APPENDIX TO USER'S MANUAL

Ultrasonic wind measuring WSS REC

This appendix is a description of WSS REC wind sensor NMEA output data for connection to the control system

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Connection of the WSS REC wind sensor

Cable colour	Function		Note
Black	Supply voltage	-	12V DC ±20% (max. 1.1A) or 24V DC ±20% (max. 0.6A) supply for the wind sensor. See note 1.
Red		+	
Orange	RS485 comm.	A	Wind speed and direction data output.
Brown		B	

Note 1: At approx. 16V, the combination of the heating elements is changed in order to consume equal power with 12V DC and 24V DC supplies. Input resistance is changed from 13 ohm to 52 ohm for voltages above 16V. In order to have the best heating using 12V DC as supply, it is recommended to keep the voltage level below 16V DC even though the WSS can operate correctly in the range 9.6V DC to 28.8V DC.

WSS REC NMEA 0183 protocol

MWV, Wind Speed and Direction Response:

Response format: $WIMWV,296,R,9.7,M,A*20<cr><lf>

where
$ = Start of the message
WI = Talker identifier (WI = weather instrument)
MWV = Wind speed and direction response identifier
296 = Wind direction value (degrees)
R = Wind direction unit (R = relative)
9.7 = Wind speed value (m/s)
M = Wind speed unit (m/s)
A = Data status: A = valid, V = invalid
* = Check sum delimiter
20 = Two-character check sum for the response
<cr><lf> = Response terminator

Update rate: Every 1 second.

XDR, Transducer Measurement Response:

Response format: $WIXDR,C,25.0,C,2,U,23.3,N,0,U,24.3,V,1,U,3.491,V,2*75<cr><lf>

where
$ = Start of the message
WI = Talker identifier (WI = weather instrument)
XDR = Transducer measurement response identifier
C = Transducer id 2 type (temperature)
25.0 = Transducer id 2 data (heating temperature)
C = Transducer id 2 units (C, heating temperature)
2 = Transducer id for heating temperature
U = Transducer id 0 type (voltage)
23.3 = Transducer id 0 data (heating voltage)
N = Transducer id 0 units (N = heating disabled or heating temperature too high, heating voltage)
0 = Transducer id for heating voltage
U = Transducer id 1 type (supply voltage)

24.3 = Transducer id 1 data (voltage)
V = Transducer id 1 units (V, supply voltage)
1 = Transducer id for supply voltage
U = Transducer id 2 type (voltage)
3.491 = Transducer id 2 data (3.5V reference voltage)
V = Transducer id 2 data (V, 3.5V reference voltage)
2 = Transducer id for V, 3.5V reference voltage
* = Check sum delimiter
75 = Two-character CRC for the response
<cr><lf> = Response terminator

Update rate: Every 15 seconds.

TXT, Text Transmission Response:

Response format: $WITXT,xx,xx,xx,c--c*hh<cr><lf>

where
$ = Start of the message
WI = Talker identifier (WI = weather instrument)
TXT = Text transmission identifier
xx = Total number of messages, 01 to 99
xx = Message number
xx = Text identifier (see Error Messaging/Text Message table)
c--c = Text message (see Error Messaging/Text Message table)
* = Check sum delimiter
hh = Two-character CRC for the response
<cr><lf> = Response terminator

Update rate: At start-up or if an error occurs.

Error Messaging/Text Message table:

Text message number (in NMEA 0183 v3.0 protocol only)	**Text message**	**Interpretation and action**
01	Unable to measure error	Not available.
02	Sync/address error	Not available.
03	Unknown cmd error	Not available.
04	Profile reset	Check sum error in configuration settings during power-up. Factory settings used instead.
05	Factory reset	Check sum error in calibration settings during power-up. Factory settings used instead.
06	Version reset	New software version in use.
07	Start-up	Software reset. Program starts from the beginning.
08	Use chksum xxx	Not available.
09	Measurement reset	The ongoing measurement of all the sensors interrupted and started from the beginning.

Note: When the WSS is turned on, a text message is sent ($WITXT, 01, 01, 07, Start-up*29).

Response example:

```
$WITXT,01,01,07,Start-up*29
$WIXDR,C,25.0,C,2,U,23.3,M,0,U,24.3,V,1,U,3.491,V,2*75
$WIMWV,296,R,9.7,M,A*20
$WIMWV,297,R,9.9,M,A*2F
$WIMWV,298,R,8.9,M,A*21
$WIMWV,294,R,9.5,M,A*20
$WIMWV,293,R,9.7,M,A*25
$WIMWV,296,R,9.5,M,A*22
$WIMWV,298,R,10.1,M,A*10
$WIMWV,      ……..
             ……..
             ……..
$WIMWV,296,R,9.9,M,A*2E
$WIMWV,296,R,9.9,M,A*2E
$WIMWV,298,R,10.1,M,A*10
$WIMWV,297,R,10.5,M,A*1B
$WIMWV,296,R,9.9,M,A*2E
$WIMWV,296,R,9.9,M,A*2E
$WIXDR,C,24.8,C,2,U,24.1,M,0,U,24.3,V,1,U,3.483,V,2*7A
$WIMWV,296,R,10.5,M,A*1A
$WIMWV,296,R,11.0,M,A*1E
$WIMWV,297,R,10.5,M,A*1B
$WIMWV,298,R,10.3,M,A*12
$WIMWV,296,R,10.1,M,A*1E
```

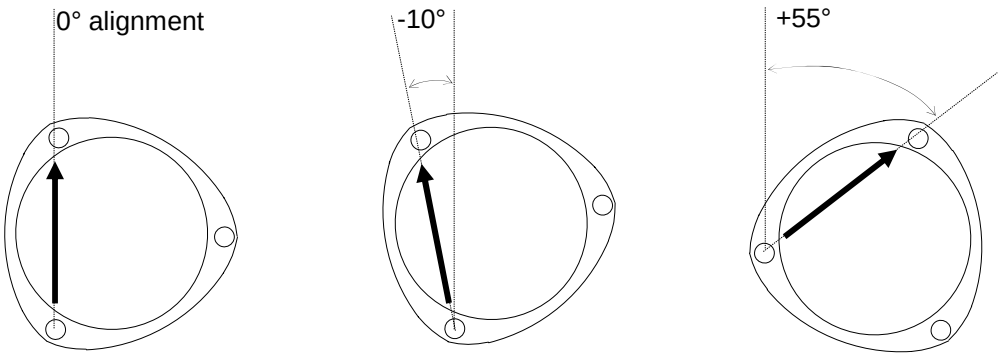
WSS REC, wind direction offset

In case the WSS REC cannot be aligned in such a way that the arrow on the bottom is parallel with the centre axis of the nacelle from rotor to the back and pointing in the rotor direction, it is necessary to make a wind direction correction. Then the deviation angle can be sent to the WSS REC.

When the deviation is found (see the examples below), the angle is sent to the WSS REC by the wind message formatting command aWU,D (direction offset).

Example: Change offset to -10°
Send the command; 0WU,D=-10<cr><lf>

Example: Change offset to +55°
Send the command; 0WU,D=55<cr><lf>



DEIF A/S reserves the right to change any of the above.