

# Wind Indicator LED

Instruction for Use 4.3224.40.000 / 4.3223.10.200



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## 1. General Information

The Wind Indicator LED is a state-of-the-art indicator unit which displays both the wind direction and the wind speed parameters. It is extremely reliable, flexible and offers optimal display.

Thanks to its compact construction and a system of integrated self-test functions, the Wind Indicator unit is very reliable - an important quality. Moreover, its flexibility is guaranteed owing to the versatile connection possibilities available on it to transmit the wind parameters; different wind transmitters can be connected or the wind parameters can be transmitted over a serial interface.

Calculated and displayed are the instantaneous values of the wind speed and the wind direction. Moreover, you can choose between 3 other modes of displaying the wind direction and its variation.

You can control the brightness of the displays manually or automatically in a wide range.

### 1.1 This Version of the Indicator

The Wind Indicator LED 4.3224.40.000 was designed for use on ships with the following Layout:

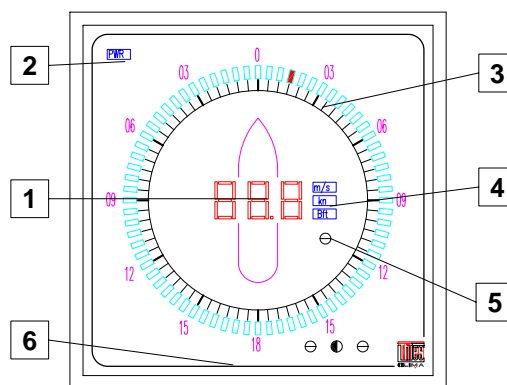


figure 1

In this (**ship-**) **version** of the Wind Indicator LED the display of the wind direction is scaled linear from 0 degrees at north over east (starboardside) to 180 degrees at south with green LED's and in the same way over west (portside) to 180 degrees at south with red LED's. Just at south and north the LED marking the wind direction is yellow. Using the display modus with variation, the set of LED's representing the variation of the wind direction is green on the starboardside and red on the portside, the LED marking the wind direction is yellow.

The units for wind speed are m/s, kn and Beaufort.

The Wind Indicator LED is equipped with a serial interface RS422 to receive or send the wind speed and direction signals as a serial data telegram by selecting a DIP-switch on the back panel. (see chapter 3 on page 7 and option 1 in *figure 2* on page 4).

### 1.2 Elements of the Indicator

The following numbers in brackets refer to the legends in the above figure 1.

- (1) The large (h=15 mm) 3-digit red display of the wind speed can be read from a considerable distance. The wind speed can be displayed in several units depending on the version of the indicator. The display can be dimmed.

- (2) The status of the power supply is displayed with a text field („PWR“). The display cannot be dimmed.
- (3) The rectangular illuminated fields (size 2x5 mm) of 72 two colour (red, green and mixed) LED's to display wind direction together with the illuminated scale contribute to optimal readability and orientation even in the most difficult circumstances. The display can be dimmed.

There are 4 different ways of displaying the wind direction selectable with a DIP-switch on the back panel of the instrument (see section 3. *Setting the Wind Indicator LED* on page 7).

- (4) A display for the 3 units of wind speed. The display can be dimmed.
- (5) 3 optical sensors (keys) to operate the display respectively to dim the display automatically (see section 4. *Operating the Wind Indicator LED* on page 9).
- (6) An illuminated scale for the wind direction face shows the scale and its legend in the dark. This illumination cannot be dimmed.

## 2. Installation

The electrical connections are located on the back panel of the display.

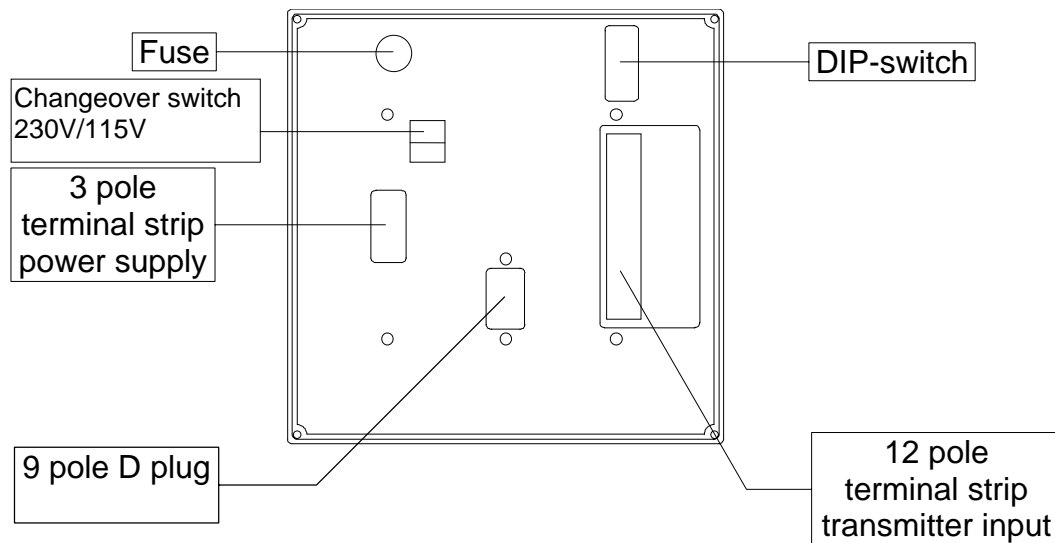


figure 2

Remove the plug-in terminals from the terminal contacts,

- Set the DIP switch to the desired mode (see 3. *Setting the Wind Indicator LED* on page 7),
- Place the instrument into the opening of the provided front panel and mount it with the enclosed holders,
- Switch off your power supply
- Connect the mains cable to the 3-pole terminal strip (see 2.1 *Power supply* below),
- Connect the transmitter cable to the 12-pole terminal strip (see 2.2 *Wind transmitter input* on page 5 below),
- Connect the serial interface cable to the 9-pole D-plug (see 0 2.3 *Serial interface* on page 5 below),
- Connect the plugs to their counterpart on the wind display unit,
- Switch on your power supply.

**CAUTION:** *Before removing the cover, disconnect the power supply!*

### 2.1 Power supply

Terminal Strip:

Pin	mark	Function
1	L1	phase
2	N	null
3	PE	not connected

The Wind Indicator LED 4.3224.40.000 operates from a 230 VAC as well as 115 VAC 50 Hz or 60 Hz mains supply. The setting take place at a changeover switch. Factory setting: 230 VAC. The max. required power is 20 VA.

## 2.2 Wind transmitter input

The wind transmitter input is a 12 pole terminal strip. This strip, depending on what wind data input has been set (see Section 3. *Setting the Wind Indicator LED* on page 7, the default setting is marked in the following table with a shadow), has the following functions:

12 pole terminal strip

pin	function parallel wind transmitter 8 Bit S7=ON, S8=ON	function parallel wind transmitter 6 Bit S7=ON, S8=OFF	function serial wind transmitter S7=OFF, S8=ON	function serial interface S7=OFF, S8=OFF
1	+15V	+15V	+5V	+5V
2	ground	ground	ground	ground
3	WS pulse	WS pulse	WS pulse	free
4	track A	V <sub>CC</sub>	clock	free
5	track B	V <sub>CC</sub> *	data (in)	free
6	track C	track C	free	free
7	track D	track D	free	free
8	track E	track E	dimmer (bright)	dimmer (bright)
9	track F	track F	dimmer (dark)	dimmer (dark)
10	track G	track G	dimension	dimension
11	track H	track H	free	free
12	Shield	Shield	Shield	Shield

R = 10 kΩ

The max. cable length for the wind transmitter is about 500 m. If the heating of the transmitter is supplied via the same cable, the max. cable length is about 50 m.

## 2.3 Serial interface

The electrical connection for the serial interface is a 9-pole D-plug (male, see *figure 2* on page 4):

Pin	Function
2	NC
3	NC
5	GND
8	+ RX / TX
9	- RX / TX

The RS422 interface is suitable for longer distances, depending on the type of cable, the quality of the cable and the termination of the cable (possible up to 5000 m).

The function of the interface is determined by the DIP-switches S6, S7 and S8 (see chapter 3 on page 7).

Note for RS422:

Disturbances on long lines may influence or overvoltages may even damage the interface of the Wind Indicator LED. We recommend:

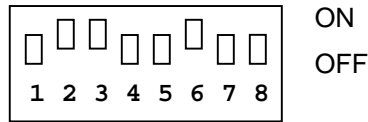
- Use a shielded cable and connect the shield to a central earth potential. An experienced possibility is to connect at least one side of the cable shield to the ground of the display or the displays (Pin 5 of the 9-pole D-plug).
- At least for cables longer than 100 m, use a twisted pair for the signals + RX and - RX and another pair for +TX and -TX.
- Connect the GND pin of the Wind Indicator LED with the GND pin of the counterpart interface with an additional wire (pair) of the cable and connect it to a central earth potential. If great differences between the potentials of the transmitter and the receiver lead to great compensating currents, use an interface adapter, that separates the potentials of the transmitter and the receiver.
- Use an appropriate termination resistor for the cable (100  $\Omega$  to 600  $\Omega$ ); place it to that indicator which is farthest away from the driver, if there is more than one indicator.

**We cannot accept warranty claims for any damage caused by overvoltages!**

### 3. Setting the Wind Indicator LED

The Wind Indicator LED has a number of different routine functions and different instrument versions which can be set on the back panel of the instrument by means of a DIP-switch. The following drawing shows the default setting of the switch. This default setting is marked in the following tables with a shadow.

DIP-switch:



switches S1 - S8

S1	Wind Indicator version	
ON	Land version	red LED for wind direction display green LED's for Variation
OFF	Ship version	Display mode <u>without</u> variation green LED for wind direction on the starboardside red LED for wind direction on the portside yellow LED for wind direction at 0 and 180 degrees
	Ship version	Display mode <u>with</u> variation yellow LED for wind direction green LED's for the variation on the starboardside red LED's for the variation on the portside

S2	S3	Display modus for wind direction
ON	ON	instantaneous values
OFF	ON	delayed values
ON	OFF	instantaneous values and variation
OFF	OFF	delayed values and variation

S4	Dimming mode (Display brightness control)	
ON	automatic dimming via the brightness sensor	
OFF	manual dimming via the sensor keys	

S5 without function

S6 switches two functions: the master/slave modus and the serial output ON/OFF

S6	Master / slave modus
ON	Slave (2 - 5 indicators connected to 1 transmitter) serial output is OFF
OFF	Master (1 indicator connected to 1 transmitter) serial output is ON

In consequence on switch S6=ON note the following:

- The output of the instantaneous wind data on the serial interface (RS422) is switched off.
- The test for the supply current of the wind transmitter (error „E06“) is switched off (see section 5. Troubleshooting on page 12). This is necessary if you connect 2 to 5 indicators to one parallel wind direction transmitter to prevent an error message.

In consequence on switch S6=OFF note the following:

- The output of the instantaneous wind data on the serial interface (RS422) is switched on.
- The test for the supply current of the wind transmitter (error „E06“) is switched on (see section 5. Troubleshooting on page 12). Only one indicator should be connected in this case to one parallel wind direction transmitter to allow a correct error message, if the supply current of that wind direction transmitter fails.

S7	S8	Wind data input selection	V <sub>CC</sub>
ON	ON	Wind direction: 8 bit parallel wind transmitter	15 V
OFF	ON	Wind direction: serial wind transmitter	5V
ON	OFF	Wind direction: 6 bit parallel wind transmitter *	15 V
OFF	OFF	Serial interface (RS422)	---

\* If you select a 6 bit parallel wind direction transmitter, there is no test for the life-zero signal of the wind speed transmitter. In consequence, there will be no error message „E04“ or „E05“.



## 4. Operating the Wind Indicator LED

The Wind Indicator LED is operated from the front with optical sensor keys. These keys are located behind the front pane. This pane of glass protects the instrument from dust.

The sensor keys respond to the contrast between the reflected and the direct radiation resulting when the surface of the sensor is touched. For this reason, care must be taken that when the sensor surface is touched, no direct sunlight falls onto the wind display (otherwise the sensor will not work). One simple way to prevent this from happening is for the user to make sure that the wind display is shaded. Also, it is very important to make sure that the sensor surfaces are not dirty.

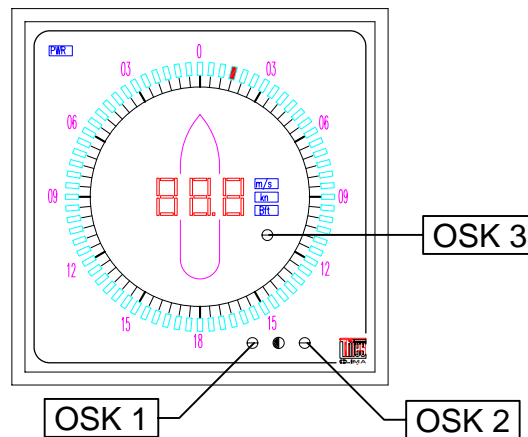


figure 3

Optical Sensor Key	Function
OSK 1 ("bright")	brightness +
OSK 2 ("dark")	brightness -
OSK 1 + OSK 2	LED test
OSK 3	units

### 4.1 Selecting the units

The unit of wind speed can be switched as desired by touching the (optically highlighted) sensor key field OSK 3 (see figure 3 on page 9) with your fingers. The unit switches once a second as long as the sensor key remains activated.

After switching on the indicator (hard reset) or the LED test (soft reset), you will get the unit selected at last.

### 4.2 Controlling the brightness

All LED's , except those in the text field „PWR“ of the power status display, can be dimmed manually or automatically. The selection is done by the switch S4 of the DIP-switch at the back panel (see 3. *Setting the Wind Indicator LED* on page 7).

If the dimmer of the indicator is set to manual, the brightness of the displays can be modified in fine gradations with the "bright" (OSK 1) and "dark" (OSK 2) sensor keys (see figure 3 on page 9). To do so, activate the indicator with one of the two keys to switch it to the dimming mode. In the dimming mode, the left half of

the wind direction face (180°...355°), proceeding from 180°, displays in yellow the brightness which has been set on the display. The brightness of the wind speed display, of the wind direction face and of the unit symbols can be altered.

The scale illumination cannot be changed.

If the dimmer of the indicator is set to automatic, (see section 3. *Setting the Wind Indicator LED* on page 7 (switch S4)), then the "bright" and "dark" sensor keys serve as brightness sensors.

The brightness of the displays adapts automatically to the brightness of the surroundings.

### 4.3 Testing the LED's (Soft reset)

The LED test is a test function which can be activated at any time. It triggers a complete initialisation of the indicator. This soft reset does the same as the hard reset by switching on the power supply.

You can switch the LED test on by activating the sensor keys of the dimmer function "bright" (OSK 1) and "dark" (OSK 2, see figure 3 on page 9) simultaneously for several seconds.

This switches on all the illuminated elements on the display.

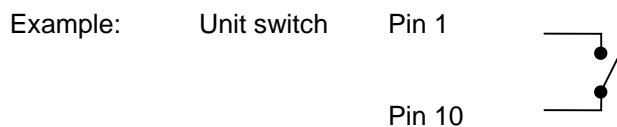
The wind direction face first lights up red and, a few seconds later, switches to green. After that the wind speed display shows the software version for about 3 seconds. Then a complete self-test is carried out and recognised errors are displayed by means of an error code in the wind speed display (see section 5. Troubleshooting on page 12).

### 4.4 Remote control

The Wind Indicator LED can be operated from an external point. The precondition for this is that no 8 bit or 6 bit parallel wind transmitter has been connected (see section 3. *Setting the Wind Indicator LED* on page 7). The following pins on the terminal strip can be used for the operation:

Terminal Strip	Function
Pin 1	+ V <sub>CC</sub>
Pin 8	Dimmer (bright)
Pin 9	Dimmer (dark)
Pin 10	Units switch

To activate a function the corresponding pin must be short circuited against pin 1 on the terminal strip. This can be done with a push button.



## 4.5 Serial protocol

The interfaces are set as follows:

Baud rate 1200 (optional 300 - 4800)  
 Data bits 7  
 Parity-bit 1  
 Parity even  
 Stop bit 1

The incoming data telegram must have the following format:

(STX)xx.x xxx\*xx(CR)(ETX)

Check sum  
 Wind direction [°]  
 Wind speed [m/s]

character No.	function
1	STX (HEX 02)
2	10 <sup>1</sup> wind speed
3	10 <sup>0</sup> wind speed
4	"." decimal point
5	10 <sup>-1</sup> wind speed
6	space (HEX 20)
7	10 <sup>2</sup> wind direction
8	10 <sup>1</sup> wind direction
9	10 <sup>0</sup> wind direction
10	"*" check sum identifier
11	check sum (hex high nibble)
12	check sum (hex low nibble)
13	CR (Hex 0D)
14	ETX (Hex 03)

The check sum is formed by the XOR function of characters 2...9 (beginning with Hex 00). Then the 8 bit checksum is divided into two ASCII characters (high and low nibble) with a value ranging from 0...F (Hex).

Example: wind speed: 5.2 m/s  
 wind direction: 125°  
 telegram: "(STX) 5.2 125\*1F(CR)(ETX)"

## 5. Troubleshooting

The Wind Indicator LED has a number of error control routines which are automatically carried out during the switch on phase of the instrument i.e. while the instrument is in operation. If an error occurs, this is indicated on the wind speed display in the form of an error code. If several errors occur simultaneously, the error with the highest priority is displayed.

Table of the error codes sorted according to priority:

(E51 low priority E99 highest priority)

Error code	Error	Cause / Remedy	Remark
Optical sensor keys:			
E51	optical sensor OSK 1 defect	surface may be dirty	1
E52	optical sensor OSK 2 defect	surface may be dirty	1
E53	optical sensor OSK 3 defect	surface may be dirty	1
Wind speed or direction transmitter:			
E01	WS > cut-off frequency (1300 Hz)	check input signal	
E02	WD transmission error	check serial WD-transmitter	
E03	WD U-level error (life-zero)	perhaps a „break in cable“	
E04	WS U-level error (life-zero)	perhaps a „break in cable“	2
E05	E03 and E04	perhaps a „break in cable“	2
E06	I <sub>CC</sub> error (transmitter supply current)	perhaps wind transmitter not connected	3
Serial interfaces:			
E10	time out serial interface	no signal (not connected)	4
E11	check sum error serial interface	check route to sender	
E12	parity error	check route to sender	
E13	WD error (FFF)	transmitted WD error	5
E14	WS error (FF.F)	transmitted WS error	5
E15	E13 and E14	transmitted error	5
Internal hardware:			
E60	WS input error	internal error (return instrument)	
E61	WD-CLK error	internal error (return instrument)	
E7x	track A,B,C,D (x=1,2,4,8)	internal error (return instrument)	
E8x	track E,F,G,H (x=1,2,4,8)	internal error (return instrument)	

Error code	Error	Cause / Remedy	Remark
E90	V <sub>CC</sub> (wind transmitter) error	internal error (return instrument)	
E91	U <sub>ref</sub> error	internal error (return instrument)	
E99	watch-dog error	internal error (return instrument)	6

WD = Wind direction  
WS = Wind speed

Remarks:

1. Definitions for the optical sensor keys OSK 1 to OSK 3 see section 4. *Operating the Wind Indicator LED* on page 9
2. If you select a 6 bit parallel wind direction transmitter, there is no test for the life-zero signal of the wind speed transmitter. In consequence, there will be no error message „E04“ or „E05“.
3. Only possible if the DIP-switch is set to S6=OFF (see 3. *Setting the Wind Indicator LED* on page 7)
4. If no telegram was received since more than 10 s
5. Check the transmitter connected to the sender of the telegram
6. Watch-dog errors occur after system break down by external or internal troubles. This error occurs regularly only after a hard or soft reset.

## 6. Technical Data

### Display:

- two colour LED's (red, green) for the wind direction
- size of LED 2 x 5 mm
- 3-digit 7-segment display for the wind speed
- height of digits 15 mm
- text field for the unit (m/s, kn or Beaufort)
- text field to display the status of the supply voltage (power LED, PWR)

Brightness – dimming manually or automatically

Resolution – wind direction: 5 degrees  
– wind speed (WS):  
– 0.1 m/s  
– 0.1 kn (WS ≤ 99.9 kn), res. 1 kn (WS > 99.9 kn)  
– 1 Beaufort (Bft)

Display mode – wind speed: instantaneous value (scanning rate ≈ 1 Hz)  
– wind direction: instantaneous value (scanning rate ≈ 10 Hz)  
(selectable by a DIP-switch) delayed value (time constant ≈ 5 s)  
variation (scanning rate ≈ 10 Hz)

## Wind transmitter input:

- Wind speed
- Pulse input
  - Amplitude 5...15V
  - Error message at low level < 0.7V (with appropriate wind speed transmitter)
  - Input frequency range 0...1300 Hz
- Wind direction
- 8 or 6 bit parallel wind direction transmitter
  - serial wind direction transmitter
  - Error message at low level < 0.7V (only parallel wind direction transmitter)
- Power supply
- power from the display unit
  - +15V (parallel wind direction transmitter)
  - + 5V (serial wind direction transmitter)

## Test functions:

- identification of a break in the supply line by measurement of the supply current of the wind transmitters,
- identification of a break in the line for parallel wind direction transmitters by "life-zero" signal
- identification of a break in the line for synchronous-serial wind direction transmitters by software
- serial communication (wind data telegrams) with check sum test and parity test.
- watch-dog for self-testing the program run of the instrument and for re-start when an error is identified.
- instrument self-testing after switch on (hard reset) or by a "LED-test" (soft reset).

## Power Supply:

- 230 VAC / 50 to 60 Hz
- max. 20 VA

## Operating Temperature:

- 0...40°C

## Physical Dimensions:

- 144mm x 144mm x 170mm (with connector)
- 138x138 mm (size of the opening)

## Weight

- 1.4 kg



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