DEIF A/S

# *Wind measuring system*

## *MALLING Type 879.3C*

***1159040004L***


# *User's manual*

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**CONTENTS**

## 1 Application

Wind measuring system 879 is a fast responding and accurate system designed for measuring relative wind speed and direction on board ships where high demands to the liability of the equipment is required - even under the roughest weather conditions.

The DEIF wind measuring system is the best choice, when it is necessary to be able to read the measuring results from a number of different places on the ship, for instance on manoeuvring points both on the bridge as well as on the bridge wings.

Optional one or more instruments, including serial data output, can be connected to the navigation computer and/or to a PC on board the ship.

The system indicates relative wind speed and direction according to the speed and the direction of the ship. If absolute wind speed and direction are required, these may be calculated either manually or automatically by means of a connected computer.

## 2 Design

The wind measuring system 879 consists of two components, a wind sensor for measuring wind speed and direction and an instrument for indication of wind speed and direction.

### 2.1 Wind sensor, type 879.3C

The wind sensor, type 879.3C is a combined sensor with a three-cup rotor for measuring wind speed and a wind vane for measuring wind direction.

The electronic house of the sensor is made in salt-water resistant bronze. The wind vane consists of fibres and the counterweight is made of stainless steel. The three-armed cup rotor is made of fibre enforced polycarbonate. The sensor is coated with 2 component finish.

### 2.2 Instrument, type 879.50 or 879.521

The wind display instrument without mobile mechanical parts includes a digital display for indication of the wind speed and a circle of LEDs (light emitting diodes) for indication of the wind direction. All the LEDs are red. There is a ship symbol and a grade scale on the instrument.

The front panel of the wind display consists of a membrane keyboard. The keyboard has keys for adjusting light intensity on the display and a push button for selection of the wind speed either in m/s or in KTS.

## 3 Function

### 3.1 Operation

It is possible using the keyboard on the front panel to set the light intensity to an adequate level and to choose between indication of wind speed in either m/s or KTS by means of three keys. The three keys are placed in the right side of the display.

The light intensity may be set in 8 different levels. The two keys "▲" and "▼" are used to increase/decrease the light intensity. With each push on the key "▲" the light intensity is increased by one level, while every push on the key "▼" decreases the light intensity by one level correspondingly.

The "MODE" key is used to switch measuring mode, which may then be read either in m/s or in KTS. The selected mode indicated by means of a red LED in m/s or KTS respectively, immediately below the speed indication.

# 4 Installation

## 4.1 Placing of wind sensor

The wind sensor must be placed far from any object, which may influence the measuring result. The best result is reached by placing the wind sensor at the top of the ship's mast.

Note: Keep away from the funnel.

Installation of the sensor immediately above the ship's deck is unfavourable, especially if the deck consists of side faces over which the wind is forced. In this case there may be turbulence of wind speed and wind direction, which has no coherence with the undisturbed wind speed and direction.

## 4.2 Cable connection

Wind sensor type 879.3C is delivered with 2 m fixed cable as standard.

This cable must not be replaced. Connections to the installation cable must be achieved through a connection box. If the wind sensor is dismounted, warranty is not valid.

In order to protect the wind sensor in the best possible way against lightning strokes, the cable screen is connected to the wind sensor housing, which is fixed to the mast. In the connection box mounted on the mast, the wind sensor cable screen and the installation cable screen should be connected to the mast, using a solid wire for both.

For further protection of the cable between the wind sensor and the connection box, as well as the installation cable between the connection box and the wind indicating instrument, using a metal conduit pipe is recommended. If the instrument is installed in a metal panel, this panel has to be carefully earthed as well as the instrument itself.

Installation cable: 4 x 0.75 $m^2$ screened max. 300 m, and max. 40nF capacity between the signal conductors.

## 4.3 Installation of wind sensor

The wind sensor is intended for installation on a vertical socket or a tube using the tap (1124480004) included on delivery. The tap has the following dimensions, see figure 1.

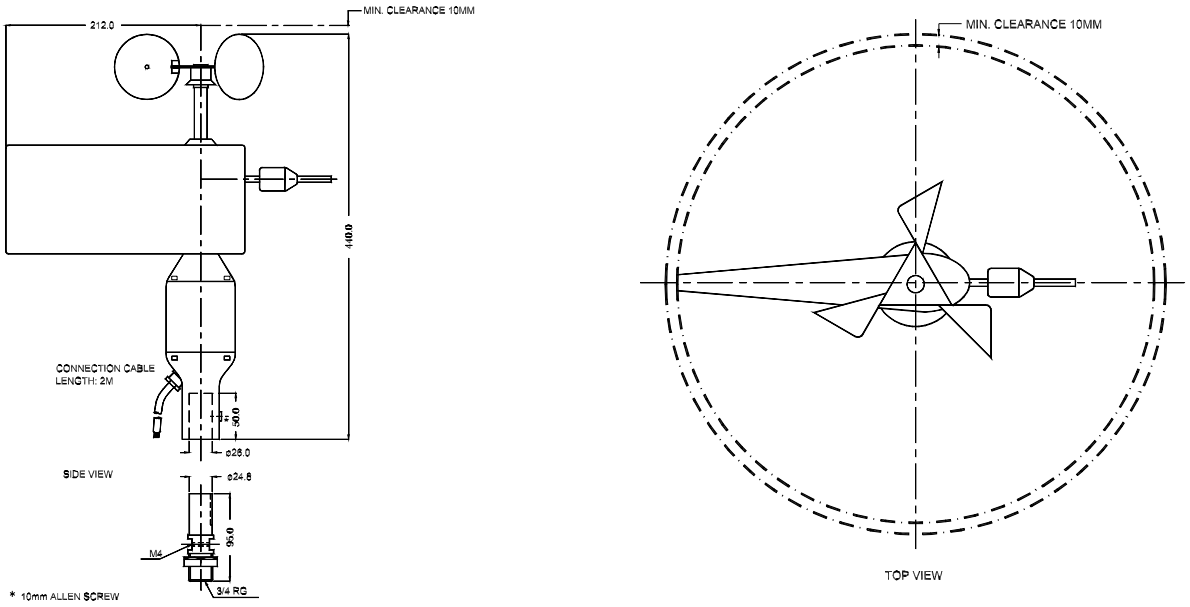
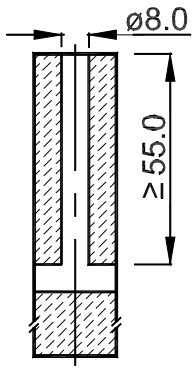



***Figure 1***

If the wind sensor is mounted without using the tap included on delivery, it must be mounted ensuring that ventilation of the sensor house is possible. - E.g. by drilling one vertical and one horizontal hole ø8 mm in the existing tap. It is of vital importance that this passage of free air is ensured.




To ensure that the instrument indicates the precise wind direction according to the ship, the wind sensor must be adjusted correctly. I.e. when mounting the tap mentioned above for the wind sensor a suitable tool (e.g. a screwdriver) is inserted into the hole on the side of the tap (shown on figure 1) on the side with the keyway, and the tap is turned until the screwdriver points towards the stem of the ship (on land-based installations the screwdriver rod should point towards north). Once the tap has been secured in this position using the lock nut, the screwdriver rod is removed (the hole is left open for ventilation purposes). The wind sensor is then mounted on the tap, first lubricating this with the copper grease included on delivery to enable demounting of the wind sensor.

### 4.4 NMEA type

Change between NMEA 1.5 and NMEA 2.x-3.0 is possible by removing the back plate and changing the position of a jumper on the rear of the display PCB: (see figure 2)

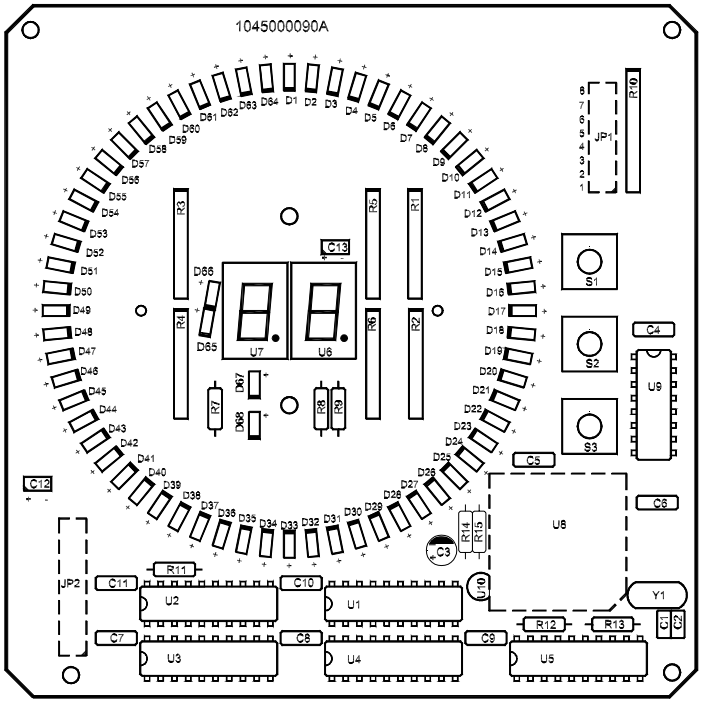



***Figure 2***

First locate the 2 x 8 pole plug (marked "JP1") on the rear of the display PCB.

a. NMEA 2.0
   Short-circuit the two pins at pos. 1 of JP1 (facing towards the CPU, marked "U8").
b. NMEA 1.5
   No jumper across the two pins of JP1.

### 4.5 Readout of direction of the wind

No jumper across the two pins of JP1, pos. 3.
Standard readout of direction of the wind 360°, pointing the stem of the ship.

Short circuit across the two pins of JP1, pos. 3.
Readout of direction of the wind is adjusted by 180°, meaning 360° pointing astern of the ship.

(No influence on NMEA output).

### 4.6 110V AC or 220V AC supply

If change of the voltage supply is needed, the rear plate is removed and the power/input PCB is carefully pulled out, see figure 3.

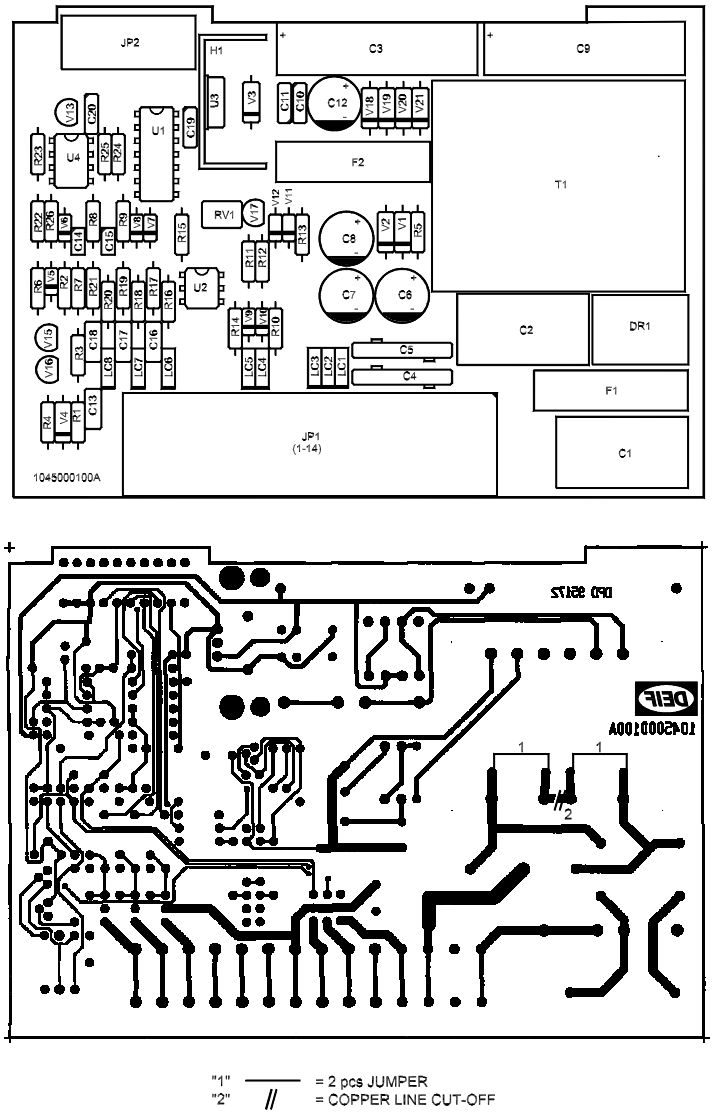



***Figure 3***

a. Change from 110V AC to 220V AC: Remove the 2 jumpers across 1.
Remount the jumpers across 2.
b. Change from 220V AC to 110V AC: Mount the 2 jumpers across 1.
Remove the jumpers across 2.

## 5 Fault finding

It is assumed in the following guidance that the fault finding is carried out on a system, which has been working. Some of the procedures may however also be useful when installing and commissioning the first time. At first, the purpose is to localize the cause of the missing supply voltage, blown fuse, defect wind sensor, defect instrument or fault in the cable connection. Further fault finding and possible repair must be carried out by a specialist/is specialist work. Warranty void if mounted seal is broken!

### 5.1 No light in the instrument

There is neither light in the circle of LED nor in the digital display, the "m/s" or the "KTS" LED. The fault is most likely caused by fault in the internal 5V DC supply, which supplies the electronic, meaning the LEDs are possible due to the fact that one of the two internal fuses has blown. See figure 3 for power supply PCB.

Check that the correct AC supply voltage (normally 220V AC, possibly 110V AC) is present on the terminals marked "≈". The correct supply voltage is stated by means of a cross (x) on the label on the back of the instrument house.

Check that there is only measured 5V DC between the terminals "1" (+5V) and "2" (0V). Provided that the AC supply voltage is present on the terminals but 5V DC is missing, a fuse has blown. The back panel of the instrument house is removed and the defect fuse is replaced.

Provided that there is less than 4.85V between terminal "1" and "5", the internal power supply 5V is either overloaded or defect. By demounting the cables from the sensor, terminal "1" - "4", the fault may be located to be either the instrument or the sensor with cable. Provided that the 5V voltage is increasing to normal, the fault has to be found either in the sensor or in the cable connection to the sensor.

### 5.2 Flashing display

This is possible if the supply voltage is less than the mark voltage -20%, that is less than 220V - 20% = 176V as far as the 220V displays are concerned. As long as the instrument is flashing, the built-in processor has inadequate supply voltage.

### 5.3 Indication whether the instrument is locked

Control whether the sensor follows the wind speed and direction or has been locked. The locking may be caused by lack of signal connection between sensor and instrument.

# 6 Technical specifications

## 6.1 Wind sensor, type 879.3C

Wind direction, measuring range .... $0..360^0$
- Resolution..... $1.4^0$
- Settling time..... max. 2 s at 10 m/s
- Settling time..... max. 4 s at 5 m/s

Wind speed, measuring range ..... 0.35..80 m/s
- Resolution..... 0.11 m/s
- Max. fault..... 0.5 m/s

Distance constant ..... 2.6 m[1)]
Power consumption ..... 40mW
Working temperature range ..... $-40..+80^0$C
Height ..... 440 mm
Max. outer diameter ..... 600 mm
Weight ..... 2.5 kg

1) The distance constant for a cup-anemometer is defined as the passage of wind required for the cup-rotor to complete 63.2 % of the step change.

## 6.2 Instrument, type 879.50 and 879.521

Wind direction, resolution..... $5,6^0$
Diode ring, number of segments..... 64
Diode ring, diameter..... 90 mm
Wind speed, resolution ..... 0.1 m/s
Wind speed, modes ..... m/s or KTS
Wind speed, display..... 2½ digits
Supply voltage ..... 220V AC ±20% or 110V AC ±20%
Power consumption ..... MAX 4W
Height ..... 144 mm
Width ..... 144 mm
Depth ..... 144 mm
Weight ..... 1.1 kg

## 6.3 NMEA 0183 ver.: 1.5 and ver.: 2.x-3.0 (type 879.50 only)

Transmission speed..... 4800 Baud
Number of bit ..... 8
Number of parity bit ..... 0
Number of stop bit ..... 1
Transmission interval ..... 1 sec.

## 6.4 Communication protocol NMEA 0183 ver.: 1.5

$IIMWD,xxx,T,,,yy.y,N,,*zz<CR><LF>
Wind direction ($0..360^0$) ..... 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>

## 6.5 Communication protocol NMEA 0183 ver.: 2.x-3.0

$WIMWV,xxx.x,R,yy.y,N,A*zz<CR><LF>
Wind direction ($0..360.0^0$) ..... 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>

### 6.6 Signal levels for NMEA 0183 (EIA/RS422) and RS-232C

The receiver is connected to instrument type 879.50 with a 2-wire screened cable. Terminal "A" is signal and terminal "B" is return (0V).

The NMEA 0183 standard requests the following signal levels:

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

The instrument type 879.50 releases the following levels:

| | |
|---|---|
| "1" –9.5V +/-0.5V | \|Isink\| ≥ 1mA @ -8V |
| "0" +9.5V +/-0.5V | \|Isource\| ≥ 15mA @ +8V |

Note that NMEA does not request that the output may settle power in "1" condition, but it is permittable. This is used in 879.50 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 bit .....8
Parity bit.....None
Number of stop bits.....None

## 7 Type numbers

Combined wind sensor.....type 879.3C
Instrument.....type 879.521
Instrument with NMEA output .....type 879.50

## 8 Spare parts and accessories

### 8.1 Spare parts

The following is recommended as spare parts (not included):

2 pcs. Fuse F1, 0.1AT, Ø5 x 20 mm (item no. 1020500010)
2 pcs. Fuse F2, 1AT, Ø5 x 20 mm (item no. 1020500006)
1 pcs. Three-armed cup rotor (item no. 1299900004)

### 8.2 Accessories

The following is included on delivery:

1 pcs. Bag of copper grease for lubricating the socket for 879.3C
1 pcs. User's manual (item no. 1159040004)

**The following can be ordered:**

1 pcs. Mounting tap (item no. 1124480004)

## 9 Drawings

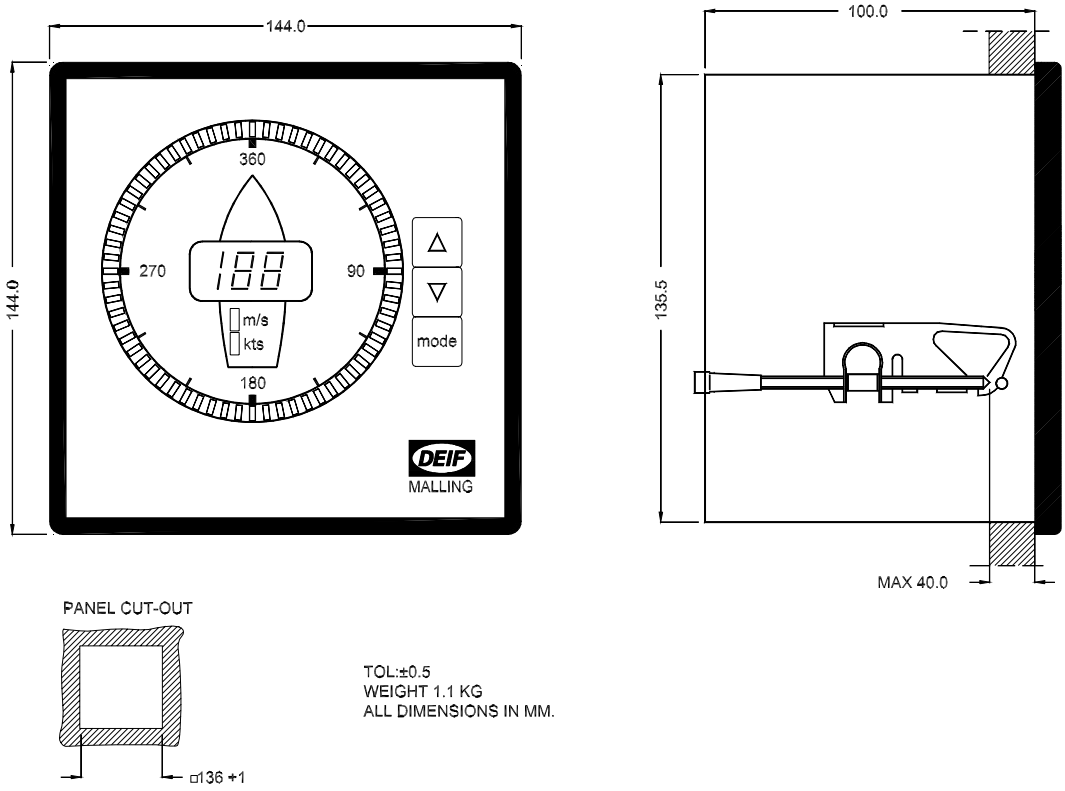



***Figure 4*** Instrument, type 879.521 and 879.50. *Metal panel must be earthed!*

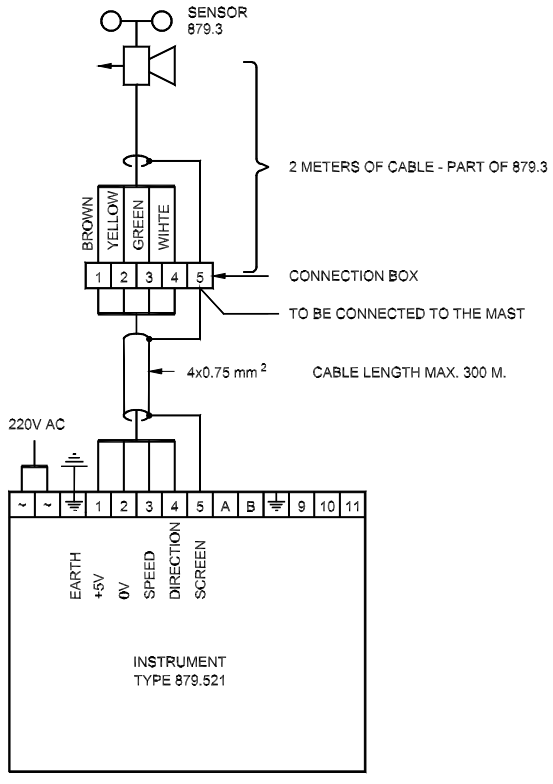



***Figure 5*** Connection diagram (1 of 3)

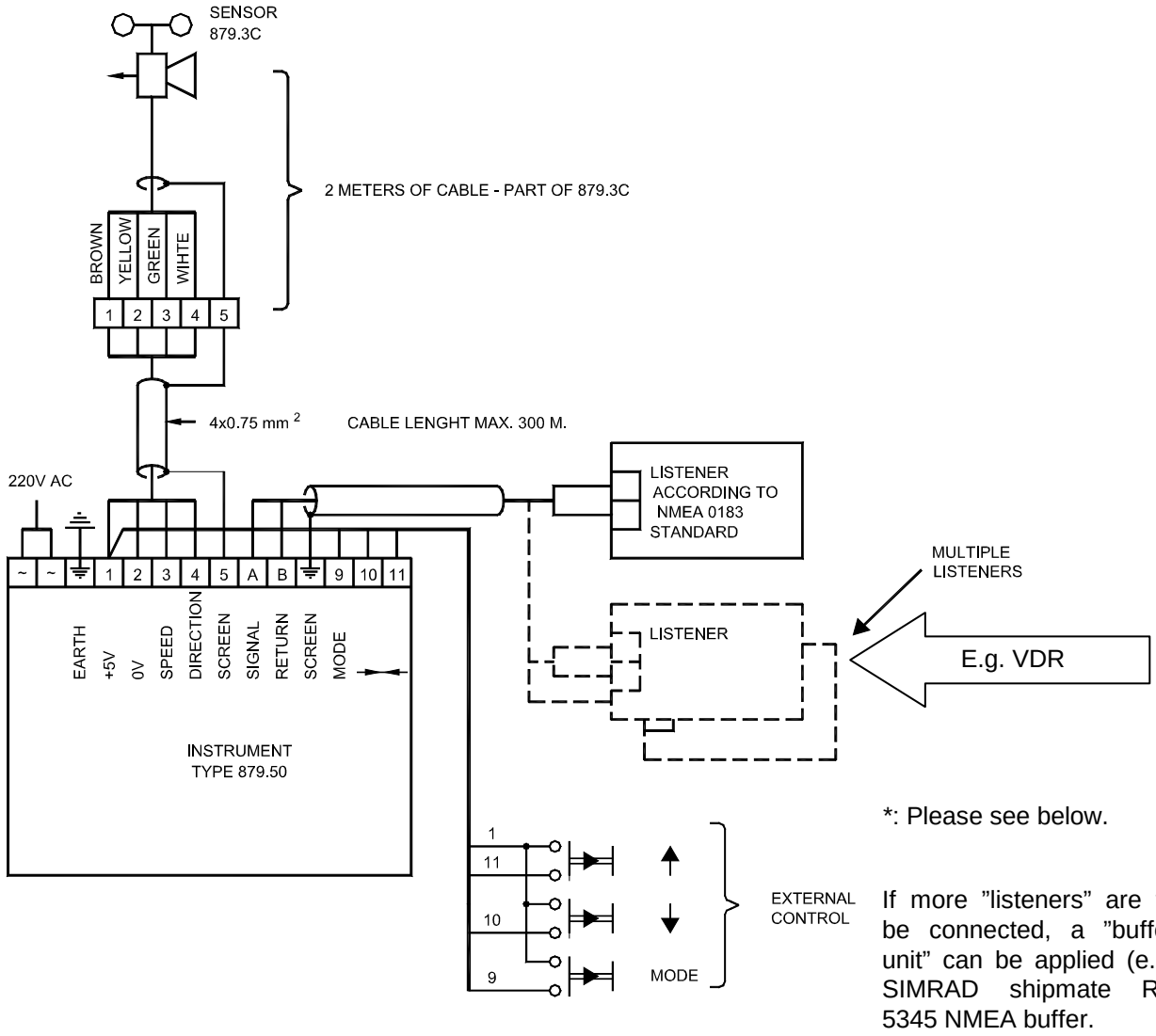



***Figure 6*** Connection diagram (2 of 3)

*****:
According to NMEA the receiver must be able to operate with a minimum differential voltage input of 2V and must not take more than 2mA from the transmitter. Based on this information the number of receivers connected to 879.50 can be calculated

The NMEA output in the 879.50 is based on a 15mA constant source generator with an internal voltage of 9.5V.

Max. receivers: 15mA / 2mA = 7.5. This means that 7 receivers can be connected, if the receiver input is made according to the NMEA standard.

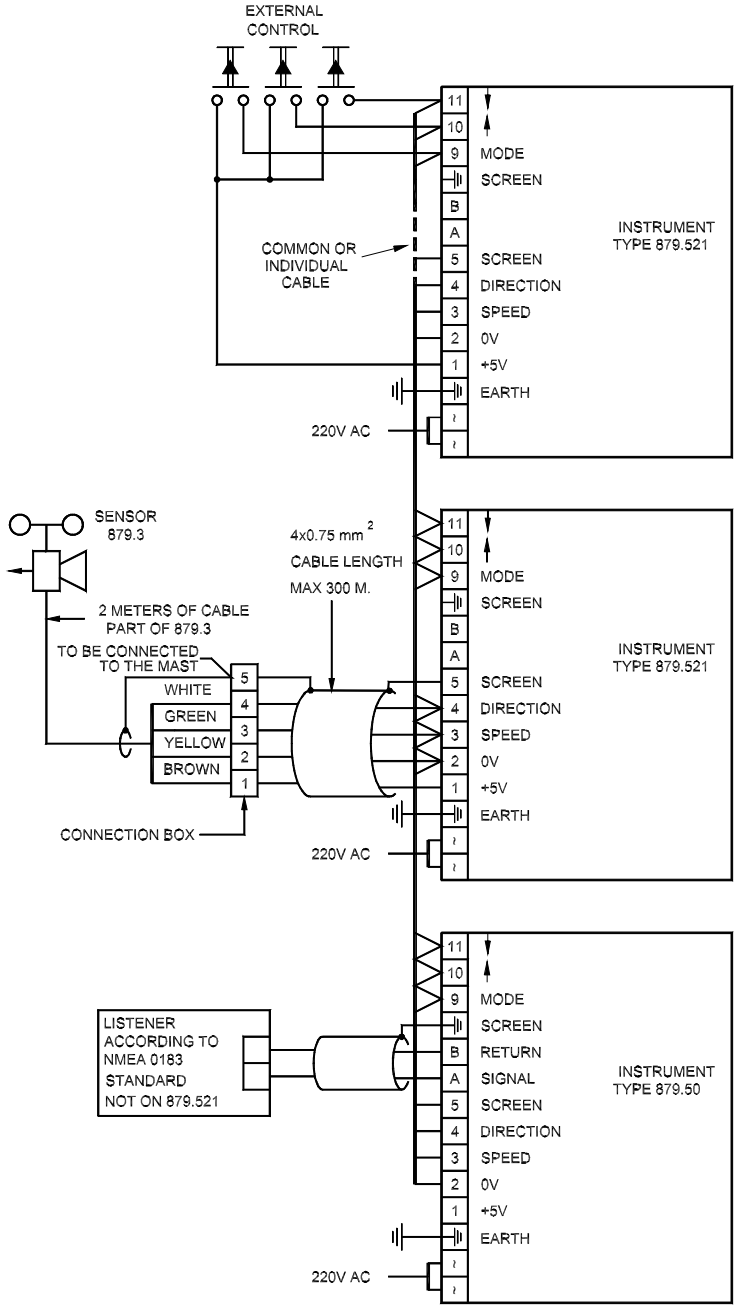



***Figure 7*** Connection diagram (3 of 3)

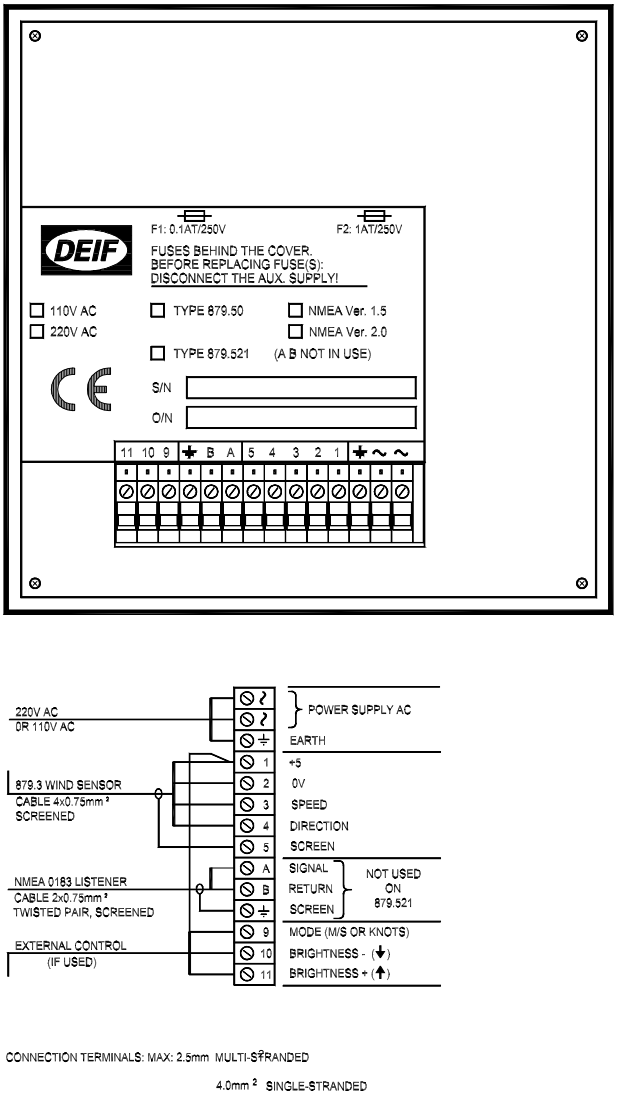



***Figure 8*** Component outlines, back of instrument