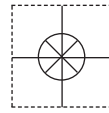


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WARNING: These products are not designed for use in, and should not be used for, human applications.

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INTRODUCTION

Thank you for purchasing Omega's RHXL3SD Thermometer-Hygrometer with Datalogging SD Card. Please read this user's manual carefully and thoroughly before using the instrument.

The RHXL3SD is a general-purpose handheld instrument that can make four kinds of measurements:

- The temperature and humidity (simultaneously)
- The dew point of ambient air
- The wet-bulb temperature of ambient air
- The temperature of a surface

The instrument comes with a temperature-humidity probe that is used to make the first three types of measurement. Surface temperature measurements are made using an optional Type K or Type J thermocouple.

Several features and capabilities enhance the RHXL3SD's versatility. Among them are automatic temperature compensation for dew point, wet-bulb and thermocouple measurements; 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 RHXL3SD 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 the instrument time-stamps and stores the measurements on an SD card plugged into it (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 that can be opened by Microsoft's Excel application.

The RHXL3SD has a backlit 2-1/2 inch diagonal display and is powered by six AA Alkaline batteries or an optional 9-VDC AC adapter.

KEY FEATURES

- Four-function instrument measures temperature/humidity, dew point, wet-bulb temperature and surface temperature
- Big (2.5-inch 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 as large as 16 GB
- Auto power off function
- Powered by six AA batteries or optional 9V AC/DC adapter

OPERATING INSTRUCTIONS

What's in the case

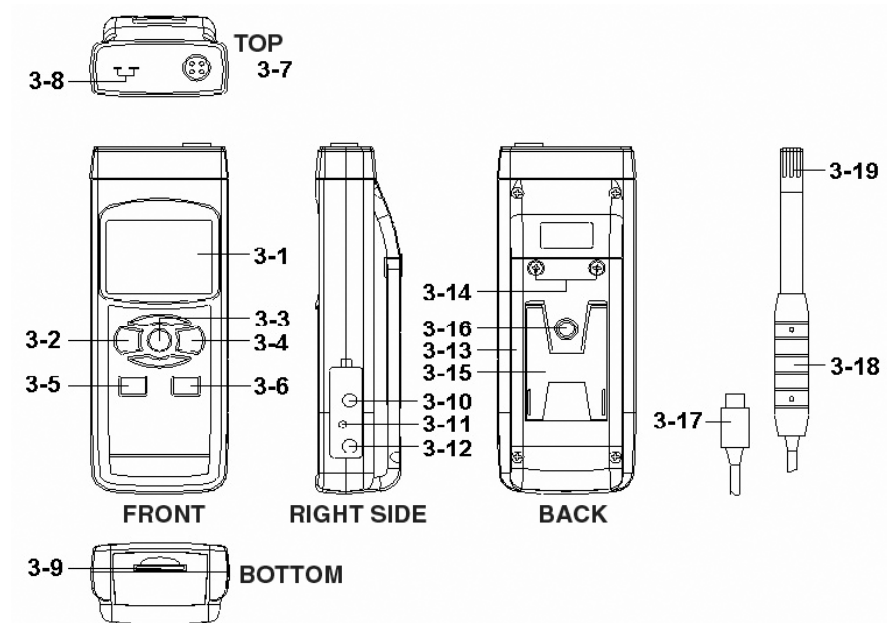
The RHXL3SD comes fully assembled in a soft carrying case along with a temperature-humidity probe, a 2 GB SD memory card and this user's manual.

Optional accessories available include:

- Type K and Type J thermocouples
- A 9VDC adapter for a 110VAC power supply
- A hard carrying case

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 RHXL3SD. It also shows the main components of the included temperature-humidity probe. Familiarize yourself with the positions and functions of these controls, indicators and connectors before moving on to the setup procedure.



1. The RHXL3SD's controls and indicators and other physical features

[CALLOUTS FOR FIGURE 1]

- 3-1 Liquid-crystal display
- 3-2 POWER/ESC button
- 3-3 FUNC./HOLD/NEXT button
- 3-4 REC/ENTER button
- 3-5 SET ▼ button
- 3-6 LOGGER ▲ button
- 3-7 Socket for temperature-humidity probe
- 3-8 Socket for Type K or J thermocouple thermometer
- 3-9 SD card socket

- 3-10 RS-232 output jack
- 3-11 RESET button
- 3-12 Socket for 9VDC AC adapter
- 3-13 Battery compartment cover
- 3-14 Battery compartment cover screws
- 3-15 Kickstand
- 3-16 Tripod attachment nut
- 3-17 Temperature-humidity probe plug
- 3-18 Temperature-humidity probe handle

- 3-19 Temperature-humidity probe head

Setup

- 1. Choose the power source.** Before using the RHXL3SD, 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 the supplied 2 GB SD memory card or another card with a capacity from 1 GB to 16 GB 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 RHXL3SD, press the POWER/ESC button and hold it until the instrument responds with a long beep.)

When the meter 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 RHXL3SD after a period of inactivity of ten minutes.
6. **Enable or disable the beeper.** Once the auto power off scheme has been chosen and stored, the display will show the word “yES” over the word “bEEP”. 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 thermocouple type has been selected 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 formatted (or not), the display will 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

To prepare to make measurements, power on the RHXL3SD and make sure an SD card is firmly seated in the socket on its bottom.

The meter can make and display four kinds of measurements:

- The temperature and humidity of a fluid (simultaneously)
- The dew point temperature of ambient air
- The wet-bulb temperature of ambient air
- The temperature of a surface, as measured by a Type K or Type J thermocouple

1. **To select the measurement mode**, use the FUNC./HOLD/NEXT button. Pressing the button repeatedly cycles through the four modes. When the FUNC./HOLD/NEXT button is released, the selected mode becomes the default until the button is pressed again.

By default, the RHXL3SD uses Celsius units for temperature measurements. To make Fahrenheit units the default, perform Step 8 of the setup procedure.

2. **To measure temperature and humidity simultaneously**, seat the temperature-humidity probe plug (callout 1-17 of Fig. 1) in its socket (callout 1-7) on the top of the instrument. Then press the FUNC./HOLD/NEXT button until the display shows the term “rH”. Holding the probe by its handle, expose the head to a representative volume of air whose temperature and humidity you wish to measure. The upper part of the display will show the measured relative humidity value (as “%RH”) while the lower part will show the temperature (as “°F” or “°C”).
3. **To measure the dew point** of ambient air, make sure the temperature-humidity probe is seated in its socket. Then press the FUNC./HOLD/NEXT button until the lower part of the display shows the term “dP”. The upper part of the display will show the measured dew point value in °F or °C”.
4. **To measure the wet-bulb temperature** of ambient air, make sure the temperature-humidity probe is seated in its socket. Then press the FUNC./HOLD/NEXT button until the lower part of the display shows the term “_Et”. The upper part of the display will show the measured dew point value in °F or °C”.

- 5. To measure surface temperature using a thermocouple**, make sure the temperature-humidity 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).

By default, the RHXL3SD is configured for a Type K thermocouple. To use a Type J thermocouple, perform Step 7 of the setup procedure.

Whenever the instrument is 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 instrument is in 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 RHXL3SD can automatically log data at a user-selected sampling period from 1 second 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 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 time-stamping measurements and storing them 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 three seconds. This action causes the “REC” message to disappear.
- 4. To log data manually**, set the sampling time to zero by performing Step 9 of the setup procedure. 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 stored continuously (with a sampling time of zero), and their locations on the card can be changed.

- 1. 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.
- 2. 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 the time-stamped data logs have the 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	Value	Unit	
2		1	2009/4/23	18:48:59	53.8 %RH	29.5	Degree C			
3		2	2009/4/23	18:49:01	53.8 %RH	29.5	Degree C			
4		3	2009/4/23	18:49:03	53.8 %RH	29.5	Degree C			
5		4	2009/4/23	18:49:05	53.8 %RH	29.5	Degree C			
6		5	2009/4/23	18:49:07	53.7 %RH	29.5	Degree C			
7		6	2009/4/23	18:49:09	53.7 %RH	29.5	Degree C			
8		7	2009/4/23	18:49:11	66.1 %RH	29.5	Degree C			
9		8	2009/4/23	18:49:13	76.7 %RH	29.6	Degree C			
10		9	2009/4/23	18:49:15	75.9 %RH	29.6	Degree C			
11		10	2009/4/23	18:49:17	66.8 %RH	29.7	Degree C			
12		11	2009/4/23	18:49:19	63.2 %RH	29.6	Degree C			
13		12	2009/4/23	18:49:21	58.5 %RH	29.6	Degree C			
14		13	2009/4/23	18:49:23	56 %RH	29.6	Degree C			
15		14	2009/4/23	18:49:25	55 %RH	29.6	Degree C			
16		15	2009/4/23	18:49:27	54.8 %RH	29.5	Degree C			
17		16	2009/4/23	18:49:29	54.4 %RH	29.5	Degree C			
18		17	2009/4/23	18:49:31	54.3 %RH	29.5				
19										

2. Typical Excel data-only screen




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 inches (52 x 38 mm)
Parameters measured	Temperature, relative humidity (R.H.), dew point, wet-bulb temperature
Measurement range	For temperature, 32 to 122°F (0 to 50°C); for R.H., 5 to 95%; for dew point, -13.5 to 120.1°F (-25.3 to 48.9°C); for wet-bulb temperature, -6.9 to 122°F (-21.6 to 50°C)

Humidity accuracy	≥70% RH: ± (3% reading + 1% RH) <70% RH: ± 3% RH
Measurement accuracy	± 1.5°F (± 0.8°C) for temperature; sum of temperature and humidity accuracies for dew point and wet-bulb temperature
Measurement resolution	0.1 degree (F or C) for temperature and humidity
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
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	3.5 mADC (normal operation, with backlight off and SD card not saving data); 28 mADC with backlight on and card saving data; 40 mADC with backlight on and card saving data
Dimensions of meter	6.97 x 2.68 x 1.77 inches (177 x 68 x 45 mm)
Weight of meter	1.08 lb (489 g)

MAINTENANCE & TROUBLESHOOTING TIPS

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 instrument “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 or not using the instrument for an extended period of time.

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

OPTIONAL ACCESSORIES for RHXL3SD

Optional accessories available include:

- 2GB-SD 2GB SD Card
- Adapter-SD AC to DC 9V Adapter
- USB-SD USB Cable
- RS232-DS RS232 Cable
- SW-U101-WIN Hard Carrying Case

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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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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- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Data Logging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments