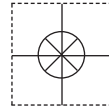


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User's Guide



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HHF-SD1 Hot Wire Anemometer- Thermometer with Data Logging SD Card



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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

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

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INTRODUCTION

Thank you for purchasing the HHF-SD1 Hot Wire Anemometer-Thermometer with Datalogging SD Card. Please read this user's manual carefully and thoroughly before using the instrument.

The HHF-SD1 is a general-purpose handheld instrument that can make two kinds of measurements:

- Air (wind) speed and temperature (simultaneously)
- Surface temperature, as measured by an optional Type K or Type J thermocouple

All hot wire anemometers, including the HHF-SD1, have at their heart a very thin metal wire that the instrument electrically heats up above ambient temperature. Air flowing past the wire cools it. The speed of the air flow can be calculated from the relationship between the metal's electrical resistance and temperature. In the HHF-SD1, the hot wire is located at the end of a telescoping probe, where it is paired with a tiny glass bead thermistor that measures air temperature.

Compared to other types of anemometers, hot wire anemometers have superior performance. For this reason, they are commonly used for precise measurement of low-speed air flows, turbulent flows, or of any flow in which rapid velocity fluctuations are of interest. Applications include:

- Environmental testing
- Maintenance and repair of air conveyors and flow hoods in clean rooms
- Measurement of air velocity produced by fans and blowers
- Balancing velocity profiles in furnaces and refrigerated cases
- Operating paint spray booths

The HHF-SD1 comes with a telescoping air speed-temperature probe. Air speeds can be displayed in m/s (meters/second), fpm (feet per minute), km/h (kilometers/hr), knots (nautical miles per hour), or mph (miles per hour). Temperatures can be displayed in °F (Fahrenheit) or °C (Celsius) units.

Several features and capabilities enhance the instrument's versatility. Among them are automatic temperature compensation for measurements made by the telescoping probe or by Type K or J thermocouples, the ability to hold readings and display maximum and minimum readings, and an automatic power off function that extends battery life.

Because it is microprocessor-based, the HHF-SD1 can make full use of the portability, reliability and large storage capacities that SD memory cards offer. Measurements can be made automatically at any sampling rate between one second and one hour. After storing and time-stamping the measurements on an SD card plugged into the instrument (a process called datalogging), the user can remove the card and plug it into a laptop or desktop computer either directly or via a USB card reader. The data logs are stored on the card as files with the .xls extension, which can be opened by Microsoft's Excel application.

The HHF-SD1 has a backlit 2.5 in. diagonal display and is powered by six "AA" Alkaline batteries or an optional 9-VDC AC adapter.

KEY FEATURES

- Includes telescoping air speed-temperature probe
- Displays air (wind) speed in meters/second, feet per minute, kilometers/hr, knots (nautical miles per hour), or miles per hour
- Measures air speeds down to 0.2 m/s with 0.01 m/s resolution (down to 40 ft/sec with 1 ft/min resolution)
- Displays temperature in °F or °C
- Big (2.5 in. diagonal) front-panel green backlit LCD is easy to read
- Displays maximum and minimum readings and holds any reading
- Automatically logs measurements at sampling time settable from one second to one hour
- Also supports manual datalogging and changing of SD card storage location
- Outputs Excel-compatible data logs
- Accepts SD memory cards of up to 16 GB capacity
- Auto power off function
- Powered by six “AA” batteries or optional 9V AC/DC adapter

OPERATING INSTRUCTIONS

WHAT'S IN THE CASE

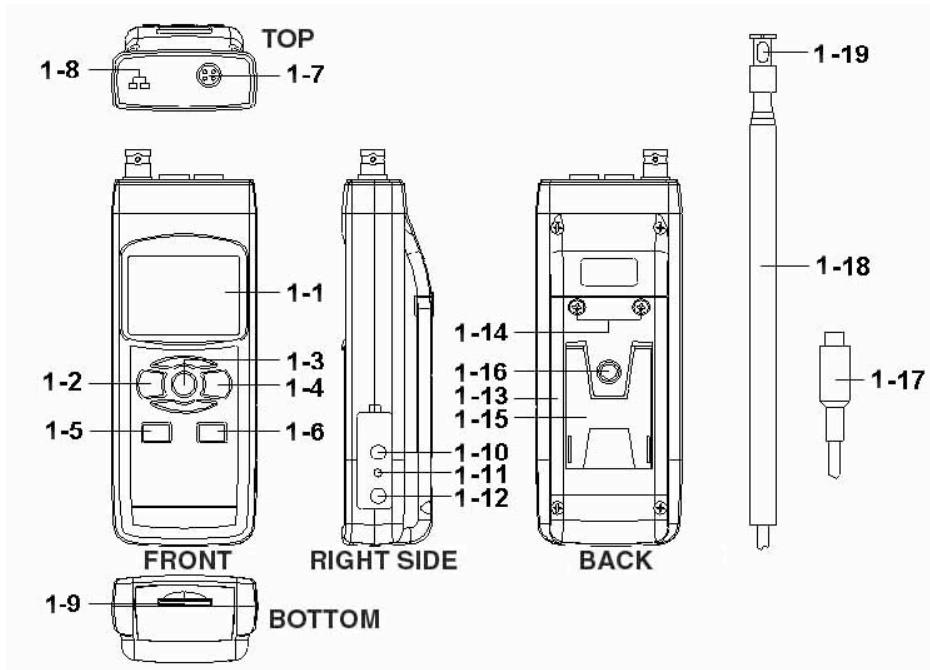
The HHF-SD1 comes fully assembled in a hard carrying case along with a telescoping air speed-temperature probe, a 2 GB SD memory card and this user's manual.

Optional accessories available from Omega include:

- Type K and Type J thermocouples
- A 9VDC adapter for a 110V power supply

See the Optional Accessories section of this manual for more details.

Figure 1 shows all of the controls and indicators on the front, right side, back, top and bottom of the HHF-SD1. It also shows the main components of the included telescoping probe. Familiarize yourself with the positions and functions of these controls, indicators and connectors before moving on to the setup procedure.



1. The HHF-SD1 's controls and indicators and other physical features

[CALLOUTS FOR FIGURE 1]

- 1-1 Liquid-crystal display
- 1-2 POWER/ESC button
- 1-3 FUNC./HOLD/NEXT button
- 1-4 REC/ENTER button
- 1-5 SET ▼ button
- 1-6 LOGGER ▲ button
- 1-7 Socket for combination air speed-temperature probe
- 1-8 Socket for optional Type K or J thermocouple
- 1-9 SD card socket
- 1-10 RS-232 output jack
- 1-11 RESET button
- 1-12 Socket for 9VDC AC adapter
- 1-13 Battery compartment cover
- 1-14 Battery compartment cover screws
- 1-15 Kickstand
- 1-16 Tripod attachment nut
- 1-17 Telescoping probe plug
- 1-18 Telescoping probe handle
- 1-19 Telescoping probe sensing head/cover

SETUP

- 1. Choose the power source.** Before using the HHF-SD1 , make sure it is powered by fresh batteries or an optional 9VDC AC adapter plugged into the bottom jack on its right side (callout 1-12).

To remove the battery compartment cover (callout 1-13), remove the two screws holding it in place (callout 1-14). Then install six AA batteries in the correct orientation, using the polarity marks on the inside of the compartment as a guide. Replace the cover by replacing the two screws.

- 2. Install an SD card.** To prepare for setup, also install an optional SD memory card of 1 GB to 16 GB capacity in the socket on the bottom of the instrument (callout 1-9). When installing the card, make sure its gold contacts are facing front and push the card into the socket until you hear a click. To remove the card, push it in until you hear a click and the card pops out.

Now power on the instrument by pressing the POWER/ESC button (callout 1-2) to generate a short beep. (To power off the HHF-SD1 , press the POWER/ESC button and hold it until the instrument responds with a long beep.)

When the instrument powers on, a series of transient startup screens will briefly appear. Once the display has stabilized, perform the following eight setup steps in the order presented.

- 3. Set the date and time.** Press the SET ▼ button (callout 1-5) and hold it for at least five seconds, until the word “dAtE” appears in the center of the display, along with the flashing value “00.00.00” at the lower left, above “yy.mm.dd”.

Set the current year by pressing the SET ▼ or LOGGER ▲ button repeatedly until the correct value appears above “yy”. Quickly (within three seconds), press the REC/ENTER button to store the setting. The next screen that appears will have the value above “mm” flashing. Use the SET ▼ or LOGGER ▲ button to navigate to the current month and press the REC/ENTER button to store the setting. When the next screen flashes the value above “dd”, again use the SET ▼ or LOGGER ▲ button to navigate to the current day and press the REC/ENTER button to store the setting.

(If you press buttons too slowly in setup mode, the screen will revert to the normal display. To return to the setup sequence, press and hold the SET ▼ button again. To move ahead to the next field in the sequence or to the next parameter, press the FUNC./HOLD/NEXT button.)

Once you have set the date, the display will prompt you to set the hour, minute and second of the current time. Again use the SET ▼ or LOGGER ▲ buttons to navigate to the correct values, and the REC/ENTER button to store the settings.

- 4. Choose a decimal point or comma** to represent the decimal division between integers and fractions (for example, American-style 20.88 vs. European-style 20,88). Once you have set the date and time, the display will show the word “bASIC” above the phrase “dEC”. Press the SET ▼ button to make “bASIC” (American style) or “Euro” appear in the upper display, as desired. Press the REC/ENTER button to store the selection as the default.

5. **Enable or disable auto power off.** Once the format of decimal point divisions has been set and stored, the display will show the word “yES” over the term “PoFF”. Press the SET ▼ button until the desired automatic power off management scheme (“yES” for enable; “no” for disable) is displayed. Press the REC/ENTER button to store the selection. If enabled, the power off function shuts off the HHF-SD1 after a period of inactivity of ten minutes.
6. **Enable or disable the beeper.** Once the auto power off function has been enabled or disabled, the display will show the word “yES” over the word “bBEEP”. Press the SET ▼ button until the desired setting (“yES” or “no”) is displayed, and then press the REC/ENTER button to store the selection as the default.
7. **Select the thermocouple type.** Once the beep sound has been enabled or disabled, the lower part of the display will show the term “tYPE”. Press the SET ▼ or LOGGER button until your thermocouple’s type (K or J) appears on the display. Then press the REC/ENTER button to store the selection.
8. **Select the temperature unit.** Once the thermocouple type has been selected and stored, the lower part of the display will show the term “t-CF”. Press the SET ▼ or LOGGER ▼ button until the unit you prefer (“F” for Fahrenheit, “C” for Celsius”) is displayed. Then press the REC/ENTER button to store the selection as the default.
9. **Set the datalogging sampling time.** Once the default temperature unit has been set and stored, the display will show a value above the letters “SP-t”. Press the SET ▼ or LOGGER _ button to decrease or increase the value until the desired sampling time appears above “SP-t”. The options are 0, 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800 and 3600 seconds (0 seconds to 1 hour).
10. **Format the SD card.** Once the sampling time has been set and stored, the term “Sd-F” will appear in the lower half of the display. Press the REC/ENTER button.

Pressing the REC/ENTER button causes the word “no” or “yES” to appear over the term “Sd-F”. Press the ▼ button to make a selection. Choose “yES” whenever a new SD card is being used, or when a used card is being repurposed (from use with another SD card instrument or a camera, for example) and all data on it is to be erased. Choose “no” to preserve any data on a card previously used with this instrument.

If you choose “yES”, after you press the REC/ENTER button the instrument will prompt you to confirm that decision by displaying the term “Ent” below “yES” and sounding three beeps. To confirm that you want to begin the erasure/formatting procedure, press the REC/ENTER button. “Ent” will then flash several times and the instrument will sound another three beeps to confirm that the SD card has been erased and formatted.

Once the SD card has been set up, the display will then either return to the first of the eight steps in the setup sequence—setting the current date and time—or show the term “ESC”. If “ESC” appears, press the POWER/ESC button to exit the setup procedure and enter normal operating mode.

NORMAL OPERATION

1. **To prepare to make measurements**, power on the HHF-SD1 and make sure an SD card is firmly seated in the socket on the bottom of the instrument.

The meter can make and display two kinds of measurements:

- Air speed and temperature (simultaneously)
 - Surface temperature, as measured by an optional Type K or Type J thermocouple
2. **To select the measurement mode**, use the FUNC./HOLD/NEXT button. Pressing the button repeatedly toggles between the two modes. When the FUNC./HOLD/NEXT button is released, the selected mode becomes the default until the button is pressed again.

By default, the HHF-SD1 uses Celsius units for temperature measurements. If you wish to make Fahrenheit units the default, press the SET ▼ button to enter the setup procedure and perform Step 8.

3. **To measure air velocity and temperature simultaneously:**
 - a. Seat the telescoping probe plug (callout 1-17 of Fig. 1) in its socket (callout 1-7) on the top of the instrument.
 - b. Press the FUNC./HOLD/NEXT button until the display shows the term “Air”.
 - c. Holding the probe by its handle, slide the sensor cover (callout 1-19) on its end down to expose the sensor. Do not touch the sensor with tools or your fingers; the thin hot wire and thermistor inside it are easily damaged.
 - d. Extend the probe to a convenient length.
 - e. Rotate the probe until the mark on top of the sensor head faces the wind or the flow of air whose speed/temperature you wish to measure. The upper part of the display will show the air speed while the lower part will show the temperature (as “°F” or “°C”).

To change the unit of air speed, use the REC/ENTER button (which has the word “Unit” stenciled below it). Repeated presses of the button cycle through the five options for air speed units: m/s (meters/second), fpm (feet per minute), km/h (kilometers/hr), knots (nautical miles per hour), and mph (miles per hour). Release the REC/ENTER button when the unit you wish to use appears, making it the default until changed.

4. **To measure surface temperature using a thermocouple**, make sure the multi-function probe is **not** in its socket. Plug an optional Type K or Type J thermocouple into its dedicated socket (callout 1-8 of Fig. 1). Then press the FUNC./HOLD/NEXT button until the display shows the term “tP”.

Touch the wire end of the thermocouple to the surface whose temperature you wish to measure. The display will show its temperature (as “°F” or “°C”).

By default, the HHF-SD1 is configured for a Type K thermocouple. To use a Type J thermocouple, press the SET_ button to enter the setup procedure and perform Step 7.

Whenever the instrument is operating in measurement mode, you can turn off the backlight (which is on by default) by briefly pressing (but not holding) the POWER/ESC button. To reactivate the backlight, briefly press the button again.

Whenever the HHF-SD1 is in either measurement mode, you also can check the current date and time by briefly pressing the SET ▼ button (which has the words “Time check” stenciled below it). Doing so causes both values to appear briefly at the lower left of the display.

HOLDING AND STORING MEASUREMENTS

1. **To hold a measured value**, press the FUNC./HOLD/NEXT button during the measurement. Doing so will cause the word “HOLD” to appear at the top of the display. Pressing the FUNC./HOLD/NEXT button again releases the hold.
2. **To record and recall readings**, press the REC/ENTER button while making measurements. This will make the term “REC” appear at the top of the display. Pressing the REC/ENTER button again, briefly, will make the term “MAX” appear to the right of “REC” and switch the display to the maximum value stored in memory during the last recording session. Pressing the REC/ENTER button again, briefly, will make the term “MIN” appear to the right of “REC” and switch the display to the minimum value stored during the last session.
3. **To exit recording mode**, press the REC/ENTER button and hold it for at least three seconds, until the term “REC” disappears from the top line of the display. The display will then revert to showing the current reading.

AUTOMATIC VS. MANUAL DATALOGGING

The HHF-SD1 can automatically log data at a user-selected sampling period from 1 second to 3,600 seconds (one hour). To view the sampling time that the instrument has been set up to use, press the LOGGER ▲ button (which has the words “Sampling check” stenciled below it) once. To change the sampling time, perform Step 9 of the setup procedure.

1. **To start automatic datalogging**, press the REC/ENTER button once. The top line of the display will then show the term “REC”. Pressing the LOGGER ▲ button at this point will make REC flash and add the flashing term “LOGGER” at the top right of the display. This indicates that the instrument is currently storing measured values and their time stamps in memory.
2. **To pause automatic datalogging**, press the LOGGER ▲ button once; this action makes the flashing term “LOGGER” disappear from the top right of the display and changes the term “REC” from flashing to constant. Pressing the LOGGER ▲ button again resumes automatic datalogging.
3. **To end automatic datalogging**, press the REC/ENTER button and hold it for at least two seconds. This action causes the “REC” message to disappear.
4. **To log data manually**, set the sampling time to zero using the procedure detailed earlier. Then press the REC/ENTER button once. The display will show the term “REC” on the top line, a value in the middle, and below it the letter “P” on the left and a number from 1 to 99 on the same line to the right. The number indicates the position on the SD card that will be used to store manually logged data.

Now press the **LOGGER ▲** button. This will cause the beeper to sound and the term “**LOGGER**” to briefly appear at the upper right of the display. As in automatic datalogging mode, in this mode the instrument is storing measurements and their time stamps on the SD card.

In manual datalogging mode, however, measurements are being stored continuously (with a sampling time of zero), and their locations on the card can be changed.

5. **To change the storage location of manually logged data**, press the **SET ▼** button once; this causes the “**P**” to disappear from the left side of the display and the value on its line to begin flashing. Once the flashing begins, you can use the **SET ▼** and **LOGGER ▲** buttons to change the flashing value to any number between 1 and 99. Once you have chosen the storage location, press the **REC/ENTER** button to save the setting. This causes the value to stop flashing and the “**P**” to return.
6. **To end manual datalogging**, press the **REC/ENTER** button and hold it for at least three seconds. This action causes the “**REC**” message to disappear from the top line of the display.

TRANSFERRING DATA FROM THE SD CARD TO A COMPUTER

After automatic or manual datalogging of measurements, remove the SD card from the instrument and plug it into your computer either directly (if it has an SD card slot) or through an SD card reader.

Because the files containing time-stamped data logs have the file extension .xls, they open in Microsoft’s Excel application. Figures 2 and 3 show two kinds of Excel presentations: a data-only screen and a graphics-only screen.

	A	B	C	D	E	F	G	H	I	J
1	Place	Date	Time	Value	Unit	Value	Unit			
2		1	2009/6/8	15:12:16	0.8 m/s	28.8	AMTemp C			
3		2	2009/6/8	15:12:17	2.2 m/s	28.8	AMTemp C			
4		3	2009/6/8	15:12:18	2.1 m/s	28.8	AMTemp C			
5		4	2009/6/8	15:12:19	2.9 m/s	28.9	AMTemp C			
6		5	2009/6/8	15:12:20	2.9 m/s	28.8	AMTemp C			
7		6	2009/6/8	15:12:21	2.7 m/s	28.8	AMTemp C			
8		7	2009/6/8	15:12:22	3.6 m/s	28.8	AMTemp C			
9		8	2009/6/8	15:12:23	2.9 m/s	28.8	AMTemp C			
10		9	2009/6/8	15:12:24	2.9 m/s	28.8	AMTemp C			
11		10	2009/6/8	15:12:25	2.9 m/s	28.8	AMTemp C			
12		11	2009/6/8	15:12:26	2.9 m/s	28.9	AMTemp C			
13		12	2009/6/8	15:12:27	3 m/s	28.8	AMTemp C			
14		13	2009/6/8	15:12:28	3.1 m/s	28.8	AMTemp C			
15		14	2009/6/8	15:12:29	3.1 m/s	28.7	AMTemp C			
16		15	2009/6/8	15:12:30	5.9 m/s	29.1	AMTemp C			
17		16	2009/6/8	15:12:31	4.2 m/s	29	AMTemp C			
18		17	2009/6/8	15:12:32	3.2 m/s	28.9	AMTemp C			
19		18	2009/6/8	15:12:33	2.6 m/s	28.6	AMTemp C			
20		19	2009/6/8	15:12:34	3.1 m/s	28.7	AMTemp C			
21		20	2009/6/8	15:12:35	3 m/s	28.7	AMTemp C			
22		21	2009/6/8	15:12:36	3 m/s	28.9	AMTemp C			
23		22	2009/6/8	15:12:37	3.1 m/s	28.9	AMTemp C			
24		23	2009/6/8	15:12:38	2.8 m/s	28.9	AMTemp C			

Fig. 2. Typical Excel data-only screen

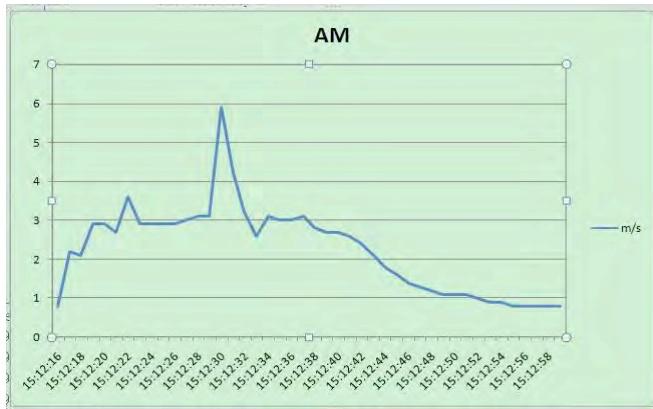



Fig. 3. Typical Excel graphics-only screen

SPECIFICATIONS

Embedded microcontroller	Custom one-chip LSI device
Display type	Liquid-crystal with green backlight
Display size	2.05 x 1.5 in. (52 x 38mm)
Parameters measured	Air speed, temperature
Measurement range	For temperature, 32° to 122°F (0° to 50°C); for air speed: 0.2 to 25 m/sec, 0.7 to 172 km/hr, 0.5 to 44.7 mph, 0.4 to 38.8 knots, 40 to 3940 ft/min
Measurement accuracy	For air speed: $\pm (5\% + 0.1 \text{ m/sec})$, $\pm (5\% + 0.3 \text{ km/hr})$, $\pm (5\% + \text{mph})$, $\pm (5\% + 0.2 \text{ knots})$, $\pm (5\% + 20 \text{ ft/min})$; for temperature: $\pm 1.5^\circ\text{F}$ ($\pm 0.8^\circ\text{C}$)
0.2	
Measurement resolution	For air speed: 0.01 m/s (0.2 to 5.0 m/s), 0.1 m/s (5.1 to 25.0 m/s); 0.01 km/hr (0.7 to 18 km/hr), 0.1 km/hr (18 to 72 km/hr); 0.01 mph (0.5 to 11.20 mph), 0.1 mph (11.2 to 44.7 mph); 0.01 knot (0.4 to 9.7 knots), 0.1 knot (9.7 to 38.8 knots); 1 ft/min (40 to 3940 ft/min); for temperature, 0.1 °F or C
Sampling time options	0, 1, 2, 5, 10, 30, 60, 120, 300, 600, 1800 or 3600 seconds (0 seconds to 1 hour)
Settable parameters	Date, time, auto power off, beep sound, sampling time, decimal point or comma decimal division, temperature unit, air speed unit, optional thermocouple type (K or J)
Storable/recallable readings	Maximum, minimum
SD card capacity	1 GB to 16 GB
Operating temperature	32° to 122°F (0° to 50°C)
Operating relative humidity	0 to 85%
Power supply	Six Alkaline “AA” batteries or optional 9-VDC AC adapter
Power consumption	30 mADC (normal operation, with backlight off and SD card not saving data); 50 mADC (with backlight on and card saving data)
Dimensions of instrument	7.99 x 2.99 x 1.50 in. (203 x 76 x 38mm)
Weight of instrument	1.13 lb. (515g)
Dimensions of probe	0.4724 in. (diameter) x 11.02 in.(collapsed)/37 in.(extended) (12mm x 280mm/940mm)

MAINTENANCE & TROUBLESHOOTING TIPS

Keep the telescoping probe clean and move the sensor cover at its tip to the up position when not using the probe. Store the probe in the carrying case when you are not using the anemometer.

When the icon  appears in the left corner of the display, it's time to replace the six "AA" batteries that power the instrument (although measurements will remain valid for several hours after the low-battery indicator first appears). Replacing the batteries requires removing the two screws that hold the battery compartment cover in place, as explained in Step 1 of the Setup procedure. After inserting fresh batteries in the correct orientation, tighten the screws to secure the cover.

If the meter "freezes" (like a computer) and buttons become unresponsive, try resetting the instrument by pushing the RESET button on its right side (callout 1-11 of Fig. 1) with the end of a paper clip.

Remove the batteries when storing the meter for an extended period of time.

Do not drop or disassemble the meter or immerse it in water.

OPTIONAL ACCESSORIES

Optional accessories available from General Tools & Instruments include:

- Type K and Type J thermocouples
- 9VDC adapter for a 110V power supply

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.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA 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.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

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.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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