USER MANUAL

IceLoad Sensor

Measures the ice load up to 20 kg

aem | LAMBRECHT meteo

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1. Safety instructions

This system is designed according to the state-of-the-art accepted safety regulations. However, please note the following rules:

- Before putting into operation please read all respective manuals!
- Please observe all internal and state-specific guidelines and/or rules for the prevention of accidents. If necessary ask your responsible safety representative.
- Use the system only as described in the manual.
- Always have the manual at hand at the installation site.
- Use the system within the specified operating condition. Eliminate influences, which might impair the safety.
- Prevent the ingress of unwanted liquids into the devices.

2. Warranty

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.

3. What is the IceLoad Sensor?

Ice load refers to the additional burden caused by the accumulation of ice on a structure. The ice load can be significant and may lead to structural damage or even failure of the construction if it is not detected and addressed in a timely manner. Therefore, it is important to monitor the ice load to ensure the safety and integrity of the affected structures.

The LAMBRECHT IceLoad sensor is based on the gravimetric measuring principle (strain gauge) and is used to measure ice loads on structures such as overhead lines, wind turbines, or cable cars. The IceLoad Sensor has a maximum load capacity of 20 kg, which is measured by its ice load measuring rod.

4. The key benefits

- ISO 12494 standardized, meeting the European standard for accurate measurement of ice load
- Maximum accuracy and a wide measurement range in a compact, low-weight unit
- Full year-round functionality in an environmentally friendly package free from antifreeze

5. Scope of delivery

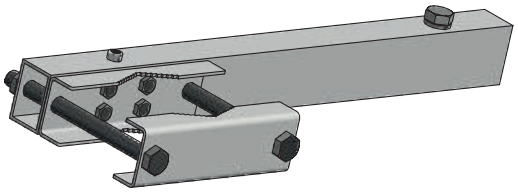
INCOMING GOODS INSPECTION

Please check the scope of delivery for completeness and any possible transport damage. Any complaints should be reported immediately in writing.

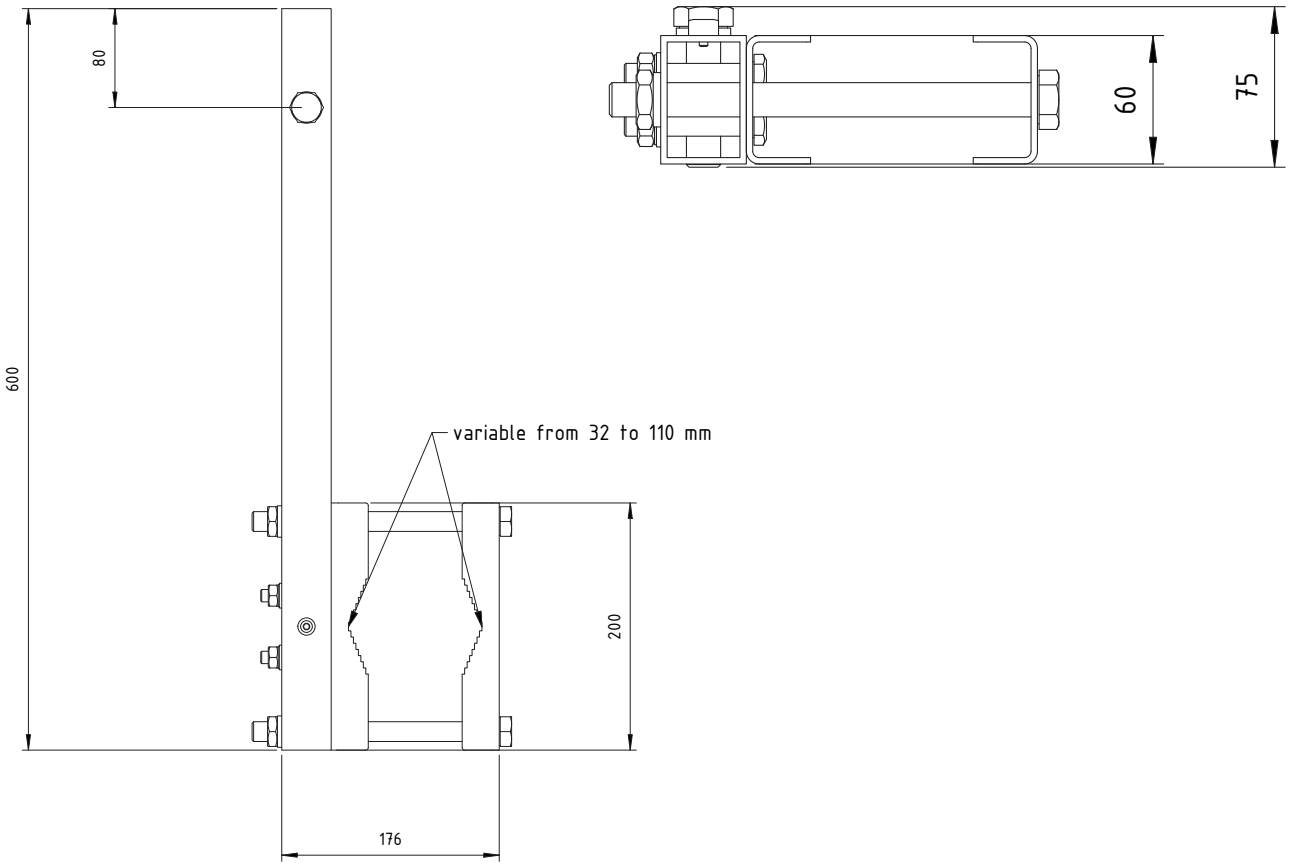
SCOPE OF DELIVERY

- 1 x IceLoad Sensor
- 1 x IceLoad Sensor tube (measuring rod)
- 1 x Fixing screw hexagonal; M16 x 1.5 x 30 DIN 961 A4
- 1 x Lock washer M16 A4
- 3 x TORX M4 x 8 TX20 ISO 14581 A4

ACCESSORIES (PLEASE ORDER SEPARATELY)

Id No.	Description
32.05108.301500	IceLoad connection cable (purple); (without fig.) Length = 15 m
32.15300.001000	Mast bracket IceLoad 

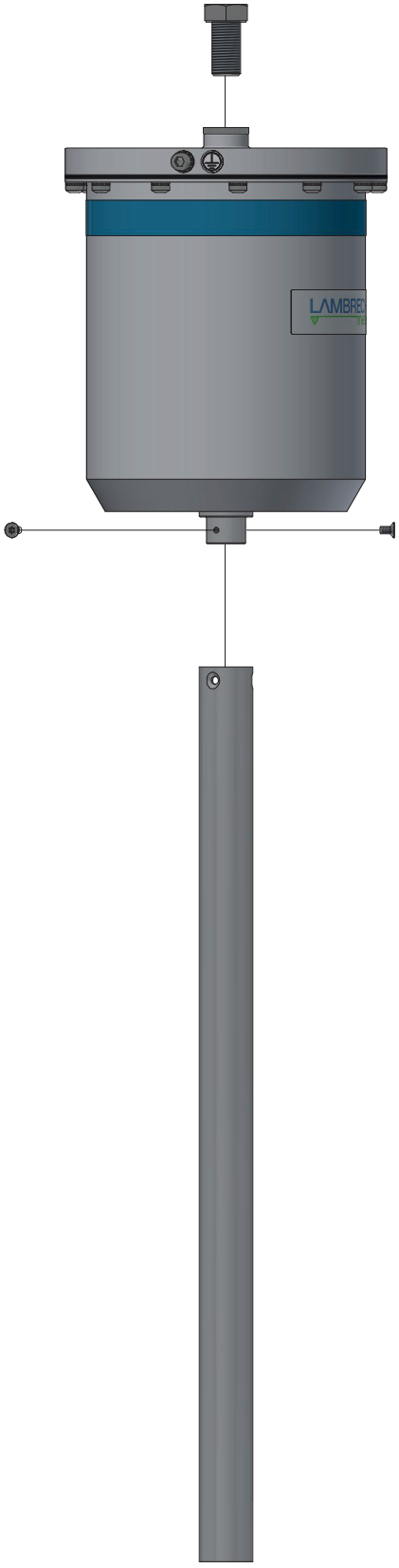
DRAWINGS OF MAST BRACKET ICELOAD



6. Installation

The sensor can be installed in just a few steps (see also drawing):

1. Mount the measuring rod on the sensor
2. Mount the sensor on the bracket
3. Connect the sensor cable
4. Tare the sensor



6.1. Mount the measuring rod on the sensor

The sensor is supplied with the measuring rod removed.
Attach the measuring rod to the sensor from below.

The sensor can simply be rotated to simplify installation of the measuring rod.

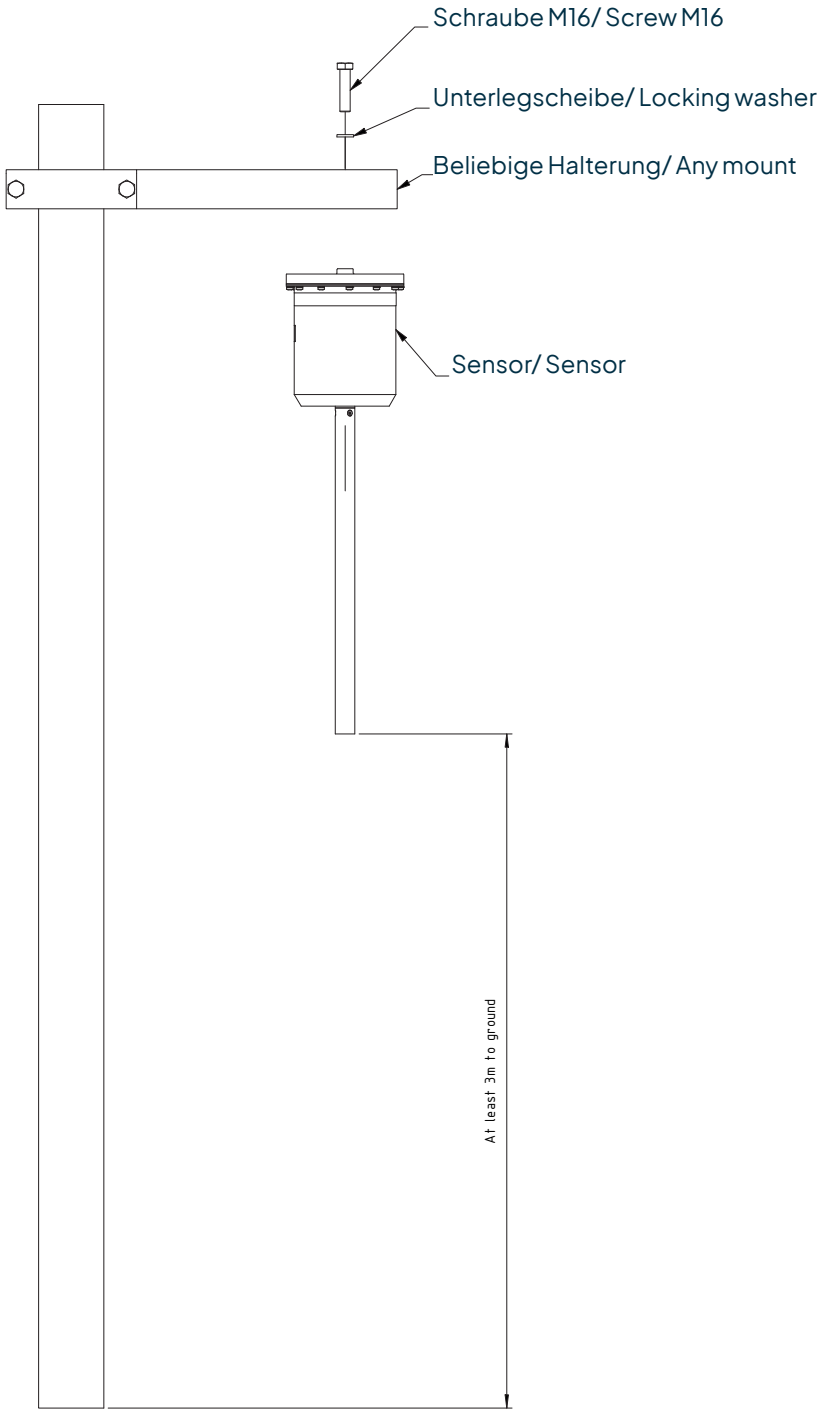
Fasten the measuring rod with the three enclosed TORX M4 x 8 TX20 ISO 14581 A4 screws.

6.2. Mount the sensor on the bracket

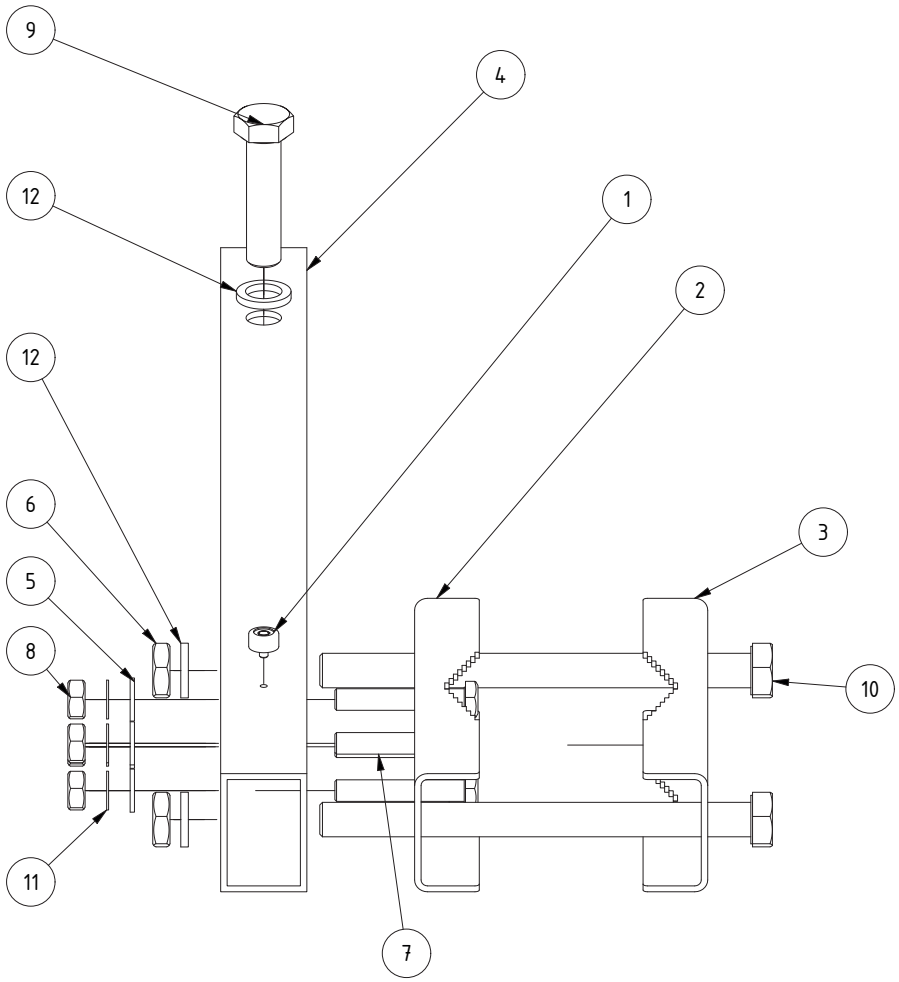
A bracket is not included in the scope of delivery and needs to be ordered separately if necessary (e.g. Id-No. 32.15300.001000 Mast bracket IceLoad).

The mast bracket 32.15300.001000 can be mounted on pipe diameters of up to 110 mm. A longer M16 screw is required for this bracket, which is included in the delivery of the mast bracket.

Example illustration (Note: bracket/traverse is not included in the scope of delivery!)



DRAWING OF THE MAST BRACKET WITH INDIVIDUAL PARTS



Pos.	Anzahl/ Quantity	ID	Benennung	Description
1	1	32.06540.005010	Libelle	Level indicator
2	1	33.15300.001001	Halteblech	Retaining plate
3	1	33.15300.001002	Halteblech_Klemm	Retaining plate_clamp
4	1	33.15300.001003	Vierkantrohr	Square tube
5	4	35.01252.101052	Unterlegscheibe 10,5 DIN ISO 7090	Washer 10.5 DIN ISO 7090
6	2	35.04035.600160	Sechskantmuttern, M16 ISO 4035 A4	Hexagon nuts, M16 ISO 4035 A4
7	4	35.09331.543800	Sechskantschraube M10 x 60 DIN 933 A4	Hexagon bolt M10 x 60 DIN 933 A4
8	4	35.09341.601000	Sechskantmutter M10 DIN 934 A4	Hexagon nut M10 DIN 934 A4
9	1	35.09611.300650	Sechskant. M16 x 1,5 x 65 DIN 961 A2	Hexagon. M16 x 1.5 x 65 DIN 961 A2
10	2	35.09611.302000	Sechskant. M16 x 200 DIN 933 A2	Hexagon. M16 x 200 DIN 933 A2
11	4	35.67981.501052	Fächerscheibe 10,5 DIN 6798 J A2	Serrated lock washer 10.5 DIN 6798 J A2
12	3	69.15300.000001	Heico Sicherungsscheibe M16 A4	Heico lock washer M16 A4

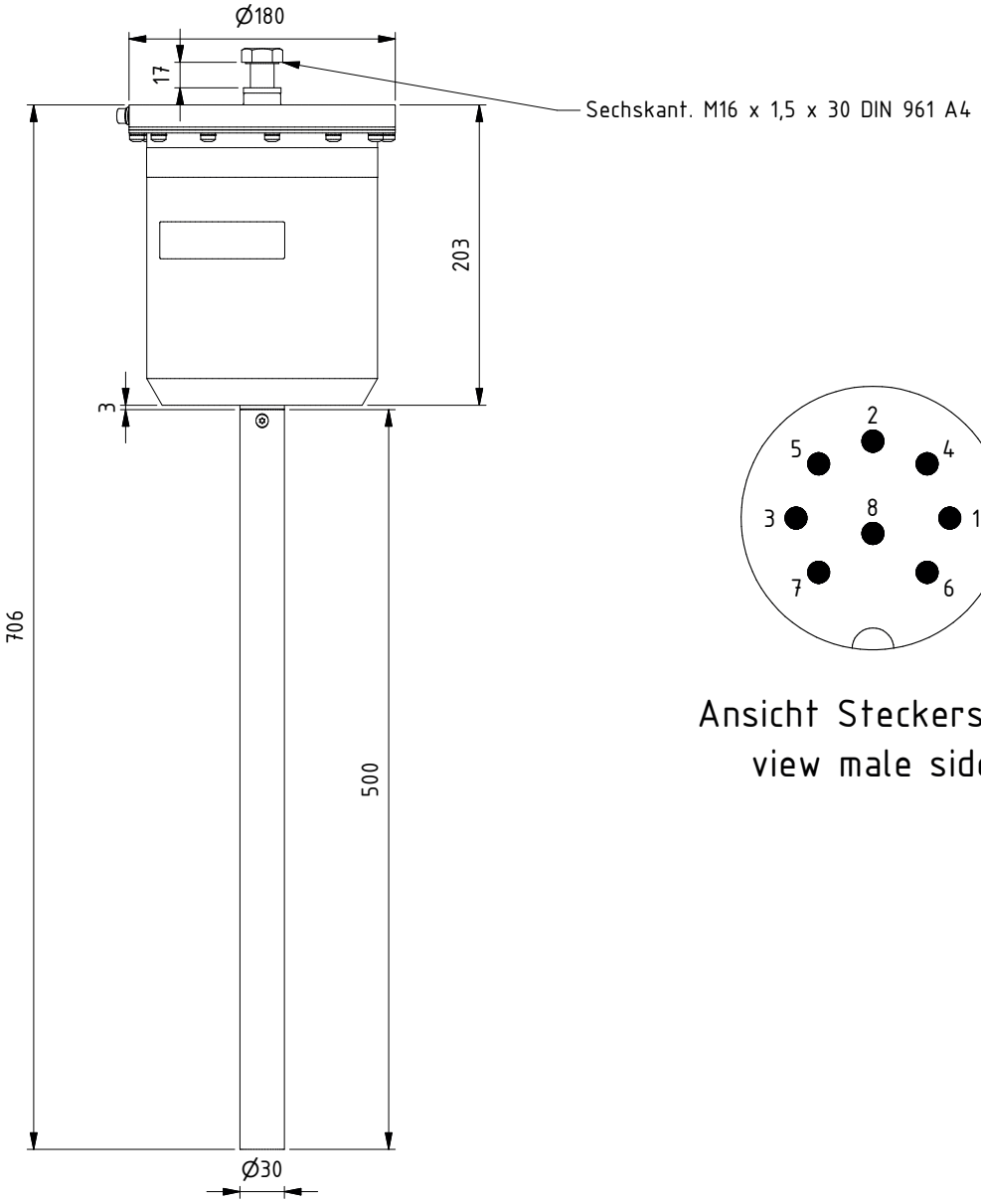
6.3. Connect the sensor cable

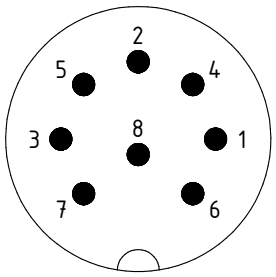
The sensor cable is not included in the scope of delivery and needs to be ordered separately (e.g. Id-No. 32.05108.301500 IceLoad connection cable (purple); length = 15 m).

The sensor cable is connected to the sensor from below (to ensure optimal protection against moisture) and routed upwards in a loop, where it is secured with suitable cable ties (not included).

The cable comes with an M16 connector (8-pole) on one end and open wires on the other end. The assignment of the connection wires can be found in the table “Pin assignment”.

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.





Ansicht Steckerseite
view male side

PIN ASSIGNMENT

Pin	Pin assignment RS 485 plug 32.15300.003000	Cable color 32.0518.301500	Cable color 32.16470.060000
coat color	-	purple	black
1	- 24 V DC nominal (sensor)	grey	black
2	Data-	brown	brown
3	+ IN / OUT analog reset	pink	red
4	+ 24 V DC nominal (sensor)	white	orange
5	Data+	yellow	yellow
6	- IN / OUT analog reset	green	green
7	+ 24 V DC nominal (heating)	blue	blue
8	- 24 V DC nominal (heating)	red	violet
Ground	connected with grounding shield	yellow/green	grounding shield

6.4. Tare the sensor

The sensor can be tared externally via the connection cable. For this purpose, the wires "+ IN/OUT analog reset" and "- IN/OUT analog reset" are connected to a terminal block. By opening and then closing the contact again, the sensor is tared.
In the case of maintenance, the sensor can be tared again if necessary after a visual inspection. However, regular taring is generally not required.

If the sensor is still iced up, we recommend that you do **not** tare the sensor.

7. Modbus protocol

The LAMBRECHT meteo Modbus sensors and the met[LOG] follow the specification of the Modbus organization: "MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1b3" (see www.modbus.org).

7.1. Data encoding

MODBUS uses the "big-endian" format for addresses and data. This means that if a value is transmitted with a number format that is larger than a single byte, the "most significant byte" is sent first. For values that go beyond one register (e.g. 32 bit) this is not clearly specified for the Modbus. In these cases (32 bit or 64 bit) the LAMBRECHT Modbus sensors follow the big-endian number format.

Example Big-Endian (1 register value):
16 - bit value

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

Example Big-Endian (2 register value):

32 - bit value

0x12345678 is transmitted in the sequence: 0x12 0x34 0x56 0x78.

To obtain the real measuring value, divide the received register value by the divisor.
Values of -9999 (16 bit value) or -9999999 (32 bit value) indicate an internal sensor error.

7.2. Standard configuration - Default

Baud rate: 19200 Baud

Address: Each sensor type (or family) has its own default address

DEVICE ADDRESS

Default device address: 14

Allowed addresses in Modbus are 1...247.

7.3. Modbus command set

The LAMBRECHT 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)

7.4. Measured value and parameter register LAMBRECHT sensors

The register range from 30001 to 35000 is designated for measurement values in the LAMBRECHT sensors. The following measurement values are provided by the IceLoad Sensor.

Modbus address IceLoad Sensor: 14

Register address	Parameter name	Unit	Factor	
32001	1 g	g	1	INT
31102	10 g	g	1	INT
31103-31104	Gross value		1000	LONG
34901	Status		1	INT
34921	Heating status		1	INT
34922	Temperature	°C	10	INT
34931	Heating power [%]	%	1	INT

7.4.1. Sensor status (Status)

The sensor status can be retrieved from register 34901. The returned numerical value must be interpreted in binary as follows.

Bit position	Status message
0	Max. heating temperature exceeded
1	Heating defective
2	N/A (Previously: 2nd non-installed temperature sensor defective - currently permanently suppressed in FW)
3	Temperature sensor defective
4-7	N/A

7.4.2. 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)

															ASCII
05	03	9C	72	00	08	CB	C3	05	03	10	30	30	2E	31	36	□□□□□□□□□□□□□□□□
34	38	30	2E	30	30	30	31	33	30	00	37	CA				00.16480.000130.□□

LEN 6	Transmission Query =>	Source Master	Dest Slave 5	Function Read Holding Register (3)	Func Desk Address=40050, Quantity of Register=8		Checksum OK:C3CB
LEN 19	Transmission Response <=	Source Slave 5	Dest Master	Function Read Holding Register (3)	Func Desk Byte count=16	Data 30 30 2E 31 36 34 38 30 2E 30 30 30 31 33 30 00	Checksum OK:CA37

7.4.3. Sensor parameters / Configuration parameters

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

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

Example: Change the RTU address from 3 to 1

03	10	9C	41	00	01	02	00	01	2D	E8	03	10	9C	41	00	01	7E	6F

LEN 9	Transmission Query =>	Source Master	Dest Slave 3	Function Write Multiple Register (16)	Func Desk Address=40001, Quantity=1	Byte count 2	Register values 00 01	Checksum OK:E82D

LEN 6	Transmission Response <=	Source Slave 3	Dest Master	Function Write Multiple Register (16)	Func Desk Address=40001, Quantity=1	Checksum OK:6F7E

8. Check and troubleshooting

Regular visual inspections for contamination and damage should be conducted, depending on the environment and seasonal influences.

9. Maintenance and repair

If you need assistance in resolving any potential issues, please contact the LAMBRECHT meteo service at:

Tel: **+49-(0)551-4958-0**

E-mail: **support-lambrecht@aem.eco**

10. Download of updates

On our website (https://www.lambrecht.net), the ***Free Software Tools & Firmware*** category can be found under ***Service*** in the ***Resources*** section. There you can easily download the latest firmware and software tools for your product and benefit from ongoing improvements and new features.

11. Technical data

COMPONENT	SPECIFICATION
Id-No.	00.15300.000030
Measuring principle	Gravimetric (DMS)
Measuring range	0...20 kg
Measurement accuracy	2 % at 1 kg ice load ≙ 20 g @ 1 kg
Measurement resolution	1 g
Signal output	Modbus RTU, RS-485
Operating conditions	-40...+70 °C (heated)
Supply	24 VDC, 3.34 A (80 W)
Dimensions	714 x 180 mm
Weight	3.3 kg
Standards	ISO 12494
Material housing	Seawater resistant aluminum

12. 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.

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