

Ultrasonic Anemometer Thies 3D – Heating in Arms and Sensor Head

S83100H



Ultrasonic Anemometer Thies 3D – Heating in Arms and Sensor Head

Order number	Availability
S83100H	Usually on stock

The Ultrasonic Anemometer 3D is designed to measure the horizontal and vertical components of wind velocity, wind direction and acoustic virtual temperature

Description

- Classified acc. to IEC 61400-12-1:2017
- Measurement of wind direction & speed in 3 dimensions X, Y and Z
- Real-time measurement
- Highest precision, maintenance-free and heatable
- Digital / analog outputs and inputs

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 acquisition 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 Ultrasonic 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 acquisition.

Specifications

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General Information

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Wind Speed

Measuring Range 0 ... 85 m/s (measures up to 99.99 m/s + output); Scaling of analog output selectable Starting threshold: 0.01 m/s

Accuracy ≤ 5 m/s: ± 0.1 m/s rms (root mean square over 360°) > 5 m/s ... ≤ 35 m/s: $\pm 1\%$ rms of measured value (root mean square over 360°) > 35 m/s ... ≤ 65 m/s: $\pm 2\%$ rms of measured value (root mean square over 360°) > 65 m/s ... ≤ 85 m/s: $\pm 3\%$ rms of measured value (root mean square over 360°)

Resolution 0.1 m/s (telegrams No. 1 to 4) 0.01 m/s (telegrams No. 5 to 12 and user-defined)

Wind Direction

Measuring Range Azimuth: 0 ... 360° Elevation: -90° ... 90°

Accuracy $\pm 1^\circ$ with wind velocity > 1 m/s ≤ 35 m/s $\pm 2^\circ$ with wind velocity > 35 m/s ≤ 65 m/s $\pm 4^\circ$ with wind velocity > 65 m/s ≤ 85 m/s

Resolution 1° (telegrams No. 1 to 4) $< 1^\circ$ (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)

Data Output Digital

Interface RS485 / RS422

Baud Rate 1200 to 921600 adjustable

Output Instantaneous values, wind speed / direction and acoustic virtual temp. 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 Heating, measurement path failure, ΔT path temperatures

Identification

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

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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 $\pm 1\%$ 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 Power supply electronics: 8 ... 78 VDC, 1.5 VA, max. 2.5 VA Power supply
S83100H / electronics + heating: 24 V AC/DC $\pm 15\%$: typ. 150 VA Power supply electronics +
S83300H heating: 48 V AC/DC $\pm 15\%$: typ. 360 VA

EMC EN 55022: 1998 class B; EN 55024: 1998; EN 61326:1997; A3:2003

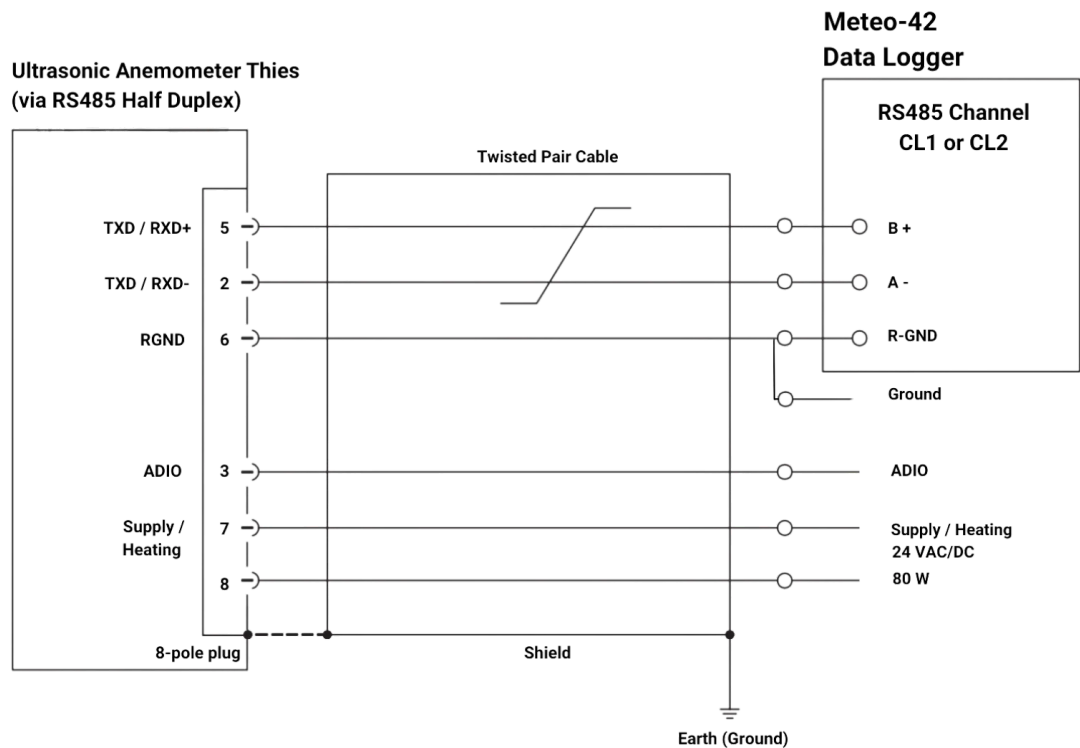
Electric Connection 8-pole plug

Manufacturer

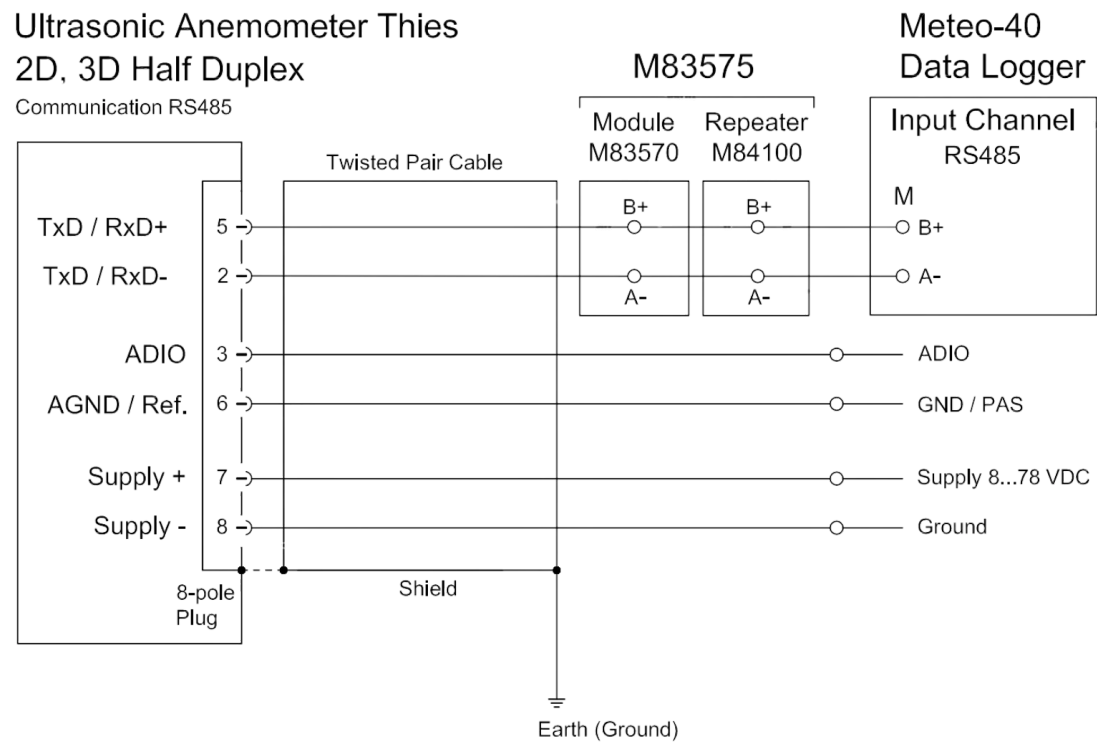
Thies

Sensor connection diagram

Sensor connection diagram to Ammonit Meteo-42 data logger



Sensor connection diagram to Ammonit Meteo-40 data logger



Accessories

- Calibration Ultrasonic Anemometer Thies 3D

Classification

Classification report Thies Ultrasonic 3D