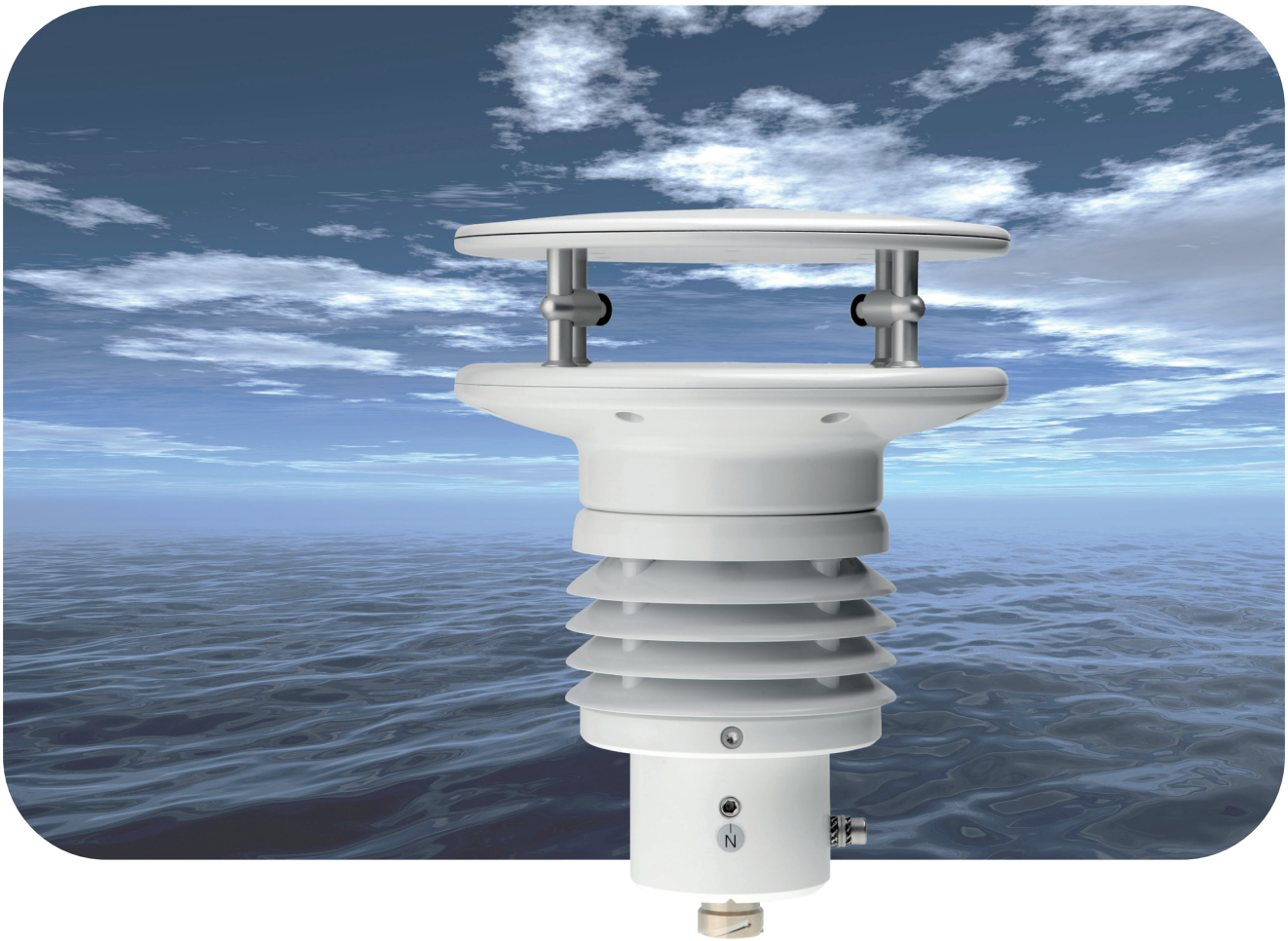

USER MANUAL

u[sonic]WS6-NAV

Weather Sensor

aem | LAMBRECHT meteo

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1 Introduction

THE IDEAL MARITIME WEATHER SENSOR

LAMBRECHT meteo, an AEM brand, is a leading global supplier of meteorological senors and data loggers for ships. Our products are used onboard inland vessels, cruise ships, tankers, container ships, and luxury yachts - wherever high-quality, reliable sensors and solutions are required. The all-in-one u[sonic]WS6-NAV weather sensor combines **six measurement parameters** in a compact housing with only one cable connector.

- Wind direction
- Wind speed
- Air temperature
- Air humidity
- Barometric pressure
- Dew point temperature (calculated value)

The sensors of the u[sonic] series are very robust, compact, and extremely reliable. When developing these sensors particular consideration has been given to highest quality for fulfilment of meteorological requirements. The system acquires the horizontal air flow and processes the measuring data to the meteorological parameters wind speed and wind direction.

Furthermore the weather-module of the u[sonic]WS6-NAV acquires the meteorological parameters air temperature, relative humidity, and barometric pressure. Based on the measured data u[sonic]WS6-NAV calculates the dew point temperature and provides for its serial output along with the measuring data. The sensors and further system components are mounted in a splash water- and dust-proof metal housing.

The measuring data are automatically transmitted via serial interface RS-422 in talker mode, when power supply is switched on. Due to their shock- and vibration proof construction the sensor u[sonic]WS6-NAV is particularly qualified for use on ships and under severe environmental conditions. The housing is made of anodized seawater resistant aluminum. An electronically controlled heating device enables the sensor to operate in between the wide range of -40 up to 70 °C.

1.1 Warranty information

Please note the loss of warranty and non-liability by unauthorized manipulation of the system. You need a written permission of the 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 (e.g. false polarity) etc..
4. Damages which are caused by using the device beyond the specified operation conditions.

Static measuring principle for wind measurements means:

- Determination of data works without moving measuring elements, i.e. none abrasion, least maintenance, and none recalibration because of this method.
- The wind parameter can be measured also in winter time accurate and precise, because of the electronic controlled heating for the static measuring elements. This heating is particularly effective against ice and snow in all climatic zones.
- The measuring principle allows very low starting values and high repeat accuracy.
- The compact sensor is easy to mount. Slight deviations from the vertical (pitch) can be neglected with this measuring principle.

Advantages of the sensor:

- Apart from the sensors for wind speed and direction the compact housing also contains built-in sensors for air temperature, relative humidity, and barometric pressure.
- Exclusion of faulty measured values by an integrated self-test function (Built-In-Test-Equipment = BITE). The plausibility of the measured values is checked for each measurement and error messages are sent if necessary.
- The compact design of this sensor with five meteorological parameters is eliminating the traditional cabling and installation work significantly. Distribution boxes, power supply units, and other accessories can be reduced to a minimum expense.

2 Setting to work

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 installed. We therefore recommend selecting the place of installation very carefully.

2.1 Installation conditions

2.1.1 General

For professional wind measurements according to meteorological standards (e. g. VDI 3786, Part 2) location and height of the wind sensor are important for representative and accurate results. 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. To obtain results which are representative for a wider area and comparable to values measured at different places, the sensor must not be mounted under the lee of higher obstacles. The distance to any obstacle should be at least 10 times the obstacle‘s height (corresponding to the definition of an **undisturbed area**). In general a measuring height of 10 m above ground is regarded ideal.

If an **undisturbed area** of this kind does not exist the sensor have to be put up at an height of at least 6 m above the obstacle height.

If the above mentioned requirements are not feasible e. g. on mobile measurements at vehicles or at measuring containers compromises have to be found and documented.

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, it is recommended to mount both sensors at the same spot, where any interaction between the sensors should be avoided. The sensor u[sonic]WS6-NAV easily meets this requirement.

The place of installation should not be in the operation fields of radar devices (radar scanners or radar transmitters), generators, or antennas. We recommend a minimum distance of 2 m to these installations. Furthermore a minimum distance of 5 m to MF-/ HF- and Satcom- (e. g. Inmatsat, VSat) antennas has to be kept. The maximum electric field intensity may not exceed 10 V/m (tested according to EMC standard). When indicated a greater distance should be kept.

To avoid any measurement errors caused by heat sources - such as hot or warm exhaust gases, hot surfaces - in the direct vicinity of the sensor, the installation site should be selected accordingly

2.2 Tools and installation material

There are no special tools or materials required for the installation works. All work can be carried out with standard tools available in a regular workshop.

2.3 Unpacking the sensor

The sensor is packed in a separate box, carefully protected against mechanical influences during transport.

Please verify that the following parts and documents are enclosed:

- Sensor u[sonic]WS6-NAV
- User manual
- Accessories: (depending on order size, packed separately)
  Connecting cable with plug and core cable ends

2.4 Incoming inspection

Please check the scope of delivery for completeness and possible transport damage. Please report any complaints immediately in writing.

2.5 Power supply

The sensor requires at the input connector a 24 VDC nominal power source for operation. The sensor heating has to be supplied with 24 VDC and has a power consumption of 60 W (max. 2.5 A).

2.6 Installation procedure (short instruction)

The sensor is installed in three steps:

1. Mounting the cable at the sensor and if necessary draw the cable through the mast.
2. Mounting the sensor at the mast; but before tightening the screws you must align the sensor to the north.
3. Attaching the cable to the power supply and the signal acquisition system.

2.7 Mounting

The sensor can be installed on a standard pipe with an outer diameter of 50 mm and an inner diameter of maximum 40 mm. Before tightening the two M8x12 grub screws and attaching the sensor you have to draw the cable through the pipe and align the sensor into driving direction.

For this purpose the housing is marked accordingly (see drawing). Before the screws of the sensor are tightened, the sensor is adjusted to north. Please pay attention to a firm mounting of the sensor at the mast! In addition, the sensor has a pin for the north direction. You can put this pin into the nick at the mast (if available). If needed you can turn in or unscrew the pin by means of Allen key.

2.7.1 North alignment of wind sensor

For wind direction measurements the north mark on the sensor must be aligned with the geographical north direction.

To adjust the wind sensor in a firm and correct manner into the north direction 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 (if available). Thus the sensor is safely attached. If needed you can turn in or unscrew the pin by means of in-hex wrench.

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.

Compass declination has to be considered.

To align the sensor ahead (on ships) locate a point outside the ship in the landscape which is located in the ship ahead direction respectively in the centre line or in case of the sensor is mounted far away from the middle line a line parallel to the centre line. Once the sensor is adjusted, it can be fixed with the two grup screws. Finally the earth screw has to be connected to the ship's ground. Acid-free contact grease is recommended to protect contact surfaces against corrosion.

Follow all safety instructions while setting up the sensor onto a mast.

2.7.2 Power and signal connection

The u[sonic]WS6-NAV sensor requires a 12-pole bayonet plug connector. The cable shield should be connected with both ends at the ground wire (PE).

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

The external connection is made by using a central connector located in the base of the device. For further details about electrical connection please see chapter „Connecting diagrams“.

If the sensor is mounted in correct manner and connected with the right cable (accessory), you can attach the wires to power supply and signal outputs to data acquisition equipment (computer). The typical power supply requirements of the weather sensor u[sonic]WS6-NAV sensor are 24 Volts with a maximum current drain of 50 mA. The input range is max. 6... 60 VDC. The heating of the u[sonic]WS6-NAV is to supplied with 24 VDC and has a heating power of 60 W (max. 2.5 A).

The serial digital output of the sensor uses differential line drivers with high common mode noise rejection. The signal levels and timings conform to the requirements of EIA/RS-422 / Talker. The line drivers are capable of transmitting data over cable lengths up to 1,220 meters (4,000 feet). This maximum distance will vary depending upon the operational environment, the wire gauge used, and the baud rate of the attached devices. When the power supply of the sensor is switched on, the sensor cyclically starts sending data protocols after approx. six seconds.

For use in environments with high electromagnetic interference (e.g. caused by motors/generators, frequency converters, or high-voltage power lines), the use of a galvanically isolated DC/DC converter (24 V DC → 24 V DC)* in combination with the u[sonic]WS6-NAV is recommended in order to further ensure interference-free operation of the u[sonic]WS6-NAV.

*) **Note:** As an example reference, a galvanically isolated DC/DC converter from a third-party manufacturer may be used, e.g. **Orion-Tr Smart 24/24-12 by Victron Energy (MPN ORI242428120)**.

The product reference is provided for information purposes only and does not constitute an approval, recommendation, or warranty. The selection, suitability assessment, and responsibility for the use of the third-party product rest solely with the user.

2.7.3 Safety regulations

Because the wind sensor often is mounted on exposed locations in dangerous heights the installation personnel has to pay attention to the relevant safety regulations for such works. During the electrical installation and termination works the external circuit-breaker must be switched off. It is not permitted to open those housings by unauthorized persons!

The warranty for the device is excluded if damage occurs due to improper handling. This particularly includes the absence of proper grounding. Correct grounding according to DIN VDI/VDE 0100 is essential for the safety and functionality of the device. If you have any questions regarding installation, please contact us.

3 Maintenance

3.1 Regular maintenance and calibration

The sensor u[sonic]WS6-NAV is service reduced and designed for a very long lifetime. Recommended is a regular visual check regarding dirt of surface caused by the weather and if so, to clean up.

If reference measurements should be necessary stringently must be noted that a comparability of the measured values is given only if the measurements take place under same conditions. I.e. the reference equipment must be used very close to the sensor!

The sensor is a measuring instrument and thus apply user specific standards regarding period of recalibration. Recommendation: 2 years. We recommend to have the filter cap of the humidity-temperature sensor every two years exchanged in our plant. Depending on the application shorter maintenance cycles could be necessary.

3.2 Visual check and cleaning

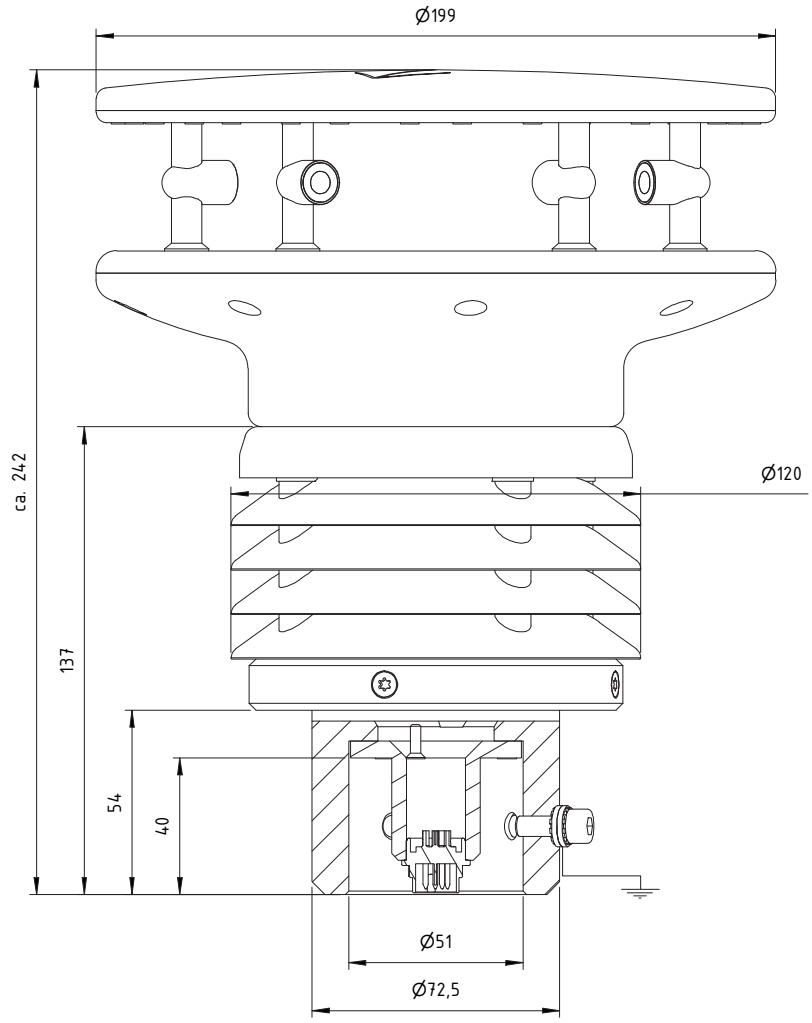
The use of the sensor under the respective environmental conditions requires certain steps. It is thus recommendable to clean the outside of the housing and shelter within specific intervals. The intervals are dependant on the environmental conditions and the degree of soiling. We recommend a regular sight and functional check. In case you should be faced with any specific problems please contact the LAMBRECHT meteo service under:

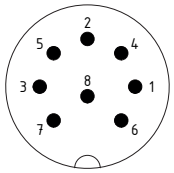
Tel.: +49 551 4958-0

4 Transports

In case the sensor is to be shipped or transported by you, it must be packed securely to avoid mechanical impacts or other damages.

5 Dimensional drawing and electrical connection - Sensor with M16 plug (ID 00.16480.100000)



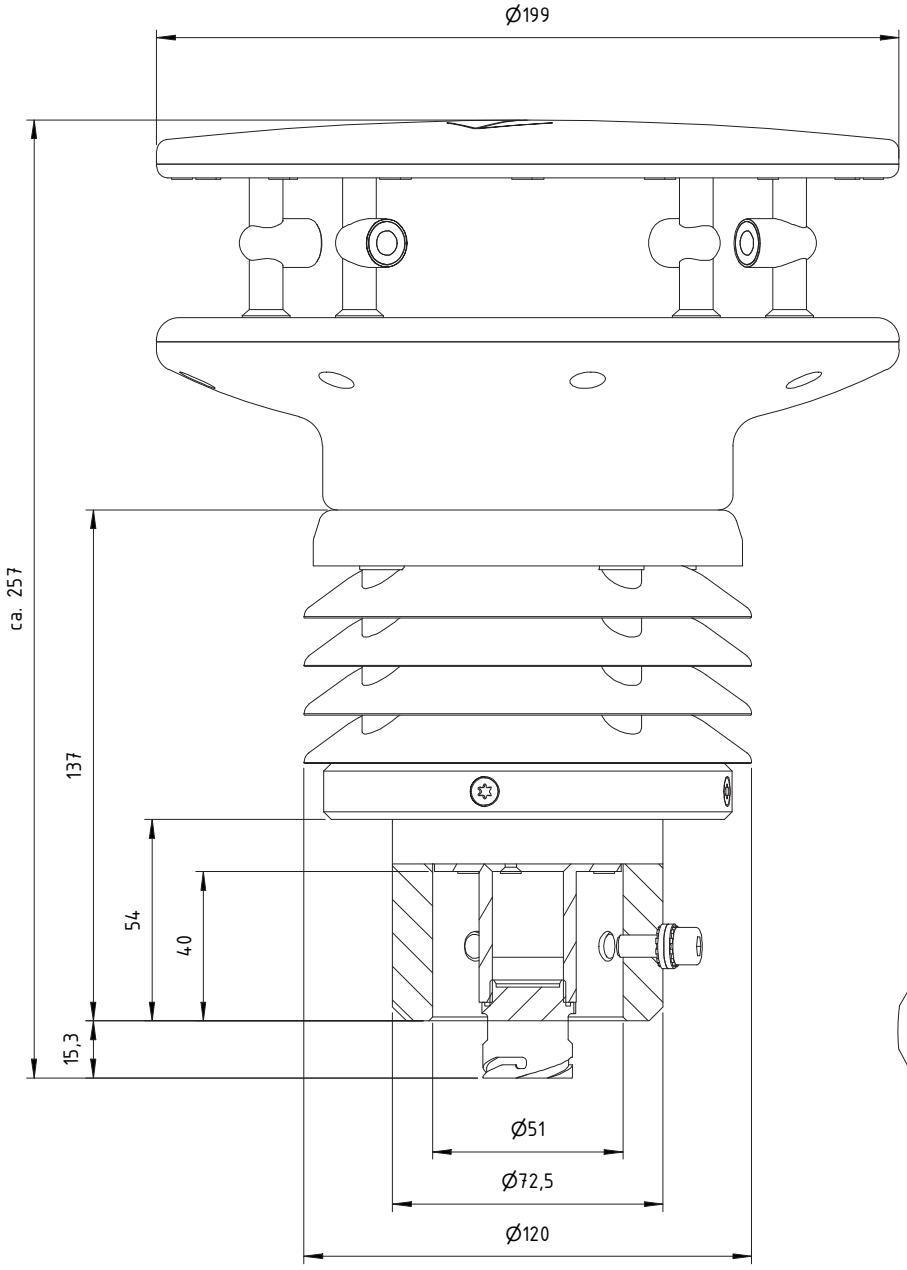


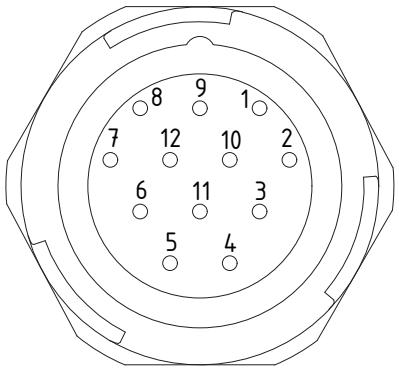
Ansicht Steckerseite
view male side

Stecker Pinbelegung			
Pin	Pinbelegung RS 485	Pinbelegung SDI-12	Kabelfarbe 32.16470.060000
1	n.c.	n.c.	schwarz
2	Data -	SDI-12 Data	braun
3	Heizungs-Steuerung (konfigurierbar)	Heizungs-Steuerung (konfigurierbar)	rot
4	n.c.	n.c.	orange
5	Data +	SDI-12 GND	gelb
6	n.c.	n.c.	grün
7	+ 24V AC/DC nominal	+ 24V AC/DC nominal	blau
8	- 24V AC/DC nominal	- 24V AC/DC nominal	lila

Male side pin assignment			
Pin	Pin assignment RS 485	Pin assignment SDI-12	Cable color 32.16470.060000
1	n.c.	n.c.	black
2	Data -	SDI-12 Data	brown
3	Heating Control (configurable)	Heating Control (configurable)	red
4	n.c.	n.c.	orange
5	Data +	SDI-12 GND	yellow
6	n.c.	n.c.	green
7	+ 24V AC/DC nominal	+ 24V AC/DC nominal	blue
8	- 24V AC/DC nominal	- 24V AC/DC nominal	violet

6 Dimensional drawing and electrical connection - Sensor with bayonet plug (ID 00.16480.100200)





Ansicht Steckerseite
view male side

00.16480.100200		
Pin	Pin assignment RS 422	Cable color 32.16420.066100
1	+ 24 VDC	black
2	- 24 VDC	brown
3	+ TXD	red
4	- TXD	orange

7 Data protocols

WIND DIRECTION AND WIND SPEED

Example of data sequence with comma separated fields: $WIMWV,357.0,R,5.2,M,A*CS<CR><LF>

field delimiter: , (comma)
header: $WIMWV
wind direction: 0.0...360.0
R: relative wind direction
wind speed: 0.1...85.0
M metric units m/s
status A (valid) / V (not valid)
stop delimiters: <CR><LF>
error code: WD 999.9
error code: WS 999.9

MESSAGE STRING WIMTA AIR TEMPERATURE

Example of data sequence with comma separated fields: $WIMTA,-25.0,C*CS<CR><LF>
field delimiter: , (comma)
header: $WIMTA
temperature: -40.0...+70.0
C: °C
stop limiters: <CR><LF>
error code: 999.9

MESSAGE STRING WIMHU RELATIVE HUMIDITY

Example of data sequence with comma separated fields: $WIMHU,100.0,,-40.0,C*CS<CR><LF>
field delimiter: , (comma)
header: $WIMHU
rel. humidity: 000.0...100.0
dew point temp.: -40.0...+70.0
C: °C
stop limiters: <CR><LF>
error code: 999.9

MESSAGE STRING WIMMB BAROMETRIC PRESSURE

Example of data sequence with comma separated fields: $WIMMB,,,1050.0,B*CS<CR><LF>
field delimiter: , (comma)
header: $WIMMB
barometric pressure: 600.0...1100.0
B: air pressure in hPa
stop limiters: <CR><LF>
error code: 9999.9

IMPORTANT! PLEASE NOTE:

FIELDLENGTH

The development of a NMEA decoder should not be proceeded from firm field lengths. The NMEA definition proceeds from a variable field length. The comma character (“,”) serves as field disconnecting switch. Numeric values in a field can be presented differently. In case a field is not sent, it has a length of 0 characters (,,) [comma-comma].

CHECKSUM

The check sum “CS” is covered to two ASCII characters hexadecimal value. “CS” calculated by XOR operation of each character in the sentence between “$” and “*”, but excluding “$” and “*”.

ERROR CODE

In case, that the sensor cannot generate a measuring value because e.g. a sensor element is defect or implausible (raw) values are collected the sensor outputs in the corresponding data protocol the above mentioned error code (e.g. 999.9) and sets the status from “A” (valid) to “V” (not valid).

Example: $WIMWV,999.9,R,999.9,M,V*37<CR><LF>

SPECIAL FEATURE WIND DIRECTION VALUE

Theoretically the value for the wind direction can take any value between 0.0° and 360.0°. It should be noted, that in a full circle the values “0.0” and “360.0” are describing the same direction. According to the international valid recommendations of the WMO (World Meteorological Organization) in the “Guide to Meteorological Instruments and Methods of Observation” (WMO No.8) the wind direction value 0.0° just has to be output at calm. The u[sonic]WS6-NAV follows the recommendation of the WMO and outputs at wind from the north the value “360.0” respectively “0.0” at calm (lull).

8 Modbus protocol

8.1 General

The LAMBRECHT meteo Modbus sensors follow the specification of the Modbus organization: “MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3” (see www.modbus.org).

8.2 Data encoding

Modbus uses the “Big-Endian” format for addresses and data. This means that if a value is transmitted with a number format which is larger than a single byte, that the “most significant byte” is sent first.

Example Big-Endian:

Register size value 16 - bits

0x1234 is transmitted in the sequence: 0x12 0x34.

To obtain the real measuring value, divide the received register value by the divisor.

Values of -9999 indicate an internal sensor error.

8.3 Standard configuration (default)

Baud rate: 19200 Baud

Byte frame: 8E1 (1 start bit, 8 data bits, 1 parity bit (even parity), 1 stop bit)

RTU Sensor address: 5

DEFAULT ADDRESSES OF THE LAMBRECHT METEO SENSORS:

Address	Sensor
1	Wind speed
2	Wind direction
3	Precipitation rain[e]
4	THP
5	EOLOS-IND; u[sonic]WS6; u[sonic]WS6-NAV
6	com[b]
7	PREOS
8	ARCO
9	u[sonic]
10	Pyranometer 2nd Class
11	Secondary standard Pyranometer
12	PT100 to Modbus converter (temperature)
13	u[sonic]WS7

8.4 Available Modbus commands

The LAMBRECHT meteo Modbus sensors support the following commands:

- "Read Holding Register" command: 0x03 (descriptive sensor data registers)
- "Read Input Register" command: 0x04 (measured values registers)
  (every measured value is to be requested individually)
- "Write Multiple Register" command: 0x10 (Write to configuration registers)

8.5 Instantaneous values / real-time values (input register)

The following measured values are provided by the LAMBRECHT meteo sensors.

Register address	Parameter name	Unit	Divisor	Quantity of registers	Access type
30001	Wind speed	m/s	10	1	Read only
30201	Wind direction	°	10	1	Read only
30401	Air temperature	°C	10	1	Read only
30601	Relative humidity	% r. h.	10	1	Read only
30701	Dew point	°C	10	1	Read only
30801	Air pressure	hPa	10		Read only

Example: Retrieving the wind speed

0D	04	75	31	00	01	7A	C5	0D	04	02	00	1F	E8	F9

LEN 6	Transmission Query =>	Source Master	Dest Slave 13	Function Read Input Register (4)	Func Desk Address=30001, Quantity of Register=1	Checksum OK:C57A

LEN 5	Transmission Response <=	Source Slave 13	Dest Master	Function Read Input Register (4)	Func Desk Byte count=2	Data 00 1F	Checksum OK:F9E8

8.6 Period values; average, maximum, and minimum (input register)

Register	Parameter name	Unit	Divisor	Quantity of registers	Access type
30002	Wind speed average	m/s	10	1	Read only
30003	Wind speed maximum	m/s	10	1	Read only
30004	Wind speed minimum	m/s	10	1	Read only
30202	Wind direction average	°	10	1	Read only
30203	Wind direction maximum	°	10	1	Read only
30204	Wind direction minimum	°	10	1	Read only
30402	Air temperature average	°C	10	1	Read only
30403	Air temperature maximum	°C	10	1	Read only
30404	Air temperature minimum	°C	10	1	Read only
30602	Relative humidity average	% r. h.	10	1	Read only
30603	Relative humidity maximum	% r. h.	10	1	Read only
30604	Relative humidity minimum	% r. h.	10	1	Read only
30702	Dew point average	°C	10	1	Read only
30703	Dew point maximum	°C	10	1	Read only
30704	Dew point minimum	° C	10	1	Read only
30802	Air pressure average	hPa	10	1	Read only
30803	Air pressure maximum	hPa	10	1	Read only
30804	Air pressure minimum	hPa	10	1	Read only

The data are valid for the period between the current request and the previous request. The maximum range of a period is 1 hour. Recalling the average value of a minimum, maximum and average group will erase the appropriate registers. Retrieve the values of a group in the sequence minimum, maximum, average.

Use command: 0x03

Example: Retrieve wind speed (min. max. avr.) and erase the register content

01	04	75	34	00	01	6A	08	01	04	02	00	00	B9	30	01
04	75	33	00	01	DB	C9	01	04	02	00	D6	38	AE	01	04
75	32	00	01	8A	09	01	04	02	00	14	B9	3F			

LEN 5	Transmission Response <=	Source Slave 1	Dest Master	Function Read Input Register (4)	Func Desk Byte count=2	Data 00 00	Checksum OK:30B9
LEN 6	Transmission Query =>	Source Master	Dest Slave 1	Function Read Input Register (4)	Func Desk Address=30003, Quantity of Register=1		Checksum OK:C9DB
LEN 5	Transmission Response <=	Source Slave 1	Dest Master	Function Read Input Register (4)	Func Desk Byte count=2	Data 00 D6	Checksum OK:AE38
LEN 6	Transmission Query =>	Source Master	Dest Slave 1	Function Read Input Register (4)	Func Desk Address=30002, Quantity of Register=1		Checksum OK:98A
LEN 5	Transmission Response <=	Source Slave 1	Dest Master	Function Read Input Register (4)	Func Desk Byte count=2	Data 00 14	Checksum OK:3FB9

8.7 Descriptive sensor parameter registers (Holding Register)

Register	Parameter name	Quantity of registers	Remark	Access type
40050	Device identification number (15 characters)	8 (2 characters in each register)	The returned data are in form of a 16 byte null terminated string	Read only
40100	Serial number (11 characters)	6 (2 characters in each register)	The returned data are in form of a 12 byte null terminated string	Read only
40150	Firmware version (up to 25 characters)	13 (2 characters in each register)	The returned data are in form of a 26 byte null terminated string	Read only

Example: Retrieve the device identification number
(The identification number shown in the example is sensor-dependent. It is only used here for demonstration purposes).

0D	03	9C	72	00	08	CA	8B	0D	03	10	30	30	2E	31	36	□□□□□□□□□□□□□□□□
34	38	30	2E	30	30	31	31	33	30	00	E8	6B				00.16480.000130□□□

LEN 6	Transmission Query =>	Source Master	Dest Slave 13	Function Read Holding Register (3)	Func Desk Address=40050, Quantity of Register=8	Checksum OK:8BCA

LEN 19	Transmission Response <=	Source Slave 13	Dest Master	Function Read Holding Register (3)	Func Desk Byte count=16	Data 30 30 2E 31 36 34 38 30 2E 30 30 31 31 33 30 00	Checksum OK:6BE8

8.8 Configuration register (holding register)

Register	Parameter name	Allowed values	Quantity of registers	Access type
40001	Modbus device address		1	Write only
40200	Baud rate	96 = 9600 192 = 19200 384 = 38400	1	Write only
40201	Parity	1 = even 0 = none	1	Write only

The device must be restarted after each change of a setting!

Example: Changing the RTU address from 4 to 1

05	10	9C	41	00	01	02	00	01	06	48	05	10	9C	41	00
01	7E	09													

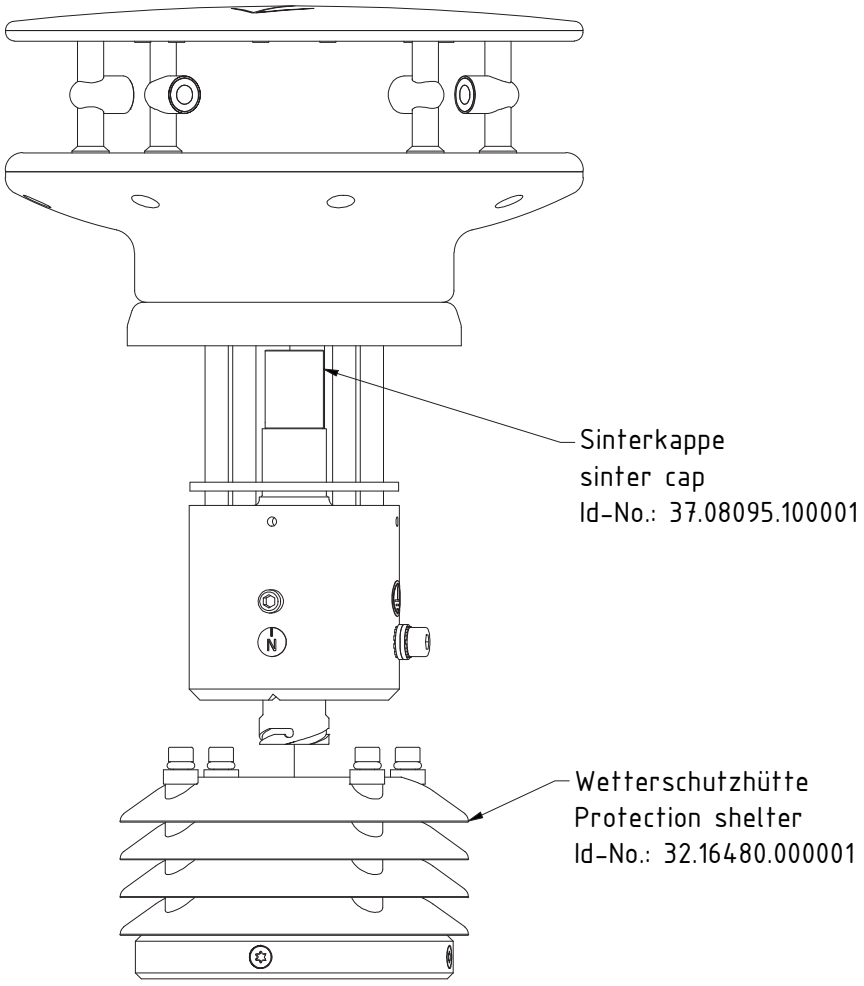
LEN 9	Transmission Query =>	Source Master	Dest Slave 5	Function Write Multiple Register (16)	Func Desk Address=40001, Quantity=1	Byte count 2	Register values 00 01	Checksum OK:4806

LEN 6	Transmission Response <=	Source Slave 5	Dest Master	Function Write Multiple Register (16)	Func Desk Address=40001, Quantity=1	Checksum OK:097E

8.9 Autoconfiguration

All LAMBRECHT Modbus sensors offer the experienced user the possibility to implement an auto-configuration in his Modbus master based on additional information stored in the sensor. The necessary information can be found in the document “General instructions for LAMBRECHT meteo Modbus sensors”.

9 Illustrated parts overview



10 Disassembly and assembly of the lower sensor part

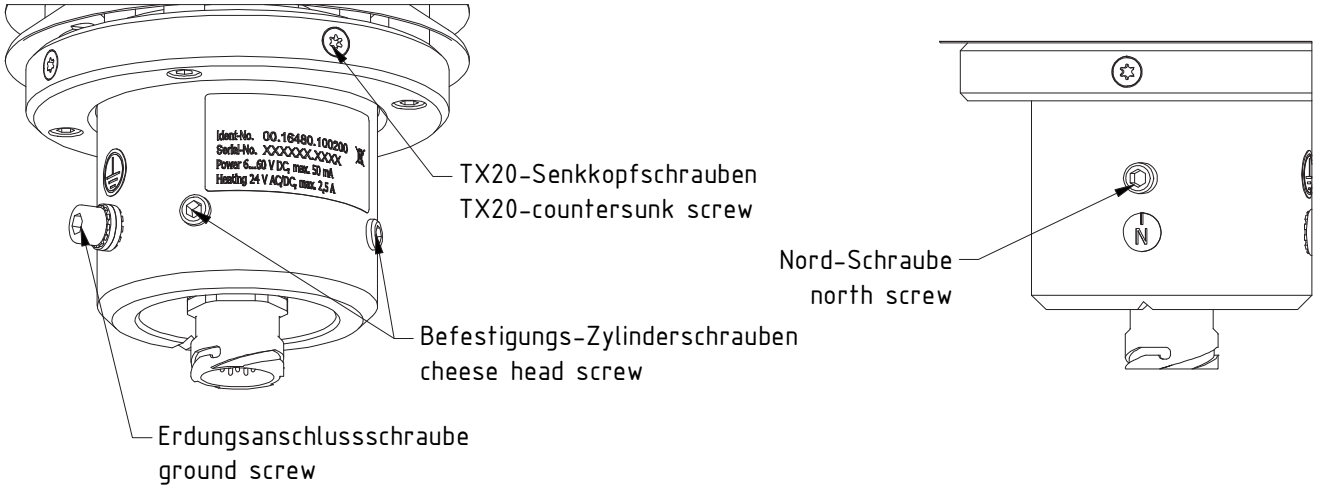
To get access to the sensor elements for temperature, relative humidity, and air pressure the protection shelter with the lamellas has to be dismantled.

TOOLS AND DEVICES

- Hexagon wrench 1.5
- Allen wrench 4.0
- Allen wrench 5.0
- Torx wrench with TX20 drive
- LOCTITE mounting adhesive No. 274

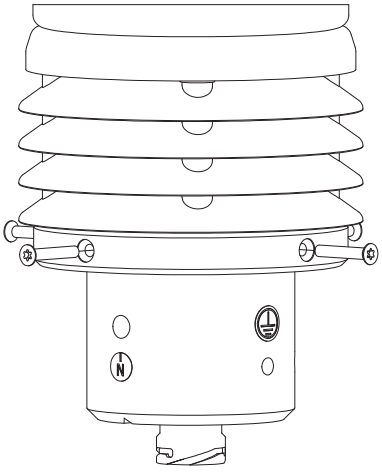
DISMANTLING OF THE SENSOR SHELTER

- Remove the ground connection screw with an Allen key 5.0.

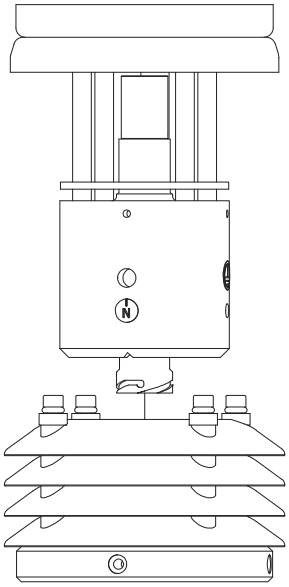


- Unscrew the cheese head screws and the north screws with an hex wrench 4.0 or screw them in so far that they no longer protrude from the sensor foot.

- Unscrew the 4 countersunk screws from the lower ring of the protection shelter with torx wrench TX20.

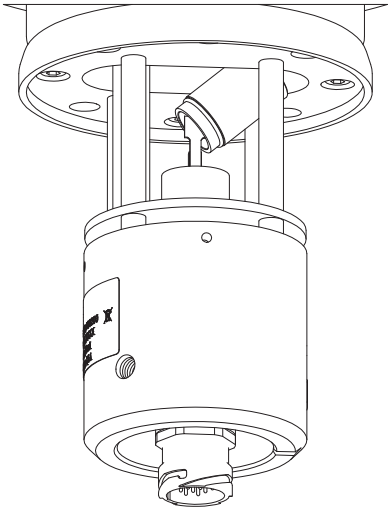


- Carefully slide the sensor shelter down and remove it.

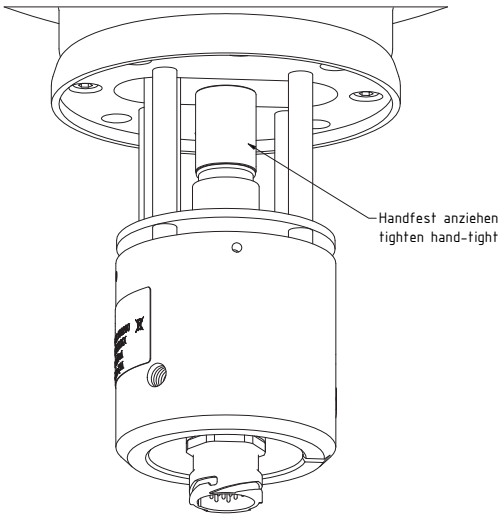


DISASSEMBLY OF THE SINTER CAP

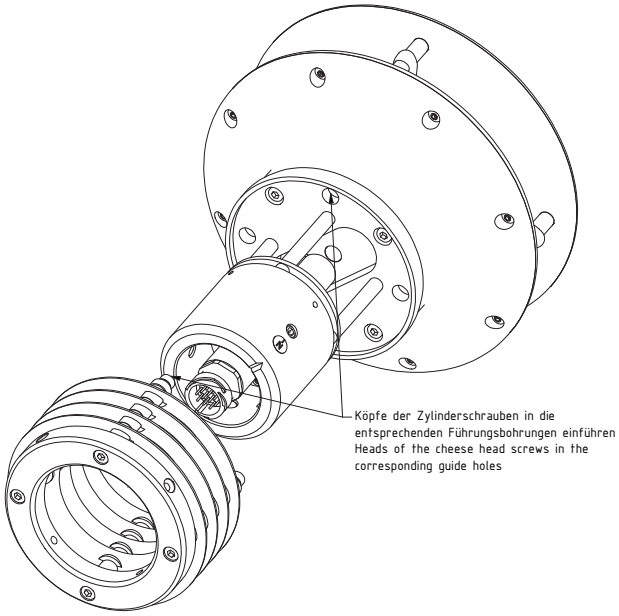
- Afterwards, the sinter cap of the weather module can be cleaned. For this, carefully unscrew the sinter cap from the weather module. The sinter cap can be cleaned in an ultrasonic bath or with water and a light detergent. After cleaning, the sinter cap must be rinsed with clear water.



- Before the sinter cap is screwed back onto the weather module, it must be completely dry. We recommend working with a second sinter cap to avoid leaving the weather module unprotected for too long.



- Push the protection shelter from downwards onto the sensor. Please note that the upper heads of the cylindrical head screws are fixed in the appropriate pilot holes.
- Fix the protection shelters with four TX20 countersunk screws.
- Screw the mounting set screws and the north screw as far as the sensor can be placed on the mast.
- Fix the earthing screws.



11 Disposal

LAMBRECHT meteo GmbH is listed and registered at the Stiftung Elektro-Altgeräte Register ear under:

WEEE-Reg.-Nr. DE 45445814

In the category of monitoring and control instruments, device type: “Monitoring and control instruments for exclusively commercial use”.

Within the EU

The device has to be disposed according to the European Directives 2002/96/EC and 2003/108/EC (Waste Electrical and Electronic Equipment). Do not dispose the old device in the household waste! For an environmentally friendly recycling and disposal of your old device, contact a certified disposal company for electronic waste.

Outside the EU

Please follow the regulations in your country regarding the appropriate disposal of waste electronic equipment.

12 Technical data

Weather Sensor u[sonic]WS6-NAV	
ID	00.16480.100000 (painted RAL 9003; with M16 plug)
ID	00.16480.100200 (painted RAL 9003; with bayonet plug)
Range of application	-40...+70 °C (-50...+70 °C heated); 0...100 % r. h.
Parameters	
Wind direction	
Measuring principle	Ultrasonic
Measuring range	0...359.9°
Accuracy	< 2° (> 1 m/s) RMSE
Resolution	0.1°
Wind speed	
Measuring principle	Ultrasonic
Measuring range	0...65 m/s
Accuracy	0.2 m/s RMSE (v < 10 m/s); 2 % RMSE (10 m/s < v < 65 m/s)
Resolution	0.1 m/s
Air temperature	
Measuring principle	Digital temperature sensor
Measuring range	-40...+70 °C
Accuracy	0.1 K (0...60 °C) [1]; 0.2 K (-40...0 °C) [1]
Resolution	0.1 °C
Relative humidity	
Measuring principle	Capacitive, digital
Measuring range	0...100 % r. h.
Accuracy	Typically 1.5 % (0...80 %) r. h. [2][3]; 2 % (> 80 %) r. h.
Resolution	0.1 % r. h.
Barometric pressure	
Measuring principle	Piezoresistive
Measuring range	300...1100 mbar
Accuracy	0.5 mbar (at 20 °C)
Resolution	0.1 mbar
Dew point temperature	
Measuring principle	Passive, calculated from air temperature and air humidity
Measuring range	-40...+70 °C
Resolution	0.1 °C

Weather Sensor u[sonic]WS6-NAV	
Trigger threshold	0.1 m/s
Interface	RS-485 (in RS-422 compatibility mode)
Protocols	NMEA 0183 (other protocols on request)
Measuring rate	0.1...10 Hz
Supply voltage	Without heating: 6...60 VDC; with heating: 24 VAC/DC ± 20 %
Current consumption	Sensor: typically 50 mA at 24 VDC; with heating: max. 10 A at 24 VAC/DC
Heating data for sensor with M16 plug (00.16480.100000)	60 W; 120 W; 240 W (standard); factory configurable
Heating data for sensor with bayonet plug (00.16480.100200)	60 W; factory deactivatable
Dimensions	See dimensional drawing
Housing	Seawater resistant aluminum
Protection class	IP 66; IP 67
Weight	Approx. 3.1 kg
Standards	
General	• Low voltage guide line: 72/23 EWG • Protection class: DIN EN 60529 • MIL-STD-810G • DIN EN 50121-4:2016 • Salt fog: EN 60945 • IEC 61724-1 • Cold test Ad acc. to DIN EN 60068-2-1 (01/2008) • Condensation test CH acc. to ISO 6270-2 (09/2005) and DIN EN ISO 12944-6 (07/1998), category C4 • Salt mist test based on DIN EN ISO 7253 (04/2002) and DIN EN ISO 12944-6 (07/1998), category C4
EMC standards / Electrical safety	• DIN EN 60945; DIN EN 61000-4-2, 3, 4, 6, 11
Accessories (please order separately)	
ID 32.16470.060000	Sensor cable; 15 m; 8-pole M16 connector (for ID 00.16480.100000)
ID 32.16420.066100	Sensor cable; 10 m; 12-pole bayonet plug (for ID 00.16480.100200)

[1] Temperature influence of the shelter: accuracy +1.5 °C at v < 2 m/s and intensive solar radiation
[2] Temperature influence of the shelter: ± < 0.1 % r.h. at +10...+40 °C
[3] Shelter inaccuracy: < 4 % r.h. dependant on v > 2 m/s and solar radiation

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