Combined Wind Sensor

(14513 HG4N18)

1 Description

1.1 General

The sensor (14513) is specifically designed for the operating on ships, oil rigs and other applications on sea. The housing and the measuring elements are made of a seawater resistant aluminium alloys. The housing, the cup-rotor and the wind vane are anodized, the housing is lacquered gray (RAL 7000) additionally.

Due to the special construction with a watertight connector and splash proof traps for the bearings and due to the shock and vibration proof construction the sensor is fully qualified for a long service life on ships.

An electronically controlled sensor heating device (option) allows for operating the sensor over the wide range from -35 up to 70 °C.

1.2 Function

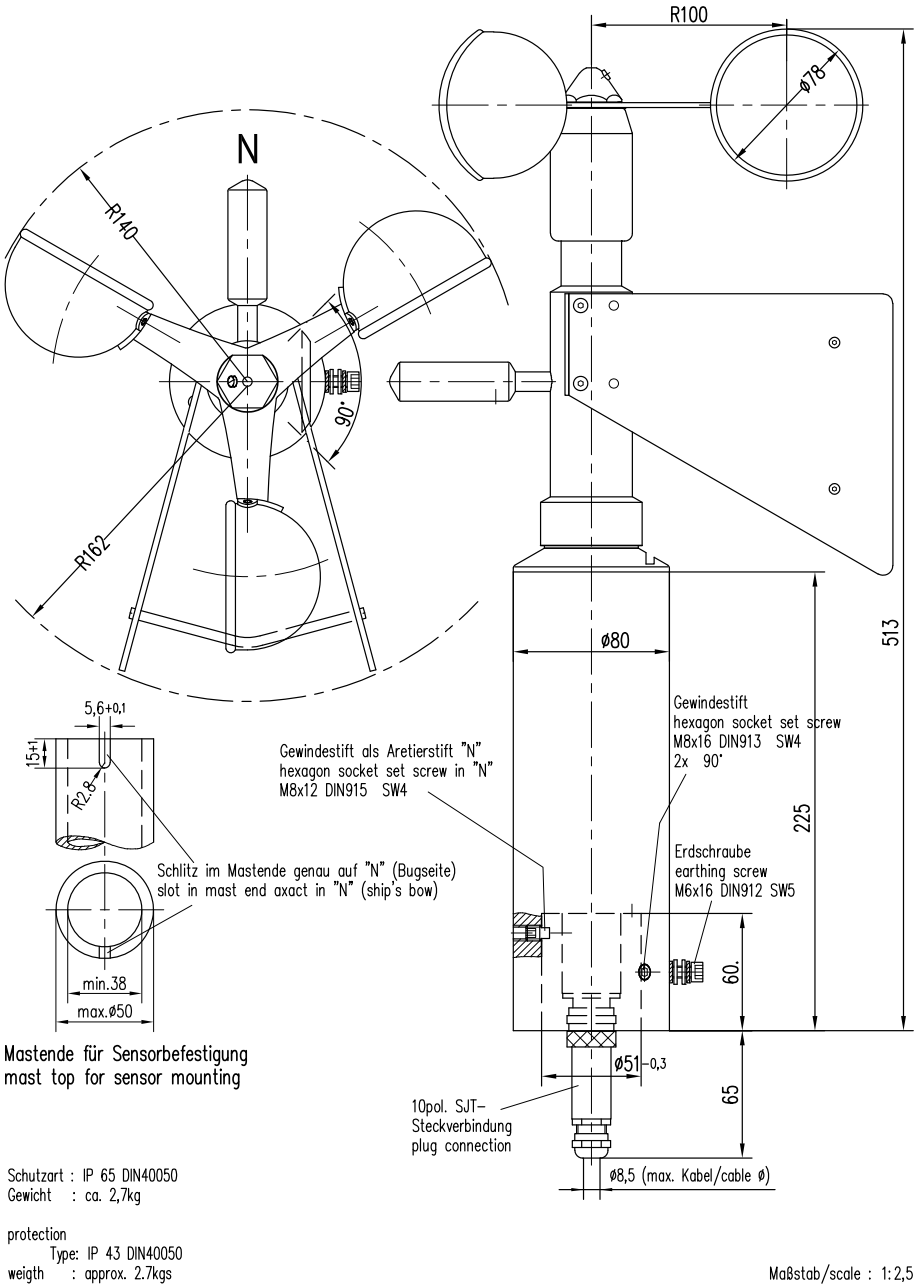
The sensor (14513) has two different measuring elements to measure wind speed and wind direction.

The three-armed cup rotor will rotate from the wind. The number of revolutions of the cup rotor is proportional to the wind speed.

The wind direction is measured with a wedge wind vane with two fins.

The wind vane axle and the rotor cup axle are coaxial, running independently of each other on ball bearings.

1.3 Dimensional drawing



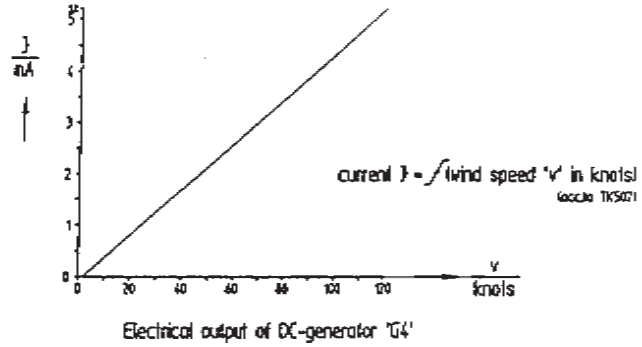
1.4 Technical data

Professional Naval-Line	(14513 HG4N18) Combined Naval Wind Sensor		Id-No. 00.14513.263 400
		Wind direction	**Wind speed**
Measuring element:		wedge-shaped wind vane with precision ring potentiometer	3-armed cup rotor with DC measuring generator
Measuring range:		0...360°	1...120 kn (60 m/s)
Accuracy:		± 1%	± 2% FS
Resolution:		0.3°	0.1 m/s
Starting value:		0.8 m/s related to a deflection of the wind vane of 90°	0.8 m/s
Range of application:		temperatures -35..+70°C heated ǀ wind speed 0...60 m/s	
Output:		4 mA at 120 kn ǀ R_a = 6656 h/ 5.2 mA at 120 kn ǀ R_a = 5024 h	
Supply voltage:		heating 24 V_{DC}/ 1.25 A/ max. 35 VA ǀ electr. controlled	
Housing:		aluminium · RAL 7000 (grey) · other colours on request	
Dimensions/ Weight:		cup rotor Ø 280 mm · H 520 mm · for mounting pipe Ø 50 mm · 2.7 kg	
Included in delivery:		1 plug · 10-pole spraywater tight · MIL-standard · when a cable is ordered, the plug is mounted to that	
Accessories:		**Indicator units** e. g. (1476 Q144SBN18) · (1477 Q144SB) · (14763 Q144SBN18) · **Power supply units**	
32.14513.066 040	**(14513 U66d)**	**Cable** · 4 m · with 10-pole plug · MIL-standard · ready-made	

Measuring element for the wind speed

Model G4 with generator: A coupled DC generator (G4) converts the number of revolutions into a direct voltage. This voltage is transmitted to further devices.

The output function is shown below:



Electrical output of DC-generator 'G4'

Measuring element for wind direction

In operation its top points in the direction the wind comes from; this direction is defined as the wind direction.

Model N: The wind vane is connected to a precision ring potentiometer. The potentiometer is a triple tapped resistor. The potentiometer is designed as an endless wound resistor with three tappings each of which is 120 degrees away from the others. Two sliders placed opposite each other, i.e. in an angle of 180 degrees and connected to the wind vane feed a 10...12 V_{DC} voltage into the potentiometer. The three output voltages at the tappings and depending on the angle of the vane are shown in the figure below.

Model H: The sensor is supplied with an electrical shaft heating and can be operate in a wide temperature range from -35 to +70 °C.

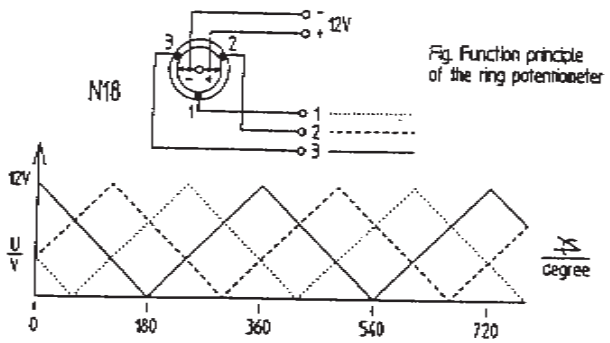


Fig. Function principle of the ring potentiometer

2 Setting into operation

2.1 Unpacking

When removing the sensor from the original cardbox take care not to damage the cup rotor and the wind vane.

The measuring elements must not be used as a handle.

2.2 Choice of the installation place

For representative wind measuring the sensor should not be installed under the lee of large obstacles. The distance between obstacle and sensor should be at least 10 times the height of the obstacle. Furthermore the sensor should at least 5 meter higher than the height of the obstacle.

For operation on ships you should select a mounting place with little interferences of obstacles such as masts, antennas, and chimneys. In most cases the users mount the sensor on a cross arm on the ship's highest mast.

2.3 Mounting

After inserting the plug connector into the socket at the bottom of the sensor shaft, the sensor is mounted on a fitting tube with an outer diameter of 50 mm and an inner diameter at least 40 mm. If a traverse is supplied for the sensor (14513) then the fitting tube is a part of the traverse. Before the screws of the sensor are tightened, the sensor is adjusted to north.

In order to install the wind sensor fast and correct regarding the north-adjustment this item is equipped with an integrated mounting aid. Inside the inner bottom of the sensor a small bolt pointing to the north is integrated to be set into a corresponding slot of the mounting pipe. Therefore the mast piece has to be designed with a corresponding slot as illustrated in the dimensional drawing.

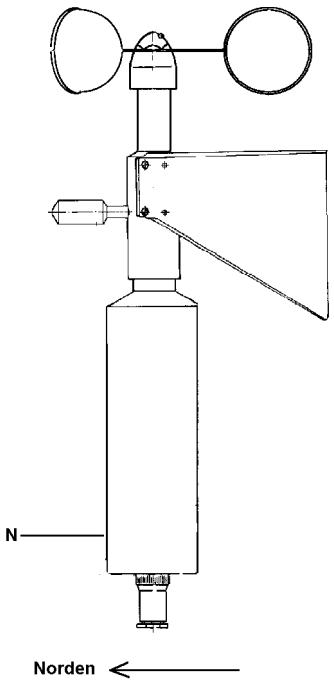
Alternatively the correct north setting can be carried out by searching a point outside the vessel in the landscape which is located in the ship ahead direction respectively in the bow-stern line or a parallel line in case of the sensor is mounted far away from the middle line. The sensor finally can be fastened by means of the two hexagonal screws when the selected point in the outer terrain is in the view-finder (groove) of the sensor which is located on the top of its housing. Finally the earth screw has to be connected to the ship's ground. An acid-free contact grease is recommended to protect contact surfaces against corrosion.

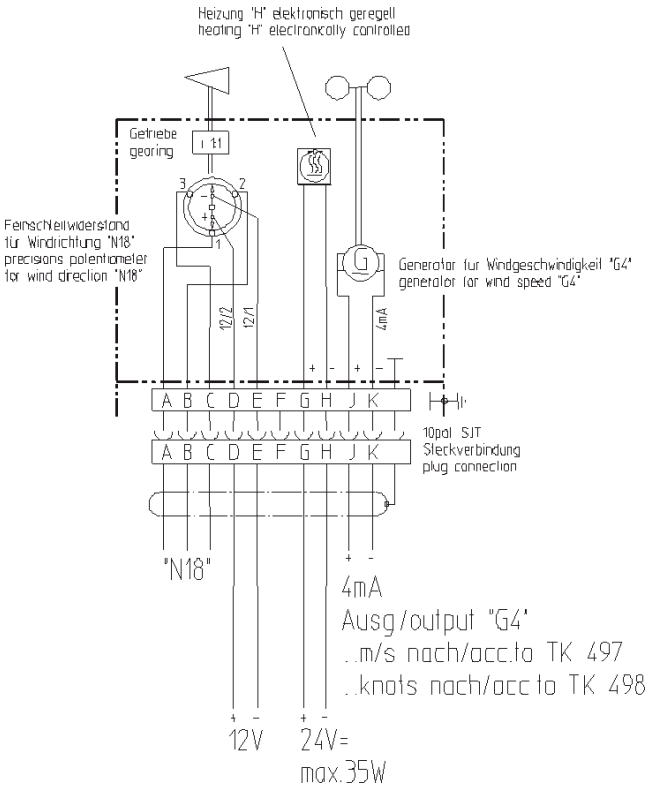
Note: Obey all safety instructions while setting up the sensor onto a mast.

2.4 Electrical connection

The cable is connected to the sensor by means of a splash-proof plug connection in the shaft of the sensor. Before mounting the sensor on the fitting tube, the cable with the plug connector is pass through the tube. See the wiring diagram for the wiring of the separated models. To facilitate the installation we recommend to use a short, flexible sensor connection cable between the sensor and a mast distribution box e.g. our model FL 0185. The connection cable is available as a accessory.

Attention: wrong connection may cause a destruction of this and other connected components !





2.5 Cable entries

Type of cable: LiYCY 10*0,75 mm²

or: 10 x AWG 20 CUL sw

The cable will be linked to the sensor by means of a plug connector to be delivered together with the item. After finishing the installation the earthing screw must be connected to the ship's ground. It should be protected against corrosion using a special acid-free contact grease. After completely wiring the sensor is ready for operation.

2.6 Setting into operation

After having finished the electrical and mechanical installation work of this item as mentioned in this manual and other related instructions the wiring should be checked once again before switching on the mains for the whole measuring system. As the main interface system of the device will start all functions and routines automatically by means of a micro-controller circuit no further operating handling is required.

2.7 Performance check

When the system installation is completed a simple performance check as mentioned here can be carried out:

• Turning the wind vane by hand approximately to the positions NORTH-EAST-SOUTH-WEST and NORTH; the values on the display must follow accordingly.

• When stopping the cup rotor carefully by hand at its axle, the displays must indicate a value of 0 knots (m/s).

• When moving it counter-clockwise (e.g. looking onto the top) by hand, all displays must indicate positive values.

The potentiometer can be checked in the resistance range:

• measuring at both slider pins the indication might be approx. 220 ohms, ±50 ohms independent of the wind direction.

• the three values at the tappings 1/2, 2/3 and 1/3 must be nearly identical. Their values might be around 200 ohms, ±50 ohms. Since the relationship of the three output signals is relevant, the absolute values can be neglected.

To check the sensor for wind direction the wind vane is set in the directions NORTH-EAST-SOUTH-WEST and fixed in these positions for a while. Accordingly to this directions the following values must be displayed: N or 0° (360°), E or 90°, S or 180°, W or 270°. If the display does not correspond to the actual positions of the wind vane, the sensor must be aligned again and the cable connections checked.

Please note the loss of warranty and non-liability by unauthorised manipulation of the system. You need a written permission of LAMBRECHT meteo GmbH for changes of system components. These activities must be operated by a qualified technician.

The warranty does not cover:

1. Mechanical damages caused by external impacts (e. g. icefall, rockfall, vandalism).
2. Impacts or damages caused by over-voltages or electromagnetic fields which are beyond the standards and specifications in the technical data.
3. Damages caused by improper handling, e. g. by wrong tools, incorrect installation, incorrect electrical installation (false polarity) etc.
4. Damages which are caused by using the device beyond the specified operation conditions.

3 Service and maintenance

3.1 Change of spare parts

Interchanging of Outer Parts

When working under harsh conditions it may be necessary that the following consumables have to be changed:

Cup Rotor: After bending away the washer, the hexagonal screw can be loosened with a wrench size SW 27. The faulty cup rotor can be removed together with the washer.

The new cup rotor has to be mounted such that the concave parts of the cups are always on the right side (cf. previous page) enabling an anticlockwise rotation.

After replacement of a cup rotor it will always be necessary to use a new washer in order to fix the rotor safely. New balancing will not be required.

Wind Vane: The wind vane blades can be removed after loosening the three screws of each blade.

After the mounting the new parts the wind vane has to be balanced.

For this purpose the sensor must be held in a horizontal position (90° shifted from the position during normal operation).

If the balancing is correct, the vane will be stable in every position. The adjustment can be made with the weight at the end opposite to the vane. It can be moved after loosening the threaded pin.

Please be sure that all screws are fixed before mounting the sensor on the mast again.

Interchanging of Inner Parts

Opening the Housing

To keep dust, humidity and seawater away from the inner parts of the sensor this work is recommended to be made only in a clean workshop. The position numbers mentioned below correspond to the numbers in the spare part drawing.

• Put the sensor in a horizontal position and remove the three screws around the connector.

• Remove the screw (14) at the upper part of the sensor

• Fix the sensor in a vice or similar instrument. To avoid damages, the housing must be protected with suitable material.

• Put a flat bladed chisel (20 x 4 mm) to the slot of the housing and turn it to the left.

• Change of spare parts as described below.

• Assemble the housing in reverse order.

Changing the N18 Ring Potentiometer

After opening the sensor according to the steps described above the potentiometer can be changed:

• Loosen the screws and remove the clamps on the base plate and the cogwheel.

• Make a sketch of the electrical connection of the potentiometer.

• Replace the potentiometer.

• Assemble the sensor in reverse order. Before tightening the fixing screws check for enough backlash for the cogwheels.

• Fix the wind vane with a piece of tape at the housing.

• Connect an ohmmeter between the pins 8a1 and 12/2 (+) of the potentiometer and turn the potentiometer until it indicates 0 Ohm.

• Fix the screws at the clamps and secure them with lacquer.

Change of the DC Generator

To exchange the DC generator the sensor and the potentiometer have to be dismantled as described above. Furthermore the following steps have to be carried out:

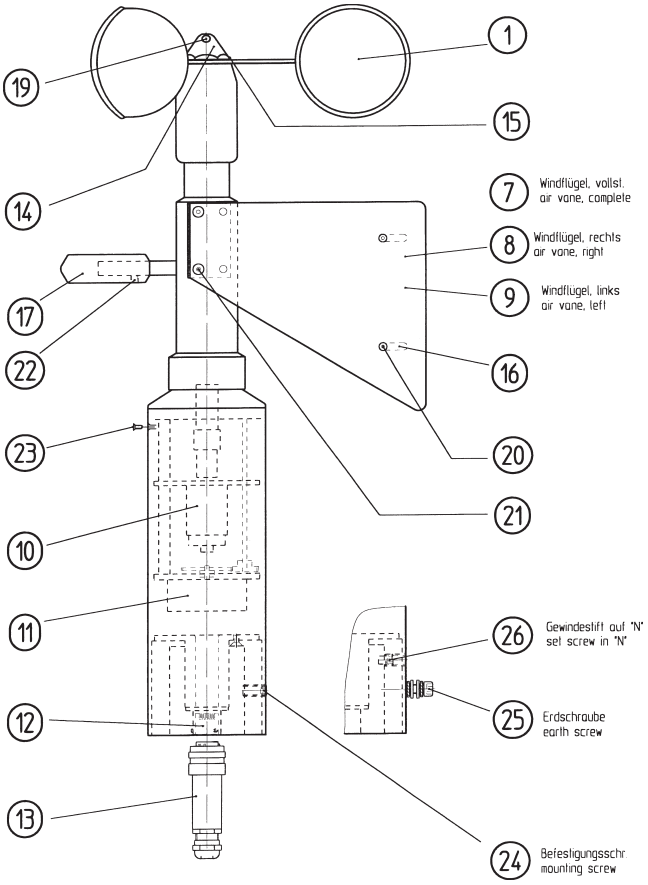
• Remove the mounting plate of the potentiometer.

• Remove the two hexagonal bolts of the generator plate.

• Replace the generator.

• Assemble the sensor as described in the above sections.

3.2 Spare parts drawing



3.3 Spare parts list

No.	Description	PPU	Order No.
-	Complete wind sensor Model 14513 H G4 N18 Paint: stone-grey (RAL 7000)	-	00.14513.263 400
-	Same model as above, but: Paint: light-grey (RAL 7035)	-	00.14513J263 400
1	Cup rotor	1	32.14698.002 030
7	Complete vane (RAL 9005)	1	32.14513.017 000
8	Right vane, black (RAL 9005)	1	32.14513.018 010
9	Left vane, black (RAL 9005)	1	32.14513.018 020
10	Generator (type G4)	1	64.19020.100 000
11	Precision potentiometer (type N)	1	63.15010.040 000
12	Panel mount pin plug	1	32.14513.029 000
13	Cable socket plug	1	32.14513.029 010
14	Cap	1	33.14676.015 000
15	Locking plate	1	33.14676.017 000
16	Brace, black (RAL 9005)	2	33.14511.160 030
17	Weight, black (RAL 9005)	1	33.14511.051 010
19	Head screw M3x4, red plastic	1	35.00842.418 201
20	Half-round screw M3x8 ISO 7380	4	35.73801.518 501
21	Half-round screw M4x8 ISO 7380	4	35.73801.249 000
22	Set screw M5x5	1	35.05511.529 990
23	Countersunk screw M2.5x6	1	35.09631.514 200
24	Gewindestift M8x16	2	35.09131.540 100
25	Set screw M8x16	1	35.09121.533 600
26	Hexagon socket screw M8x16	1	35.09151.539 800

3.4 Repair procedures

The fault tracing and service work only should be carried out by skilled maintainers having passed a factory training at our facilities or a similar course.

All spares of the sensor mentioned here which cannot be repaired have to be disposed appropriately according to the local instructions of the waste management. For all other repairs which cannot be carried out by own staff the sensor has to be returned to our works .

The full shipping address of our company is mentioned in this booklet.

3.5 Ordering of spares

In case of spares as mentioned here are required are required for replacements or to be put on stock the following information are required to forward the right spare parts to the customer:

· name of item and type number

· ordering number/parts number

· required quantity

· related component or name of higher assembly

· type of vessel and country of origin

· reference number of LAMBRECHT wiring diagram (marked by bold letters SKF or SWF, followed by 3 or 4 numbers).

A detailed inquiry containing these information will be appreciated by us for the safe identification of the required item(s) and to prevent wrong deliveries. Above mentioned data can be obtained from the designation label and from the spares list of this system component.

4 Setting out of operation

4.1 Storage

The wind sensor has to be stored in a clean and dustfree room with temperatures between -40 and 60 °C (not condensing) in the original cardbox or a similar packing.

4.2 Dispatching

For shipping the sensor we recommend to use the original cardbox or a similar packing. To prevent damages during transport it is necessary to protect the wind vane and the cup rotor.

5 Remarks

This manual describes the standard design as well as possible options. The respective performance will be stated in the specification and/or the commercial documents of the contract.

Our products are subject to continuous developments. Technical alterations for the technical progress are reserved.

Ordering Help

Model:	(14513 HG4N18)
Id-No.:	00.14513.263 400
NATO Stock No.:	**6660-12-350-3658**

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