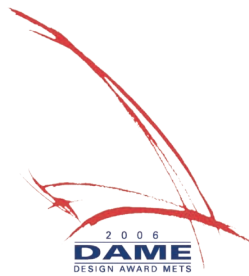


LB150



Real-Time, Site Specific Weather Information

The LB150 Ultrasonic WeatherStation® Instrument meets a growing need for real-time, site specific weather information. Accurate data helps organizations make important decisions regarding weather conditions that affect safety and operations. Traditional weather instrumentation is composed of several individual sensors including wind cups, which are prone to breaking and are less accurate at low speeds. Airmar's WeatherStation Instrument incorporates seven sensors, with no moving parts, all in one compact unit.



Sensing Technology

Ultrasonic

WeatherStation® Instrument

Features

- True wind speed and direction
- Apparent wind speed and direction
- Barometric pressure
- Air and wind chill temperature
- Heat index temperature
- Relative humidity
- Dew point temperature
- Measures wind speed and direction ultrasonically
- Wind calibration traceable to NIST
- Internal WAAS GPS
- Three-axis solid-state compass
- Three-axis accelerometer provides stabilized pitch and roll information in dynamic conditions
- RS422/NMEA 0183 output
- WeatherCaster™ Software
- Easy installation and two-year warranty
- Maintenance-free operation—no moving parts
- Custom configurations available

www.airmar.com

LB150 Ultrasonic WeatherStation® Instrument

Airmar Ultrasonic WeatherStation® Instrument

The Airmar WeatherStation Instrument is the only all-in-one weather sensor that calculates apparent wind speed and direction, barometric pressure, air temperature, relative humidity, dew point and wind chill temperature. With the internal compass and Global Positioning System (GPS), true wind speed and direction can also be calculated. The UV stabilized, compact housing is fully waterproof and resistant to chemicals.

The WeatherStation Instrument comes with our intuitive WeatherCaster™ Software. Data can be viewed in both digital and analog format and can be saved for a set period of time. The log time can be adjusted in intervals from 6 to 72 hours. Standard NMEA sentences and an RS422 interface allows for the flexibility of designing your own software program to fit your specific application. Our comprehensive technical manual makes the job easy!

Software updates for the LB150 and WeatherCaster Program are available on Airmar's website: www.airmar.com

Airmar's WeatherStation Instrument includes both a standard 1-14" UNS and 3/4" NPT thread connections to accommodate standard mounting hardware. The waterproof base connector assures trouble-free installation and servicing, while a quick disconnect feature allows for easy removal. Standard cable lengths of 10 m or 15 m (33' or 49') allow you to simply connect the sensor to the optional USB Converter Box. The converter allows the WeatherStation Instrument measurements to be displayed on a PC by converting the data from RS422 and NMEA 0183 to USB.



State-of-the-Art Wind Tunnel
Every Airmar® WeatherStation® Instrument's wind measurements are calibrated in the on-site wind tunnel, which is traceable to National Institute of Standards and Technology (NIST) Standard Reference Material.

How the WeatherStation® Instrument Works

The ultrasonic wind sensor (an ultrasonic anemometer) measures apparent wind speed and direction. The WeatherStation Instrument contains four ultrasonic transducers, visible through the four holes in the top of the sensor's wind channel (see figure 1). These transducers operate in pairs—one transducer transmits a pulse into the air. The pulse bounces off the metal plate at the bottom of the wind channel and arrives at the listening transducer a short time later.

When there is no wind, the pulse travels at the speed of sound from the sender to the receiver. Whenever the wind is blowing in that direction, the pulse will arrive sooner than if the air is still. Similarly, whenever the wind is blowing in the opposite direction, the pulse will arrive later than if the air is still. The four transducers take turns in sending and receiving pulses (see figure 2).

A microprocessor within the WeatherStation Instrument then combines the measurements from all four transducers to calculate the resultant wind speed and direction. Throughout this process, the sensor monitors the air temperature, to compensate for the fact that the speed of sound in air changes with temperature.

Understanding True and Apparent Wind

The WeatherStation Instrument has the unique ability to display both true and apparent wind. True wind is the actual motion of the air relative to the earth. Apparent wind is the wind which an observer experiences while moving or on board a vehicle. It is the result of two motions—the actual motion of the air (the true wind) and the motion of the vehicle. If the vehicle is not moving, then the true and apparent wind will be the same.

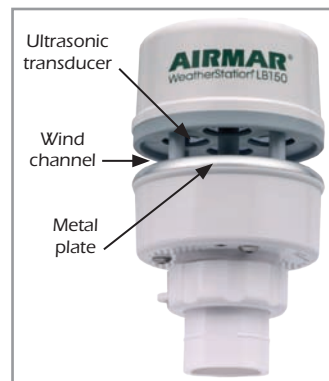


Figure 1

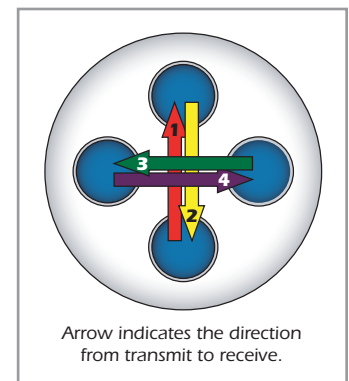


Figure 2

Arrow indicates the direction from transmit to receive.

Data can be displayed in the following units of measure:

Wind Speed

- m/s—meters per second
- Knots—1 knot = 1.15 miles MPH
- KPH—kilometers per hour
- MPH—miles per hour

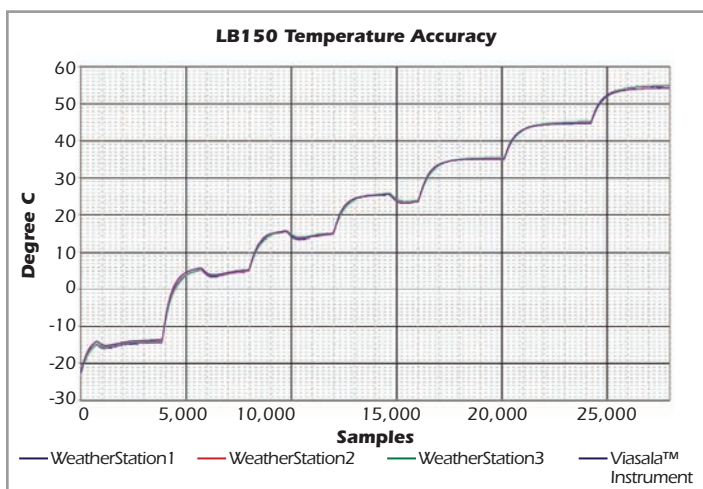
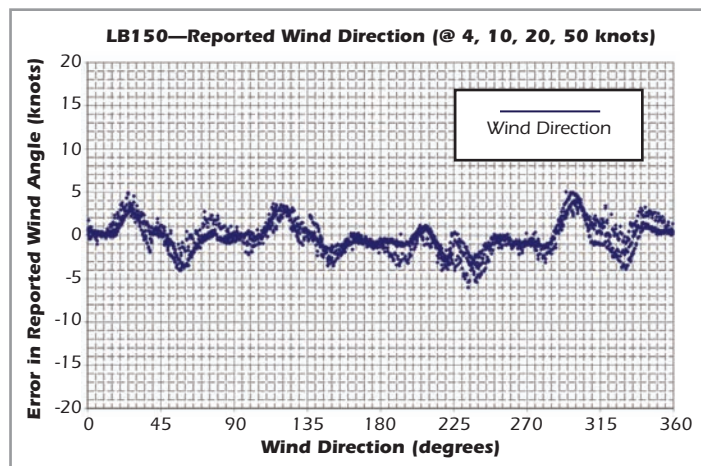
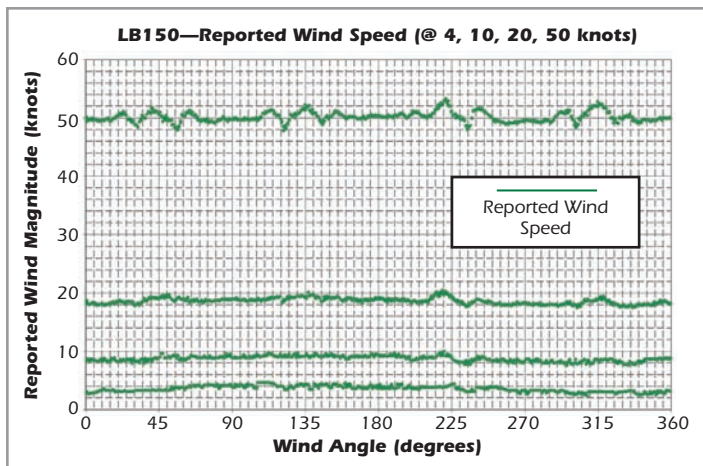
Barometric Pressure

- hPa—hectopascals
- mbars—millibars
- inHg—inches of mercury

Temperature

- °C—Celsius
- °F—Fahrenheit

LB150 Performance Graphs and Applications



Connecting the WeatherStation® Instrument to the PC
 When connecting the WeatherStation Instrument to a PC only, a USB converter is required. The WeatherStation Instrument attaches to the USB box via a plug-in cable.



Wind Energy



Buildings



Chemical processing



Structural monitoring



Offshore platforms and docks



Commercial Marine
(PB200)



Agriculture



Hazardous response



Outdoor leisure centers

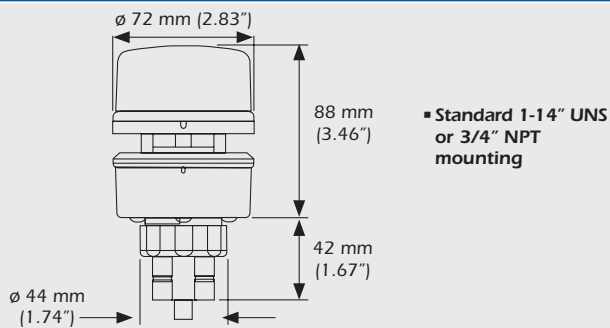


Road weather conditions



Technical Information

DIMENSIONS



SPECIFICATIONS

Wind Speed Range: 0 m/s to 40 m/s (0 MPH to 92 MPH)
Wind Speed Resolution: 0.1 m/s (0.1 MPH)
Wind Speed Accuracy @ 0°C to 55°C (32°F to 131°F), no precipitation*:
 — Low Wind Speeds: 0 m/s to 5 m/s (0 MPH to 11.5 MPH); $\pm 0.5 \text{ m/s (1.1 MPH) } +10\%$ of reading
 — High Wind Speeds: 5 m/s to 40 m/s (11.5 MPH to 92 MPH); $\pm 1 \text{ m/s (2.3 MPH) or } 5\%$ RMS, whichever is greater
Wind Speed Accuracy in wet conditions:** 2.5 m/s (5.7 MPH) RMS
Wind Direction Range: 0° to 360°
Wind Direction Resolution: 0.1°
Wind Direction Accuracy @ 0°C to 55°C (32°F to 131°F), no precipitation*:
 — Low Wind Speeds: 2 m/s to 5 m/s (4.6 MPH to 11.5 MPH)—6° RMS typical
 — High Wind Speeds: >5 m/s (>11.5 MPH)—3° RMS typical
Wind Direction Accuracy in wet conditions:**
 >4 m/s (9.2 MPH)—8° RMS typical
Compass Accuracy:
 —1° RMS when level
Air Temperature Range: -25°C to 55°C (-13°F to 131°F)
Air Temperature Resolution: 0.1°C (0.1°F)
Air Temperature Accuracy: $\pm 1^\circ\text{C} (\pm 1.8^\circ\text{F})^*$ @ >4 knots (>4.6 MPH) wind
Barometric Pressure Range:
 850 mbar to 1150 mbar (25 inHg to 34 inHg, 850 hPa to 1150 hPa)
Barometric Pressure Resolution: 1.1 mbar (0.032 inHg, 1.1 hPa)
Barometric Pressure Accuracy:
 $\pm 20 \text{ mbar } (\pm 0.59 \text{ inHg, } \pm 20 \text{ hPa})$ when altitude correction is available
Relative Humidity Range: 10% to 95% RH
Relative Humidity Accuracy*: $\pm 4\%$ units RH
GPS Position Accuracy:
 3 m (10') with WAAS/EGNOS (95% of the time, SA off)
Operating Temperature Range: -25°C to 55°C (-13°F to 131°F)
Supply Voltage: 9 VDC to 16 VDC
Supply Current: <150 mA
Weight: 285 grams (0.7 lb)
Sensor Baud Rate (RS422/NMEA 0183):
 4,800 bps (can be increased to 38,400 bps with a command)
Thread Sizes on Base: 1-14" UNS or 3/4" NPT
Certifications and Standards: CE, RoHS

DATA OUTPUT PROTOCOL

RS422/NMEA 0183 Sentence Structure*
\$GPDTMDatum Reference
\$GPGGAGPS Fix Data
\$GPGLLGeographic Position—Latitude and Longitude
\$GPGSAGNSS DOP and Active Satellite
\$GPGSVSatellites in View
\$GPRMCRecommended Minimum GNSS
\$GPVTGCOG and SOG
\$GPZDATime and Date
\$HCHDGHeading, Deviation, and Variation
\$WIMDAMeteorological Composite
\$WIMWD ...Wind Direction and Speed
\$WIMWV ...Wind Speed and Angle
\$WIMWR ...Relative Wind Direction and Speed
\$WIMWT ...True Wind Direction and Speed
\$YXXDRTransducer Measurements

*Additional data available from the WeatherStation® Instrument

SENSOR PROVIDES

Apparent and True Wind Speed and Direction
 Readings come from the ultrasonic anemometer

Air Temperature

Based on a negative temperature coefficient thermistor that measures the ambient air temperature

Relative Humidity

Measured with a capacitive cell humidity sensor

Barometric Pressure

Measured using a temperature-compensated silicon piezoresistive pressure sensor corrected to equivalent sea level pressure based on attitude named by GPS

Heat Index

Based on air temperature and relative humidity

Wind Chill

Based on wind speed and air temperature

Magnetic Compass Heading

Two-axis magneto-inductive sensors

Pitch and Roll Angles

Three-axis MEMS accelerometer

Position, Speed, and Course Over Ground

Global Positioning System (GPS) receiver

MATERIALS

White Housing..... GE® Geloy®

Metal Plate Anodized Aluminum

Wind Channel..... Dupont® Delrin™

RMS—Root Mean Square, LEN—Load Equivalency Number
 Humidity and temperature readings compared to Vaisala® Instruments

*When the wind speed is less than 2 m/s (4.6 MPH) and/or air temperature is below 0°C (32°F), wind and temperature readings will be less accurate.

**Wet conditions include moisture, rain, frost, dew, snow, ice and/or sea spray in the wind channel.