Ultrasonic Anemometer Thies 2D - Heating in Arms and Sensor Head - Overhead

The Ultrasonic Anemometer 2D is designed to acquire the horizontal components of wind velocity and wind direction as well as the virtual temperature in two dimensions.

Description

- Classified acc. to IEC 61400-12-1:2017
- Measurement of wind direction, wind velocity and virtual temperature
- Highest precision, maintenance-free, different heating options
- Digital & Analog outputs

The Ultrasonic Anemometer 2D is designed to acquire the horizontal components of wind velocity and wind direction as well as the virtual temperature in two dimensions. Due to the measuring principle the instrument is ideal for inertia-free measurement of gusts and peak values.

Wind velocity and direction

The speed of propagation of the sound in calm air is superposed by the velocity components of an air flow in the direction of the wind. A wind velocity component in the propagation direction of the sound supports the speed of propagation; i.e. it increases if while a wind velocity component against the propagation direction reduces the speed of propagation.

The propagation speed resulting from superposition leads to different propagation times of the sound at different wind velocities and directions over a fixed measurement path. As the speed of sound greatly depends on the temperature of the air, the propagation time of the sound is measured on each of the two measurement paths in both directions. This rules out the influence of temperature on the measurement result. By combining the two measuring paths which are at right angles to each other, the measurement results of the sum and the angle of the wind velocity vector are obtained in the form of rectangular components. After the rectangular velocity components have been measured, they are converted to polar coordinates by the digital-signal-processor of the anemometer and output as a sum and angle of wind velocity.

Acoustic virtual temperature

The thermodynamic interrelationship between the propagation velocity of sound and the absolute temperature of the air is defined by a root function. The physical interrelationship between sound velocity and temperature is ideal when measuring the air temperature as long as the chemical composition is known and constant.

Heating

The Ultrasonic is equipped with a sophisticated heating system, which keeps all outer surfaces that might disturb the data acquision in case of ice formation, efficiently on a temperature above +5°C. The converters carrying arms belong to the heated outer surfaces, as well as the ultrasonic converters itself and the housing – depending on the model.

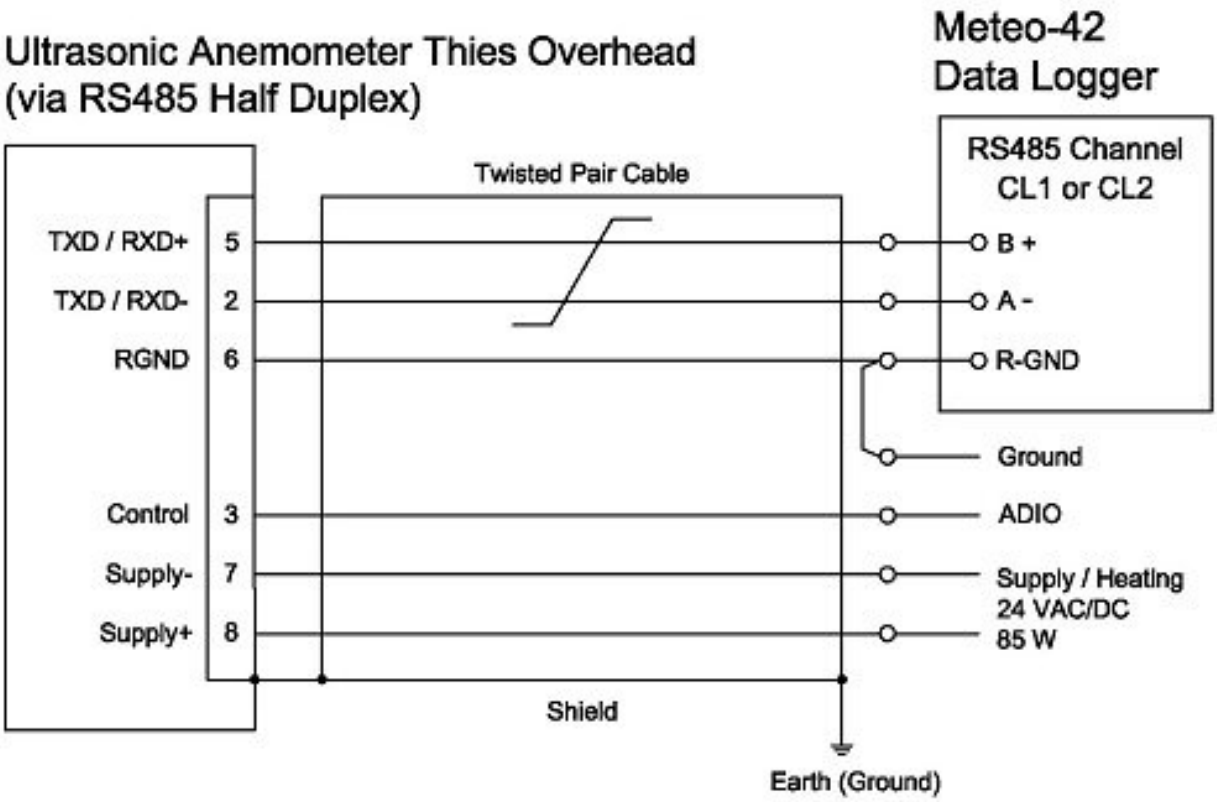
The Ultrasonic is able to acquire measuring data with high accuracy even in unheated state at temperatures down -40 °C. There is no temperature-depending quality of the measuring data. The heating is necessary only for avoiding ice formation on the instrument construction and the associated blockage of the run time data acquisition.

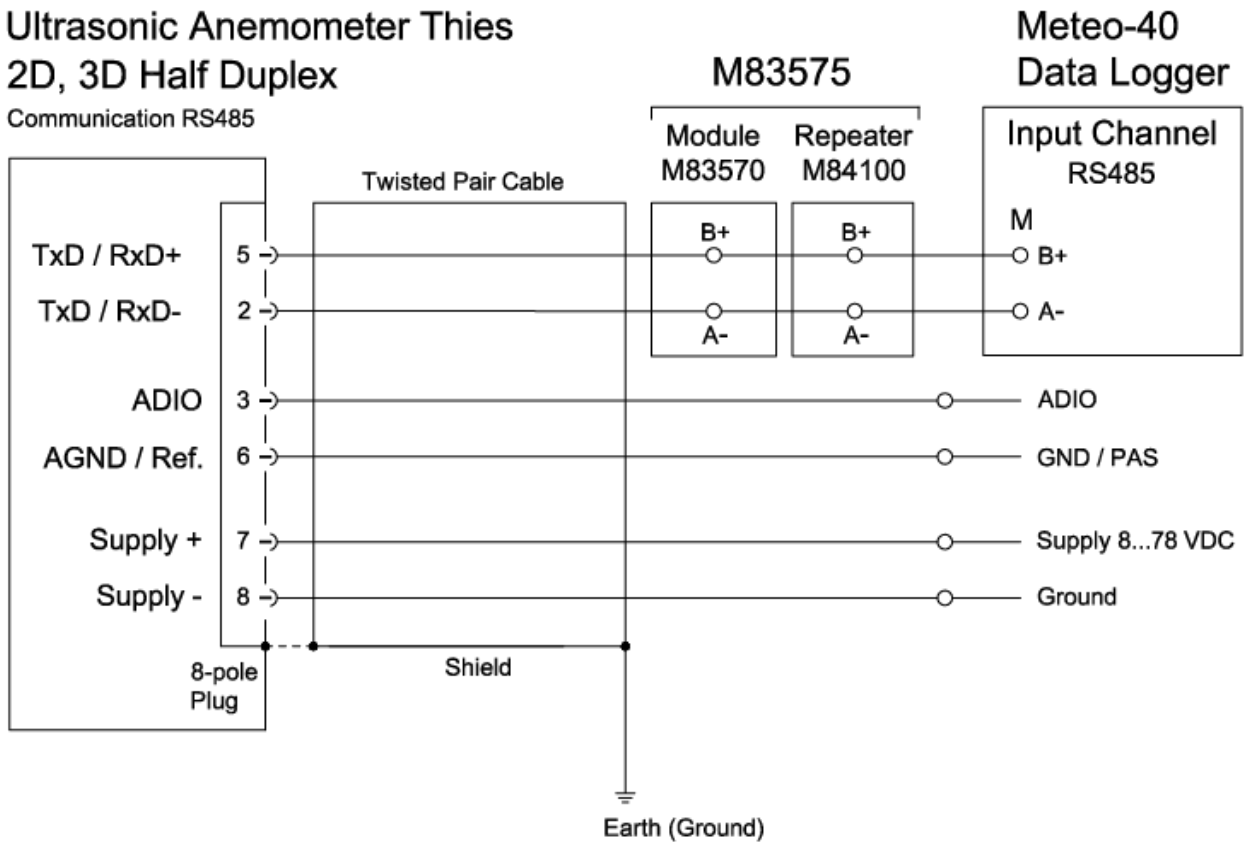
Specifications

Wind Speed	
Measuring range	0 ... 75 m/s, scaling of the analog output is free selectable (Starting threshold: 0.01 m/s)
Accuracy	± 0.1 m/s @ ≤ 5 m/s ± 2% of meas. value @ > 5 m/s
Resolution	0.1 m/s (standard) < 0.01 m/s (user-defined)
Wind Direction	
Measuring range	0 ... 360°
Accuracy	± 1°
Resolution	1° (standard), < 1°(user-defined)
Virtual Temperature	
Measuring range	-50 ... +70°C
Accuracy	± 0.5 K to 35 m/s
Resolution	0.1 K (standard)
Data Output Digital	
Interface	RS485 / RS422
Baud rate	1200 to 230400 selectable
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

Wind Speed	
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, wind velocity & direction, virtual temp.
Output	Instantaneous values, sliding mean values 0.5 sec to 100 min freely selectable
Output rate	Updating rate 1 to 100 msec
Resolution	16 bit
Analog Inputs	
Input number	Up to 3 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: -50 ... +80°C (heated), -30 ... +80 °C (unheated) Storage: -50 ... +80°C (Measuring operation possible with heating down to -75°C)
Internal measuring rate	Up to 400 measurements per second at 20°C
Operating voltage S82100H S82200H S82300H S82800H	Power supply electronics: 8 ... 78 V DC, 1.5 VA, max. 2.5 VA Power supply electronics + heating: 24 V AC/DC ± 15%: typ. 80 VA, max. 90 VA @ 24V Power supply electronics + heating: 24 V AC/DC ± 15%: typ. 85 VA, max. 90 VA @ 24V Power supply electronics + heating: 48 V AC/DC ± 15%: typ. 280 VA, max. 310 VA @ 48V Power supply electronics + heating: 24 V AC/DC ± 15%: typ. 85 VA, max. 90 VA @ 24V
Electr. connection	8-pole plug
Mounting	Mast tube 1 ½", e.g., DIN 2441
Protection	IP 67
Weight	2.5 kg
Manufacturer	Thies

Sensor connection diagram




Ultrasonic Anemometer Thies
2D, 3D Half Duplex
Communication RS485
M83575
Module
M83570
Repeater
M84100
Meteo-40
Data Logger
Input Channel
RS485
Twisted Pair Cable
TxD / RxD+
TxD / RxD-
ADIO
AGND / Ref.
Supply +
Supply -
5
2
3
6
7
8
B+
A-
M
ADIO
GND / PAS
Supply 8...78 VDC
Ground
8-pole
Plug
Shield
Earth (Ground)