

Instruction for Use

021480/12/06

Wind Direction Transmitter „First Class“

Low Power Device with digital output, 8 Bit serial-synchronous

4.3150.x0.000



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1 Models available

Order- No.	Meas. range	Elect. Output	Supply	Heating
4.3150.00.000	0...360°	digital: 8 bit serial-synchron.	3,3V...42V DC	yes 24 V AC/DC
4.3150.10.000	0...360°	digital: 8 bit serial-synchron	3,3V...42V DC	no

2 Application

The wind direction transmitter serves for the detection of the horizontal wind direction in the field of meteorology and the technology of environmental protection.

Special characteristics:

- High level of measuring accuracy and resolution
- High damping ratio at a small delay distance
- Low starting threshold
- Low current consumption (3.3V@1.4 mA)
- Easy removal, and mounting when changing the ball bearing

For winter time use the wind direction transmitter (see chapter 1 models available) is optionally equipped with an electronically regulated heating, which guarantees the smooth-running of the ball bearing, and prevents ice forming in the space between the external rotation parts. Electrical supply of the wind transmitter heating is provided for ex.. by our power supply unit order-no. 9.3388.00.000.

Remark:

When using fastening adapters (angle, traverses, etc.) please take a possible effect on the measurements by turbulences into consideration.

3 Mode of Operation

The dynamic characteristics of the wind vane is achieved by the aluminum light-weight construction. The co-action of wind vane and balance weight results in a high damping ratio with small delay distance as excellent characteristic of the complete vane.

The axis of the wind vane is running in ball bearings and carries a diametrically magnetized magnet at the inner end. The angle position of the axis is scanned contact-free by a magnetic angle sensor through the position of the magnet field. As the sensor is operated in magnetic saturation, effects by external magnetic fields can almost be eliminated. The connected electronics calculates the angle position of the axis and provides the respective serial-synchronous output signal.

An AC- or DC-voltage of 24 V is intended for the separate supply of the optional heating. In all probability, the heating guarantees a trouble-free function of the Wind Direction Transmitter First Class even under extreme meteorological icing-conditions..

The outer parts of the instrument are made of corrosion-resistant anodized aluminum, and stainless steel. Highly effective labyrinth gaskets and O-rings protect the sensitive parts inside the instrument against humidity and dust.

Wind Direction Code

The wind direction (0... 360°) is transformed into an 8 bit Gray-code (Thies special), and then output. The resolution is 2.5°. 144 increments per revolution.

Increment 0 = 0° = North and corresponds to the sector 0... 2.5°

Increment 143 = 357.5° corresponds to the sector 357.5... 0°

Schritt x 2.5°	Bit 0 / Spur A	Bit 1 / Spur B	Bit 2 / Spur C	Bit 3 / Spur D	Bit 4 / Spur E	Bit 5 / Spur F	Bit 6 / Spur G	Bit 7 / Spur H	Schritt x 2.5°	Bit 0 / Spur A	Bit 1 / Spur B	Bit 2 / Spur C	Bit 3 / Spur D	Bit 4 / Spur E	Bit 5 / Spur F	Bit 6 / Spur G	Bit 7 / Spur H	Schritt x 2.5°	Bit 0 / Spur A	Bit 1 / Spur B	Bit 2 / Spur C	Bit 3 / Spur D	Bit 4 / Spur E	Bit 5 / Spur F	Bit 6 / Spur G	Bit 7 / Spur H	
0									36									72									108
1									37									73									109
2									38									74									110
3									39									75									111
4									40									76									112
5									41									77									113
6									42									78									114
7									43									79									115
8									44									80									116
9									45									81									117
10									46									82									118
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26									62									98									134
27									63									99									135
28									64									100									136
29									65									101									137
30									66									102									138
31									67									103									139
32									68									104									140
33									69									105									141
34									70									106									142
35									71									107									143

Table 1: 8 Bit Thies Gray Code

4 Recommendation Site Selection / Standard Installation

In general wind measurement instruments should be able to detect the wind conditions of a large area. In order to obtain comparable values when determining the surface wind, measurements should be taken at a height of 10 meters over an even area with no obstacles. An area with no obstacles means that the distance between the wind direction transmitter and an obstacle should be at least 10 times the height of the obstacle (s. VDI 3786 Part 2). If it is not possible to fulfill this condition then the wind direction transmitter should be set up a height where local obstacles do not influence the measured values to any significant extent (approx. 6-10 m above the obstacle). The wind direction transmitter should be set up in the center of flat roofs and not on the edge in order to avoid any preferential directions.

5 Installation

5.1 Mounting of the Wind Vane

Before the wind direction transmitter can be installed at a selected site, the wind vane and the balance weight must be mounted at the adaptors of the wind direction transmitter. The individual process steps are explained in the following list, and by the drawing (figure 1). Necessary tool: Philips screw driver.

- **Wind vane:**
- Remove the screw M3 from the thin adaptor.
- Put the wind vane onto the thin adaptor. (The longer part of the wind vane deflector must indicate upward).
- Put the screw M 3 through the hole of the wind vane from below into the adaptor, and screw tight.
- **Balance weight:**
- Remove the screw M3 from the thicker adaptor.
- Put the balance weight onto the thicker adaptor.
- Put the screw M 3 through the hole of the balance weight from below into the adaptor, and screw tight.

Remark:

As the screws are covered with locking varnish they are rough-running with the fastening.

The screw head must be immersed completely in the counter-bore of balance weight and wind vane!

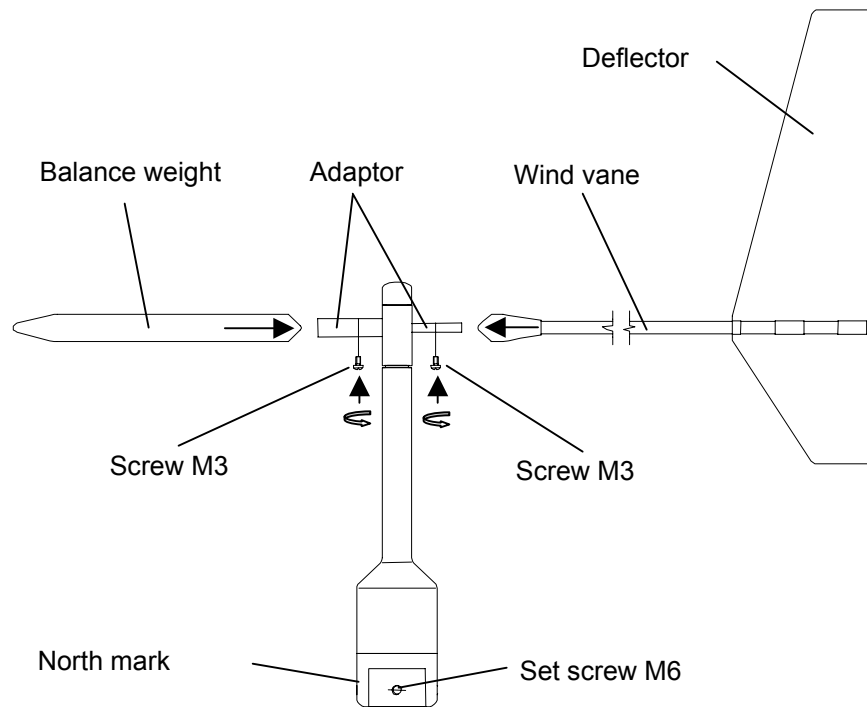


Figure 1: Mounting of the wind vane

5.2 Electrical Mounting

Solder a shielded cable with diameter 7-8 mm and a core cross-section of 0,5...0,75 mm² to the enclosed coupling socket.

- The number of necessary wires is given in the connection diagram (chapter 8).

Cable recommendation	
Type/ No. of cores /Diameter	Cable diameter
LIYCY 4 x 0,75 mm ²	ca. 7 mm
LIYCY 5 x 0,50 mm ²	ca. 7 mm
LIYCY 6 x 0,75 mm ²	ca. 7,7 mm
LIYCY 7 x 0,50 mm ²	ca. 7,5 mm
LIYCY 8 x 0,50 mm ²	ca. 8 mm

5.3 Mechanical Mounting

Mount the transmitter onto a pipe socket of R 1" (Ø 33,5 mm) and a length of 25 mm. The pipe socket must have an internal diameter of at least 25 mm as the wind direction transmitter must be connected electrically with a plug from below. After electrical connection the wind direction transmitter is put onto the pipe socket, and is fixed by means of 2 threaded pins (female hexagon 3 mm) at the base of the transmitter.

Attention:

Storing, mounting and operation under weather conditions is permissible only in vertical position, as otherwise water can get into the instrument.

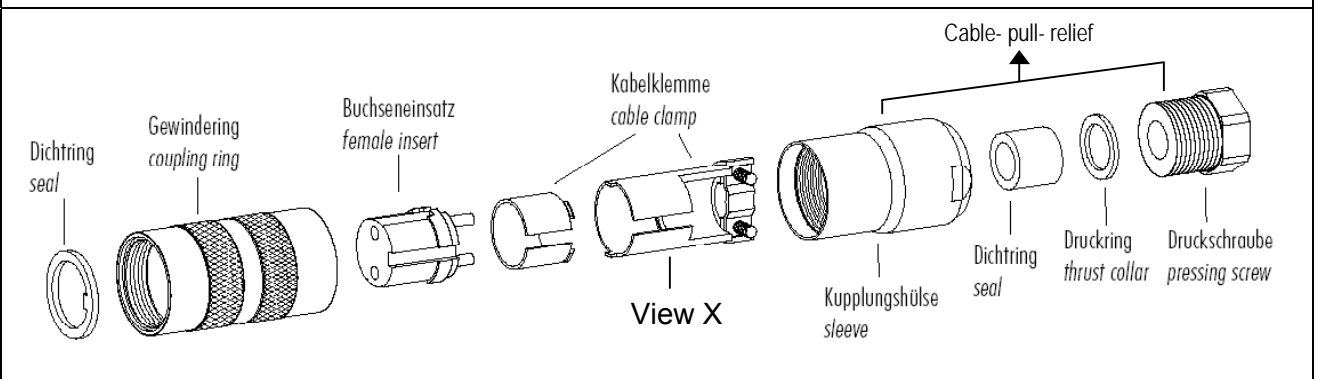
5.4 North Alignment

Remark:

When the wind direction transmitter is in operation, the north marking (line mark) at the base of the transmitter must indicate to the geographical north.

5.5 Plug mounting

Coupling socket 507550 (Binder, Serial 423), EMC with cable clamp



1. Stringing parts on cable acc. to plan given above.
2. Stripping cable sheath 20 mm
Cutting uncovered shield 15 mm
Stripping wire 5mm.

Cable mounting 1

Putting shrink hose or insulating tape between wire and shield.

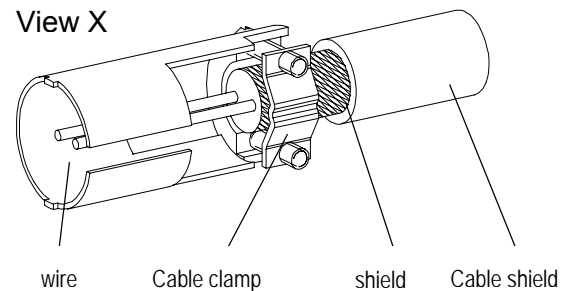
Cable mounting 2

If cable diameter permits, put the shield backward on the cable sheath.

3. Soldering wire to the insert, positioning shield in cable clamp.
4. Screwing-on cable clamp.
5. Assembling remaining parts acc. to upper plan.
6. Tightening pull-relief of cable by screw-wrench (SW16 und 17).

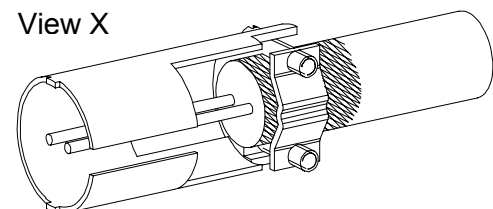
Cable mounting 1

View X



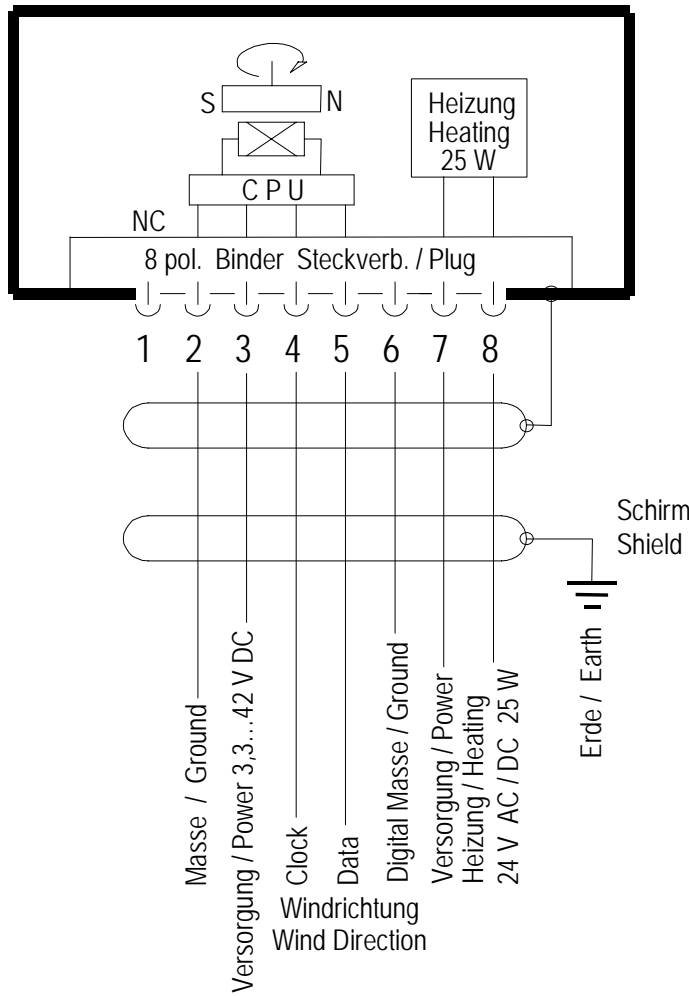
Cable mounting 2

View X

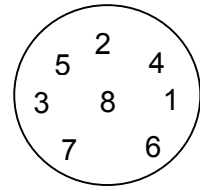


6 Connecting Diagram

Order-No.
4.3150.00.000
4.3150.10.000



View on the soldered joint of the counter plug



Order-no 4.3150.10.xxx (w/o heating) PIN 7 and 8 are not connected

Contact	Name	Function
1	-----	Not connected
2	GND	Supply ground
3	+Vcc	Supply 3,3 V ... 42 V DC
4	Clock	Serial-synchron Clock
5	Data	Serial-synchron Data
6	DIG-GND	Digital ground
7	HZG	Heating supply:
8		Voltage: 24 V AC/DC Power: 25 W

7 Serial-synchronous Interface

The serial-synchronous interface has a unidirectional two-leads-interface. When no data query is carried out the wind transmitter is in standby-mode. On the first received clock signal the 8 bit measuring value of the wind direction is accepted in a shift register, and the LSB is connected to the data output. In parallel, the new measuring process is starting. After 8 clock pulses the WD-code is output, and with further 8 clock-pulses the transmission of the inverse WD-code (see table 2) is carried out. The inverse WD-code can be applied for the transmission error control. The simultaneous data output and the starting of a measuring process mean that always the last measuring value is output (see figure 2).

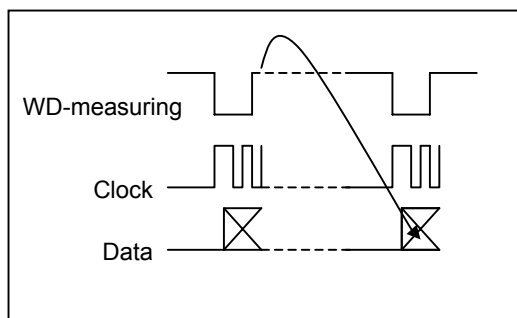


Figure 2: Wind-Direction- Code

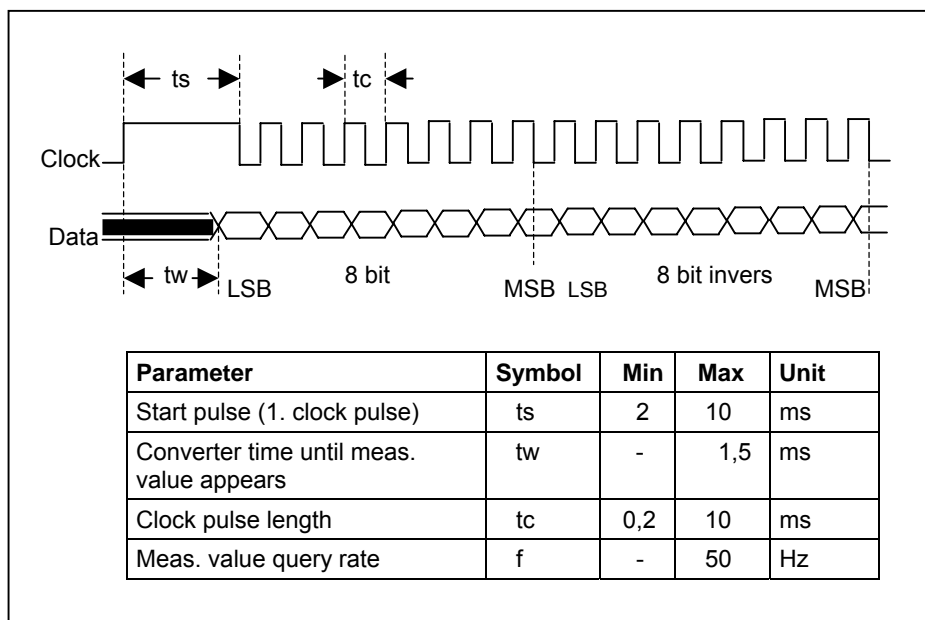


Table 2: Interface specification "serial- synchron."

8 Placing into Operation

Connect the wind transmitter to a power supply unit and a serial-synchronous interface, as described in the connection diagram. After connection of the supply voltage, and after a delay of $t(v) = 5\text{sec}$, while the interface is inactive, the wind direction data can be recalled via the interface.

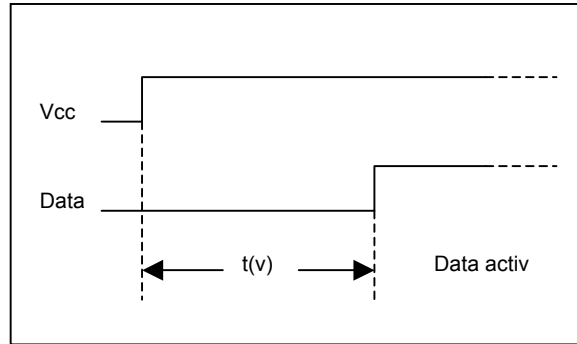


Figure 3: Data- out activation

9 Maintenance

If properly installed, the instrument requires no maintenance. Heavy pollution can lead to blockage of the slot between the rotating and the stable parts of the transmitter. Thus it is advisable to remove the accumulated dirt from the instrument.

Certain symptoms of wear and tear can appear on the ball bearings after years of use. These symptoms are expressed in a lowered sensitivity of response, standstill or run-noises of the ball bearings. In case that such disturbances might occur we recommend to return the instrument - in original package – to the factory for maintenance work.

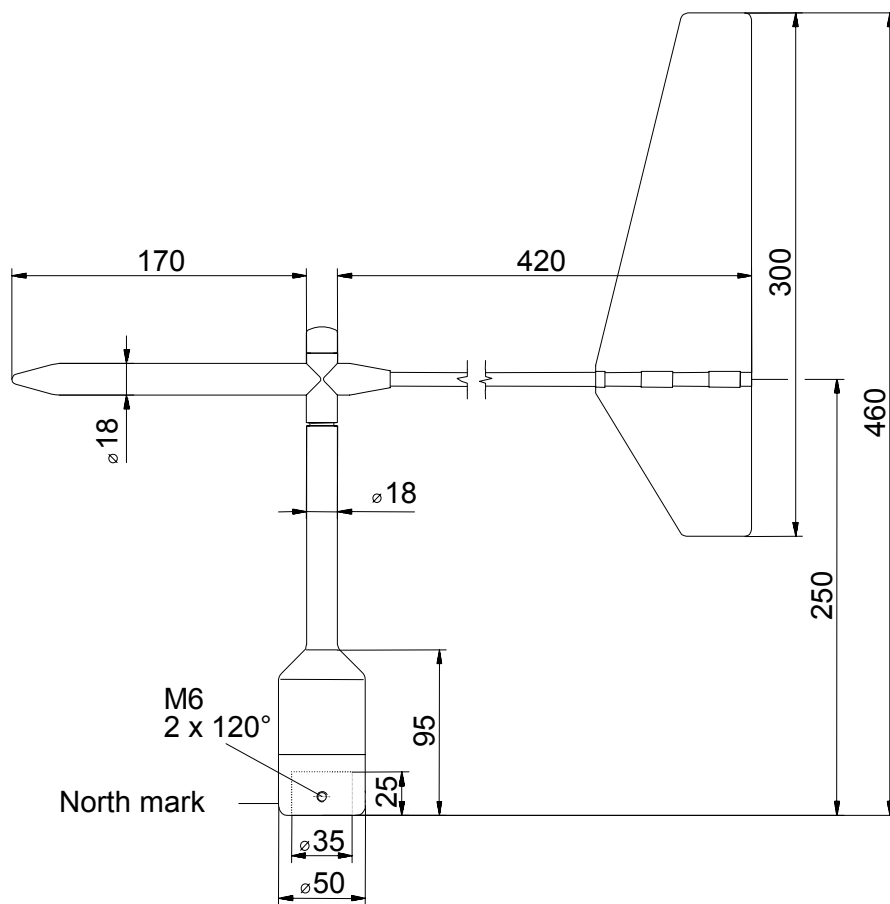
10 Technical Data

Characteristic	Description
Measuring range	0 ... 360 °
Measuring Accuracy	1°
Resolution of measuring value	2,5°
Survival speed	85 m/s up to 0,5 h
Permissible ambient conditions for operation	-50 ... +80°C all occurring situations of rel. humidity incl. dew moistening
Output	8 bit serial synchronous (see table 2)
Output-Code	Thies Gray Code (see table 1)
Electrical output	Data (out), Clock I (Data (out) max = 10 mA Clock (in) see table x Power- On delay 5sec
Data-Out (Amplitude)	Vcc (max = 15V)
Clock-IN (Amplitude)	3,3V ... Vcc
Starting threshold	< 0,5 m/s at 10° amplitude
Delay distance	< 1 m (acc. to ASTM D 53666 – 96)
Damping ratio	D > 0,25 (acc. to ASTM D 53666 – 96)
Quality factor	K > 1 $K = \frac{4 \cdot D \cdot \omega_0}{\rho \cdot u}$
	D damping ratio, ω_0 angular frequency of undamped oscillation, ρ air density u wind speed.
Heating	Surface temperature of housing neck > 0 °C at 20 m/s up to –10 °C air temperature, at 10 m/s up to –20 °C using the Thies icing standard 012002 on the housing neck heating regulated with temperature sensor
Electrical supply (Vcc)	Vcc 3,3 V DC ...42 V DC Icc < 1.4 mA in standby Icc ≈ 2.5 mA 10Hz query rate
Electrical supply for heating	24 V AC/DC (galvanically isolated from housing) Pmax = 25 W
Connection	8-pole plug connection for shielded cable in the shaft (see connecting diagram)
Mounting	Mounting on mast 1" (DIN EN 10255; 1"= Ø 33,4 mm) ,

Remark: mounting on mast 1½ " is possible with separate adapter (option).

Dimensions	See dimensional drawing
Weight	ca. 0,7 kg
Protection	IP 55 (DIN 40050)
EMC	EN 61000-6-2:2001 (immunity) EN 55022:2001, Class B (interfering transmission)

11 Dimensional drawing



12 Accessories

The following accessories are available for the wind direction transmitter:

<p>Traverse 0,6 m</p> <p>For mounting the wind speed and wind direction transmitter jointly onto a mast</p>	4.3174.00.000	<p>Horizontal sensor distance: 0,6 m</p> <p>Vertical sensor distance: 0,2 m</p> <p>Mast receptacle: 48 - 50 mm</p> <p>Material: Aluminum, anodised</p> <p>Dimensions: tube Ø 34x4mm, 668 mm long, 756 mm high</p>
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<p>Hanger</p> <p>–FIRST CLASS- 1m</p> <p>For the lateral mounting of a wind speed and wind direction transmitter onto a mast..</p>	4.3184.01.000	<p>Sensor distance to mast: 1 m</p> <p>Mast clamp: 40 – 80 mm</p> <p>Tube diameter: 34 mm</p> <p>Material: Aluminum</p>
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<p>Lightning rod</p> <p>For mounting the a/m traverse or hanger.</p>	4.3100.98.000	<p>Dimension: Ø 12 mm, 500 mm long, 1050 mm high</p> <p>Material: Aluminum</p>
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Please contact us for other accessories such as cables, power supply units, masts, as well as for additional mast- or system-constructions.

Example: Wind transmitter with traverse and lightning rod.





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