# Ultrasonic Anemometer Thies 3D

# S83100H / S83300H

سنسور اولترا سونیک سه بعدی هیتردار شرکت تیس

کد سفارش

**S83100H: Heating for sensor arms and ultrasonic converters**
**S83300H: Extra strong heating for the whole sensor incl. housing**

- Measurement of wind direction & speed in 3 dimensions X, Y and Z
- Highest precision
- Real-time measurement
- Maintenance-free / heatable
- Digital / analog outputs and inputs

## Description

The Ultrasonic Anemometer 3D is designed to measure the horizontal and vertical components of wind velocity, wind direction and acoustic virtual temperature in 3 dimensions. The Ultrasonic Anemometer 3D consists of 6 ultrasonic transformers, in pairs facing each other at a distance of 200 mm. The three resulting measurement paths are vertical in relation to each other. The transformers function both as acoustic transmitters and receivers.

In comparison to cup anemometers, the measuring principle provides for inertia-free measurement of rapidly changing variables with maximum precision and accuracy. It is particularly suitable for the measurement of gusts and peak values. The level of accuracy achieved when measuring the air temperature (acoustic virtual temperature) surpasses that of classical methods, in which the temperature sensors are used with a weather and radiation shield, following correction of the influence of damp occurring with certain weather situations.

The maintenance-free and wearless anemometer needs no re-calibration, and is equipped with a heating for winter operation even under extreme conditions.

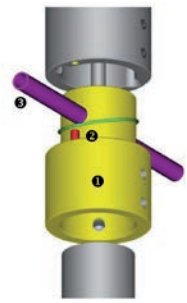
All calculations are carried out by a high-capacity digital-signal-processor (DSP) within the propagation time of the ultrasonic signals with an accuracy basis of 32 bit. The instrument offers comprehensive statistic functions such as gliding averaging, standard deviation, co-variance etc., which can be selected via the digital interface. The gliding averaging can be set optionally in vectorial or scalar form, identically or differently for each parameter.

## Heating

For a multitude of applications the continuous output of solid measuring data of the wind velocity and direction is an indispensable requirement to the measuring system, even under meteorological extreme conditions such as icing situations. The Ultrasonic is equipped with a sophisticated heating system. This system keeps all outer surfaces that might disturb the measuring value acquision in case ice formation, efficiently on a temperature above +5°C.

Also the measuring arms belong to the heated outer surfaces, as well as additionally the ultrasonic transducer and the housing – depending on the model. The Utrasonic is in a position to generate measuring data with high accuracy even in unheated state at temperatures of up to below –40 °C. There is no temperature-depending quality of the measuring data. The heating is necessary only for avoiding the ice formation on the instrument construction, thus avoiding an involved failure in the measuring value acquistion.

## Alignment to north with North ring adapter (S83010)




We recommend installing a North ring adapter (1; yellow), which assists aligning the sensor correctly and avoids re-alignment after sensor replacement.

The North ring adapter is installed between sensor and boom. It is equipped with a north pin (2; red) and a direction bearing tube (3; violet). By selecting a fixed point in north direction, the adapter can easily be aligned and fixed with screws on the boom.

Remove the tube and place the sensor on the adapter. The sensor is mounted with its north drilling on the north pin of the adapter and screwed in place.



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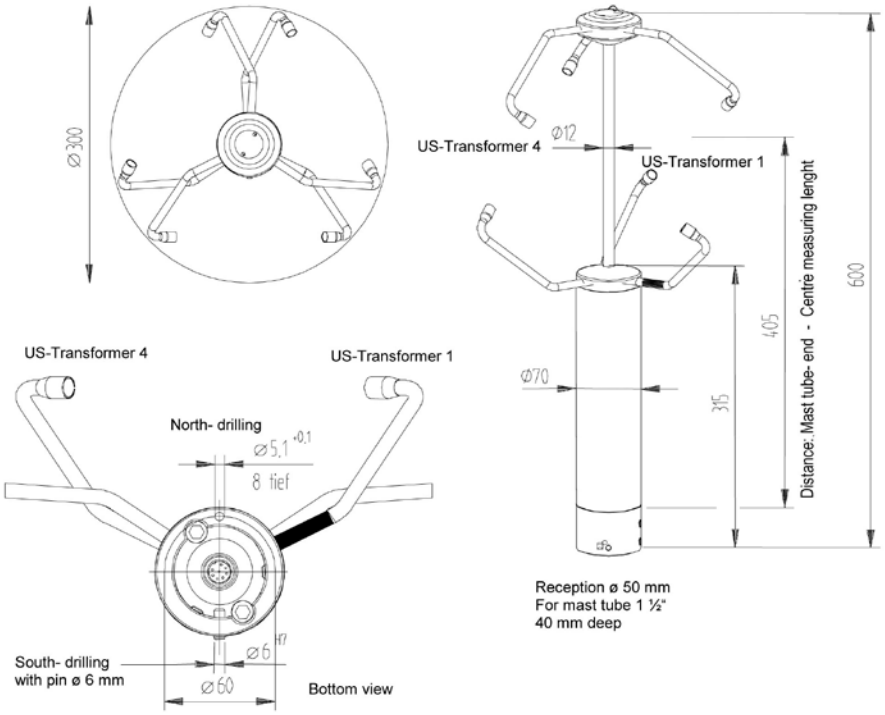
## Dimensional drawing




## Specifications

| | |
|---|---|
| **Wind Speed** | |
| Measuring range | 0 ... 85 m/s (measures up to 99.99 m/s + output); Scaling of analog output selectable<br>Starting threshold: 0.01 m/s |
| Accuracy | ≤ 5 m/s: ± 0.1 m/s rms (root mean square over 360°)<br>> 5 m/s ... ≤ 35 m/s: ± 1% rms of measured value (root mean square over 360°)<br>> 35 m/s ... ≤ 65 m/s: ± 2% rms of measured value (root mean square over 360°)<br>> 65 m/s ... ≤ 85 m/s: ± 3% rms of measured value (root mean square over 360°) |
| Resolution | 0.1 m/s (telegrams No. 1 to 4)<br>0.01 m/s (telegrams No. 5 to 12 and user-defined) |
| **Wind Direction** | |
| Measuring range | Azimuth: 0 ... 360° Elevation: -90° ... 90° |
| Accuracy | ± 1° with wind velocity > 1 m/s ≤ 35 m/s<br>± 2° with wind velocity > 35 m/s ≤ 65 m/s<br>± 4° with wind velocity > 65 m/s ≤ 85 m/s |
| Resolution | 1° (telegrams No. 1 to 4)<br>< 1° (telegrams No. 5 to 12 and user-defined) |
| **Acoustic Virtual Temperature** | |
| Measuring range | -40 ... +70°C (not specified, but useful measuring range: -75 ... +75°C) |
| Accuracy | ± 0.5 K |
| Resolution | 0.1 K (in telegrams No. 1 to 5) |



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| | |
|---|---|
| **Data Output Digital** | |
| Interface | RS485 / RS422 |
| Baud rate | 1200 to 921600 adjustable |
| Output | Instantaneous values, wind speed / direction and acoustic virtual temp.<br>Sliding mean values 0.5 sec to 100 min freely selectable |
| Output rate | 1 per 1 msec to 1 per 60 sec., adjustable in msec steps |
| Status identification | Heating, measurement path failure, ΔT path temperatures |
| **Data Output Analog** | |
| Electr. output | 0 ... 20 mA / 0 ... 10 V or 4 ... 20 mA / 2 ... 10 V for wind vectors X, Y and Z |
| Output | Wind vectors X, Y and Z, Instantaneous values, sliding mean values 0.5 sec to 100 min freely selectable |
| Output rate | Updating rate 0.1 ... 100 Hz |
| Resolution | 16 bit |
| **Analog Inputs** | |
| Input number | Up to 5 analog inputs possible. (3x standard, 2x add. configurable acc. to manu.) |
| Input resolution | 16 bit |
| Sampling rate | 0.1 ... 100 Hz per channel |
| Input range | 0 ... 10 V |
| Data processing | Output of measured values in user-specific telegram |
| Accuracy | ± 1% of meas. value in the range -40 ... +70°C |
| Linearity, integral | INL: type < 6LSB |
| Effective low-noise bits | Type 14 bit (at DC-supply for avoiding of dynamic cross-talk in the connection line) |
| **General** | |
| Temperature range | Oper. temperature: -40 ... +70°C; Storage: -50 ... +80°C; with heating up to -75°C |
| Internal measuring rate | Up to 285 complete measurement sequences per second at 20°C |
| Operating voltage<br>S83100H<br>S83300H | Power supply electronics: 8 ... 78 VDC, 1.5 VA, max. 2.5 VA<br>Power supply electronics + heating: 24 V AC/DC ± 15%: typ. 150 VA<br>Power supply electronics + heating: 48 V AC/DC ± 15%: typ. 360 VA |
| EMC | EN 55022: 1998 class B; EN 55024: 1998; EN 61326:1997; A3:2003 |
| Electr. connection | 8-pole plug |
| Manufacturer | Thies |
| Ammonit Meteo-40 | RS485-M (Half duplex, 2-wire, baudrate: 38400 bps) |
| Accessory | Module set M83575 (incl. isolated repeater) |



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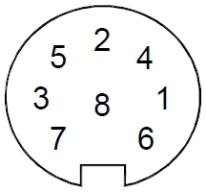
## Connector Pin Assignment (Serial interface, half-duplex and analog outputs)

| Plug Pin No. | Ammonit Wire Color | Allocation | Function | Solder terminal of coupling socket |
|---|---|---|---|---|
| 1 | | WG* | Analog output wind speed |  |
| 2 | brown | TXD- / RXD- | Serial interface | |
| 3 | green | ADIO (Analog Digital Input Output)** | Function configurable | |
| 4 | | WR* | Analog output wind direction | |
| 5 | white | TXD+ / RXD+ | Serial interface | |
| 6 | yellow | AGND | Analog ground | |
| 7 | red/pink | AC/DC | Supply, reverse-polarity protected | |
| 8 | blue/grey | AC/DC | Supply, reverse-polarity protected | |

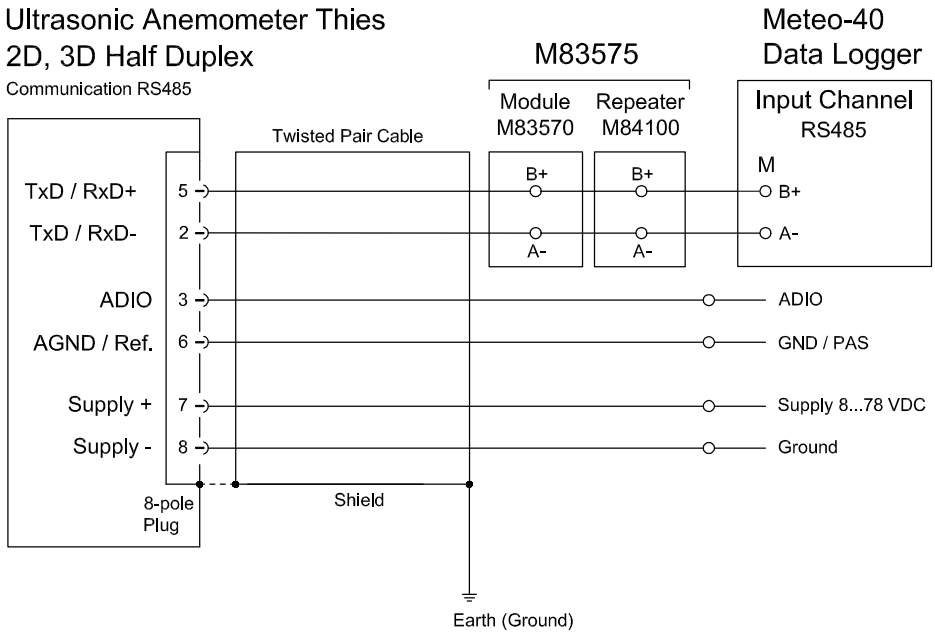


* If configured by Ammonit, Pin not used.
** Pin configured for analog output of wind speed. OR If heating is managed by the Meteo-40 data logger, Pin 3 is configured to switch the sensor heating.

Cable type (without heating): LiYCY 4 x 2 x 0.25 mm²

## Sensor Connection to Ammonit Meteo-40 Data Loggers

In order to connect the Ultrasonic sensor to the Ammonit Meteo-40 data logger, an additional module set (M83555 or M83575) has to be installed between sensor and data logger.



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