DEIF

-power in control

USER's MANUAL/INSTALLATION NOTE

Wind display type WSDI-2
- Input and wiring
- Mounting

CE ®

Document no.: 4189350032C

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1. Introduction

This document provides guidelines for mounting, connection and commissioning of the WSDI-2 indicator. The WSDI-2 indicator is made for direct connection to DEIF wind sensor type WSS or WSS-L. But other types can be used together with the WSDI-2, as long as the sensor has an RS485 (or RS422 talker) output with NMEA 0183.

Unpacking

The WSDI-2 indicator is delivered in a cardboard box. To protect the indicator, it is important to store it in the box until mounting.

The indicator is protected against ESD (static electricity). Therefore, in the process of mounting and wiring of the indicator, no special attention to ESD is needed.

The WSDI-2 indicator is designed for front mounting, and four screws must be used to fix the indicator to the switchboard console. These screws are not included because of varying thickness of the different switchboards. See chapter 8 for details.

The cardboard box contains	WSDI-2
User's Manual/Installation Note	1
Indicator	1
Terminal block	1
200 Ohm terminator resistor	1
Frame (cover)	1

2. Input and wiring instruction

| Terminal no.	Signal	Marking	Remark	
1	0 V	1. -	Aux. supply, 9.0…31.2V DC, <5 W	
2	12/24 V	2. +12/24 V		
			External dimmer connection	**NCI-1 connection**
3	CAN-H	3.	Do not connect	CAN-H
4	Dimmer or CAN-C	4.Dim-sw	Connect to a potential free contact. Open 2.5 V, closed 0.1 mA	Normally not connected
5	Dimmer or CAN-L	5.Dim-sw		CAN-L
6	Not used	6.	Do not connect	Do not connect
7	RS485 (data+)	7.A (+)	Orange wire on WSS	
8	RS485 GND	8. Data GND	Normally not connected (can be connected to screen on WSS)	
9	RS485 (data-)	9.B (-)	Brown wire on WSS	
Wind sensor type WSS or WSS-L supply				
Black wire	0V DC	None	Type WSS 12 V/24V DC/2A	
Red wire	24V DC	None	Type WSS-L 12 V/24V DC/0.6A	

Rear view of the indicator:
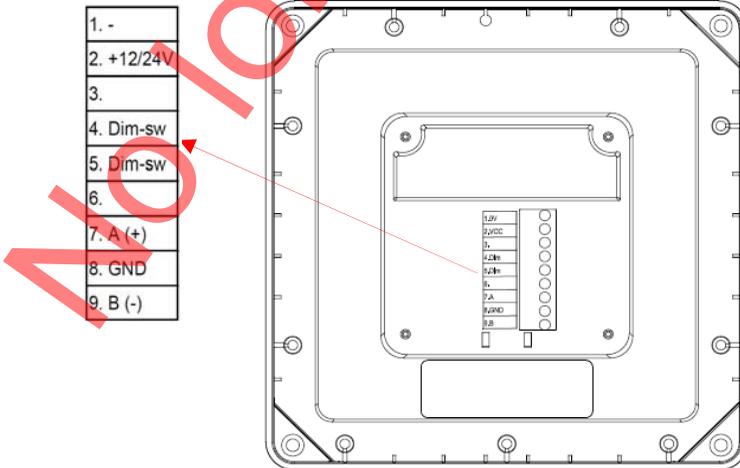
3.   Interconnecting indicators

The drawing below shows how to connect two or more indicators to the same wind sensor.

Using the WSS from DEIF, up to three indicators can be connected to the same sensor. Please notice that if a VDR is needed, this has to be connected directly to the sensor's RS485 communication output.

The shown remote dimmer is a simple switch able to carry 2.5 V 0.1 mA.
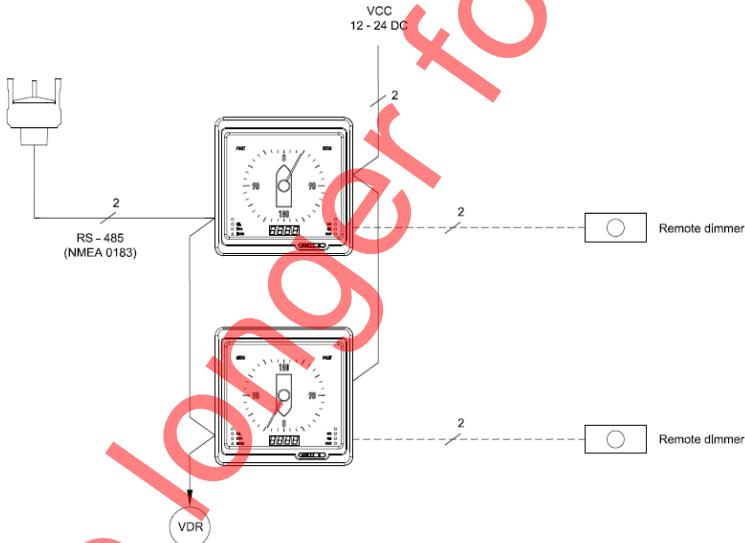
The RS485 line must be terminated with a 200 Ohm resistor!
**The resistor must be mounted directly on the connector terminals (between A-B) and is included with the WSDI-2.**

If the WSDI-2 is to be used in applications showing true wind, use the NCI-1 NMEA interface box to connect to the ship's navigation system. See appendix 2.

4. User interface

Type	Function	Remark
1. Status LED	M/S	Indicates selection of wind speed read-out in m/s
2. Status LED	KTS	Indicates selection of wind speed read-out in knots
3. Status LED	BEAU	Indicates selection of wind speed read-out in Beaufort
4. Status LED	REL	Indicates selection of wind values relative to ship
5. Status LED	TRUE	Indicates selection of true wind values
6. Error LED	ERROR	Indicates internal error (orange flash)
7. Status LED	Service tool	See error functions section
8. Status LED	Service tool	
7-segment display	Wind speed/ information (4-digit)	Guides the user in the menu system and provides information about dimmer levels, setup, etc.
Analogue scale and pointer	Wind direction	360 degrees pointer rotation on a black back illuminated scale
1. Push-button	MODE	Selects operation and setup modes
2. Push-button	Dimmer	Selects dimmer level and provides enter function

@: All status LEDs and 7-segment displays are red.
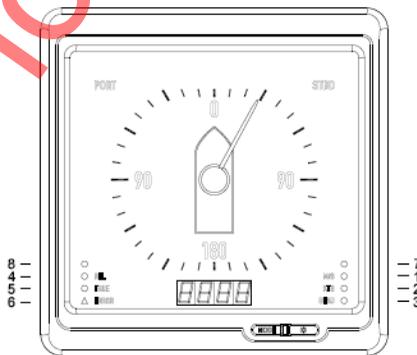
5. Setup

The indicator has three different menus for use in different situations:

The **main menu** is for the daily use, and here the user can:

- set the dimmer level according to the current light conditions on the bridge (10 dimmer levels).
- change the wind speed read-out according to user preferences (M/S, KNOTS or BEAUFORT).

The main menu is default when the indicator is powered up.

The **advanced menu** is for changing fundamental user settings, and here the user can:

- select the wind type measurement to be relative or true read-out (true also needs speed signal connected, see appendix 2).
- change the damping of the read-out. This is to get a more relaxed reading if this is wanted. The damping can be selected in four levels: 1, 5, 10 or 30 seconds.
  The damping is an averaging function applied to both digital read-out and pointer.
- select the beep sound on or off, when pushing buttons.
- select light groups. Needs CAN connection between used indicators. This feature enables the user to dim more indicators in selected groups from just one of the indicators in the group. Up to seven groups can be selected. Normally, 'None' is selected for single dimmer systems.

For entering the advanced menu, see the following pages.

The **installation menu** is for setting the indicator up for the first time or for fundamental change/control of installation. Here the installer can:

- select the input type:

  NMEA 0183
  Select this for connection with WSS/WSS-L or another wind sensor with NMEA 0183.

  NMEA 0183+remote dimmer
  Select this for connection with WSS/WSS-L or another NMEA 0183 sensor, and the system is using an external dimmer button for remote dimmer control.

  CAN
  For wind data input via the CAN interface, only for future use!

  Demo
  Demonstration mode for showing indicator without input signal connected.

- select light mode (dimmer function):

  L1
  Select this if the indicator is placed in an overhead panel or other positions where direct sunlight is rare.
  In this mode, the dimmer works in 10 linear levels (normal).

  L2
  Select this if the indicator is placed in a position where it is exposed to direct sunlight under normal operation.
  In this mode, the dimmer works in eight linear levels and the last two levels in special "sunlight mode". The sunlight mode is active in the last two levels, where the scale and pointer illumination is shut down and all power is used for light in the display. This enables reading in strong sunlight.

- offset correction of <u>wind direction</u> (±180 degrees)
  If the wind sensor is not correctly aligned with the ship, this can be corrected by adding an offset value to the sensor signal, so the display reading will be correct.
  If a DEIF WSS or WSS-L sensor is connected, offset correction is stored in the WSS sensor. Otherwise (other sensor types), the offset is saved in the instrument.

- select service tool
  This is selected for service purposes. See error handling section for further details.

- select source reset
  This is used in CAN systems. The function auto-selects a new data source, e.g. if NCI-1 is replaced, this function must be activated.

For entering the installation menu, see the following pages.

Main menu (default)		
Button*:	**Display:**	**Remark:**
MODE	M/S	Wind speed read-out in m/s
	KTS	Wind speed read-out in knots
	BEAU	Wind speed read-out in Beaufort
☼	0	Dimmer level 0
	1	Dimmer level 1
	2	Dimmer level 2
	3	Dimmer level 3
	4	Dimmer level 4
	5	Dimmer level 5
	6	Dimmer level 6
	7	Dimmer level 7
	8	Dimmer level 8
	9	Dimmer level 9

* Each push toggles between settings.

Information about display reading:

- Wind speed range 0.0 – 9.9, display shows [x.x].
- Wind speed range 10.0 – 99.9, display shows [xx.x].
- Wind speed range 100.0 – 999.0, display shows [xxx.x].
- If no input available, display shows [- - - -].

Advanced menu				
Press [MODE] > 5 sec. to enter this menu				
Press [MODE] [☼] < 1 sec. to save selected setting				
Button:	**Sub menu:**	**Button:**	**Display:**	**Remark:**
[MODE]	Wind type	[☼]	rEL	Relative wind
			tRUE	True wind (needs speed input to work)
[MODE]	Damping	[☼]	dA.0	Damping 1 sec.
			dA.1	Damping 5 sec.
			dA.2	Damping 10 sec.
			dA.3	Damping 30 sec.
[MODE]	Beep	[☼]	b.on	Buzzer turned on (beep is heard)
			b.OFF	Buzzer turned off
[MODE]	Light group	[☼]	None	No light group selected
			DEIF	Light group 0 selected
			1	Light group 1 selected
			2	Light group 2 selected
			3	Light group 3 selected
			4	Light group 4 selected
			5	Light group 5 selected
			6	Light group 6 selected
Returns automatically to main menu when no activity for more than 10 sec.				

Installation menu				
Press [MODE] [☼] > 10 sec. to enter this menu				
Press [MODE] [☼] < 1 sec. to save selected setting				
Button:	**Sub menu:**	**Button:**	**Display:**	**Remark:**
[MODE]	Input select	[☼]	183	NMEA 0183
			r.183	NMEA 0183 and remote dimmer enabled
			CAn	CAN interface
			dE	Demo mode for demonstration
[MODE]	Dimmer type	[☼]	L1	Light mode 1
			L2	Light mode 2
[MODE]	Sensor offset	[☼]	OFF.S	Offset correction of sensor (direction value) See below for setting details!
[MODE]	Service		SEr	Service tool, see chapter 6. Only visual info!
[MODE]	CAN reset		LrES	Source reset (CAN systems only) (use "save" to activate)
Returns automatically to main menu when no activity for more than 5 min. Or press [MODE] [☼] > 10 sec. to manually return to main menu				

Wind direction offset

- In this mode, the user can adjust offset, one digit at a time.
- Pointer shows actual wind direction + offset.
- Display shows [OFFS] for 1 sec. and then the selected value (ex. [123] or [-123]), and selected digit is flashing.
- Sign is the first digit from the left, it can be changed between " " and "-". This digit is only flashing when the digit is changed to "-". When all other digits are 0, the sign cannot be changed.
- Only values in the area -180° - +180° are accepted.

6.   Error functions

General:

Error LED (6)
Flashes orange when the display unit is not valid, contact DEIF!

Display
If no NMEA 0183 input is available, the display shows [- - - -].

When powering up, the display is showing the software version [1.20.3] for a few seconds.

Service tool:

When "service tool" is selected in the installation menu, the user can monitor status from the wind sensor:

a.   Display toggles between [SEr] and then status for the wind sensor communication. [0000] indicates that the sensor is OK and that no communication errors are detected. A figure in this field indicates the actual number of communication errors detected since the service tool was opened.

b.   Status LED 7 "no name - right" flashes every time data is transmitted or received on RS485/NMEA 0183.

c.   Status LED 8 "no name - left" is activated if an error from the sensor is detected (flashes every time data from the WSS is missing or corrupt).

Others:

If the instrument is in demo mode, the display toggles between [-dE-] and simulated wind speed.

7. Dimensions
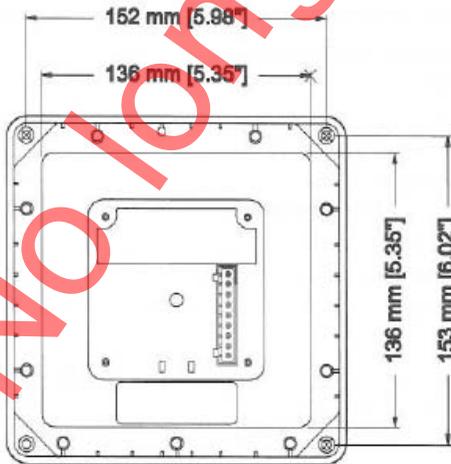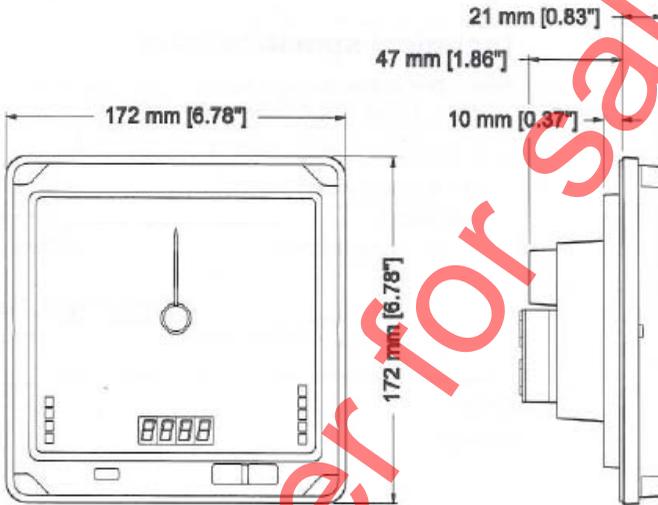
8.   Mounting instructions

Mount the indicator using four screws. The length of the screws depends on the thickness of the console; we recommend 3-4 mm metric screws. Maximum torque for the screws used for mounting is 0.8 Nm (±0.2).

The indicator has an integrated gasket, ensuring IP66 exposure from the front. An IP66 option ensuring IP66 exposure also from the rear is available.
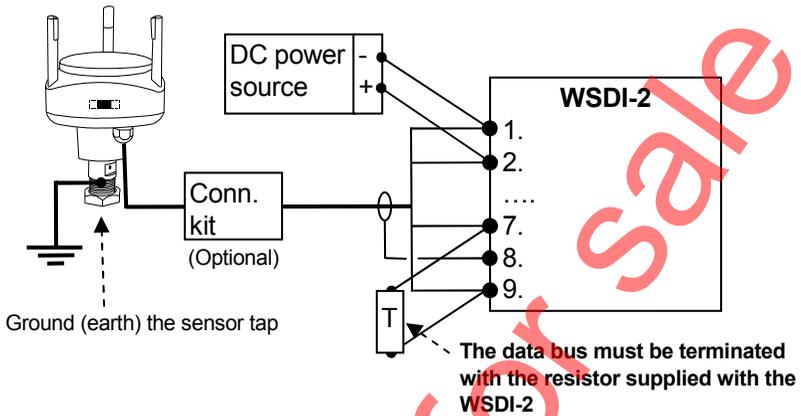
DEIF recommends using CH or PHRX screws, rustproof type. Never use UHRX!
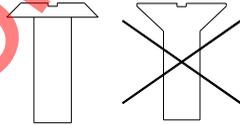
To obtain IP66 protection when mounting the display in a panel, seal all four screws with silicone glue or filler to prevent water from penetrating through the threads of the screws and inside the panel!

Mount the included 200 Ohm resistor between A and B on the connector (terminal number 7 and 9) to terminate the RS485 line. If more units are connected on the line, only one termination resistor must be placed on the last unit.

APPENDIX 1 – connecting a WSS or WSS-L to a WSDI-2 display

Ground (earth) the sensor tap

The data bus must be terminated with the resistor supplied with the WSDI-2

Wind sensor WSS/WSS-L Cable colour	Display WSDI-2 Terminal no.:	Description	Comments
Black (-)	1. 0 V	Aux. voltage: 0 V	Aux. voltage to WSDI-2 and WSS are parallel-coupled in the terminal block
Red (+)	2. VCC	Aux. voltage: +12 or 24V DC	
Orange (A)	7. A	Data A	RS485 data communication
Brown (B)	9. B	Data B	
Screen	8. Data GND	Cable screen	Cable screen

See also: WSS/WSS-L User's Manual/Installation Note, document no. 4189350026.

Combined RS485 (I/O) and NMEA 0183 (I) operation
A combination of up to ten RS485 (I/O) and one NMEA 0183 listeners can be connected to the WSS data interface at the same time.

The data line must be terminated with a 200 Ohm resistor to obtain the > +/-2.1 V output necessary for a standard NMEA 0183 input circuit to work. The NMEA 0183 input load must be < 2 mA @ +/-2 V and preferably opto-isolated. For connection of additional NMEA 0183 I/Os, see appendix 2.

APPENDIX 2 – NCI-1 NMEA 0183 to CAN interface box

This interface box performs three tasks:

1) Makes true wind available on the WSDI-2 by receiving NMEA speed data from the navigation system.
2) Acts as a NMEA output buffer with galvanic separation.
3) Makes NMEA 0183 VWR and MWV wind sentences available.

True wind

The WSDI-2 is able to calculate the "true wind" relative to the ship's heading and as if the ship was not moving (by compensating for the ship's own speed).

The calculated true wind is relative to water when speed through water (VHW) is available, or relative to ground when water speed is not available and speed over ground (in RMC sentence) is available on the NMEA 0183 input.

Please be aware that true wind on the WSDI-2 is not "geographic true wind", where the heading is relative to either geographic north or magnetic north. Wind speed is relative to water (or ground), but direction is relative to the ship's heading.

NMEA output buffer with galvanic separation

It is not recommended to connect more than one standard NMEA 0183 input in parallel on the RS485 port of the WSS sensor to listen in on the MWV sentence coming from the WSS sensor.

The NCI-1 NMEA output can drive up to eight standard NMEA 0183 inputs, for example to connect a navigation system and a VDR.

The NCI-1 also adds a 1.5 kV galvanic separation between the wind system and the ship's navigation system, which may prove to provide good extra protection and a means to reducing noise loops interfering with data communication.

Additional VHW sentence

If the connected system needs VHW instead of MWV, it will also be available on the buffered output (both sentences will be present).

WSDI-2 setup to support the NCI-1

In the WSDI-2 "installation menu", the "input select" must be set to "183" (not "r.183" or "CAN")!

The remote dimmer function will then be disabled.

**It is not possible to connect the NCI-1 in parallel with the remote dimmer.**

Connecting the NCI-1

The NCI-1 is supplied with 2 x 1.5 m cable for connection to the WSDI-2 instrument and the ship's navigation system, respectively.

The cables are named NMEA and CAN, respectively (the CAN cable also contains the wires for the aux. supply voltage).

See the label on top of the NCI-1 to find the NMEA and CAN cables.
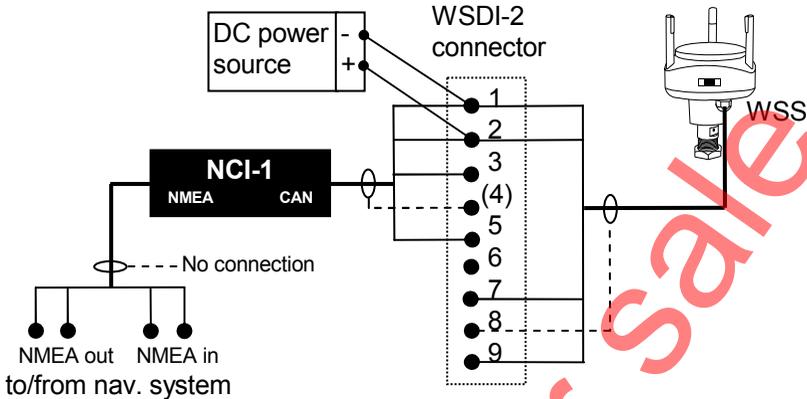
NCI-1 CAN cable connection to the WSDI-2 wind display			
NCI-1 wire colour	Function	WSDI-2 terminal	Note
Black	Supply -	1	0 V
Red	Supply +	2	Nominal 12-24V DC
White	CAN-H	3	Built-in termination from 3 to 5
Bare (shield)	CAN-C	(4)	Should not be connected
Blue	CAN-L	5	

Do not connect a dimmer switch between WSDI-2 terminal 4 and 5!

Extending the CAN cable
The CAN cable may be extended to max. 6 m by using either a shielded DeviceNet cable or a shielded Ethernet CAT5 cable (or higher).

NCI-1 NMEA cable connection to navigation system			
NCI-1 wire colour	NCI-1 function	Navigation system NMEA port	NMEA sentences
Blue	Out: B	In: B / - / GND/Return	VWR & MWV
White	Out: A	In: A / + / RX	
Black	Input: B	Out: B / - / GND/Return	VHW or RMC
Red	Input: A	Out: A / + / TX	
Bare (shield)	Do not connect	Do not connect	

Extending the NMEA 0183 cable

The NMEA 0183 cable may be extended by using a shielded twisted pair cable (e.g. a single wire pair in an Ethernet CAT5 cable only used for the NMEA 0183 signal).

Take care to connect the right cable to the WSDI-2. If the NMEA 0183 cable is accidently connected to the supply voltage, the NMEA I/O may be damaged!

If the NCI-1 box is replaced by another NCI-1, you will have to make a "CAN reset" in the installation menu to be able to receive speed data again!

NMEA data indicator

A red LED inside the box, where NMEA is connected, will flash when NMEA 0183 data is received. If this indicator is not flashing when NMEA input data is supposed to be available, the NMEA input connection may be reversed (wrong polarity), the bit rate may be wrong (must be 4800 Baud) or data is not sent from the speed log, navigation system or GPS receiver.

CAN data indicator

Similarly, there is a LED where the CAN cable is connected, indicating that the CANbus is correctly connected and wind data from the WSDI-2 is received.

If both indicator LEDs are flashing at the same time once every 10 sec., it indicates that the aux. supply voltage for the NCI-1 box is present, but neither NMEA nor CAN input signals are available. Check cabling and connection to the WSDI-2, and check the NMEA 0183 connection as mentioned above.

NCI-1 technical specifications

Aux. voltage	Nom. 12-24V DC (8-35V DC)
Consumption	Max. 0.8 W @ full loaded I/O
CANbus	Built-in 120 Ω termination
NMEA 0183 input	Opto-isolated NMEA input
	Sentence: VHW (water speed) or RMC, VTG (COG)
	Bit rate: 4800 b/s
	Min. input voltage: 1.8 V
	Max. input voltage: +15 V continuous
	Input voltage < 1 sec.: +35 V
	Max. input current: 2 mA
	Galvanic protection Aux./CAN/NMEAout: 1500 V
NMEA 0183 output	RS485/RS422 and RS232 compatible
	Sentence: MWV and VWR
	Bit rate: 4800 b/s
	Differential output 100 Ω load: 2.1 V
	Max. output current: 20 mA
	Galvanic protection Aux./CAN: 1500 V

NMEA 0183 output sentences

MWV wind speed and angle, format:
$IIMWV,67.99,R,3.40,N,A*0B<Cr><Lf>
- 67.99 is the wind angle in degrees from 0 to 360°
- R indicates that it is a relative wind measurement
- 3.40 is the wind speed
- N is speed unit, knots
- A is status – data is valid
- 0B is the checksum

VWR relative (apparent) wind speed and angle, format:
$IIVWR,67.9,R,3.4,N,1.7,M,6.2,K*74<Cr><Lf>
- 67.9 is the wind angle in degrees from 0 to 180°
- R indicates that the wind is coming from right (starboard), alternatively, L indicates that the wind is coming from left (port)
- 3.4,N is the wind speed in knots
- 1.7,M is the wind speed in m/s
- 6.2,K is the wind speed in km/h
- 74 is the checksum

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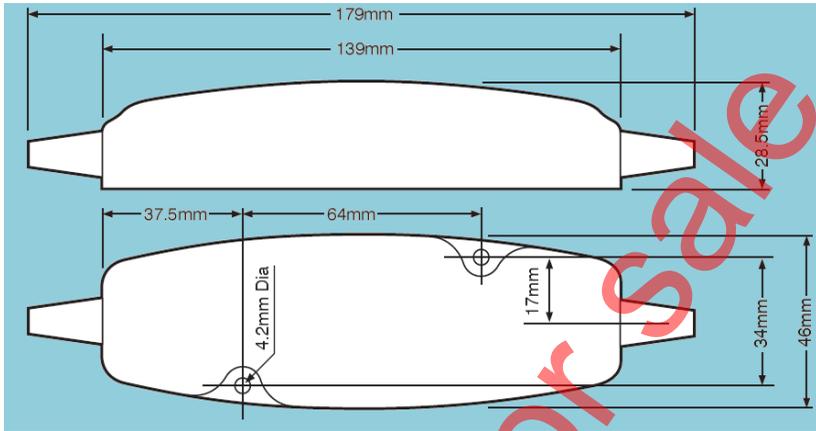
DEIF A/S reserves the right to change any of the above.