



# User's Guide



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# HH503 Digital Thermometer

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**WARNING:** These products are not designed for use in, and should not be used for, human applications.

# INTRODUCTION

This instrument is a 4½ digit, compact-sized portable digital thermometer designed to use external K-type and J-type thermocouples as temperature sensor. Temperature indication follows Reference Temperature/Voltage Tables (N.I.S.T. Monograph 175 Revised to ITS-90) for K-type and J-type thermocouples. One K-type thermocouple are supplied with the thermometer.

## SAFETY INFORMATION

It is recommended that you read the safety and operation instructions before using the thermometer.

### **WARNING**


To avoid electrical shock, do not use this instrument when working voltages at the measurement surface over 24V AC or DC.

### **WARNING**

To avoid damage or burns, do not make temperature measurement in microwave ovens.

### **CAUTION**

Repeated sharp flexing can break the thermocouple leads. To prolong lead life, avoid sharp bends in the leads, especially near the connector.

The  symbol on the instrument indicates that the operator must refer to an explanation in this manual.

# SPECIFICATIONS

## ELECTRICAL

**Temperature Scale:** Celsius or Fahrenheit user-selectable

**Measurement Range:**

J-TYPE -200°C to 1050°C, (-328°F to 1922°F)

K-TYPE -200°C to 1370°C, (-328°F to 2498°F)

**Resolution:** 0.1°C or 0.2°F

**Accuracy:** Accuracy is specified for operating temperatures over the range of 18°C to 28°C (64°F to 82°F), for 1 year, not including thermocouple error.

$\pm(0.05\% \text{ rdg} + 0.3^\circ\text{C})$  -50°C to 1370°C

$\pm(0.05\% \text{ rdg} + 0.7^\circ\text{C})$  -50°C to -200°C

$\pm(0.05\% \text{ rdg} + 0.6^\circ\text{F})$  -58°F to 2498°F

$\pm(0.05\% \text{ rdg} + 1.4^\circ\text{F})$  -58°F to -328°F

**Temperature Coefficient:** 0.1 times the applicable accuracy specification per °C from 0°C to 18°C and 28°C to 50°C (32°F to 64°F and 82°F to 122°F).

**Input Protection:** 24V dc or 24V ac rms maximum input voltage on any combination of input pins.

**Maximum Differential Common Mode Voltage (Maximum Voltage between T1 and T2 during measurement):** 1volt.

**Reading Rate:** one time per second.

**Input Connector:** Accepts SMP male miniature thermocouple connectors.

## **ENVIRONMENTAL**

**Ambient Operating Ranges:** 0°C to 50°C (32°F to 122°F) <80% R.H.

**Storage Temperature:** -20°C to 60°C (-4°F to 140°F) <70% R.H.

## **GENERAL**

**Display:** 4½ digit liquid crystal display (LCD) with maximum reading of 19999.

**Overload:** "----.-" is display.

**Battery:** Standard 9V battery.

**Battery Life:** 100 hours typical.

**Auto power off:** The meter key switch inactive for more than 30 minutes,  
press power key to resume operation.

**Dimensions:** 192mm(H) x 91mm(W) x 52.5mm(D)

**Weight:** 365g.

# OPERATING INSTRUCTIONS

## ① ① Power Switch

The ① key turns the thermometer on or off. In the data SET mode, can not power off, must leave data SET mode then power off.

## ② °C/°F Selecting the Temperature Scale

Readings are dual displayed in either degrees Celsius(°C) or degrees Fahrenheit(°F). When the thermometer is turned on, it is set to the temperature scale that was in use when the thermometer was last turned off. To change the temperature scale, press the °C/°F key.

## ③ HOLD Mode (only Main display)

Pressing the HOLD key to enter the Data Hold mode, the "HOLD" annunciator is displayed. When HOLD mode is selected, the thermometer held the present readings and stops all further measurements.

Pressing the HOLD key again to cancel HOLD mode causing thermometer to resume taking measurements.

In the MIN/MAX recording mode, press HOLD key to stop the recording. Press HOLD key again to resume recording. (Previously recorded reading are not erased).

#### ④ **Cold Junction Temperature Display mode (second display)**

Press C.J. TEMP key to display the thermocouple input connector cold junction temperature on second display.

Press C.J. TEMP key again to exit this mode.

#### ⑤ **K/J T1 Input Thermocouple Type Select**

The K/J key switch the thermocouple input selects the K-type or J-type thermocouple as input.

When the thermometer is turned on, it is set to the type selected that was in use when the thermometer was last turned off.

#### ⑥ **MIN MAX with Time record Mode**

Press MIN MAX key to enter the MIN MAX Recording mode, (displays the Maximum reading with time, Minimum reading with time and Average reading stored in record mode). In the this mode the automatic power-off feature is disabled and ① key, °C/°F key, REL key, SET key, Hi/Lo LIMITS key, K/J, C.J. TEMP and all Recall keys are disabled.

The beeper emits a tone when a new minimum or maximum value is recorded.

Present temperature reading displayed on second display.

Push MIN MAX key to cycle through the MAX, MIN and AVG readings.

If an overload is recorded, the averaging function is stopped and average value display"----.-".

The true average of all the reading taken over at least 22 hours period can be displayed. If 22 hours is exceeded, new averages are no longer calculated. The last calculated value is retained as the average reading, but the actual minimum and maximum reading will continue to be captured.

In the this mode, press HOLD key to stop the recording of readings, all values are frozen, press again to restart recording.

To prevent accidental loss of MIN, MAX and AVG data, in this mode can only be cancelled by pressing and hold down the MIN MAX key for 2 seconds to exit and erased recorded readings.

⑦

### **REL Relative mode**

Pressing REL key to enter the Relative mode, zero the display, and store the displayed Reading as a reference value and annunciator REL is displayed. Present temperature reading displayed on second display. Press REL key again to exit the relative mode.

The relative value can also be entered by the user. (See "SET mode" later in this manual.)

When the desired Relative value has been entered, press REL key to enter the Relative mode, press SET key use set Relative value as a reference value. Press REL key again to exit the relative mode.

In the Relative mode, the value (can not  $>\pm 3000.0$  counts) shown on the LCD is always the difference between the stored reference and the present reading.



### ⑧ **Sec. Minu. Selecting the Time scale**

Reading the third displayed (Time) in either second or minute. When the thermometer turned on, it is set to second. To change the Time scale, press Sec. Minu. key.


Maximum Time reading is 100 hours. If 100 hours is exceeded, reset Time to zero and restart.

### ⑨ **SET mode (Relative value set, Time set and Hi/Lo Limits value set)**

1. Press SET key to enter Relative value SET mode (Press ENTER key can escape relative value set mode), REL set mode. = = = =. = is displayed in main display.

Relative value is entered via overlay numbers, then press overlay ENTER key, stored the relative value, enter Time set mode.

2. Time set mode, (Press ENTER key can escape Time set mode) =. = = : = = is displayed in second and third display. Time (hours, minutes, seconds) value is entered via overlay numbers, then press overlay ENTER key. Time start from set time value, enter Hi/Lo Limits value set mode.

3. Hi Limit value set mode,  is displayed (Press ENTER key can escape Hi Limit value set mode), = = = =. = is displayed in main display, Hi Limit value is entered via overlay numbers, then press overlay ENTER key, stored the Hi Limit value, enter Lo Limit value set mode (Press ENTER key can escape Lo Limit value set mode). = = = =. = is displayed in main display, Lo Limit value is entered via overlay numbers, then press overlay ENTER key, stored the Lo Limit value and exit SET mode.

4. When the thermometer is turned on. The Relative set value and Hi/Lo Limits set value that was in use when thermometer was last turned off set values.


**⑩ Relative value Recall display mode.**

Press REL RECALL key to display the Relative set value on second display.  
Press REL RECALL key again to exit this mode.

**⑪ Hi/Lo Limits value Recall display mode**

Press Hi/Lo RECALL key to display the Hi set Limit value on second display.  
Press Hi/Lo RECALL key again to display the Lo Limits set value on second display. Press Hi/Lo RECALL key again to exit this mode.

**⑫ Hi/Lo Limits mode (only Main display)**


Press Hi/Lo LIMITS key to enter the Hi/Lo Limits comparative mode,  is displayed, when input temperature value exceed Hi or Lo Limits value. The beeper emits a continuity pulse tone. Press Hi/Lo Limits key again to exit the Hi/Lo LIMITS mode.

# OPERATOR MAINTENANCE

## WARNING

To avoid possible electrical shock, disconnect the thermocouple connectors from the thermometer before removing the cover.

## Battery Replacement

Power is supplied by a 9 volt "transistor" battery. The "" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery cover. Remove the battery from battery contacts.

# CALIBRATION PROCEDURE

**Note:** The following calibration procedures should be performed only by qualified technicians who have access to the following:

Equipment: The class of calibration should be 10 times greater than the measured meter.

Step 1: Short the J3 with jumper.

Step 2: Apply 65 mV to the T1 input from Volts Calibrator and wait till the reading becomes stable, then press the SET key until the display shows 0.1.

Step 3: Apply Type K 0°C to the input T2 and wait till the reading becomes stable, then press the SET key until the meter shuts off by itself.

Step 4: Remove the jumper from J3.

**NOTES:**

**NOTES:**

## WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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