OMEGA HHF23

Environmental Monitoring Meter

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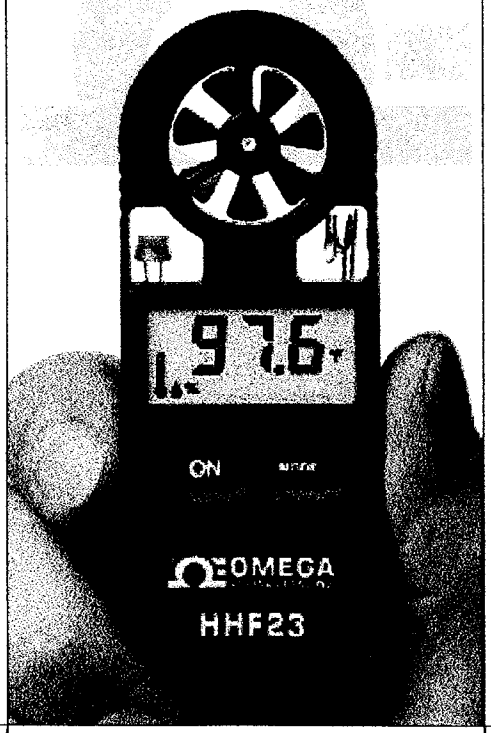
Patented • Accurate • Rugged

Wind Speed, Temperature, Wind Chill, Humidity, Heat Stress, Dew Point



CE MADE IN THE USA

OMEGA HHF23 Environmental Monitoring Meter

Wind Speed, Temperature, Wind Chill

OMEGA HHF23

Environmental Monitoring Meter

Wide range of wind speeds and low startup speed

External temperature and humidity sensors for fast and accurate response

Impeller can be replaced without tools

Includes slip-on hard cover, neck lanyard and battery

Waterproof

Floats

1-Year Warranty

Measures:
Current Wind Speed
Maximum Wind Speed
Average Wind Speed
Temperature
Wind Chill
Relative Humidity
Heat Stress Index
Dew Point Temperature

Units:
Knots
Meters per Second
Kilometers per Hour
Miles per Hour
Feet Per Minute
Beaufort Force
°C and °F
% Humidity

Accuracy:
±3% wind speed
±1°C temperature
±3% humidity

US PATENT NO. 5,783,753

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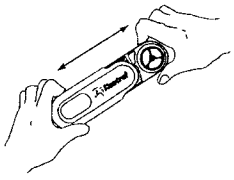
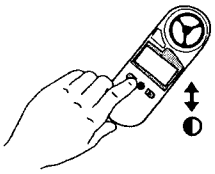
OMEGA HHF23

OPERATION

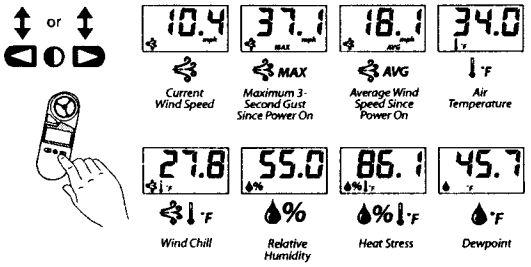
1) **Slide off cover.**



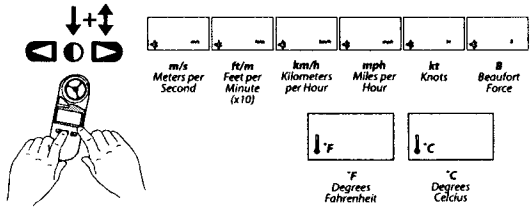
2) **Turn on:** Press the center button (◐) to turn on the unit.



3) **Select operating mode.** Press the right arrow (▶) to scroll through the measurements listed below. Press the left arrow (◀) to scroll through the measurements in reverse order. The instantaneous measurements will be displayed. (See *Understanding the Measurements* section for more information.)



4) **Select the units of measure.** Press ▶ while holding ◐ to scroll through the units of measure.



5) **Hold mode.** Press ◀ while holding ◐ to hold the measured value on the display. The word "HOLD" will blink to indicate the Hold Mode. Press ◀ or ▶to view the other measurements in Hold Mode. Press the ◐ button to exit the Hold Mode. This mode can be useful for taking measurements when unable to view the display, as within a duct. The Max and Avg Wind Speed Modes will continue to work as usual.

6) **Turn on the backlight.** Press ◐ to activate the backlight for 10 seconds. If ◀ or ▶ are pressed while the backlight is illuminated, the backlight will remain illuminated for another 10 seconds. Press ◐ while the backlight is illuminated to manually turn off the backlight.

7) **Turn off.** Hold ◐ for 2 seconds to manually turn off the unit. The unit will automatically turn off if no buttons have been pressed for 45 minutes.

UNDERSTANDING THE MEASUREMENTS

Wind Speed - average over the previous three seconds. The measurement will be accurate for air flow through the front or rear of the unit.

Maximum Wind Gust - maximum 3 - second wind speed since the unit was turned on.

Average Wind Speed - average wind speed since the unit was turned on.

Temperature - instantaneous temperature of the thermistor, which is located at the end of the long coiled leads in the open cavity below the wind vane. The exposed thermistor will respond quickly to changes in temperature when air flows past it. For fastest response, either hold the unit into the wind or wave the unit side to side for 15 seconds. Readings should be taken it the shade.

Wind Chill - combination of wind speed and temperature, as defined by the US National Weather Service. Wind chill is the effective temperature on a human or animal at low temperatures due to wind speed. Wind chill readings will be the same as the temperature readings above 45°F or below 3 mph.

Relative Humidity - amount of moisture in the air compared to the amount of moisture the air can hold for the given temperature, represented as a percent. Because relative humidity is also a function of the temperature, the response time will be dependent on the temperature response time (see temperature section above). Readings should be taken in the shade.

Heat Stress – combination of temperature and humidity, as defined by the US National Weather Service. Heat stress is the effective temperature on a human or animal at high temperatures due to humidity. Heat stress readings will be the same as the temperature readings below 70°F.

Dewpoint – calculated based on temperature and humidity measurements, as a measure of moisture content in the air. If the dewpoint is very close to the temperature, the air is humid. If the temperature and dewpoint are the same, dew will form. If this happens below freezing, frost will form.

MAINTENANCE & TROUBLESHOOTING

Storing

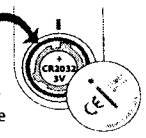
Avoid storing your where it will be exposed to temperatures below -20°C [-4°F] or above 80° C [176° F] for extended periods of time. Doing so may cause permanent damage. (Note that the inside of a car parked in the hot sun can reach very high temperatures.) If the temperature of the actual LCD of your unit exceeds 70° C [158° F], it will temporarily become solid black until it cools down to below this temperature.

Use of the Lanyard and Cover

To connect the lanyard to the protective cover, slip the lanyard end through the large opening in the cover and out the slot.

Replacing the Battery

When your display flashes the low battery indicator (), replace the battery. Use a large coin to open the battery compartment. Insert a new CR2032 coin cell (available where watch batteries are sold), positive (+) pole up. When replacing the battery door, be sure to keep the black rubber o-ring seated in the groove on the case back.



Why does the Impeller Appear Imbalanced?

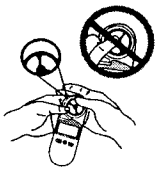
It is NORMAL for the impeller to oscillate as it comes to a stop. It is NOT imbalanced. Rather, it contains a very small magnet which responds to the earth's magnetic fields. This does not affect the accuracy of the wind speed readings because the magnetic field applies both a braking and an accelerating force which cancel each other. The impeller has been calibrated to provide wind speed readings accurate to within at least ± 3%.

High Speed Use

After several hours of sustained operation over 25 M/S (~49 KT, 90 KM/H, 56 MPH or 4,923 FPM), the Kestrel will lose some accuracy due to wear of the sapphire bearings in the impeller.

Replacing the Impeller

Press FIRMLY on the sides of the black impeller housing with your thumbs to remove the entire assembly. When inserting the new impeller, be sure the arrow is facing the display side of the unit, and is aligned with the top of the meter. Press on the sides of the housing rather than the center.



Taking Accurate Humidity, Heat Stress and Dewpoint Measurements

The patented system for measuring relative humidity allows for extremely fast and accurate readings. The sensor is located in the large hole on the rear of the unit. Even extreme and abrupt changes in the surrounding humidity will be measured in under 1 minute. To test this, place your hand around the rear of the unit. Within several seconds, the humidity will increase dramatically. After removing your hand, the humidity will quickly begin to decrease. Next, place your hand near the rear of the unit and wave the unit back and forth. The humidity will not change because the air flow is diluting the humidity from your hand.

This example shows the importance of keeping air flow past the sensor while taking a measurement. If there is no natural air flow past the sensor, wave the unit back and forth. It is also reasonable to lay the unit down on a solid surface for 1 minute to allow the sensor to adjust.

BEAUFORT SCALE

The Beaufort Scale is a system for estimating wind force without the use of instruments based on the visible effects of the wind on the physical environment. The behavior of smoke, waves, trees, etc., is rated on a 13 point scale. The scale was devised in 1805 by the British naval Commander Sir Francis Beaufort (1774-1875) and is still commonly used by mariners.

Force	*Description*	*Kts*
0	*Calm*	*0*
1	*Light Air*	*1-3*
2	*Light Breeze*	*4-6*
3	*Gentle Breeze*	*7-10*
4	*Moderate Breeze*	*11-16*
5	*Fresh Breeze*	*17-21*
6	*Strong Breeze*	*22-27*
7	*Near Gale*	*28-33*
8	*Gale*	*34-40*
9	*Strong Gale*	*41-47*
10	*Storm*	*48-55*
11	*Violent Storm*	*56-63*
12+	*Hurricane*	*64+*

SPECIFICATIONS

Accuracy

(Within OPERATIONAL RANGE)

Wind Speed	±3% of reading
Temperature	±1°C
Wind Chill	±2°C
Relative Humidity	±3% of scale
Heat Index	±3°C
Dewpoint	±3°C (above 20% RH)

Response Time

Wind Speed	1 Second
Temperature, Relative Humidity, Wind Chill, Heat Index, Dewpoint	<1 Minute

Units and Operational Range

Units	Low End	High End
Meters per Second	0.3	40
Feet per Minute	59	7877
Kilometers per Hour	1.0	144
Miles per Hour	0.7	89
Knots	0.6	78
Beaufort Force	1	16
Celsius	-29	70
Fahrenheit	-20	158
Percent Humidity	5	95

Display

Type: Reflective 3½ digit LCD.

Digit Height: 9 mm. [0.36 in.].

Update: 1 second.

Temperature Limitations: Normal operation from -15°C to 60°C [-4°F to 140°F]. Below -15°C [-4°F] the display fluid may freeze. Accurate readings may be taken by keeping the unit warmer than -15°C [4°F] and exposing it for the minimum time necessary to take a reading (less than one minute).

Auto Shutdown: After 45 minutes of no button presses.

Environmental

Sealing: Electronics enclosure IP67 – water resistant to 1 m. [3 ft.]. Floats.

Shock: Drop tested to 2 m. [6 ft.].

Storage Temperature: -40°C to 60°C [-40°F to 140°F].

Physical

Buttons: Three sealed tactile rubber buttons control all functions.

Battery: User-replaceable CR2032 coin cell. Typical life, 300 hours without backlight, 40 hours with backlight.

Impeller: 25 mm. [1 in.] diameter, sapphire bearings, light weight. User-replaceable impeller/housing assembly.

Temperature Sensor: Hermetically sealed precision thermistor.

Humidity Sensor: Solid state silicone capacitance sensor.

Case: Slip-on case prevents damage to display and moving parts.

Dimensions: Unit: 4.8 x 1.7 x 0.7 in [122 x 42 x 18 mm]; case: 4.8 x 1.9 x 1.1 (122 x 48 x 28 mm].

Weight: Unit2. 3 oz [65g]; case 1.3 oz [37 g].