

# Wind Indicator LED

Instruction for Use 4.3222.xx.x00 / 4.3223.xx.x00



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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 an optional 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 (see chapter 3. *Setting the Wind Indicator LED* on page 7.

There are 3 different units for wind speed: m/s, kn res. Kt and km/h res. Beaufort, You can control the brightness of the displays manually or automatically in a wide range.

## 1.1 Versions of the Indicator

The Wind Indicator LED was designed in different versions for different purposes with the following numbers:

### 4.3222.xx.xxx

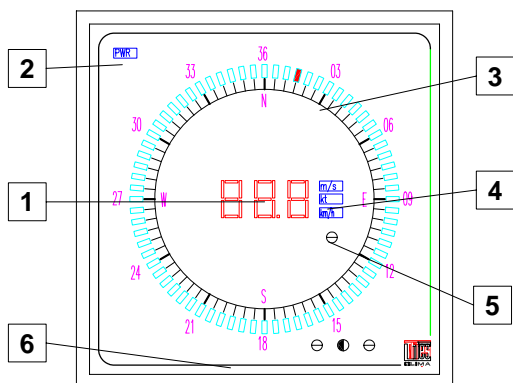


figure 1

In this (**land-**) **version** of the Wind Indicator LED the display of the wind direction is scaled linear from 0 degrees at north over east, south and west to 360 degrees at north. The LED marking the Wind direction is red. The set of LED's representing the variation are green.

The units for wind speed are m/s, kt and km/h.

### 4.3223.xx.xxx

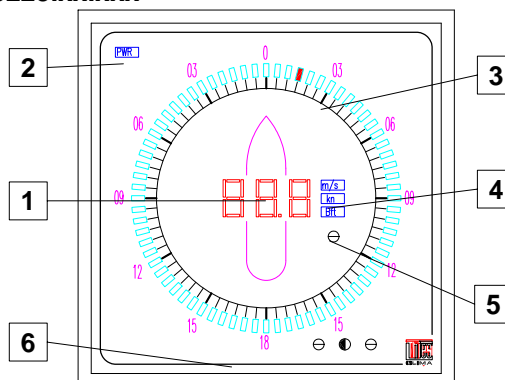


figure 2

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.

### 4.322x.xx.1xx

In this version the Wind Indicator LED is equipped with a serial interface RS232 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. *Setting the Wind Indicator LED* on page 7 and option 1 in figure 3 on page 4).

### 4.322x.xx.2xx

In this version 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 0 3. *Setting the Wind Indicator LED* on page 7 and option 1 in figure 3 on page 4).

#### **4.322x.x0.xxx**

In this version of the Wind Indicator LED the power supply is 230 VAC 50/60 Hz as well as 115 VAC 50/60 Hz, selectable by switch. Factory setting: 230V AC 50/60Hz.

#### **4.322x.x2.xxx**

In this version of the Wind Indicator LED the power supply needs 24V DC.

#### **4.322x.1x.xxx**

In this version the Wind Indicator LED is equipped with one terminal strip for wind transmitters (see in *figure 3* on page 5).

#### **4.322x.2x.xxx**

In this version the Wind Indicator LED is equipped with two terminal strips for one wind transmitter and additional Wind Indicators LED.

### **1.2 Elements of the Indicator**

The following numbers in brackets refer to the legends in the figures 1 and 2.

- (1) The large (h=15 mm) 3-digit red display for the instantaneous value 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“). This 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 chapter 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 chapter 4. *Operating the wind Indicator* 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.

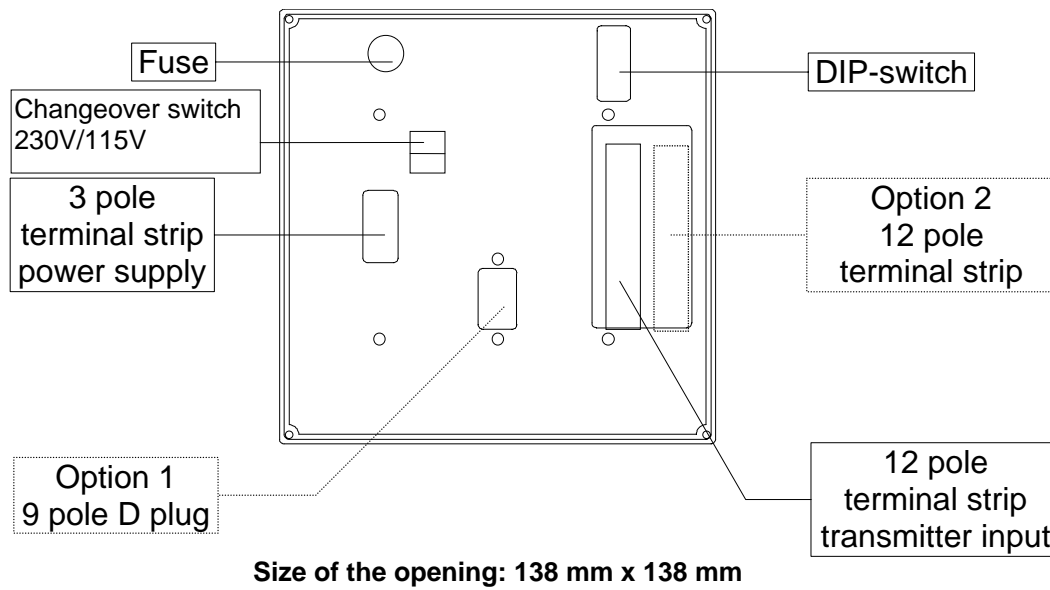


figure 3

- 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 (138 mm x 138 mm) of the provided front panel and mount it with the enclosed holders.
- Switch off your power supply.
- Connect the mains cable / DC-cable to the 3-pole plug terminal (see 2.1 *Power supply* on page 5),
- Connect the transmitter cable to the 12-pole plug terminal (see 2.2 *Wind transmitter input* on page 5),
- Optionally connect the serial interface cable to the 9-pole D-plug (see 2.3 *Serial interface* on page 6), (4.322x.xx.1xx or 4.322x.xx.2xx).
- 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: 230V / 115V AC  
at 4.322x.x0.xxx

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

24V DC  
at 4.3222.x2.xxx

Pin	Function
1	+
2	-
3	PE

The Wind Indicator LED 4.322x.x0.000 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 Wind Transmitter LED 4.322x.x2.xxx needs a power supply of 24 V DC.

## 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 Chapter 3. *Setting the Wind Indicator LED* on page 7) , has the following functions:

12 pole terminal strip

pin	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 (8/5 Bit) S7=OFF, S8=ON	function serial interface S7=OFF, S8=OFF
13	1	+15V	+15V	+5V	+5V
14	2	ground	ground	ground	ground
15	3	WS pulse	WS pulse	WS pulse	free
16	4	track A		clock	free
17	5	track B		data (in)	free
18	6	track C	track C	free	free
19	7	track D	track D	free	free
20	8	track E	track E	dimmer (bright)	dimmer (bright)
21	9	track F	track F	dimmer (dark)	dimmer (dark)
22	10	track G	track G	dimension	dimension
23	11	track H	track H	free	free
24	12	Shield	Shield	Shield	Shield

R = 10 kΩ

As an option (4.322x.2x.x00), the display can be equipped with a second 12 pole terminal strip (dashed in the above table). This terminal allows to connect up to 5 Wind Indicators LED parallel to one transmitter with 8 or 6 Bit wind direction code. The max. cable length over all 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 (4.322x.xx.1xx or 4.322x.xx.2xx)

For the different versions of the Wind Indicator LED with a serial interface see chapter 1.1 *Versions of the Indicator* on page 2.

The electrical connection for the serial interface is a 9-pole D-plug (male, see *figure 3* on page 4):

Pin	Function
2	RX (RS232)
3	TX (RS232)
5	GND (RS232, RS422)
8	+ RX / TX (RS422)
9	- RX / TX (RS422)

The RS232 interface is suitable for distances up to 15 m.

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. *Setting the Wind Indicator LED* 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:

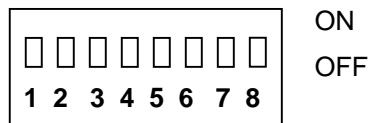
- Use a shielded cable and connect the shield to a central earth potential. An experienced possibility is to connect at least one side of the cable shield to the ground of the display or the displays (Pin 5 of the 9-pole D-plug).
- At least for cables longer than 100 m, use a twisted pair for the signals + 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.

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 starboard side 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 starboard side 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	life-zero error control
ON	error control on
OFF	error control off

The life-zero error control is switched off through the switch-function S5 = OFF for all wind sensor models. Therefore no error information E03, E04, E05.

S6 switches two functions: the master/slave modus and the serial data input/output.

S6	Master / Slave Modus	Serial data input
ON	Slave serial output is OFF	ON
OFF	Master serial output is ON	OFF

In consequence on switch S6 = ON note the following:

- The output of the instantaneous wind data on the optionale interface (RS232 or RS422) is switched off.
- The input of the instantaneous wind data on the optionale interface (RS232 or RS422) is switched on.
- The test for the supply current of the wind transmitter (error „E06“) is switched off (see chapter 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 (RS232 or RS422) is switched on.
- The input of the instantaneous wind data on the serial interface (RS232 or RS422) is switched off.
- The test for the supply current of the wind transmitter (error „E06“) is switched on (see chapter 5. Troubleshooting on page 12).

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 8/5 bit *	5V
ON	OFF	Wind direction: 6 bit parallel wind transmitter **	15 V
OFF	OFF	Serial interface (RS232, RS422)	---

\* The serial wind sensor models (8 bit/5 bit/ WR) are identified automatically. If a compact-windsensor ( 5 bit WR) is connected, „COP“ is indicated in the display for approx. 2 sec. after switching on the instrument.

\*\* The 6 bit combined wind sensor has no life-zero error control for the wind speed sensor. Therefore no error information E04, 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.

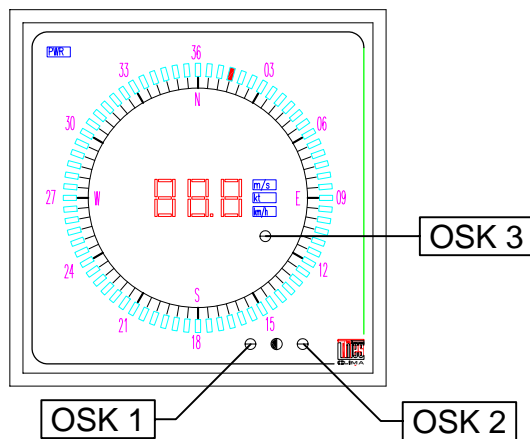


figure 4

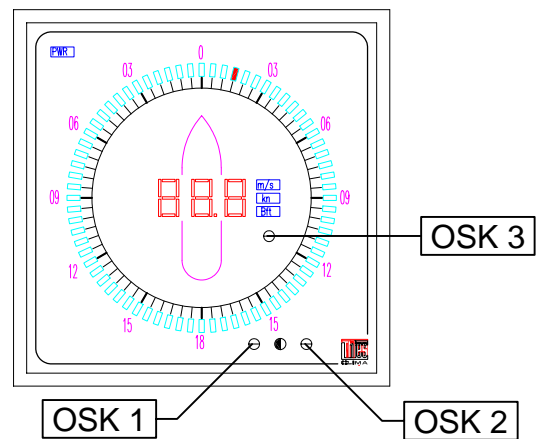


figure 5

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 4* or *4*) 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 and the scale illumination, 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 4* or *figure 5*). 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.

**Please note:**

**As long as the dimming mode is switched on, no measurements or calculations will be carried out!**

If the dimmer of the indicator is set to automatic, (see chapter 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 4* or *figure 5* 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 (see chapter 5. *Troubleshooting* on page 12).

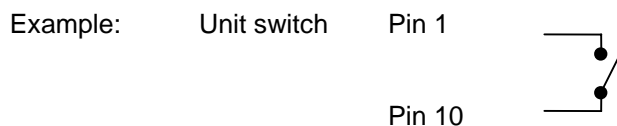
**4.4 Remote control**

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 chapt. 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 (4.322x.xx.1xx , 4.322x.xx.2xx)

The interfaces are set as follows:

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

Data exchange is done in 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)

## 4.6 Check Sum in the Protocol

The forming of the check sum with the different protocols is carried out between the ASCII-characters "STX" or "\$" resp., and the "\*" in the respective protocol.

The check sum is formed by XOR-connection (starting with Hex 00). From the 8 bit check sum result then two ASCII-characters (high and low nibble) with a value range from 0 to F (hexadecimal).

For Example : Standard Telegram:      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

Error code	Error	Cause / Remedy	Remark
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)	
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 chapter 4. Operating the wind Indicator on page 9
2. The 6 bit combined wind sensor has no life-zero error control for the wind speed sensor. Therefore no error information E04, 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

<b>Display:</b>	<ul style="list-style-type: none"><li>• two colour LED's (red, green) for the wind direction</li><li>• size of LED 2 x 5 mm</li><li>• 3-digit 7-segment display for the wind speed</li><li>• height of digits 15 mm</li><li>• text fields for the units (m/s, kn or kt, km/h or Beaufort)</li><li>• text field to display the status of the supply voltage (power LED, PWR)</li></ul>
Brightness	dimming manually or automatically
Resolution wind direction:	5 degrees
Resolution wind speed (WS):	<ul style="list-style-type: none"><li>• 0,1 m/s</li><li>• 0,1 kn (WS ≤ 99.9 kn), res. 1 kn (WS &gt; 99.9 kn)</li><li>• 0,1 kt (WS ≤ 99.9 kt), res. 1 kn (WS &gt; 99.9 kt)</li><li>• 0,1 km/h (WS ≤ 99.9 km/h), res. 1 km/h (WS &gt; 99.9 km/h)</li><li>• 1 Beaufort (Bft)</li></ul>
Display mode	<ul style="list-style-type: none"><li>• wind speed: instantaneous value (scanning rate ≈ 1 Hz)</li><li>• wind direction: instantaneous value (scanning rate ≈ 10 Hz) selectable by delayed value (time constant ≈ 5 s) a DIP-switch) variation (scanning rate ≈ 10 Hz)</li></ul>
<b>Wind transmitter input:</b>	
Wind speed	<ul style="list-style-type: none"><li>• Pulse input</li><li>• Amplitude 5...15V</li><li>• Error message at low level &lt; 0.7V (with appropriate wind speed transmitter)</li><li>• Input frequency range 0...1300 Hz</li></ul>
Wind direction	<ul style="list-style-type: none"><li>• 8/5 or 6 bit parallel wind direction transmitter</li><li>• serial wind direction transmitter</li><li>• Error message at low level &lt; 0.7V (only parallel wind direction transmitter)</li></ul>
Power supply	<ul style="list-style-type: none"><li>• power from the display unit</li><li>• +15V (parallel wind direction transmitter)</li><li>• + 5V (serial wind direction transmitter)</li></ul>
<b>Serial interface (4.322x.xx.1xx Or 4.322x.xx.2xx):</b>	
Type	<ul style="list-style-type: none"><li>• RS 232 (V.24) unidirectional, max. distance 15 m (4.322x.xx.1xx)</li><li>• RS 422 (V.11) unidirectional, max. distance up to 5 km (4.322x.xx.2xx)</li></ul>
Format	<ul style="list-style-type: none"><li>• Baud rate 1200 Baud</li><li>• 7 data bits</li><li>• 1 start and stop bit</li><li>• 1 parity bit (even)</li></ul>

<b>Test functions:</b>	<ul style="list-style-type: none"> <li>• identification of a break in the supply line by measurement of the supply current of the wind transmitters</li> <li>• identification of a break in the line for parallel wind direction transmitters by "life-zero" signal</li> <li>• identification of a break in the line for synchronous-serial wind direction transmitters by software</li> <li>• serial communication (wind data telegrams) with check sum test and parity test.</li> <li>• watch-dog for self-testing the program run of the instrument and for restart when an error is identified.</li> <li>• instrument display of the software version and self-testing after switch on (hard reset) or by a "LED-test" (soft reset).</li> </ul>
<b>Power Supply:</b>	<ul style="list-style-type: none"> <li>• 230 V/115V AC / 50 to 60 Hz (4.322x.x0.xxx) switchable Factory adjustment 230V AC.</li> <li>• max. 20 VA</li> <li>• Option: 24 V DC (4.322.x.x2.xxx)</li> </ul>
<b>Operating Temperature:</b>	0 ... +40°C
<b>Physical Dimensions:</b>	<ul style="list-style-type: none"> <li>• 144mm x 144mm x 170mm (with connector)</li> <li>• 138x138 mm (size of the opening)</li> </ul>
<b>Weight</b>	1.4 kg



## **ADOLF THIES GmbH & Co. KG**

Hauptstraße 76      37083 Göttingen Germany  
P.O. Box 3536 + 3541      37025 Göttingen  
Phone ++551 79001-0      Fax ++551 79001-65  
[www.thiesclima.com](http://www.thiesclima.com)      [info@thiesclima.com](mailto:info@thiesclima.com)



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