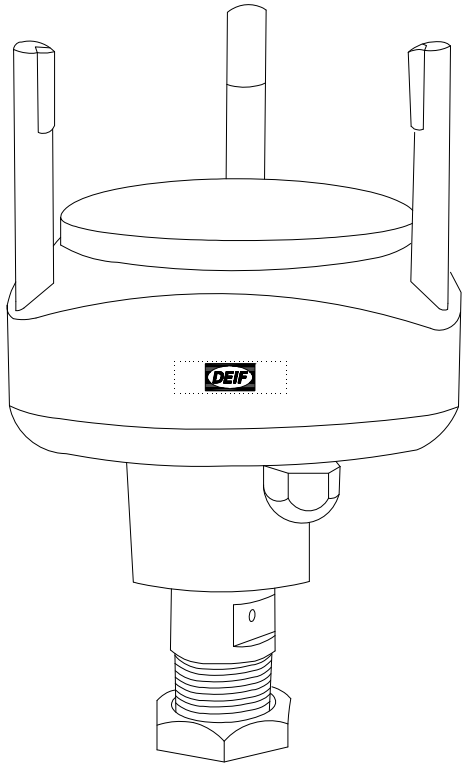
DEIF A/S

Ultrasonic wind measuring system

Type WSS, WSDI, WSI

4921250059C



- *Sea-waterproof construction*
- *Accurate read-out of wind direction and wind speed*
- *NMEA data output*
- *1-3 displays per sensor*
- *Based on ultrasonic principle – no moving parts*
- *Built-in, automatically activated heating element to prevent ice*

CE

Application

The wind measuring system WSS is a fast responding and accurate system designed for measurement of wind speed and wind direction on-board ships. The wind measuring system WSS is classified for residential, commercial and light industry plus industrial environment.

This system offers the advantage of reading the measuring results from several locations on-board, e.g. at control desks both on the bridge and on the bridge wings.

The displays are provided with data output for serial transfer of measuring values to the navigation computer of the ship and/or to a personal computer via NMEA protocol.

The system indicates relative wind speed and wind direction. If indication of absolute wind speed and wind direction is required, these values must be calculated separately.

Construction

The wind measuring system WSS consists of three components: A **wind sensor**, an **interface box** and 1-3 **displays** for indication of wind speed and wind direction.

Wind sensor type WSS

The sensor is based on 3 ultrasonic transducers arranged in a triangle for measuring of wind speed and wind direction by measuring the time it takes the ultrasound to travel from one transducer to the other two.

Placing:

Ideally, the wind sensor should be placed far from large objects that might influence the measuring results; however, in practice this is normally not possible on-board a ship. The best result is achieved by placing the sensor at the top of a mast in the opposite end of the superstructure.

Placing the sensor just above the superstructure is disadvantageous, especially where the superstructure consists of wide side faces, over which the wind is forced. This may result in turbulence, velocities and wind directions that are out of proportion to the actual, undisturbed wind speed and wind direction.

Connections:

The wind sensor is supplied with 2 metres fixed cable. From factory the cable is connected to the sensor via a waterproof gland, and this must not be replaced by another cable; the cable is extended by using a standard connecting box.
Optional: The IP67 connector kit can be ordered together with the transducer and used to connect the fixed transducer cable with an extension cable. (Note: connectors are for soldering).

Installation cable:

4 x 0.75mm^2 screened cable, e.g. UL2464 18AWG4C+AE, length max. 300 metres, capacity max. 70nF between signal conductors.
Optional: a suitable extension cable can be ordered with the transducer in length from 1 to 300 meters.

Mounting:

The sensor is delivered with a mounted steel tap. The tap is fastened on the mast using e.g. a pole/tube with an inner ¾" RG thread.

WSS interface box type WSI

The interface box is connected between the sensor and the display. The interface box is supplied from an 18…32V DC supply and will then supply the ultrasonic transducers and the built-in heating element and at the same time convert the data signal for wind direction and wind speed into a TTL signal intended for the display. This is to make it possible to replace an existing wind sensor type 879.3c with our new sensor type WSS, and to be able to connect the sensor to the existing display type 879.50/879.521. Please note that the new name for the display is WSDI. Besides, the already mounted cable for the sensor can still be used.

Display type WSDI

The display is equipped with a display for read-out of wind speed plus a circle of red LEDs for indication of wind direction. On the display a ship's symbol plus graduation lines are printed.

The keyboard on the front of the display is provided with 3 push-buttons at the right for setting of:

Light intensity:

The light intensity is adjusted to a suitable level by pressing the up arrow (▲)/down arrow (▼) keys to increase/decrease the light intensity (8 levels).

Read-out in "m/s" or "knots":

The "MODE" push-button is used to change the measuring unit for the wind speed between reading in m/s or knots. A red LED at the centre of the display is lit, indicating the selected measuring unit.

Technical specifications

Wind sensor type WSS

Sensor generally:

- Power supply:	12V DC ±20% (max. 1.1A)	
	24V DC ±20% (max. 0.6A)	
- Temperature:	Working range:	-52...+60°C
	Storage:	-60...+70°C
- Relative humidity:	0…100%	
- Pressure:	600…1100hPa	
- Electrical connection:	2m 4 x 0.75mm^2 screened cable type UL2464 18AWG/4C+DW+AL/MY+Jacket. The 2m cable is fixed mounted on the sensor and is open-ended.	
- Materials:	Wind sensor housing:	Polycarbonate +10% glass fibre
	Mounting tap:	Corrosion-resistant stainless steel
	Weight:	0.8kg
- Protection:	IP66, to EN 60529	
- Electromagnetic compatibility:	EN 61326: 1997 + Am 1:1998 + Am 2:2001	

Wind speed section:

- Measuring range:	0...99.9 KTS	
- Resolution:	0.1 KTS	
- Linearity:	0...68 KTS:	±0.6 KTS or ±3%, whichever is greater
	68...99.9 KTS:	±5%
- Response time:	1.0 s	

Wind direction section:

- Measuring range:	0...360° continuously
- Resolution:	1°
- Accuracy:	±3° in relation to the wind direction
- Response time:	1.0 s

Communication port:

- RS485:	NMEA 0183 protocol. For further information, see specific manual

Installation options:

- IP67 Connector kit	1 pcs, Plug Male 7 pin. IP67, for soldering	10 22 00 00 52
	1 pcs, Screw cap for male plug	10 29 92 00 02
	1 pcs, Plug female 7 pin. IP67, for soldering	10 22 00 00 53
	1 pcs, Screw cap for female plug	10 29 92 00 03
- Extension cable	1 to 300 meters 4x0.75mm^2 cable (1m steps)	10 20 23 00 16

WSS interface box type WSI:

- Power supply:	24V DC +30% -25% reverse polarity protected (working voltage 18…32V DC)		
- Power consumption:	Max. 0.9A at 24V DC (1.25A at 18V DC). A 2A fuse is recommended as protection for the supply input		
- Galvanic separation:	Between supply and the rest: 600V		
- Output for WSS supply:	30V DC 0.6A to WSS		
- Output for display WSDI:	TTL. 5V wind speed and direction		
- Input from WSS wind sensor:	RS485 communication for wind speed and direction		
- EMC:	According to EN 61000-6-1/2/3/4		
- Protection:	Housing: IP40. Terminals: IP20 to IEC 529 and EN 60529		
- Temperature:	Operating:	-25°…70°C to EN 60051	
	Storage:	-50°…90°C	
- Material:	Polycarbonate (30% GFR)	UL94V0	
- Mounting:	Mounted on a 35mm DIN rail or by means of two 4mm screws according to DIN 46277 and DIN EN50022		
- Vibration:	3…13.2Hz:	2mm (peak-peak)	EN 60945
	13.2…100Hz:	0.7g	DNV Class A
- Weight:	0.45kg		

Display type WSDI:

- Number of LEDs in circle: 64 pcs.
- Display: 2½ digit luminous 7-segment displays, height 14mm
- m/s or knots: Indication of m/s or knots is changed by means of the "MODE" push-button
- Power supply: 110 or 220V AC, 50-60Hz
- Power consumption: 6W
- EMC: According to EN 61000-6-1/2/3/4
- Protection: Housing: IP52. Terminals: IP20 to IEC 529 and EN 60529
- Material: All plastic parts are self-extinguishing to UL 94 (V0)
- Weight: 0.8kg
- Data-out (serial): NMEA 0183 (EIA/RS422), version 2.x-3.0 or IEC 61162-1
  Optional: NMEA-0183 version 1.5

Transmission speed:	4800 Baud
Number of bits:	8
Number of parity bits:	0
Number of stop bits.	1
Transmission interval:	1 s

- Protocol NMEA 0183 ver. 1.5: $IIMWD,xxx,T,,,yy.y,N,,*zz<CR><LF>
  Wind direction (0…360°) xxx
  Wind speed (0.0…99.9 KTS) yy.y
  Hexadecimal check sum zz
  (XOR of all characters until the “*”-character (not included))
  End of transmission (EOT) <CR><LF>
- Protocol NMEA 0183 ver. 2.x-3.0: $WIMWV,xxx,x,R,yy.y,N,A*zz<CR><LF>
  Wind direction (0…360°) xxx,x
  Wind speed (0.0…99.9 KTS) yy.y
  Hexadecimal check sum zz
  (XOR of all characters until the “*”-character (not included))
  End of transmission (EOT) <CR><LF>
- Connection: Terminal “A” signal, terminal “B” return (0V). Use a 2-wire screened cable
- Signal levels for NMEA 0183 (EIA/RS422): The NMEA 0183 standard requires the following signals levels:

“1” between -15V and +0.5V	|Isink| ≥ 0mA
“0” between +15V and +4V	|Isource| ≥ 15mA @ +4V

  The display type WSDI releases the following levels:

“1” -9.5V ±0.5V	|Isink| ≥ 1mA @ -8V
“0” +9.5V ±0.5V	|Isource| ≥ 15mA @ +8V

  Please notice that NMEA does not request that the output may settle power in "1" condition, but it is permissible. This is used in WSDI in order to make it compatible with RS-232C/V24.

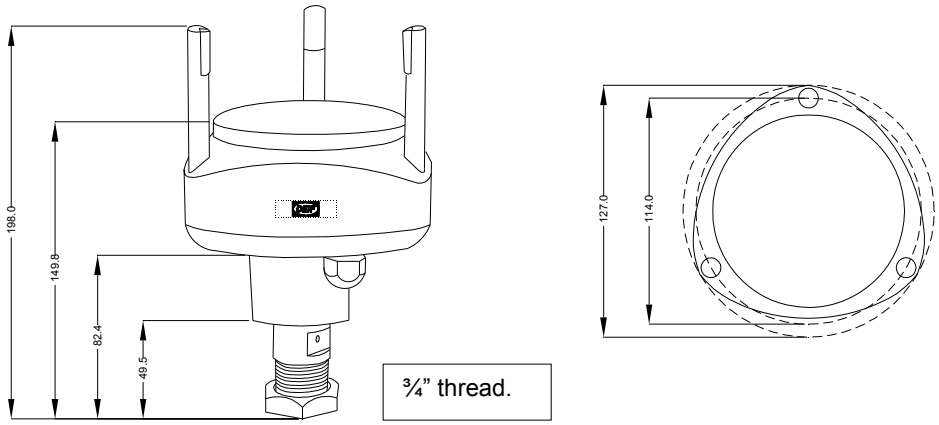
  The NMEA 0183 signal is inverted like RS232.

  The "A" and the "B" signals are galvanically separated as prescribed by NMEA. An RS232C receiver may be connected. Applicable would be a PC with the following configuration:

Transmission speed:	4800 Baud
Number of data bits:	8
Parity bits:	None
Number of stop bits:	None

Dimensions, wind sensor WSS

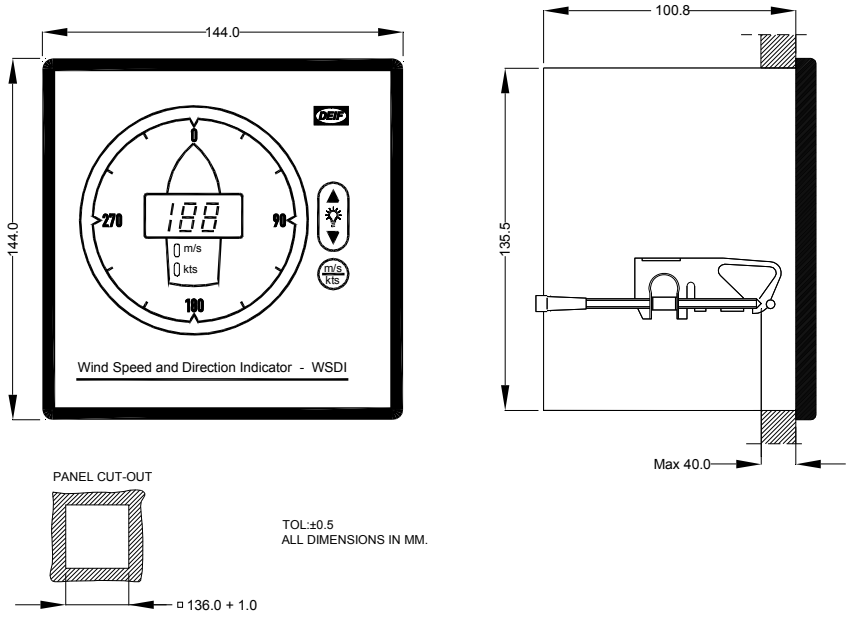
All dimensions in mm



WSS

Dimensions, display

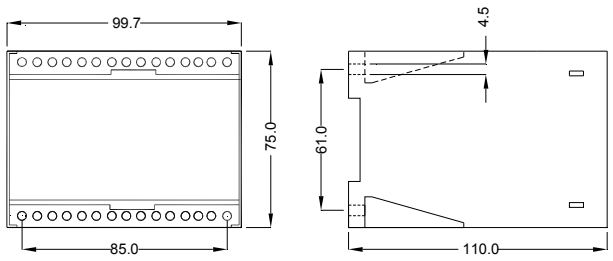
All dimensions in mm



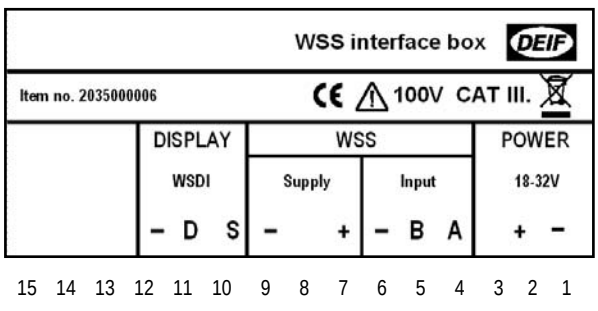
WSDI

WSS interface box type WSI

Dimensions



Front panel



Connections

WSS interface box WSI

Pin no.	Function		Note
1	Supply voltage	-	24V DC supply for the interface box
2		+	
3		NC	
4	RS485 comm.	A	Wind speed and direction data from the wind sensor
5		B	
6		GND	
7	Power supply out	+	30V DC supply for the wind sensor
8		NC	
9		-	
10	Wind speed	TTL out	Wind speed and direction data to the display type WSDI
11	Direction	TTL out	
12	Common	GND	
13		NC	Do not connect
14		NC	
15		NC	

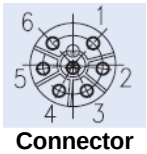
Display WSDI

Pin no.	Function		Note
AC	Supply	220V AC or 110V AC	To change from 220V AC to 110V AC or vice versa, see the manual for WSS
AC			
GND	EARTH		The ship's hull, it is not necessary to connect this terminal
1	AUX +5V DC	External mode control	For external dimmer and read-out of m/s or KTS in the display
2	0V	Input from WSS interface box	Terminal 12 on the WSS interface box
3	Wind speed		Terminal 10 on the interface box
4	Direction		Terminal 11 on the interface box
5	Screen		The cable screen. Do not connect the other end
A	Signal	NMEA	NMEA0183 version 1.5 or 2.x-3.0
B	Return		
	Screen		The cable screen. Do not connect the other end
9	Mode shift	m/s or KTS	Read-out in the display
10	Dimmer	▼	Decrease illumination
11	Dimmer	▲	Increase illumination

Wind sensor WSS

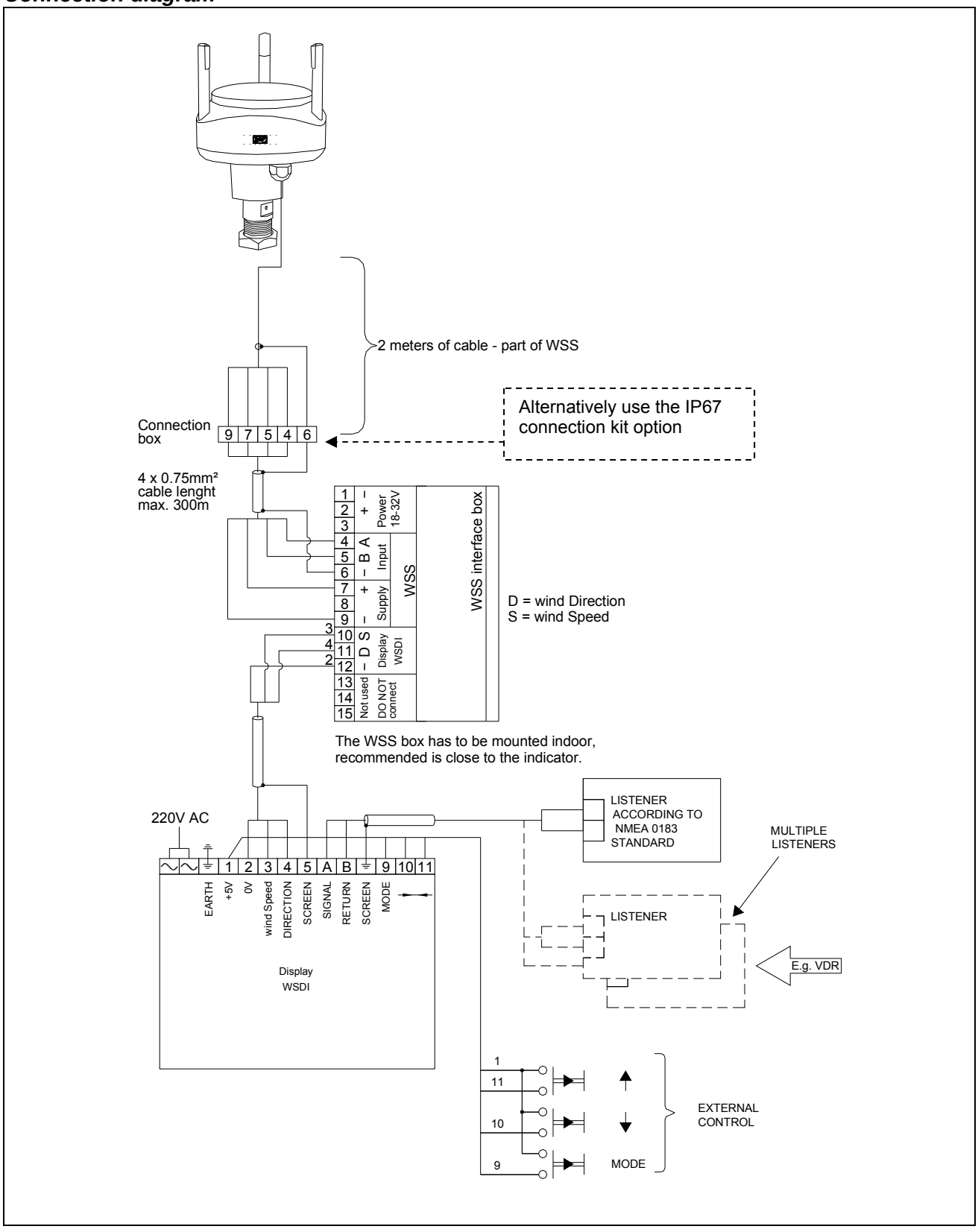
Cable colour	Function		Note
Black	Supply voltage	-	30V DC supply for the WSS wind sensor
Red		+	
Orange	RS485 comm.	A	Wind speed and direction data output
Brown		B	

IP67 Connector kit assembly instruction (OPTIONAL)

WSS/WSS-L cable (black) Male (CON1) connector	 Connector pin no.	WSS extender cable xx meters Female (CON2) connector	Signal comments
Black (-) ●	1	Black (-) ●	30V DC Supply for WSS/WSS-L
Red (+) ●	2	Red (+) ●	
Orange ●	3	Orange ●	RS485 Comm. From WSS/WSS-L
Brown ●	4	Brown ●	
Screen ●	5	Screen ●	Cable screen

Each connector must be soldered to respective cable (detailed information is available in the installation instruction).

Connection diagram



Order specifications

	Type	Power supply
Example:	WSS	220V AC