Wind Sensors METEOROLOGY

PROFESSIONAL

Al METAL VANE

Al METAL CUP ROTOR

IP 53 PROTECTION RATING

Versions

The METEOROLOGY family of sensors comprises the heated sensors 14576-24 V for wind speed and 14566-24 V for wind direction as well as the unheated sensors 14576 I (wind speed) and 14566 F1000 (wind direction).

Measuring Elements

The heated models use optoelectronic measuring elements to detect, without any wear, the rotation of the cup anemometer and the wind vane, respectively.

The unheated models use measuring elements with extremely low friction to detect rotations; this also guarantees a long service life.

Cup Anemometer

The three-armed cup anemometer with a diameter of 215 mm is rotated by the wind. The number of revolutions is a measure of the wind speed.

The cup anemometer's constructive features that are permanently controlled by the quality management during the manufacturing process ensure optimum linearity.

Wind Vane

The single-bladed wind vane has a great radius so that even small wind speeds move the wind vane to the corresponding wind direction.

The size and form of the wind vane are optimized for a low starting value, and an excellent compromise regarding its dynamic properties (inertia, proper frequency) has been achieved.

Putting into operation

The wind can be represented by a vector quantity. For a complete description of the wind it is necessary to specify its speed and direction. The two components are subject to spatial and temporal variations; thus, strictly speaking, they are valid only for the site where the measuring instrument is put up. We therefore recommend to select the place of installation very carefully.

Selecting the place of installation

Generally, wind measuring instruments should not measure the specific wind conditions of a limited area, but indicate the typical wind conditions of a wider area. The values measured at different places must be comparable.

Thus, when installing the sensor you should make sure the place of installation is not under the lee of great obstacles. The distance between the obstacles and the sensor should be 10 times the height of the obstacles (this corresponds to the definition of an undisturbed terrain).

If an *undisturbed terrain* of this kind does not exist the sensor must be put up at a height of at least 5 m above the obstacle height.

If the sensor must be installed on a roof top the place of installation must be in the middle of the roof to avoid predominant wind directions.

If you want to measure both wind direction and wind speed, install the sensors at the same measuring point, if possible, and make sure to avoid any mutual influence of the sensors.

A wind sensor pair easily meets this requirement since the sensors are set up side by side. Their horizontal distance should be approximately 1.5 m. The two sensors must be staggered vertically so that the lower edge of the upper wind speed sensor is 0.1 to 0.5 m above the upper edge of the lower wind direction sensor.

Mounting the sensor on the mast

Mount the sensor at the top of a grounded tube with an outer diameter of 50 to 52 mm. Make sure the device is easily accessible so that you can set up the north direction for the wind direction sensor and perform any maintenance work.

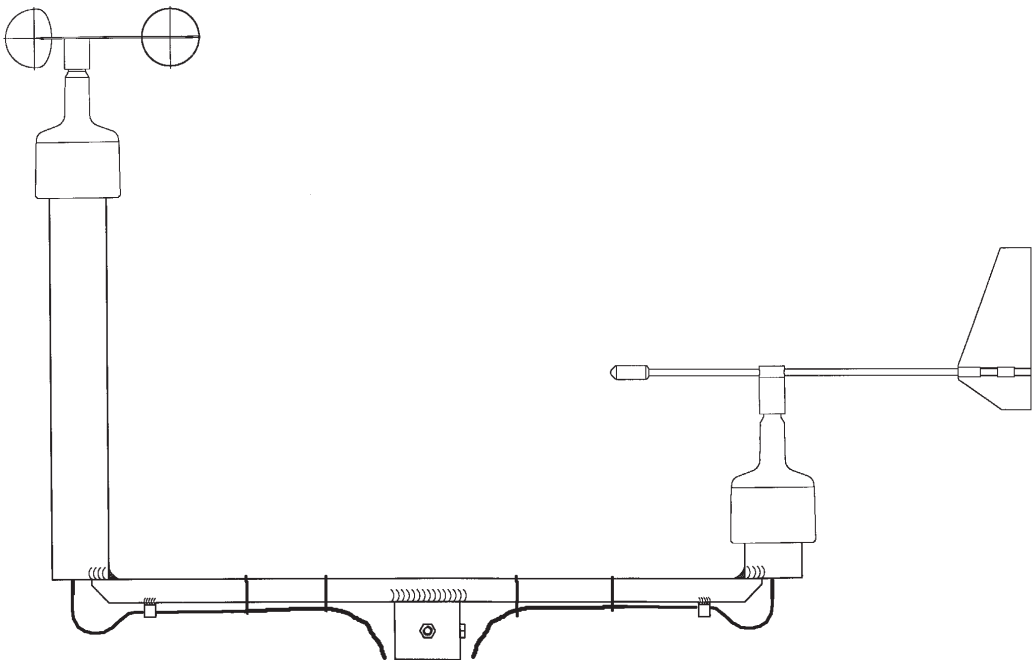
Attention!
Ladders or other lifting helps must be absolutely in order and must be guarantee a secure support! Follow the rules for prevention of accidents.

To reach the sensors use a ladder of the appropriate length or a telescoping working platform of the appropriate height.

You can also use masts that can turn around their vertical axis or masts consisting of individual segments or telescoping masts that you can secure after setting up the north direction.

If wind speed and wind direction are measured at the same time, the measurement generally takes place not only at the top of a mast but also at the ends of a cross arm. The arms must stay torsion-free and vibration-proof even at high wind speeds and they must be accessible for you to perform mounting and maintenance work.

When you install the connecting cables make sure not to excessively shorten the cable leading to the connector in the lower part of the sensor casing so that you can later maintain or dismount the sensor.



View of the cable routing on a wind cross arm.

Electrical Connection

All devices of the *meteorology* family of sensors are connected using a 12 pole connector (pins) embedded in the bottom of the casing.

Attention!
Because the installation take place in a dangerous height, the assembly personal must follow the rules for prevention of accidents.

Cable Layout

The connecting cable is suitably led along the mast between the data evaluation device (indicating instrument or data acquisition system) and the sensor. The cable must be fastened using appropriate cable ties (their length depends on the mast diameter).

You can also install the entire connecting cable within the tube elements of the mast if the mast is prepared correspondingly.

Tip: Lead the cable in a wide curve from the mast to the bottom of the casing so that you can later easily dismount the cable.

Please make sure the cable is protected from humidity on the side of the data processing system. Generally, Pg sockets that use a rubber joint to prevent humidity from penetrating into the terminal box of the data processing system provide sufficient protection.

Example representation:
Cable run by a EMC fair Pg-socket.

Output Signal

When you connect the output signal please note the assignment of the wires of the open cable end shown in the internal circuit diagrams on the following pages.

The individual output wires lead you to the corresponding connecting terminals of the data acquisition section.

The electronics of the...

... 14576 24V, 14566 24V, and 14566 F1000 models is powered via the leads J(-) and H(+) of the 12-pin connector.

The following values are allowed:

Model	Voltage	Current
14576-24 V	10...30 V_{DC}	max. 30 mA
14566-24 V	10...30 V_{DC}	max. 30 mA
14566 F1000	12 V_{DC}	max. 30 mA

14576 I ...

... For the 14576 I model please note the recommended circuit in the following paragraph.

Note for the 14566 F1000 model

This model uses an *open sliding contact* to convert the wind vane orientation into an electrical signal. To prevent the sliding contact from being damaged you may have to take into consideration a pull-up or pull-down resistance of more than 100 kΩ.

A voltage or a constant current source can be used to power the sensor. The maximum specific resistance must not exceed 2 Ω.

Recommended Circuit for 14576 I

The technical data of the interface between a proximity switch according to NAMUR and an electronic amplifier is defined by DIN 19 234 (DIN = Deutsche Industrienorm, German Industry Standard). The proximity switch is connected using a two-wire cable (here: wire L(+) and B(-)).

These two wires power the proximity switch and simultaneously control the amplifier via the current consumption that changes in accordance with the revolutions of the cup anemometer.

To ensure a safe interaction between the proximity switch and the amplifier, the DIN 19 234 specifies the following values for the amplifier:

1. Power supply for the control circuit
   no-load voltage U_0: 7...9 V
   preferred value: 8.2 V
   short circuit current I_K: 7...16 mA
   preferred value: 8.2 mA
2. Current-dependent switching or monitoring points

2 a. Switching point
The amplifier switching point must be within a proximity switch current consumption range of 1.2 mA to 2.1 mA.

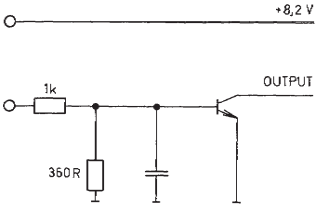
2 b. Cable damage monitoring
If the current consumption of the proximity switch falls below a certain value it is assumed that there is a cable damage or another error in the proximity switch. The cable damage monitoring must react within a current range of 0.05 mA to 0.15 mA.

2 c. Short circuit monitoring
If the current consumption of the proximity switch exceeds a certain value it is assumed that there is a short circuit on the cable or a corresponding fault in the proximity switch. The short circuit monitoring must react within a current range that corresponds to a compensating resistance of the proximity switch of 360 to 1000 ohms.

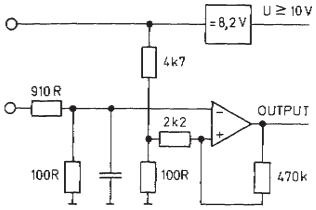
If the preferred current of the power supply is according to point 1 this will be a current range of 6.0...7.45 mA.

The data defined in DIN 19 234 show that the triggering of switching or monitoring processes depends on the current in the interface between the proximity switch and the amplifier. Thus, a current evaluation should be made when designing an amplifier for proximity switches according to DIN 19 234.

The cable resistance must not exceed 100 ohms.



Example: Discrete circuit



Circuit with OP amplifier

The electronic heating...

... of the 14576 24V and 14566 24V models is powered by an external power supply unit. The necessary voltage of 24 V_{DC} is connected via the wires M(-) and G(+).

Grounding

To reduce the risk of inductive interference the sensor must be properly grounded (screening on both sides).

The use of ready-made connecting cables (order no. 32.14566.060 xxx) guarantees a proper grounding between sensor and cable. You just have to connect the cable screening to the ground of the indicator or the data acquisition unit.

When other cables are used, you must create an appropriate screening.

Setting up the North direction for the wind vane

For wind direction measurements the north mark on the sensor must be aligned with the geographical north direction; the allowed maximum alignment deviation is ±3 degrees.

To set up the sensor's north orientation select a landmark which is as far as possible up north with regard to the final position of the wind direction sensor.

The reference point can be selected using a topographical map (1:25000). The exact position of the reference point is determined using an amplitude compass that can be adjusted horizontally on a stand.

A point on the rotary knob and another point on the casing shaft represent the north mark of the wind direction sensors. These two marks must be exactly in line with each other; when you have aligned the marks, you may fix the wind vane with e.g. a piece of adhesive tape. When you have fixed the wind vane this way you can locate the reference point by aiming at it over the axis. Now you must turn the sensor casing on the mounting tube until the tip of the wind vane points to the reference point in the north.

Please make sure there is no magnetic deviation of the compass.

When the north direction is set up for the wind direction sensor, tighten the headless screws in the lower part of the casing and remove any adhesive tape, if necessary.

Using an indicating instrument or a data acquisition system, verify the proper measurement and transmission of the measured values for at least three directions with an offset of 90 degrees from each other.

If you cannot select a northern reference point owing to local conditions, you can proceed analogously using a reference point in the south. In this case, however, you have to make sure the north mark on the sensor does not point to the reference point but in the opposite direction.

Maintenance

The sensor design permits long periods of maintenance-free operation. To obtain useful measured data the measuring station must be systematically controlled and monitored.

The properties of the sensor may change due to wear, soiling, and corrosion and as a result of external mechanical influences. The properties of the electronic module may also change.

We therefore recommend to check the measuring station periodically according to intervals listed in the following table:

Maximum interval	Wind direction	Wind speed
a) 1 week	Time mark of the measuring station (correction if necessary) Visual control of the device function Rough verification of the measured values	
b) 6 months	Measured value transmission test Verify that the sensors are still fixed to the device carrier	Wind speed comparison measurement using a hand-held anemometer
c) 2 years	Sensor calibration Verification of the north setup	

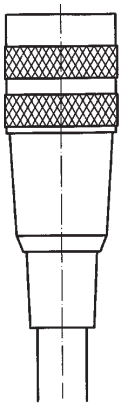
If the weekly check according to a) gives cause to assume the existence of any malfunction you must perform the checks listed under b).

If the malfunctions are confirmed by these checks or are revealed for the first time you must perform the checks listed under c).

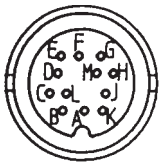
When you have performed the checks listed under c) and the data are not measured correctly, please contact the manufacturer Wilh. LAMBRECHT GmbH.

Pin assignement

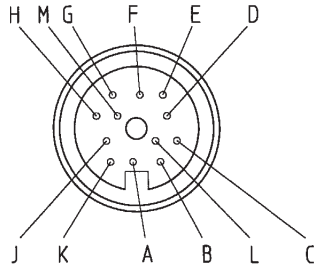
Id-No. 32 .14565. 060 xxx



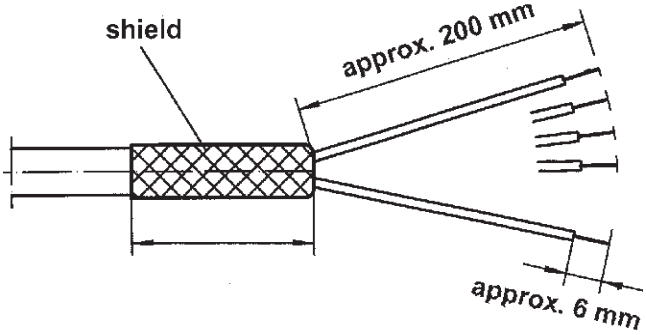
Coupler socket
Id-No. 65 .53070. 470 100



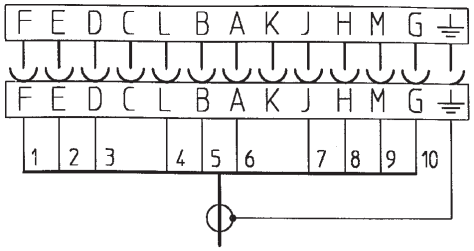
View of the socket from the solder side



View of the socket from the plug side

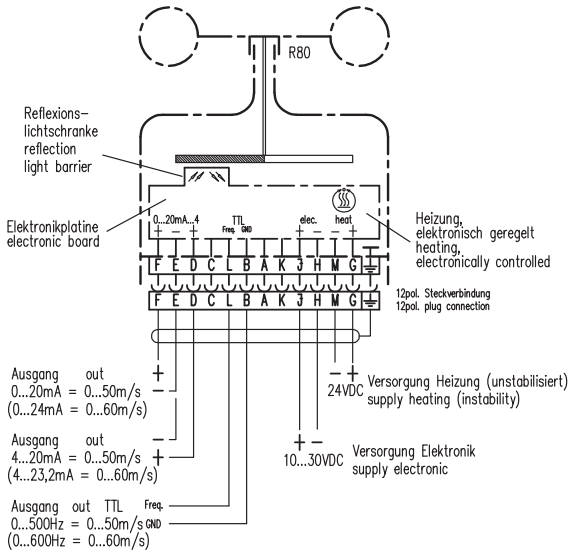


View of a cable end.
The single leads of the cabel are approx. 200 mm bared and equipped with end splices (6 mm long).
The cable shield is approx. 30 mm returned.

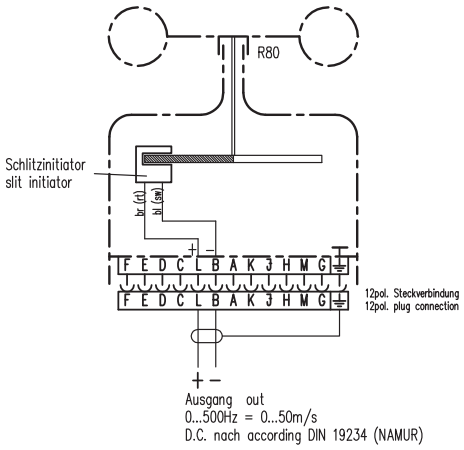


Steckerbelegung		
Ader	AWG C UL	Pin-Nr.
1	schwarz - sw	F
2	braun - br	E
3	rot - rt	D
		C
4	orange - or	L
5	gelb - ge	B
6	grün - gn	A
		K
7	blau - bl	J
8	violett - vi	H
9	grau - gr	M
10	weiß - ws	G
⏚	Schirm	⏚

14576 24V **Id-No. 00.14576.250 004** **14576 I** **Id-No. 00.14576.010 000**

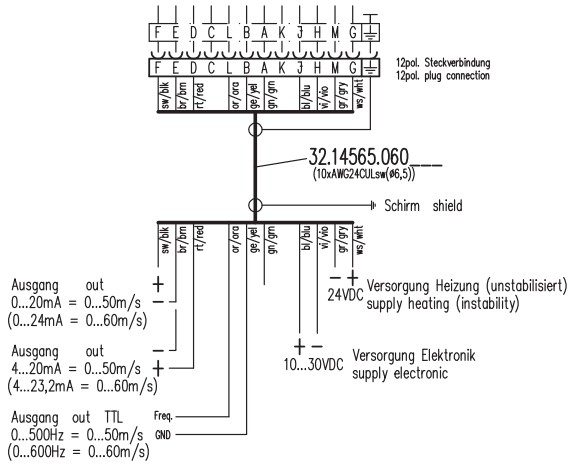


nach according TK509 (50m/s)



nach according TK509 (50m/s)

Anschlußbild mit Anschlußkabel .....
internal circuit diagram with connecting cable .....



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Anschlußbild mit Anschlußkabel .....
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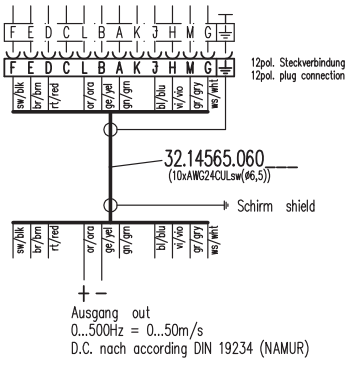
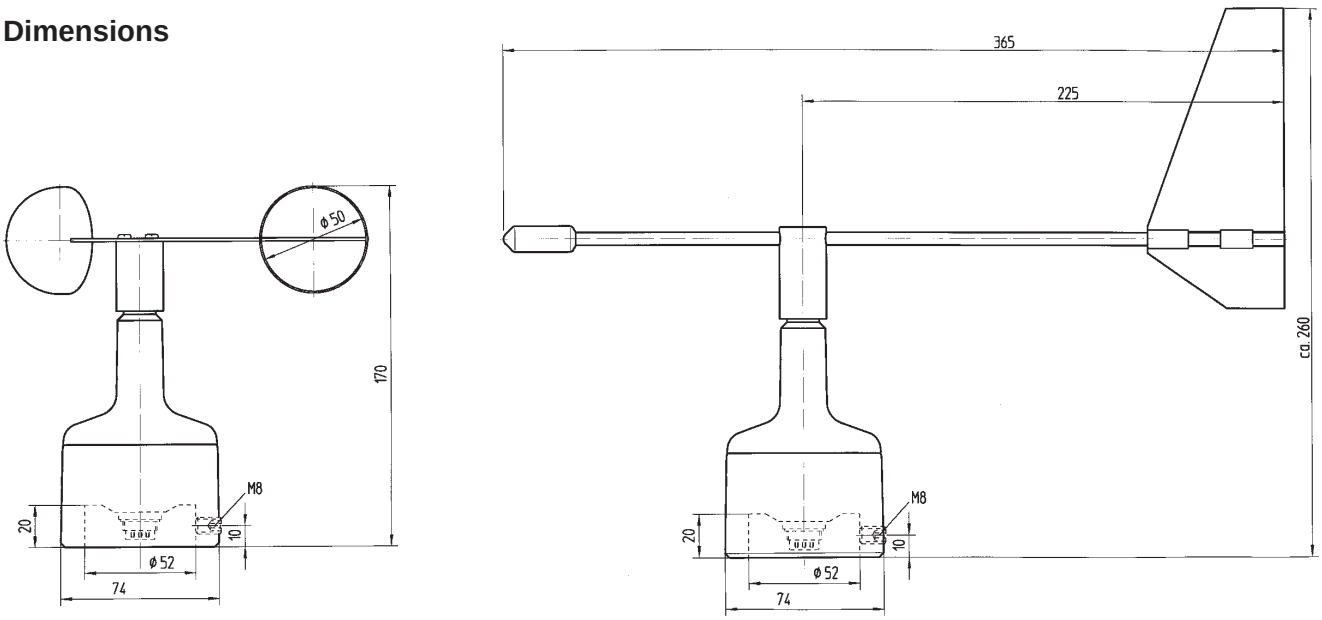
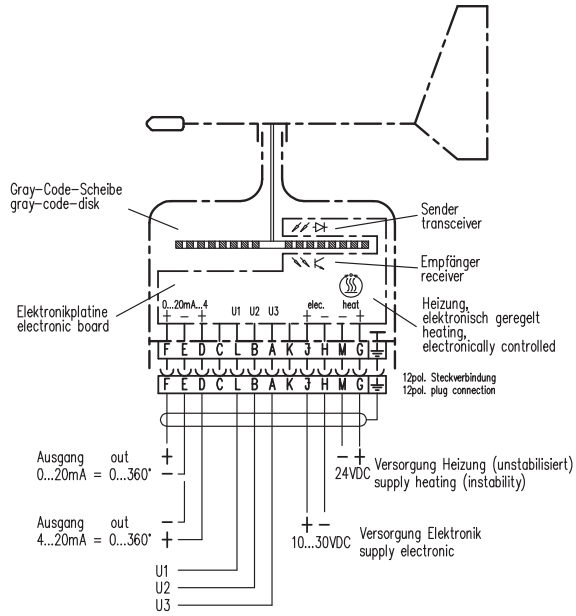


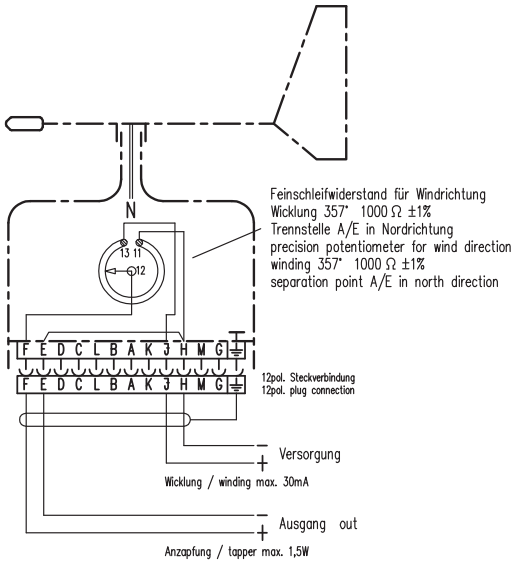
nach according TK509 (50m/s)

Dimensions

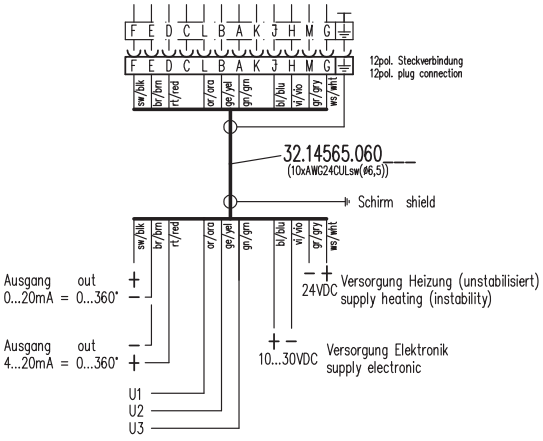


14566 24V **Id-No. 00.14566.200 30** **14566 F1000** **Id-No. 00.14566.000 030**

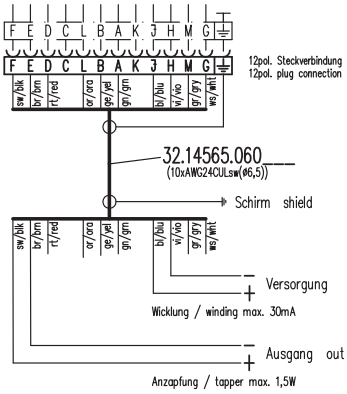




Anschlußbild mit Anschlußkabel .....
internal circuit diagram with connecting cable .....



Anschlußbild mit Anschlußkabel .....
internal circuit diagram with connecting cable .....

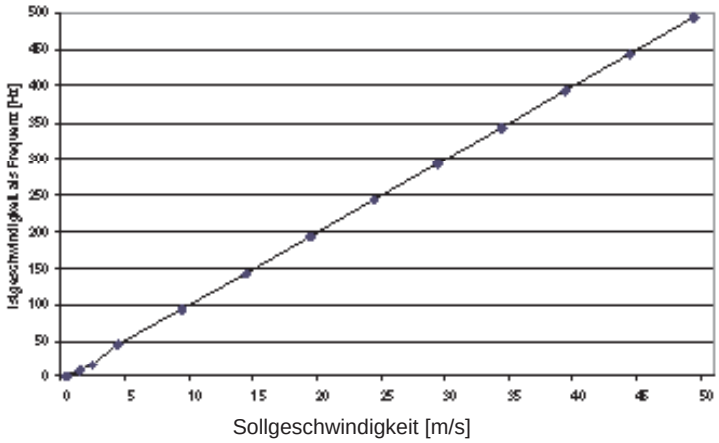


Wind tunnel results (DWD Hamburg)

Wind speed sensor (14576 24V)

Instantaneous value v [m/s]	*Measured frequence f [Hz]*
0,30	0
1,07	7,5
2.10	16,5
4,95	45
9,82	93
14,75	142
19,80	192
24,80	243
29,68	292
34,52	342
39,56	393
44,41	443
49,48	493

Linearitätskennlinie der Windgeschwindigkeit



No.	00.14576.250 004	00.14576.010 000
Code	**(14576 24V)**	**(14576 I)** 3)
General		
Operating temperature range *	-30...+70 °C	0...+70 °C 4)
Power supply	10...30 VDC; 30 mA (int. transducer)	8...15 VDC; 2 mA
Power supply heating	24 VDC; 600 mA; 15 VA	-----
Heating	electronical shaft heating	-----
Technical data		
Measuring range; resolution	0...60 m/s; 0.1 m/s	0...60 m/s; 0.1 m/s
Output signals	3...600 Hz (for 0.3...60 m/s)	3...600 Hz (for 0.3...60 m/s) ~ Ron=1 kOhm; Roff=10 kOhm
	0/4...20 mA (for 0...50 m/s) 1) 2)	-----
Starting value	<= 0.3 m/s	<= 0,3 m/s
Accuracy	±0.3 m/s <= 10 m/s; ±2% > 10 m/s	±0.3 m/s <= 10 m/s; ±2% > 10 m/s
Distance constant; time constant	5 m; 1 sec	5 m; 1 sec
Dimension		
Measuring elements	opto-electronical (incremental)	inductive proximity switch (NAMUR) SJ 3,5 N
Cup rotor	black anodized, sea water resistant aluminum	black anodized, sea water resistant aluminum
Housing; paint	aluminum diecasting; RAL9002	aluminum diecasting; RAL9002
Dimensions	H 170 mm; cup rotor Ø 210 mm (R80)	H 170 mm; cup rotor Ø 210 mm (R80)
Weight	approx. 0.4 kg	approx. 0.4 kg
Other	delivered with 12-pin plug and integrated transducer	delivered with 12-pin plug
No.	**00.14566.200 304**	**00.14566.000 030**
Code	**(14566 24V)**	**(14566 F1000)** 3)
General		
Operating temperature range *	-30...+70 °C	0...+70 °C 4)
Power supply	10...30 VDC; 1...30 mA (int. transducer)	12 VDC or constant current 1 mA
Power supply heating	24 VDC; 600 mA; 15 VA	-----
Heating	electronical shaft heating	-----
Technical data		
Measuring range; resolution	0...360°; 2.5°	0...358°; 2.5° 5)
Output signals	0/4...20 mA; RLmax = 500 Ohm @15 VDC; 3x 0...10 VDC; Imax = 10 mA 1)	0...1000 Ohm
Starting value	<= 0.3 m/s	<= 0.3 m/s
Accuracy	±1%	±1%
Damping ratio	0.3	0.3
Dimension		
Measuring elements	opto-electronical (144 steps)	linear precision potentiometer
Wind vane	black anodized, sea water resistant aluminum	black anodized, sea water resistant aluminum
Housing; paint	aluminum diecasting; RAL9002	aluminum diecasting; RAL9002
Dimensions	H 260 mm; vane L 365 mm	H 260 mm; vane L 365 mm
Weight	approx. 0.6 kg	approx. 0.6 kg
Other	delivered with 12-pin plug and integrated transducer	delivered with 12-pin plug; the potentiometer has 3 connections (start, slider, end); 4-wire circuit; slider load max. 5 mW
*) Remark: In case of possible icing and formation of ice at the movable sensor measuring element the function is restricted for the duration of icing.	1) each max. load 500 Ohm at 15 VDC	3) intrinsically safe transducer
	2) overscaling up to 60 m/s possible (0...24 mA = 0...60 m/s) (4...23.2 m/s = 0...60 m/s)	4) -30...+70 °C by non-icing conditions
		5) 2° blank winding to north

Subject to change without notice. 145x6_b-de-de.indd 06.12

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