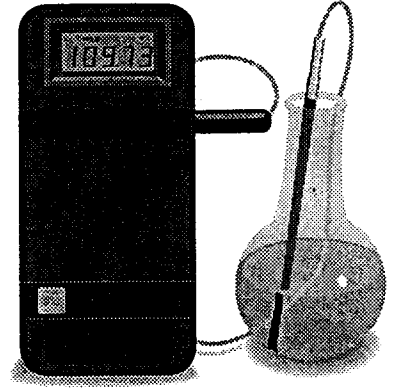


HH40 Series
Handheld Thermistor
Thermometer



Operator's Manual

Unpacking Instructions

Remove the Packing List and verify that you have received all equipment, including the following (quantities in parentheses):

- HH40 Series Meter (1)
- 9 Vdc alkaline battery (1)
- NIST traceable calibration certificate (1)
- Operator's manual (1)

If you have any questions about the shipment, please call the OMEGA Customer Service Department.

When you receive the shipment, inspect the container and equipment for signs of damage. Note any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor damage claims unless all shipping material is saved for inspection. After examining and removing contents, save packing material and carton in the event reshipment is necessary.

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INTRODUCTION

The OMEGA® HH40 Series handheld thermistor thermometer is a rugged, field tested unit that fits a wide variety of temperature measurement applications requiring ultra-high accuracy and high resolution at an economical price. The HH41 accepts OMEGA's 400 Series thermistor probes with phone jack termination. The HH41 features display hold and °F/°C selection from the single front panel tactile feedback silicone function button. The unit's LCD display features a low battery indication and also rate of temperature change arrows which, flashing at different speeds, inform the operator of the rate at which the temperature is changing. The unit has internal jumpers to disable selection of °F or °C from the front panel and enable display of either °F or °C only. Internal jumpers are also present to select either auto or manual shutoff mode.

In the auto shutoff mode, the unit will automatically shut off in 10 minutes with no function key entry. Model HH42 has all the features of the HH41 with the addition of RS-232 communications.

Each unit is supplied with 9 Vdc alkaline battery, NIST traceable calibration certificate, and complete operator's manual.

OPERATING INSTRUCTIONS

1. Insert your 400 series probe into the jack on the right side of the thermometer.
2. Press the upper half of the rubber rocker switch marked "ON/OFF" to turn the unit ON. (Pressing this switch again will turn the unit OFF.)

For the HH42 RS-232 version, plug an RS-232 cable into the mating connector at the top of the thermometer. Plug the other end of the cable into the serial port on your PC. For additional information, see the instructions with the software package.

3. READOUT:

<i>Display</i>	<i>Explanation</i>
°C/°F symbols	Reading is displayed in degrees C or F
-20.00 to +130.00 (-4.00 to +266.00)	Actual temperature in degrees Celsius (Fahrenheit)
LO	Temperature is below -20.00°C (-4.00°F) or a probe is not inserted
HI	Temperature is above 130.00°C (266.00°F)

OPERATING INSTRUCTIONS: (continued)

<i>Display</i>	<i>Explanation</i>
Flashing battery replacement symbol	Battery needs
Steady on battery symbol	Do not use the unit until battery is replaced!
Up/Down arrows	Indicates rate of change. Faster flashing = faster change. Arrows off = stable reading.

4. The thermometer can "freeze" or "hold" a reading shown on the display. Press the lower half of the rubber rocker switch momentarily, the reading will "freeze" and the "HOLD" indicator will flash.
5. To change the reading from degrees C to F or F to C, press the lower half of the rubber rocker switch down for approximately 4 seconds (the HOLD indicator will flash 4 times), and the °C/°F indicator will change.
6. The thermometer will automatically turn itself off after 10 minutes of operation. You may turn the unit off at any time by pressing the ON/OFF switch.

HH42 SERIAL INTERFACE OPERATION

Baud Rate: 9600
Data Length: 8 Bits
Parity: None
Stop Bits: 1

HARDWARE INTERFACE: A standard DB9 female connector is provided with the following pins.

**TABLE 1
PIN CONNECTIONS**

PIN	Direction	Signal Name
1		No Connection
2	to Host	RX (Receive Data)
3	From Host	TX (Transmit Data)
4		No Connection
5		GND
6		No Connection
7	From Host	RTS (Request to Send)
8		No Connection
9		No Connection

The Model HH42 serial interface provides a method for a user to capture the temperature readings from the HH42 on a computer or terminal. The HH42 enters the HOST mode when the RTS line becomes active true. When the RTS line becomes FALSE the HH42 returns to the normal mode of operation. Note that the automatic battery saver turnoff, if enabled, still occurs even when in the HOST mode when temperature is being displayed. The automatic battery saver does not operate when the HH42 is waiting for a command.

Any time the HH42 detects the RTS TRUE it enters the HOST mode and transmits the ">" character and a space to the computer indicating it is on line and ready to receive commands and output data. While at the ">" prompt the HH42 is able to accept commands from the computer or terminal. Table 2 defines the commands for the HH42. Note that 'b' = a space, cr = Carriage Return, and lf = Line Feed characters in both Table 2 and Table 3.

**TABLE 2
HH42 COMMANDS**

COMMAND	DESCRIPTION
Tcrlf	Puts the HH42 into the Output mode. Causes the HH42 to output the current temperature to the connected computer or terminal followed by crlf. Note the display formats from Table 3. Repeats every 524 milliseconds.
SFcrlf	Puts the HH42 into Deg F mode. All subsequent temperatures displayed will be in Degrees F.
SCcrlf	Puts the HH42 into the Deg C mode. All subsequent temperatures displayed will be in Degrees C.

The HOST protocol of operation is listed in Table 3. The display formats for the temperatures LO, HI, and positive temperatures less than 99.99 are preceded by a space. Negative temperatures are preceded by a "-", temperatures greater than 99.99 must be positive and the most significant digit is 1.

TABLE 3 HOST PROTOCOL OF OPERATION

HH42 Output	Direction	Computer	Action
>b	←	RTS TRUE	Causes HH42 to enter HOST mode
>b	←	Tcrif	Causes HH42 to enter output mode and output current temperature in current scale every 524 milliseconds
bL0.bCcrif		Display	Temperature display of Low temperature
bH1.bCcrif		Display	Temperature display of High temperature
bI2.34bC		Display	Temperature display in C
-01.23bC		Display	Temperature display in C
223.34bF		Display	Temperature display in F
>b	←	Hold RTS False	Hold RTS false at least 600ms. HH42 re-enters HOST mode
SFcrif	←	SF	Sets HH42 to Deg F scale (HOST mode only)
>b			After new temperature scale set
>b	←	Tcrif	Enters output mode
156.23bF		Display	Displays current temperature every 524msec in Deg F
>b	←	Hold RTS False	Hold RTS false at least 600 ms, then returning to TRUE causes HH42 to re-enter HOST mode
SCcrif	←	SC	Sets HH42 to Deg C scale (HOST mode only)

BATTERY REPLACEMENT

1. Remove the probe and turn the unit on its face.
2. Unscrew the four Phillips head screws on the back.
3. Pick the unit up with the probe jack facing you (right side of the case). With one hand holding the front half of the case and the other hand holding the back half of the case, open the case up in a rotating motion with the right side of the case being the center of rotation.
4. Placing your thumb on the circuit board battery terminals, rotate and lift the battery away from the circuit board with your forefinger.
5. Place the new 9V battery on the circuit board with the battery terminals oriented to mate the terminals on the circuit board (battery + is towards the top of the unit).
6. Place your thumb against the terminals on the circuit board, and with your forefinger snap the battery into place.
7. Replace the back cover and the four screws.

INSTRUMENT SPECIFICATIONS

MEASUREMENT RANGE:

-20.00°C to +130.00°C
(-4.00°F to +266.00°F)

RESOLUTION:

0.01°C (0.01°F) from -20 to 102°C
(-4 to 215°F)
0.02°C (0.05°F) from 102 to 130°C
(215 to 266°F)

REPEATABILITY:

0.002 to 0.01°C (-20 to 70°C)
0.004 to 0.02°F (-4 to 158°F) typical for one
week at constant ambient temperature

ENVIRONMENTAL CONDITIONS:

Operating:

Temperature 10 to 40°C (50 to 104°F)
Humidity 0 - 85%

Storage :

Temperature 0 - 60°C (32 to 140°F)
Humidity 0 - 70%

ACCURACY:

When used in combination with an OMEGA® 400 Series 0.1°C thermistor probe, the thermometer/probe system will have an overall accuracy of +/- 0.2°C or better when the temperature to be measured is between 0°C and +70°C.

READING RATE: 2 per second

DISPLAY: 4-1/2 digit LCD

INSTRUMENT SPECIFICATIONS (cont'd)

**INSTRUMENT ACCURACY
VS. TEMPERATURE***

(Not including probe error)

Temp(°C) (°F)	Accuracy(°C) (°F)
-20 (-4)	0.016 (0.029)
-10 (14)	0.015 (0.027)
0 (32)	0.015 (0.027)
10 (50)	0.015 (0.027)
20 (68)	0.015 (0.027)
30 (86)	0.015 (0.027)
40 (104)	0.017 (0.031)
50 (122)	0.019 (0.034)
60 (140)	0.023 (0.041)
70 (158)	0.029 (0.052)
80 (176)	0.037 (0.067)
90 (194)	0.049 (0.088)
100 (212)	0.066 (0.119)
110 (230)	0.088 (0.158)
120 (248)	0.117 (0.211)
130 (266)	0.156 (0.281)

*Ambient temperature: 18 to 28°C (64 to 82°F)

POWER:

9 Vdc battery, alkaline, optional 110 Vac adaptor

BATTERY LIFE:

20 hrs. typical, alkaline battery; 10 hrs. typical for
HH42 with RS232C communications operating

DIMENSIONS:

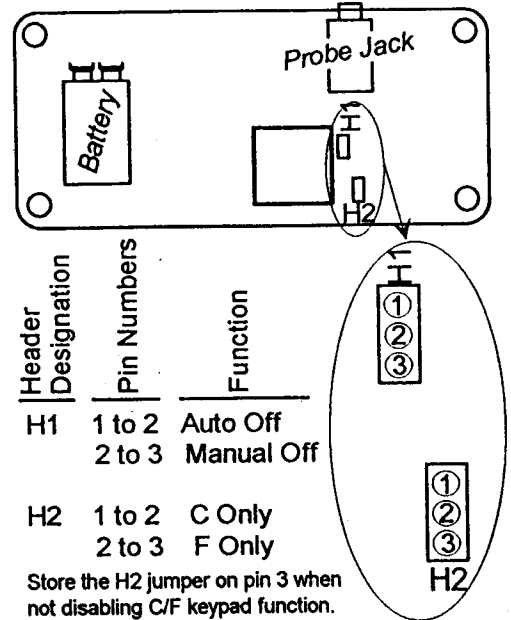
184.1 x 83.8 x 31.8 mm (7.25" H x 3.30" W
x 1.25" D)

WEIGHT: 312 g (11 oz.)

SPECIAL FUNCTIONS:

The HH40 Series can be put into special configurations through proper placement of user-accessible jumpers on the inside of the unit.

If it is desired for the unit to stay on indefinitely and not turn off after 10 minutes, adjust the jumpers on "H1"; C/F front panel selectability can be defeated by adjusting the jumpers on "H2."



THERMOMETER RECALIBRATION

The thermometer should be recalibrated every year to maintain its accuracy. Recalibration should be performed at OMEGA. When the thermometer requires recalibration, contact the OMEGA Customer Service Department for instructions on returning the unit.

ACCESSORIES

The following accessories are available for the HH40 Series thermometers:

<u>Part No.</u>	<u>Description</u>
HH40-AC	110 Vac adaptor
HH40-SOFT	Software for HH42
SC57	Soft case for HH41 or HH42
RCC-1000	Rigid attaché case for meter and probes
MN1604	Extra 9V alkaline battery



WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA 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 should malfunction, 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. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being 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 which wear or which are damaged by misuse are not warranted. These include contact points, fuses, and triacs.

OMEGA is glad to offer suggestions on the use of its various products. Nevertheless, OMEGA only warrants that the parts manufactured by it will be as specified and free of defects.

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Every precaution for accuracy has been taken in the preparation of this manual; however, OMEGA ENGINEERING, INC. neither assumes responsibility for any omissions or errors that may appear nor assumes liability for any damages that result from the use of the products in accordance with the information contained in the manual.

SPECIAL CONDITION: Should this equipment be used in or with any nuclear installation or activity, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the equipment in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA ENGINEERING Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

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

1. P.O. 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 OR CALIBRATION, consult OMEGA for current repair/calibration charges. Have the following information available BEFORE contacting OMEGA:

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

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