display per channel.

### 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 PROTECTION 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.



## 2. SPECIFICATIONS

### 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.

### ELECTROMAGNETIC COMPATIBILITY:

Total accuracy = specified accuracy ±2°C(3.6°F)



## 2. SPECIFICATIONS

### **SAMPLE RATE:**

3 seconds per period

### **DIMENSION:**

184×64×30mm

### **WEIGHT:**

250g Approx

### **ACCESSORY:**

K Type Bead Probex2, Battery, Carrying Case, Instruction Menu, Software program, RS-232 Connection Cable.

### **POWER REQUIREMENT:**

9 Volt Battery

### **BATTERY LIFE:**

Approx. 100hrs with alkaline battery

### **AC ADAPTER:**

9VDC  $\pm$ 15% 100mA

### **PLUG DIAMETER:**

3.5mm×1.35mm

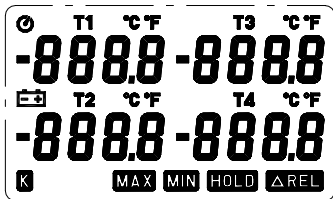
### **OPTION:**

AC Adapter, USB Cable.

### **NOTE:**

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.

### 3. SYMBOL DEFINITION AND BUTTON LOCATION



: This indicates that the minus temperature is sensed.

°C °F : Centigrade and Fahrenheit indication.

: Thermocouple Type Indication.

: The Maximum value is now being displayed.

: The Minimum value is now being displayed.

: This indicates auto power off is enabled.

: This indicates that the display data is being held.

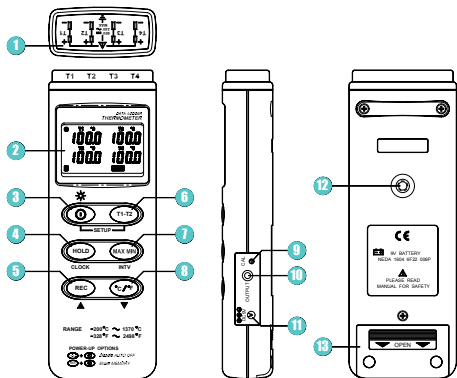
: The Battery is not sufficient for proper operation.

T1, T2  
T3, T4 : It indicates the value below is T1, T2, T3, T4 Temperaturesensor.

: It indicates the value below is T1-T2 sensor.

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

### 3. SYMBOL DEFINITION AND BUTTON LOCATION



① K type temperature sensor T1 to T4 input connector

② LCD display

③ ON/OFF & Backlight button

④ Hold button

⑤ Record button

⑥ T1-T2 button

⑦ MAX MIN function 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



## 4. OPERATION INSTRUCTIONS

### 4.1 POWER-UP & TURN ON/OFF BACKLIGHT

The  key turns the Thermometer ON or OFF and backlight ON & OFF.

Press it once to turn on the Thermometer.

Press it again for moment to turn ON or OFF backlight.

Press and hold this button 3 second to turn OFF the power.

### 4.2 CONNECTING THE THERMOCOUPLES

For measurement, plug the thermocouple into the input connectors.

### 4.3 SELECTING THE TEMPERATURE SCALE

When the meter was powered on, the user may change it to Fahrenheit (°F) by pressing "°C/°F" button and vice versa to Celsius

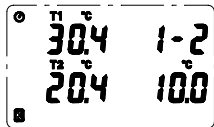
### 4.4 DATA-HOLD OPERATION

The user may hold the present reading and keep it on the display by pressing the "HOLD" button. When the 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 "MAX MIN", "T1-T2" and "°C/°F" button are disabled. (when you press "°C/°F", "T1-T2" and "MAX MIN" button in HOLD mode, there will be two continuous beeps).

### 4.5 T1-T2 OPERATION

When this button is pushed, "1 - 2" will be shown on the upper right hand side LCD display to indicate that the tester is under T1 minus T2 mode. The temperature difference is shown on the right hand side display as shown in Fig.





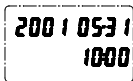
## 4. OPERATION INSTRUCTIONS

### 4.6 RECORD AND ERASE MEMORY OPERATION

When one presses the "REC" button, the meter will start recording, and pressing 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 5 seconds, then LCD will show "CLR" "SURE 5", then release all buttons to clear the memory.



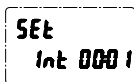
### 4.7 RELATIVE OPERATION



- 1: press and hold "T1-T2" button and then power on the meter:
- 2: press "HOLD"(clock):
- 3: press "REC" ▲ or "C/°F" ▼ to increase or decrease number, press "HOLD"(clock) to adjust next item. The adjusting order is year → month → day → hour → minute, then press "HOLD" (clock) to finish adjusting. If you want abort during a setup process, press power button to cancel.

## 4. OPERATION INSTRUCTIONS

### 4.8 RECORDING INTERVAL SETUP



- 1: press and hold "**T1-T2**" button and then power on the meter:
- 2: press "**MAXMIN**" (INTV)
- 3: press "**REC**" ▲ or "**°C/°F**" ▼ to increase or decrease number, press "**MAXMIN**" (INTV) to adjust next item, then press "**MAXMIN**" (INTV) to finish. If you want abort during a setup process, press power button to cancel.

### 4.9 MAX/MIN OPERATION

When pressing 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 sample of 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 and "**°C/°F**" button are disabled.(when you press "**C/°F**" button in "**MAX MIN**" mode, there will be two continuous beep).




## 4. OPERATION INSTRUCTIONS

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 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 needs to be replaced with new one.

### 4.12 CALIBRATION POINT

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

#### P.S

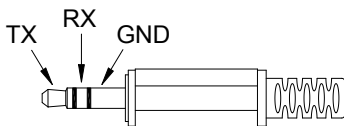
Normally, performing offset Calibration with thermal stabled ice water through VR1 will give a very good calibration result.

### 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.





## 5. SETUP SOFTWARE

**OPERATING SYSTEM REQUIRED: WINDOWS XP/ VISTA/ WINDOWS 7/ WINDOWS 8/ WINDOWS 10**

### **MINIMUM HARDWARE REQUIRED:**

- At least 50 MB hard disk space available to install the software
- Download software here: <https://perfectprime.com/pages/manual>, locate your product under Thermocouple Thermometer and download the software

### **TUTORIAL - QUICK START TO USE SOFTWARE:**

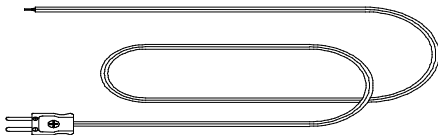
- Turn on the device
- Load the software and it should be connected automatically with the device. You can confirm by seeing values on the image of the thermocouple thermometer in the newly opened window, representing the temperature it is detecting.
- For live temperature reading click the "Start graphing real time data" button on the tool bar"
- To save live data, click stop and click on the graph and click save
- To load data from logging, go to Data logger on toolbar and press load, to save to computer, press save when data is loaded and after selected the data set you want to save.

### APPENDIX: THERMOCOUPLE PROBE SPECIFICATION

Model	Range	Tolerances	Description
TP-K01 Bead probe	-50°C, to 200°C,	$\pm 2.2^{\circ}\text{C}$ or $\pm 0.75\%$	with Teflon tape insulation Maximum insulating temperature : 260°C
	-58°F to 392°F	( $\pm 3.6^{\circ}\text{C}$ or $\pm 0.75\%$ )	

#### TP-K01:

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



#### DOWNLOAD THE PROTOCOL

#### DOWNLOAD THE PROTOCOL OF SERIAL INTERFACE HERE:

[https://cdn.shopify.com/s/files/1/1291/1589/-files/TC0304\\_TC0309\\_Protocol.pdf?v=1614323450](https://cdn.shopify.com/s/files/1/1291/1589/-files/TC0304_TC0309_Protocol.pdf?v=1614323450)

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