



Lufft – WS Series Compact Weather Sensors
For measuring the wind speed, wind direction, compass, temperature, relative air humidity, barometric pressure, global radiation, and precipitation

Lufft WS Series

Compact Weather Sensors

Depending on the particular model, the new measuring instrument range provides a power-saving ultrasonic wind sensor incorporating an electronic compass for automatic adjustment for magnetic North, a temperature sensor, a capacitive sensor for relative air humidity, a barometric pressure sensor, a sensor for global radiation (CMP3), and a sensor for liquid precipitation using a tipping bucket system. It also provides a Doppler radar sensor for solid and liquid precipitation that measures the size and velocity of individual particles to calculate the quantity and intensity of precipitation (rain/snow).

Built-in data pre-processing and output through the SDI-12 (factory setting) or RS-485 serial interfaces using various output protocols provide interface compatibility of the unit for all OTT dataloggers, ADCON RTUs as well as for commercially available HydroMet dataloggers and PLC systems. Configurable low-power modes ensure low power consumption. Heater and fan may be engaged as required. Thus, the unit is ideally suited for all solar-powered hydro-meteorological applications as well as for those that are mains powered for heated operation in wintertime.

Wind is internally measured using 10Hz rate and complies with the requirements of the WMO guideline providing output of vector and scalar means, maximum gust, and corresponding wind direction. Moreover, average and extreme values as well as a large number of meteorological data such as standard deviation, dew point, and much more is calculated.

Meteorology

Models of the Instrument Range

WS200 Compact Weather Sensor

- Wind speed
- Wind direction
- Electronic compass
- Heater for wind measurement



WS300 Compact Weather Sensor

- Temperature
- Air humidity
- Barometric pressure
- Fan for temperature/humidity measurement



WS301 Compact Weather Sensor

- Temperature
- Air humidity
- Barometric pressure
- Global radiation
- Fan for temperature/humidity measurement



WS500 Compact Weather Sensor

- Wind speed
- Wind direction
- Electronic compass
- Temperature
- Air humidity
- Barometric pressure
- Fan for temperature/humidity measurement
- Heater for wind measurement



WS501 Compact Weather Sensor

- Wind speed
- Wind direction
- Electronic compass
- Temperature
- Air humidity
- Barometric pressure
- Global radiation
- Fan for temperature/humidity measurement
- Heater for wind measurement



WS601 Compact Weather Sensor

- Wind speed
- Wind direction
- Electronic compass
- Temperature
- Air humidity
- Barometric pressure
- Precipitation (rain), tipping bucket
- Fan for temperature/humidity measurement
- Heater for wind measurement



WTB 100 Rain Gauge

- Precipitation (rain), tipping bucket

WS400 Compact Weather Sensor

- Temperature
- Air humidity
- Barometric pressure
- Precipitation (rain/snow), Doppler radar
- Fan for temperature/humidity measurement
- Heater for precipitation measurement



WS600 Compact Weather Sensor

- Wind speed
- Wind direction
- Electronic compass
- Temperature
- Air humidity
- Barometric pressure
- Precipitation (rain/snow), Doppler radar
- Fan for temperature/humidity measurement
- Heater for wind/precipitation measurement



Device Overview

	WS200	WS300	WS301	WS500	WS501	WS601	WS400	WS600	WTB100
Air temperature		•	•	•	•	•	•	•	
Air humidity		•	•	•	•	•	•	•	
Barometric pressure		•	•	•	•	•	•	•	
Precipitation (rain)						•	•	•	
Precipitation (snow)							•	•	
Wind direction	•			•	•	•		•	
Wind speed	•			•	•	•		•	
Compass	•			•	•	•		•	
Global radiation			•		•				
Leaf wetting (external)						•			
Temperature (external)	•	•	•	•	•	•	•	•	
Precipitation, external contact input	•	•	•	•	•				
Precipitation, internal tipping bucket						•			•
Precipitation, Doppler radar							•	•	
Heater	•			•	•	•	•	•	
Fan for temperature/humidity		•	•	•	•	•	•	•	
Power Safe Mode 2	•	•	•	•	•	•			

Features

Calculated Wind Data

- Instantaneous values
- Vector and scalar means in intervals from 1 to 10 minutes
- Wind direction, compass-corrected
- Electronic compass
- Standard deviation
- Maximum/minimum values of the wind direction sectors
- Maximum gust of wind and wind direction

Calculated Temperature, Humidity, Barometric Pressure and Precipitation Data

- Temperature
- Relative and absolute air humidity
- Dew point
- Relative and absolute barometric pressure
- Air density
- Wet-bulb temperature
- Specific enthalpy
- Windchill in WS500, 501, 600 and 601 combined sensors
- Precipitation (cumulative), intensity and type

Features that may be set using the Lufft-Config tool or SDI-12 commands:

- Metric or imperial unit output
- Heater for wind measurement
- Fan for temperature and humidity measurement
- Power consumption modes – Standard, PS1, and PS2
- Elevation of the location for relative barometric pressure.
- Compass deviation
- Mean value time
- Reset of absolute amount of precipitation

Accessories:

- 10 m long cable with mating connector and bare-wire ends (supplied); 20 m long cable optionally available
- 24 VDC/50 W power supply for heater, IP65 for outdoor installation
- 24 VDC/50 W power supply for heater, IP20 for housing installation

Accessories for Installation:

- 2" mounting pipe, 90° angled, for wall mounting
- 2" mast with mounting plate
- Tripod aluminum mast, portable
- 10 m mast
- Universal mount (horizontal: 3/4"... 5/4"; vertical: 1"... 2")

Applications:

- Climatologic and synoptic weather stations
- Weather observation for road and traffic control systems, heliports and airports
- Mountain weather station for flood and avalanche warning
- Agro-meteorological station
- Urban or industrial weather station for sewage-treatment plants and sluices
- Weather observation on buoys, dykes and dams
- Weather observation in nature reserves



Technical data

Wind speed

- Measuring method: ultrasonic, 10 Hz
- Measuring range: 0 ... 75 m/s
(WS601: 0 ... 30 m/s)
- Resolution: 0.1 m/s
- Accuracy: ± 0.3 m/s or ± 3 %
(0 ... 35 m/s), ± 5 % (35 ... 75 m/s) RMS
- Response threshold: 0.3 m/s
- Units: m/s, km/h, mph, kts

Wind direction

- Measuring method: 4x 10 Hz ultrasonic sensors
- Measuring range: 0 ... 359,9°
- Resolution: 0.1°
- Accuracy: $\pm 3^\circ$ (> 1m/s) RMSE
- Threshold: 0.3 m/s

Compass

- Measuring method: built-in electronic compass
- Measuring range: 0 ... 359°
- Resolution: 1°
- Accuracy: $\pm 10^\circ$
- Measuring rate: 5 minutes

Electrical data

Interfaces*

- SDI-12, release 1.3 (factory setting)
- RS-485, galvanically isolated, half-duplex, baud rates 1200 ... 19200
- RS-485 protocols: Binary, ASCII, TLS2002FG3, MODBUS

*May be selected using the Lufft-Config tool (PC software for Windows OS)

Power supply

- Input voltage: 4 ... 32 VDC
- Power consumption, standard mode: 85 mA max. @ 12 VDC (fan)
- Power consumption, mode no. 1: 25 mA @ 12 VDC
(WS200, WS500/501, WS600/601)
8 mA @ 12 VDC (WS300/301, WS400)
- Power consumption, mode no. 2: 2 mA @ 12 VDC
- Heater: 24 VDC/20 W
24 VDC/40 W (WS400/600)

Air temperature

- Measuring method: NTC
- Measuring range: -50 ... +60 °C
- Resolution: 0.1 °C (-20 ... +50 °C), otherwise 0.2 °C
- Accuracy: ± 0.2 °C (-20 ... +50 °C), otherwise ± 0.5 °C

Dew point temperature

- Measuring method: passive, calculated from air temperature and air humidity
- Measuring range: -50 ... +60 °C
- Resolution: 0.1 °C
- Accuracy: ± 0.7 °C

Air humidity

- Measuring method: capacitive
- Measuring range: 0 ... 100 % R.H.
- Resolution: 0.1 % R.H.
- Accuracy: ± 2 % R.H.

Barometric pressure

- Measuring method: MEMS sensor, capacitive
- Measuring range: 300 ... 1200 hPa
- Resolution: 0.1 hPa
- Accuracy: ± 0.5 hPa (0 ... +40 °C)

Ambient

Operating temperature range

-50 ... +60 °C

Storage temperature

-50 ... +70 °C

Relative humidity

0 ... 100 % R.H.

General data

Dimensions (H x Ø)

194 to 445 mm (model) x 150 mm

Weight

0.8 to 1.7 kg (model)

Fastener

Ø 2" or 60 ... 76 mm

Material

Plastic (PC) and
Stainless steel mounting clamp

Colour

White

Type of protection

IP66

Global radiation

- Measuring method: CMP3 thermopile pyranometer, Class 2
- Spectral range: 300 ... 2800 nm
- Measuring range: 0 ... 1400 W/m²
- Resolution: 1 W/m²
- Temperature error: ± 5 % (-10 ... +40 °C)

Precipitation (liquid)

- Measuring method: tipping bucket
- Type: rain
- Bucket orifice: 200 cm²
- Measuring range: 0 ... 200 mm/h
- Resolution: 0.2 mm
- Accuracy: ± 2 %

Precipitation (liquid/solid)

- Measuring method: Doppler radar
- Types: rain, snow
- Measuring range drop size: 0.3 ... 5 mm
- Intensity: 0 ... 200 mm/h
- Resolution (liquid): 0.01 mm
- Repeatability: > 90 %
- Accuracy: ± 20 %
(related to the annual precipitation and depending on weather and site specific conditions)

Standards

- EMC directive: 2004/108/EC
- Emitted interference: EN 55011:2009, EN 61000-6-3
- Immunity: EN 61000-6-2 and EN 61000-4-2/3/4/5/6/8/16/29
- RoHS directive: 2011/65/EU
- IEC / CISPR 11
- prEN 50147-3