



HM-1 & HM-1U™

Hazmat Systems

User's Guide

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1) Introduction

The HM-1 & HM-1U hazmat weather stations are designed for first responders to hazardous material incidents. The weather station provided important real-time information for monitoring and responding to incidents. The long range radios on our hazmat stations allow responders to monitor the situation in real-time and from a safe distance.

Our hazmat stations work in conjunction with CAMEO/ALOHA software that enables responders to monitor plume dispersion. CAMEO was developed by Chemical Emergency Preparedness and Prevention Office (CEPPO) and the National Oceanic and Atmospheric Administration Office of Response and Restoration (NOAA). The software was developed for front-line chemical emergency planners and responders. CAMEO helps in evaluating and predicting dispersion patterns.



2) Getting Started

There are two models of our hazmat stations. The HM-1 and the HM-1-US are Rainwise's two stations. The HM-1-US has the same features as an HM-1 except it has a Windsonic anemometer.

HM1



HM-1-US



2.1) Hazmat Components

- Transport Case
- Tripod
- Tripod Base
- Ground Anchor Kit
- Battery Support Tube
- Sensor Assembly
- Wireless Display (with serial cable)
- 6 VDC charger for Wireless Display



3) Installation & Power Up

The Hazmat weather stations are designed for rapid deployment and can be setup by one person in less than 2 minutes. The most common setup is on the tripod provided. A vehicle mount is also sold separately as an option.

3.1) Setting up Tripod

The tripod requires no tools to setup and features a unique push button locking system that is secure and easy to use. The tripod is adjustable to a fully extended wind sensor height of 10 feet. A bubble level is on the tripod to ensure the base is stable.

1. Remove tripod.
2. Attach tripod legs to tripod base (as seen in Figure 2.1)
3. Extend the three tripod legs to the desired length.
4. Install the tripod feet. The tripod feet should be installed so the black tab is facing out.



Figure 2.1

Ground Anchor Kit: (for extreme weather conditions or long term deployment)

1. Nail anchor plate into ground with securing spikes provided.
2. Attach rope provided from the anchor plate up to the tripod base.



3.2) Installing Battery Support Tube

The battery/support tube is shipped with 4 “D” batteries installed. We recommend changing the batteries every three months to ensure proper operation of the system. To change the batteries, unscrew the battery cap from the base of the battery/support tube. The positive end of the batteries should insert into the tube first.

1. Loosen the thumb screw on the side of the tripod support base and insert the battery/support tube into the tripod base.
2. Seat the tube securely by matching the cut-out in the tube with the support base.
3. Tighten the thumb screw.

3.3) Powering Up

1. Insert the sensor assembly onto the battery support tube.



- a. Tilt the tripod until it is easy to place the sensor assembly onto the mast.
- b. Make sure the slot in the sensor assembly mast fits over the screw in the battery/support tube to prevent rotation of the unit.
- c. When the sensor assembly is attached to the battery/support tube, the system automatically begins to operate.
- d. The LED at the bottom of the sensor assembly should now flash every 30 seconds indicating the system is operating.

An electronic compass is installed in the sensor assembly which eliminates the need to orient the sensor assembly to a specific direction. The sensor assembly will automatically orient itself.

3.4) Displaying Data

1. Open the display case and switch the “SYSTEM POWER” and “DISPLAY” switches on.
 - a. Real-time sensor information will be displayed within 30 seconds.
2. The display may be moved to a remote location.
 - a. The transmitter has a maximum range of **7 miles**. Ranges in excess of ¼ mile require clear line of sight.

Refer to Section 5.0 for more detailed operating instructions of the wireless display.

4) Sensor Assembly

The sensor assembly comes completely assembled. The sensor assembly contains the following sensors:

- **Wind Speed**
- **Wind Direction**
- **Wind Chill**
- **Dew Point**
- **Temperature**
- **Humidity**
- **Heat Index**
- **Barometric Pressure**
- **Radiation Detector:** For early warning and general monitoring of radiation levels. Displays current level in REMs and total exposure in REM hours. This sensor is designed as an early warning device and does not replace hand held Geiger counters.
- **Electronic Compass:** insures the reported wind direction is accurate regardless of the assembly’s orientation.

4.1) Sensor Assembly Power

The sensor assembly is powered by 4 Alkaline D cell batteries. The battery life is greater than 1000 hours with these batteries. For fixed installations, extension cables are available to permanently connect power.

5) Wireless Display (RDI-1 & RDI-1-US)

Once the sensor assembly has been made operational, the wireless display will immediately receive data after turning the "System Power" switch on. Turn the "Display" switch on and data will be displayed on the next transmission received.

RDI-1 is supplied with the HM-1. RDI-1-US is supplied with the HM-1-US.



After the RDI-1 is powered the display will show 12:00 and the other displays will show dashes (----.)

Within 30 seconds the unit should receive information from the sensor unit. When this happens the dashes will be replaced with current values.

If after a couple of minutes the dashes don't disappear try another location. If you feel you are well within the sensor units range and there is still no reception refer to Section 5.7 "Diagnostic Mode".

5.1) Wireless Display Power

The wireless display is powered by re-chargeable lead-acid batteries. The display will run up to 24 hours before needing to recharge. The batteries should be recharged for 24 hours after each use to ensure optimal performance and battery life. A 6 VDC charger is supplied in the main carrying case.

The display can be switched off to conserve battery life. The display will not lose data or reset its clock while the display is switched off.

The display may also be powered from 12 volts DC or 110 VAC (with transformer provided). This allows the display to be permanently installed in a vehicle or control room.

5.2) Connecting to a Computer

To connect to a computer running CAMEO/ALOHA:

1. Use the serial cable located in the lid of the display.
 - a. Plug the phono jack into the RDI-1 and the DB9 connector into the computer serial port.
 - b. The display will provide ALOHA compatible weather data to the computer.
2. Select a SAM station under the "Setup/Atmospheric" menu.
3. Select the appropriate COM port and Aloha should begin to receive data within 30 seconds.

6) Wireless Display Settings

Quick Reference Guide:

Note: The parameters can be selected by pressing directly on the word. For instance when setting the time press directly on the word "TIME".

Setting the Clock/Calendar:

- MAX – SELECT – TIME – MAX
- Up/down with MIN/MAX
- SELECT when done
- Keep pressing SELECT to Exit

Display a Max or Min:

- MAX/MIN- Parameter button

Reset a Max or Min:

- Hit SELECT while a max or min is being displayed

Turning Displays On and Off

- MAX – SELECT – BRIGHTNESS
- Press parameter buttons to toggle on and off.
- SELECT when done
- Keep pressing SELECT to Exit

Make a parameter toggle

- SELECT – parameter button

Lock display

- MAX – SELECT – HUMIDITY
- Press HUMIDITY button to toggle to "Loc".
- SELECT twice when done.

Unlock display

- HUMIDITY and BAROMETER together.

Parameters:

Time: Displays either current time or date.

Temperature: Displays outside and inside temperature as well as wind chill and dew point.

Humidity: Displays Relative Humidity and the Temperature Humidity Index (THI). **THI** is a measure of relative heat that a human feels, accounting for temperature and humidity combined.

Barometer: Displays barometric pressure and indicates if the pressure is falling, rising or is steady (LEDs off).

Wind Speed: Displays current wind speed and rose shows wind direction.

Radiation: Displays current level in REMs and total exposure in REM hours. This sensor is designed as an early warning device and does not replace hand held Geiger counters.

6.1) Setup Mode

Enter the setup mode:

Press



then

SELECT

All the displays will go blank and the MIN and MAX lights will be flashing.

In the setup mode you can change one or all of the parameters. Select the parameter you wish to change by pressing the appropriate button. Once you have changed that parameter, you will be returned to the Setup mode. Choose another parameter or press **SELECT** to exit back to normal operation.

6.11) Time/Date

- Be sure you are in the setup mode. The max and min LEDs should be flashing.
- Press the **TIME** button (press on the word TIME). The current time will appear.
- Press the **MAX** button once. Use the **MIN** and **MAX** buttons to select 12 hour or 24 hour format. Press **SELECT** to accept.
- Press the **MAX** button once. The hour will now be flashing. To change the hour press the **MAX** button to increase and **MIN** to decrease it. The hours are shown in 24-hour military time.
- Press the **SELECT** button when the hour is correct. The minutes will now flash. Repeat the same steps as with the hour adjustment.
- Press **SELECT** when done. Note that the seconds are set to zero when **SELECT** is pressed.
- The month will flash. Set the month in the same way.
- Press **SELECT** when done.
- The day will flash. Set the day in the same way.
- Press **SELECT** when done.

6.12) Parameter Units

Units of temperature, wind speed, rainfall and barometric pressure can be set independently in the setup mode.

TEMPERATURE

- Be sure you are in the setup mode. The max and min LEDs should be flashing.
- Press **TEMPERATURE** (press the word TEMPERATURE).
- The temperature display will show either “U 0” or “U 1”. This indicates the selected temperature units. “0” is for Fahrenheit and “1” is for Celsius. The THI units are also set by this option.
- Press **MAX** button to select Celsius (“1”) or **MIN** for Fahrenheit (“0”).
- Press **SELECT** when done.

WIND SPEED

- Be sure you're in the setup mode. The max and min LED's should be flashing.
- Press **WIND SPEED** (press on the words WIND SPEED).
- The wind speed display will show "U.0", "U.1", "U.2" or "U.3". This indicates the selected wind speed units.
- "U.0" is miles per hour, "U.1" is kilometers per hour, "U.2" is knots and "U.3" is meters per second.

BAROMETER

- Be sure you are in the setup mode. The max and min LED's should be flashing.
- Press **BAROMETER** (press on the word BAROMETER).
- The barometer display will show either "U. 0" or "U. 1".
- Press **MAX** button to select millibar ("1") or **MIN** for inches ("0").
- Press **SELECT** when done.
- Assuming no offset has been entered, the current absolute pressure will be displayed.
- Call a local airport for the current sea-level pressure.
- Adjust your display to match this value by pressing **MAX** to increase the value and **MIN** to decrease it.
- **OPTIONAL:** To display the actual offset value press **MAX** and **MIN** at the same time. You can set this back to zero by pressing the **SELECT** key. You must be holding down both **MAX** and **MIN** when you do this.
- Press **SELECT** when done.

6.2) Brightness

Pressing the Brightness button will dim the displays. If the displays are already dim they will return to full brightness.

6.3) Automatic Toggling of Displays

Display windows with multiple parameters can be set to toggle every two seconds. One or multiple windows can be set to toggle.

The following windows can be set to toggle:

- Time/Date
- Temperature
- Humidity/THI
- Radiation

To start a window to toggle: Press **SELECT** then the button below the window you wish to scroll. To stop a window scrolling, press the button below the window.

6.4) Fine Tuning Temperatures

The inside temperature is affected by a number of environmental factors. You may wish to adjust the temperature offset up or down by a couple of degrees to compensate for these factors. Only perform these adjustments once the unit has had time to stabilize (30 min after power up).

- Enter the Setup mode by pressing **MAX** then **SELECT**. The max and min LEDs should be flashing.
- Press **TEMPERATURE**
- Press **SELECT**. The designator setting “ch” or “ch1” will be displayed.
- Press **BRIGHTNESS once for inside temperature or twice for outside temperature**. The current temp will be displayed. This value may be adjusted by adding an offset. Don't change this unless you are sure the value is not correct.
- Press **MAX** to increase the offset and **MIN** to decrease it.
- Press **MAX** and **MIN** at the same time to display the actual offset value. You can set this back to zero by pressing the **SELECT** key. You must be holding down both **MAX** and **MIN** when you do this.
- Press **SELECT** when done.
- Press **SELECT** again to exit the setup mode.

6.5) Setting Temperature Characters

A designated temperature character can be enabled in the temperature window. This feature is typically only used when the temperature window is set to scroll. To set or clear this feature, follow these steps:

- Enter the Setup mode by pressing **MAX** then **SELECT**. The max and min LEDs should be flashing.
- Press **TEMPERATURE**. The current units will be displayed either “U 0” or “U 1”.
- Press **SELECT**. The designator setting “ch 0” or “ch 1” will be displayed.
- To enable the designator press the **MAX** button “ch 1”. To clear the designator press the **MIN** button “ch 0”.
- Press **SELECT** when done.
- Press **SELECT** again to exit the setup mode.

6.6) Operating the Display

For a detailed explanation on each parameter display, refer to Section 5.0.

6.61) Selecting Display Parameters

Pressing the button below a display will cycle through the available display options. The LED next to the display will indicate the current selection. The scroll mode will cycle through these selections automatically. Refer to Section 2.4 to set auto scroll.

6.62) Turning Displays On and Off

Displays may be turned on or off independently.

- Enter the Setup mode by pressing **MAX** then **SELECT**. The MAX and MIN LEDs should be flashing.
- Press **BRIGHTNESS**.
- Each display will show either “on” or “off”.
- To change a display’s status, press the button below the desired display (for example, “TIME”.) This will toggle the status.
- Press **SELECT** when done.
- Press **SELECT** again to exit the setup mode.

6.63) Displaying Minimums and Maximums

To display a maximum value, press **MAX**, then press the button below the desired display. The maximum value will be displayed along with the date and time of occurrence. The “min” or “max” of the current selection will be displayed. Ensure that the desired selection is being displayed before doing the max/min sequence. If the window is scrolling, stop it by pressing the button below the display before pressing **MAX**.

6.64) Resetting Minimums and Maximums

Minimum values are displayed in the same manner as the maximums. Maximums and Minimums can be reset by pressing **SELECT** while a max or min is being displayed. The new value will flash to indicate that it has been reset.

6.65) Resetting Radiation

To reset the accumulated radiation count set the **RADIATION** display to the accumulated display by pressing the **RADIATION** button until the LED next to **ACC** is lit. Next press the **MAX** button then press the **RADIATION** button. Press **SELECT** while the last recorded time/date reset is being displayed in the time window.

6.66) Locking the Display

The display can be locked to prevent tampering. The lock will disable the **SELECT** key. This will disable the following functions:

- Min and Max reset.
- Entry into the setup mode.
- Entry into the diagnostic mode.

LOCK DISPLAY:

- Enter the Setup mode by pressing **MAX** then **SELECT**. The max and min LED's should be flashing.
- Press **HUMIDITY**.
- The display will show either “run” or “Loc”.
- Toggle this selection by pressing **HUMIDITY**.
- When “Loc” is displayed press **SELECT**.
- Press **SELECT** again to exit the setup mode.

UNLOCK DISPLAY:

- Press **HUMIDITY** and **BAROMETER** together. This will cause the unit to reset. When the unit resets, “- - -” will be shown in the windows until data is received again. If the display is powered down it will automatically unlock.

NOTE: To exit the setup mode at any point, keep pressing **SELECT** until the unit returns to normal operation (In most cases twice).

6.7) Diagnostics Mode

The diagnostic mode is seldom needed or used. It provides information about sensor unit voltage, software versions, communications, and the ability to reset the display back to factory defaults.



HUMIDITY – shows the software versions of the display and sensor unit. The two digits on the left represent the display version number and the two on the right is the station version.

TEMPERATURE – for checking the battery condition of the sensor unit. The value toggles between the current, maximum, and minimum battery voltage during the last 24 hours.

TIME – for communication diagnostics. The number on the right indicates the reception of good data packets. Bad data packets are displayed on the left.

WIND SPEED – for communication diagnostics. The value increments with every data byte received. The number wraps at 100. The byte count as well as the packet counters can be reset by pressing the wind speed button.

6.71) Factory Reset

The display can be reset to factory defaults if the **BAROMETER** button is pressed while in Diagnostic mode.



Once the button has been pressed, the unit will reset. The EEPROM memory is tested; this may take a few seconds. If the process is halted and the time display shows “bad,” contact the RainWise Service Department.

7) Archiving Data & Other Software

After an event you may wish to archive the data. Close the CAMEO/ALOHA program then you may use either a terminal emulation program such as Hyperterminal or the VWS software supplied with the interface.

7.1) Serial Command Protocol

All standard commands to the Computer Interface begin with a colon character, (:). This serves as the attention signal to the system. The Computer Interface will respond with a greater-than character (>). After the greater-than prompt is received, the host sends a single letter command from the list below. The Computer Interface will respond with one or more lines of data or messages. If an unknown command letter is received after the colon, the Computer Interface will respond with a question-mark character (?).

- A** Automatic output: The Computer Interface responds "OK", and then will output one line of data each time it is received from the WS-2000 or WT-2000 Sensor package. Each line has the same format as in the Current Data command (:D) below. To end the automatic output, send a : character to the Computer Interface. This command may be used to verify the signal received from the sensor package. In normal operation, the Computer Interface should output data every two seconds. If the received signal is weak, data will be output less frequently or not at all.

- B** Barometer altitude correction (418 MHz systems only): After the B, the host sends the adjusted pressure as four digits with no period, followed by a carriage return. (The pressure is in inches of mercury). For example, :B2985<Enter> sets the pressure to 29.85 inches Hg. The Computer Interface will respond with "OK" if the adjusted pressure is within the valid range, otherwise it will respond "Input too small" or "Input too big". The valid adjustment range is 16.00 to 33.00 inches of mercury.

To remove the offset adjustment, enter a pressure of zero, for example, :B0<Enter>. After this command, the computer interface will report the absolute pressure.

(NOTE: If you are using the WeatherView32 software, you may use the Weather Station Properties dialog to offset the pressure.)

- D** Current Data output: The Computer Interface responds with a single line of sensor data, as a comma-separated list in the order shown in the Output Data Format section. For normal data, the tag character will be "D". The Wind speed field is the current speed. The High wind speed is the maximum recorded since this item was reset with the :W command. The Rainfall field is the daily total for the current day. If the Computer Interface has not received data from the Sensor package, the tag character will be "E", followed by the text "No Data Received"

Sample Output:

D,12/07,10:28:12, 43, 93,29.70,135, 0, 50, 1.32, 6.51, 43,!197

- I** Increment logging interval: The Computer Interface switches to the next logging interval, and outputs the new value: 1, 2, 5, 10, 15, 20, 30, or 60 minutes. See also the :L command, below.
- K** Set Computer Interface's clock: After the K, the host sends the date and time to the logger as MMDDhhmmss<cr>. For example, :K0603153456<Enter> sets the logger's clock for June 3, at 3:34:56 PM. The logger will respond "OK" if it receives a valid time after the K, or "Clock not set." if any other character is received. Use the :D command to verify that the time and date were set properly.
- L** Logging interval: The Computer Interface outputs the current data logging interval, in minutes. Sensor data is logged to RAM at each multiple of the logging interval. For example, if the interval is 20 minutes, data is logged on the hour and at 20 and 40 minutes past the hour.

M Min/Max data: The logger responds with a tag character of "M" and the daily minimum value, time of occurrence, daily maximum value, and time of occurrence, for each sensor. The output is one long line. The sensor order is as in the Data Format list. If there is no data from the Sensor unit, each item will show "NO DATA"

Sample Output (this is output as one long line): 43,09:53, 50,04:35, 93,00:00, 95,03:05,29.68,11:04,29.85,00:00, 0,00:00, 23,08:50, 23,08:50, 50,04:35,!151

N Reset min/max data: All minimum and maximum sensor values are set to the current sensor values and the current time. Note that the minimum and maximum values are automatically logged to RAM and reset daily at midnight.

O Output logged data: The Computer Interface outputs a text header, followed by one line of data for each logging interval, and several lines of daily min/max data logged at midnight. Each normal data item has a tag character of "D", and each midnight data item has a tag of "M". The system also writes special messages when the clock is reset or the data RAM is cleared. These messages have a tag of "E". The data order on each normal record is as shown in the Output Data Format section. The Wind speed item is the average for the recording interval period. The High wind speed is the highest for the recording interval.

Sample Output (with only one record logged):

```
>H,DATE,TIME,TEMP,HUM,BARO,WDIR,WSPD,WSHL,RF_DAY,BATT,CHILL  
D,12/07,10:25, 43, 93,29.70,067, 3, 10, 1.32, 6.51, 42  
OK
```

Q Query RAM: The Computer Interface outputs the number of items logged.

R Rainfall output. The logger outputs all three rainfall counters: the daily total, monthly total, and total rainfall, and the time that the total was reset.

Sample Output (1.35 inches of rain today, 1.44 inches for the current month, and 16.58 inches total since Aug 3):
1.35, 1.44,16.58,08/03,16:52,!174

S Reset daily and monthly rainfall to zero. The Computer Interface responds "OK"

T Reset Total rainfall to zero. The Computer Interface responds "OK"

U Set the output error detection to 16 bit CCITT-CRC or checksum. Each time this command is issued the computer interface will toggle modes and output either **CRC** or **SUM** with CRLF. By default the unit is set to checksum for backwards compatibility. When CRC is enabled each line of the data dump will include a CRC. The CRC is calculated from the first character up until (not including) the '!'. The CRC is formatted in 5 digit ASCII.

V Version Number. The Computer Interface responds with the EPROM revision code for itself and for the sensor package.

Sample Output:

Version 418:42 Sensors: 21

W Reset high wind speed. The high wind speed, which is output with the :D command, is reset to the current wind speed.

Y RAM Test and clear. The RAM is tested. This test clears all system data. This command must be entered twice to confirm the test. If the test succeeds, the system responds "OK". Otherwise an error message is output. Contact RainWise in this case.

Z Clear all logged data. The system responds "OK".

7.2) Virtual Weather Station from Ambient

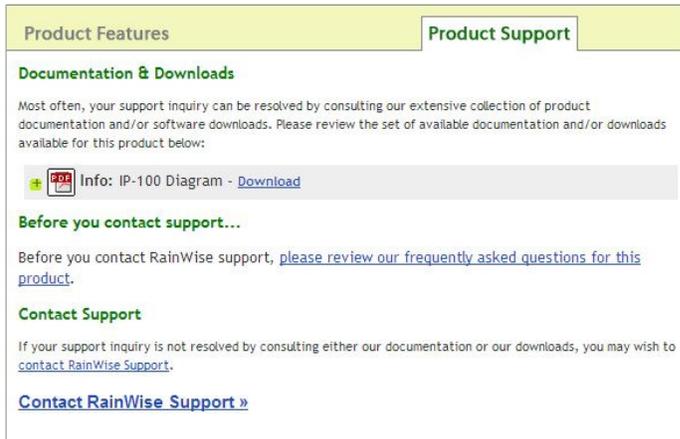
This software is an enhanced data base management software and may be used independently or for archiving. Refer to the "Help" on the CD for user instructions.

This version of Virtual Weather Station will function with the RDI-1 Display and Computer Interface. However the accumulated radiation will be contained in the rainfall field. **A free software upgrade will be available shortly that will change the rainfall description to "Accumulated Radiation".**

For further information please contact Rainwise.

8) Product support

Product support can be found on Rainwise.com at the bottom of your products web page. Documents are available here along with frequently asked questions. If your support inquiry is not resolved by troubleshooting or our product support, you may wish to contact RainWise.



The screenshot shows a web page with two tabs: "Product Features" and "Product Support". The "Product Support" tab is active. Underneath, there is a section titled "Documentation & Downloads" with a sub-header "Before you contact support...". The text in this section reads: "Most often, your support inquiry can be resolved by consulting our extensive collection of product documentation and/or software downloads. Please review the set of available documentation and/or downloads available for this product below:". Below this text is a link with a PDF icon: "Info: IP-100 Diagram - Download". Further down, there is a section titled "Contact Support" with the text: "If your support inquiry is not resolved by consulting either our documentation or our downloads, you may wish to contact RainWise Support." and a link: "Contact RainWise Support »".

8.1) Contact Information

RainWise Inc.

18 River Field Road, Trenton, ME 04605 USA

Phone: (207) 288-5169

Toll Free: (800) 762-5723

Online: <http://www.rainwise.com/>

Contact Form: <http://www.rainwise.com/about/contact>

9) Warranty

RainWise, Inc. warrants RainWise, Inc. manufactured Hazmat products against defects in materials and/or workmanship for a period of **5** years from the date of purchase and agrees to repair or replace any defective product without charge. Equipment supplied by RainWise but not manufactured by RainWise is covered by the particular warranty of that manufacturer.

IMPORTANT: This warranty does not cover damages resulting from accident, misuse or abuse, lack of reasonable care, the fixing of any attachment not provided with the product or damage due to a lightning strike. RainWise, Inc. will not reimburse for take-down or installation charges. RainWise, Inc. will not pay for warranty service performed by a non-authorized repair service and will not reimburse the consumer for damage resulting from warranty service performed by a non-authorized repair service. No responsibility is assumed for any special, incidental or consequential damages.

To return a unit under this warranty, call (800)762-5723 within the continental US or (207)288-5169. The service department will document the need for repair/replacement and arrange such. Shipping costs from the customer to RainWise are borne by the customer, RainWise will cover return shipment. It is the customer's responsibility to see that the unit is properly packed, preferably in the original box, because damage occurring during return shipment is not covered by this warranty.

NOTE: No other warranty, written or oral, is authorized by RainWise, Inc. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. Some states do not allow the exclusion of limitation of incidental or consequential damages, so the above exclusion and limitations may not apply to you.