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DATA SHEET

WSS 500 and WSS 550
General purpose wind sensors

- Static sensor

- High resolution

- Approvals

- Robust design

- Watertight

- Extreme temperatures

- Heating element

- Wide power supply range

- Standard NMEA protocol

Data sheet

Technology

DEIF Static Wind Sensor Technology uses ultrasound to determine horizontal wind speed and direction. The WSS 500 series 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 500 series sensor is automatically heated when used in cold climates. Finally, the WSS 500 series sensors are maintenance-free and do not require field calibration.

Versions

The wind sensor is available in two versions:
- WSS 550 with built-in heating element to prevent ice
- WSS 500 without heating

Applications

The WSS 500 series sensors are classified for residential, commercial and light industry plus industrial environment.

The WSS 550 sensor can be used in almost any conditions, whereas WSS 500 is only specified down to 0^oC, 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. WSS 500 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 500 series can be directly connected to the DEIF XDi-N indicator, forming a superb wind system. The WSS 500 series can of course also be place in systems together with a WSDI-2 display.

- 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, the WSS 500 series sensors can be used as precise stand-alone wind sensors in applications where wind data is used as information, and where a short outage due to extreme weather is not critical.

Housing

The WSS 500 series is designed to withstand the environment on board a ship.
The 1” stainless steel mounting rod with standard ¾” pipe thread facilitates mounting and secures good earth connection through the hull of the ship.

Interface

The WSS 500 series has an RS-485 two-way interface with communication following the NMEA 0183 protocol.

Supply

The WSS 500 series can be supplied from a DC supply of nominal 12 to 24 V DC.

Wind sensor static, WSS 500 series

Cable

The WSS 500 series is connected with a single 4 × 0.75 mm^2 screened cable. Cable extension can be made by a standard 4 × 0.75 mm^2 screened cable, for example UL2464 18AWG4C+AE, length max. 300 metres, the capacity between each signal conductor should not exceed 70 nF. Twisted pair is recommended (see options).

Error flag

The WSS 500 series 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 500 series 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 RS-485 interface, so contact DEIF if you have special needs like this.

Protection from birds

Birds are known to be able to damage ultrasonic wind sensors; therefore the bird avoidance kit is standard on all DEIF WSS 500 series sensors. This needle cap prevents birds from landing on the sensor.

Options

- A VDR (voyage data recorder) can be connected directly to the RS-485 port.
- Bird avoidance option is available for previously delivered sensors without "bird kit" preinstalled.
- WSS-shielded extension cable, variable length from 1 to 300 metres.
- 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	12 V or 24 V DC (9.0 to 31.2 V DC)	
Power consumption	WSS 500 and WSS 550 with inactive heating element: < 0.1 W WSS 550 with maximum heating < 15 W	
Interface	RS-485 bus (I/O) The bus should be terminated with 120 to 200 ohm for pure RS-485 operation Combined RS-485 (I/O) and NMEA0183 (I) operation: A combination of up to ten RS-485 (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 $\geq$ +/-2.1 V output necessary for a standard NMEA0183 input circuit to work The NMEA0183 input load must be $\leq$ 2 mA @ +/-2 V NOTE: An 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 "WSS 500 series appendix to user's manual", document no. 4189350076	NMEA 0183 ver. 3.0
Wind speed	Range: 0 to 116 KTS (0 to 60 m/s) Resolution: 0.1 Knots Accuracy: 0 to 68 KTS: ±0.6 KTS or ±3 %, whichever is greater > 68 KTS: ±5 %	
Wind direction	Range: 0 to 360° continuously Resolution: 1° Accuracy: ±3 % in relation to wind direction	
Update interval	1 second	
Start-up time	< 5 s from power on to valid data output	
Connection	2 m 4 × 0.75 mm^2 screened cable type UL2464 18AWG/4C+DW+AL/MY+Jacket The 2 m cable is fixed on the sensor and is open-ended	
Mounting	¾" pipe thread: Outer diameter: 1.04 inch (26.4 mm), 14 threads per inch	
Compass safety distance	0.2 m (8 inches)	IEC/EN 60945
Protection	IP66	IEC/EN 60529
Relative humidity	0 to 100 %	EN/IEC 60068-1/2
Pressure	600 to 1100 hPa	
Temperature	WSS 550 operating range: -40 to +55 °C (class approved for -25 to +55 °C)* WSS 500 operating range: 0 to 55 °C** Storage (both): -60 to +70 °C *Note: for WSS 550 to operate at -52 °C, the power supply must be 15 V or 30 V. At any other power supply range, the lowest operating temperature is -40 °C. **Note: WSS 500 has no automatic heating element to prevent ice, the sensor will work below 0 °C, but it will depend on weather conditions	IEC/EN 60068-2-1
Vibration test	3 to 13.2 Hz: 2 mm (peak-peak) 13.2 to 100 Hz: 0.7 g	EN 60945, EN/IEC 60068-2-6 and DNV Class A
	3 to 15 Hz: +2.5 mm (peak) 15 to 50 Hz: 2.3 g	GL curve 4 for masts
Safety	Cat. III, pollution degree 2, 550 V AC rms, 50 Hz, 1 minute	EN 61010-1
EMC	CE-marked for industrial environment	EN 61000-1-1/2/3/4 and IEC/EN 60945
Housing	Wind sensor housing: Polycarbonate +10 % glass fibre Mounting tap: Corrosion-resistant stainless steel	UL94 V0
Weight	0.8 kg	
Dimensions, card-board box	450 × 315 × 230	

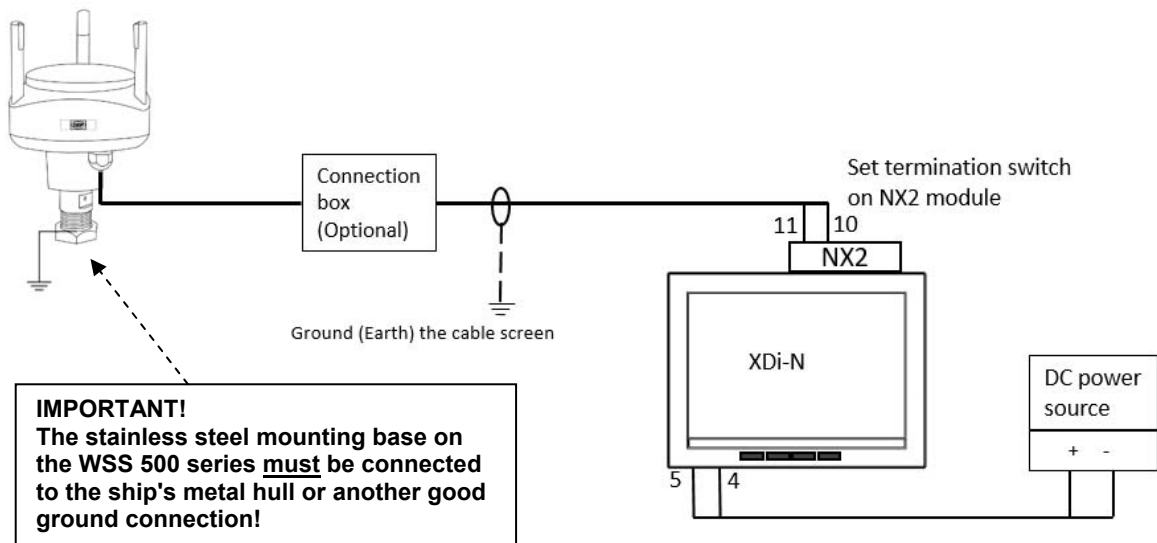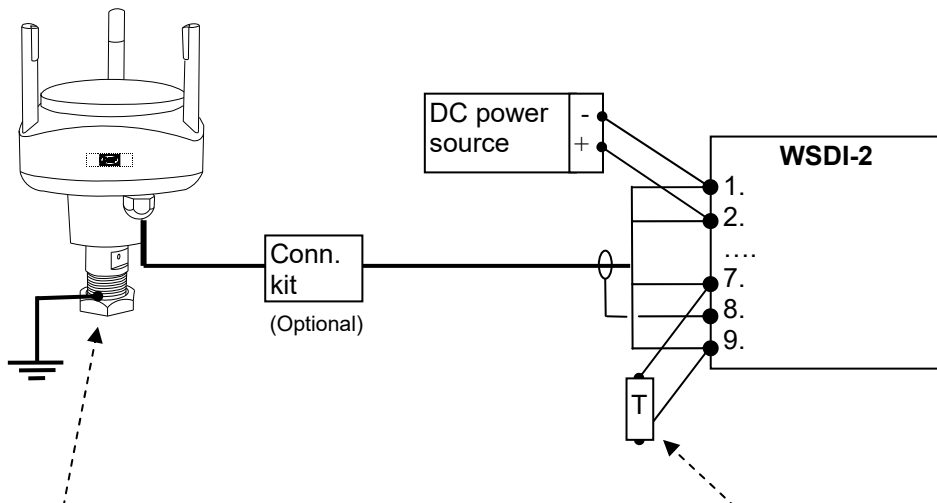| Approvals	Type-approved according to:	CCS, DNV, GL, GOST-R, RRR, and RS
Accessories	IP66 connection box kit: IP66 connection box w/cable glands and screw terminals to extend the sensor cable with an extension cable IP67 connector kit: Watertight male and female connector for soldering to the sensor cable and the extension cable respectively Extension cable: Available in 30, 40, 50 and 100 m length 4 × 0.75 mm^2 shielded cable Bird avoidance kit: Spike kit to prevent birds from interrupting the wind measurements or, in worst case, from damaging the sensor (For retrofit on previous WSS sensor versions only)	

Labels

Product label:

Terminals and function – cable colours and function

Cable colour	Function		Note
Black	Supply voltage	-	DC supply voltage for the wind sensor
Red		+	
Orange	RS-485 comm.	A	Wind speed and direction data output
Brown		B	
Shield	Electrical shielding of data signal		The shield must normally not be connected to terminal 8, only if electrical noise interferes with the operation of the WSDI-2 Also see the warning below

Connection of WSS 500 series and XDi-N

IMPORTANT!
The stainless steel mounting base on the WSS 500 series must be connected to the ship's metal hull or another good ground connection!

Connection of WSS 500 series and WSDI-2

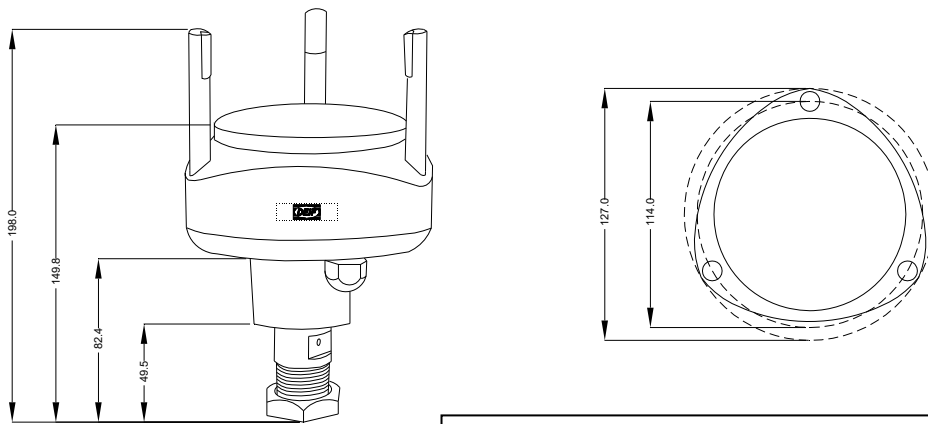**IMPORTANT!**
The stainless steel mounting base on the WSS 500 series <u>must</u> be connected to the ship's metal hull or another good ground connection!

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

Unit dimensions, WSS 500 series

All dimensions are in mm

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

Available variants

Type	Variant no.	Description	Item no.	Note
WSS 550	01	WSS 550 with bird avoidance and heating	2958050060-01	
WSS 500	02	WSS 500 with bird avoidance (no heating)	2958050060-02	
WSS 550 upgrade kit	01	WSS 550 with bird avoidance and WSI interface box	2958040050-01	
WSS 500 upgrade kit	01	WSS 500 with bird avoidance and WSI interface box	2958040150-01	

Available accessories

Accessory	Description	Type	Note
WSS extension cable 1	30 m, 4 × 0.75 mm^2, shielded	Cable	
WSS extension cable 2	40 m, 4 × 0.75 mm^2, shielded	Cable	
WSS extension cable 3	50 m, 4 × 0.75 mm^2, shielded	Cable	
WSS extension cable 4	100 m, 4 × 0.75 mm^2, shielded	Cable	
WSS IP66 connection box kit	Connection box kit for WSS cable extension	Connection box	Alternative to IP67 connectors
WSS IP67 connector kit	2 connectors for WSS extension cable (IP67, soldered)	Connector	Alternative to IP66 connection box

Order specifications

Product variants:

Mandatory information			Additional accessories to a standard variant	
Item no.	**Type**	**Variant no.**	**Accessory**	**Accessory**

Example:

Mandatory information			Additional accessories to a standard variant	
Item no.	**Type**	**Variant no.**	**Accessory**	**Accessory**
2958050060-01	WSS	01	WSS extension cable 2	WSS IP66 connection box kit

Due to our continuous development we reserve the right
to supply equipment which may vary from the described.

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