Wind sensor type WSS and WSS-L
DATA SHEET



Static sensor

- No moving parts
- High-precision ultrasonic measurements

High resolution

- Wind direction 1°
- wind speed 0,1 knot

Approval

- GL, DNV, CCS, RS, GOST-R

Robust design

- Sea-water proof housing
- Vibration tested up to 2.3g

Watertight

- According to IP66

Extreme temperatures

- WSS operates down to -52°C
- WSS-L is not recommended below 0 °C
- Both operates to +60 °C

Heating element

- WSS has built-in, automatically activated, heating element to prevent ice

Wide power supply range

- Nominal 12V DC or 24V DC supply voltage

Interface

- RS485 I/O using NMEA 0183 data protocol for direct connection to WSDI-2 wind display, VDR (voyage data recorder) or Dynamic Positioning System.

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Technology
DEIF Static Wind Sensor Technology uses ultrasound to determine horizontal wind speed and direction. The WSS and WSS-L sensors have no moving parts so they are free from the challenges posed by conventional mechanical wind sensors (friction, inertia, time constant, over-speeding, starting threshold). The unique triangular design of the sensor array assures accurate measurement of wind from all directions. The WSS sensor is automatically heated when used in cold climates. Finally, WSS/WSS-L sensors are maintenance-free and do not require field calibration.

Versions
The wind sensor is available in two versions:
- WSS with built-in heating element to prevent ice
- WSS-L without heating

Applications
WSS/WSS-L are classified for residential, commercial and light industry plus industrial environment.
The WSS sensor can be used in almost any conditions, where the WSS-L is only specified down to 0^{o}C, but it will work far below that temperature as long as ice or snow is not covering the sensor elements or obstructing the sight between the elements. The WSS-L should only be used in relatively warm geographic areas or in applications where wind data is mainly for information and not critical for operation or safety.

- The WSS or WSS-L can be directly connected to the DEIF WSDI-2 display forming a superb wind system.

- Alternatively, it can be used with the former display – WSDI – which required a WSI interface box.

- It forms part of the WSS upgrade kit used to replace the old DEIF 879 dynamic wind sensor.

- Finally WSS or WSS-L can be used as precise stand-alone wind sensors in a system (e.g. a DP system).

Housing
The WSS is designed to withstand the hostile environment onboard a ship.
The 1" stainless steel mounting rod with standard ¾" pipe thread makes the mounting easy and secures good earth connection through the hull of the ship.

Interface
The WSS/WSS-L has a RS485 two-way interface with communication following the NMEA 0183 protocol.

Supply
The WSS can be supplied from a DC supply of nominal 12…24V DC.

Cable
The WSS is connected with a single 4 x 0.75mm^2 screened cable. Cable extension can be made by a standard 4 x 0.75mm^2 screened cable, e.g. UL2464 18AWG4C+AE, length max. 300 metres, the capacity between each signal conductors should not excide 70nF. Twisted pair is recommended. (see options)

Error flag
The WSS/WSS-L continuously evaluates the measurements, and if obstructions or incorrect measurements are detected, an invalid flag is set in the NMEA0183 message to indicate that data is invalid and should not be used. This could be caused by a bird landing on the sensor. As soon as the disturbance disappears, the flag will be cleared and valid measurements sent.

Customised setup
Forming part of a normal wind system, the WSS will not need any setup. If the sensor is used for special applications, there might be special needs, for example storing data for automatic sensor alignment corrections. Such special needs can often be accomplished by sending control commands to the sensor via the RS485 interface, so please contact DEIF if you have special needs like this.

Option
- A VDR (voyage data recorder) can be connected directly to the RS485 port.
- Bird avoidance option, a needle cap to prevent birds from landing on the sensor, disturbing the measurements or damaging the ultrasound elements.
- WSS-shielded extension cable, variable length from 1 to 300 meters.
- IP67 connector kit, for use with extension cable (for soldering).
- IP66 connection box kit, for use with extension cable.

Technical specifications

Sensors are designed according to the standards below		**Standards**
Power supply	12V or 24V DC (9.0…31.2V DC)	
Power consumption	WSS-L and WSS with inactive heating element: < 0.1W WSS with maximum heating ≤ 15W	
Interface	RS485 bus (I/O). The bus should be terminated with 120 to 200 ohm for pure RS485 operation. Combined RS485 (I/O) and NMEA0183 (I) operation: A combination of up to ten RS485 (I/O) and one NMEA0183 listeners can be connected to the WSS data interface at the same time. The data line must be terminated with a 200 to 250 ohm resistor to obtain ≥ +/- 2.1V output necessary for a standard NMEA0183 input circuit to work. The NMEA0183 input load must be ≤ 2mA @ +/- 2V. NOTE: A NMEA-buffer is recommended if connection of more than one standard NMEA-input is needed.	NMEA 0183 ver. 2.x-3.0
Data sentence	NMEA0183: $WIMWV – Wind speed and direction data $WIXDR – Transducer Measurement Response $WITXT – Error messaging For details, see the Appendix to User's Manual, Wind measuring system, document no. 4189350028.	NMEA 0183 ver. 3.0
Wind speed	Range: 0….116 KTS (0….60m/s) Resolution: 0.1 Knots Accuracy: 0…68 KTS: ±0.6 KTS or ±3%, whichever is greater > 68 KTS: ±5%	
Wind direction	Range: 0…. 360° continuously Resolution: 1° Accuracy: ±3% in relation to wind direction	
Update interval	1 second	
Start-up time	< 5 sec. from power on to valid data output	
Connection	2 meter 4 x 0.75mm² screened cable type UL2464 18AWG/4C+DW+AL/MY+Jacket. The 2m cable is fixed mounted on the sensor and is open-ended.	
Mounting	¾" pipe thread: Outer diam: 1.04 inch (26.4mm), 14 threads per inch.	
Compass safety distance	0.2 meter (8 inch)	IEC 945 and EN 60945
Protection	IP66	IEC 529 and EN 60529
Relative humidity	0…. 100%	EN/IEC 60068-1/2
Pressure	600…1100hPa	
Temperature	WSS operating range: -52…+60°C (class approved for: -25…+60°C) WSS-L operating range: 0…60°C (see note) Storage (both): -60…+70°C Note: WSS-L has no automatic heating element to prevent ice, the sensor will work below 0°C, but it will depend on weather conditions.	EN 60051
Vibration test	3…13.2Hz: 2mm (peak-peak) 13.2…100Hz: 0.7g	EN 60945, EN/IEC60068-2-6 and DNV Class A
	3…15Hz: ± 2.5mm (peak) 15…50Hz: 2.3g	GL curve 4 for masts
Safety	Cat.III, poll.dg.2, 550VAC rms, 50Hz, 1 minute,	EN 61010-1
EMC	CE-marked for industrial environment	EN 61000-1-1/2/3/4
Housing	Wind sensor housing: Polycarbonate +10% glass fibre Mounting tap: Corrosion-resistant stainless steel	UL94 V0
Weight	0.8 kg	
Dimensions, cardboard box	450 x 315 x 230	
Approvals	Type-approved according to:	GL, DNV, CCS, RS and GOST-R

Accessories	IP66 Connection box kit: IP66 Connection box w/cable glands and screw terminals to extend the sensor cable with an extension cable. IP67 Connector kit: water tight male and female connector for soldering to respectively the sensor cable and the extension cable. Extension cable: 1 to 300 meters 4x0.75mm^2 shielded cable (1m steps) DEIF id.no.1020230016. Bird avoidance kit: Spike kit to prevent birds from interrupting the wind measurements or in worst case from damaging the sensor.	

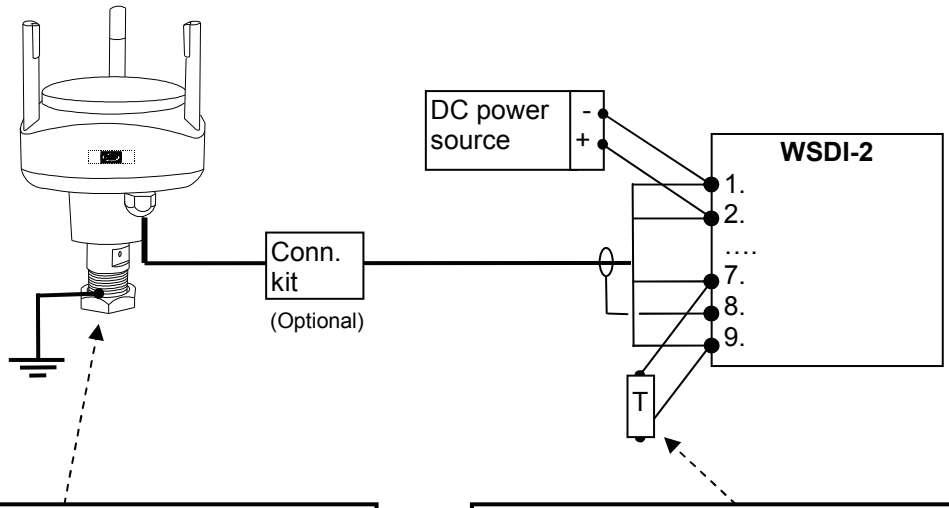
Labels

Product label:

WSS	**CE logo**
SN:	**Disposal icon**
DEIF logo	**Bar code + item number**

Terminals and function – cable colours and function

Cable colour	**Function**		**Note**
Black	Supply voltage	-	DC supply voltage for the wind sensor
Red		+	
Orange	RS485 comm.	A	Wind speed and direction data output
Brown		B	
Shield	Electrical shielding of data signal		See warning below.

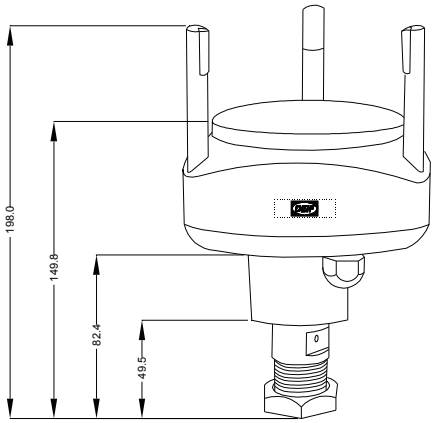


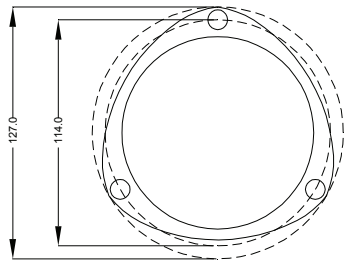
IMPORTANT!
The stainless steel mounting base on the WSS/WSS-L must be connected to the ship's metal hull or another good ground connection!

IMPORTANT!
The data bus must be terminated with a resistor (see technical spec. above) to secure stable operation!

Unit dimensions, WSS and WSS-L

All dimensions in mm





¾" pipe thread:
Outer diam: 1.04 inch (26.4mm), 14 threads per inch.

Order specifications

Examples: WSS

WSS-L upgrade kit

Example - ordering a wind system example:

WSDI-2 FWD

WSS

Connector box kit

Extension cable 80 meter

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