

## Ultrasonic Anemometer Thies 2D - Heating in Arms

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 acquisition 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.

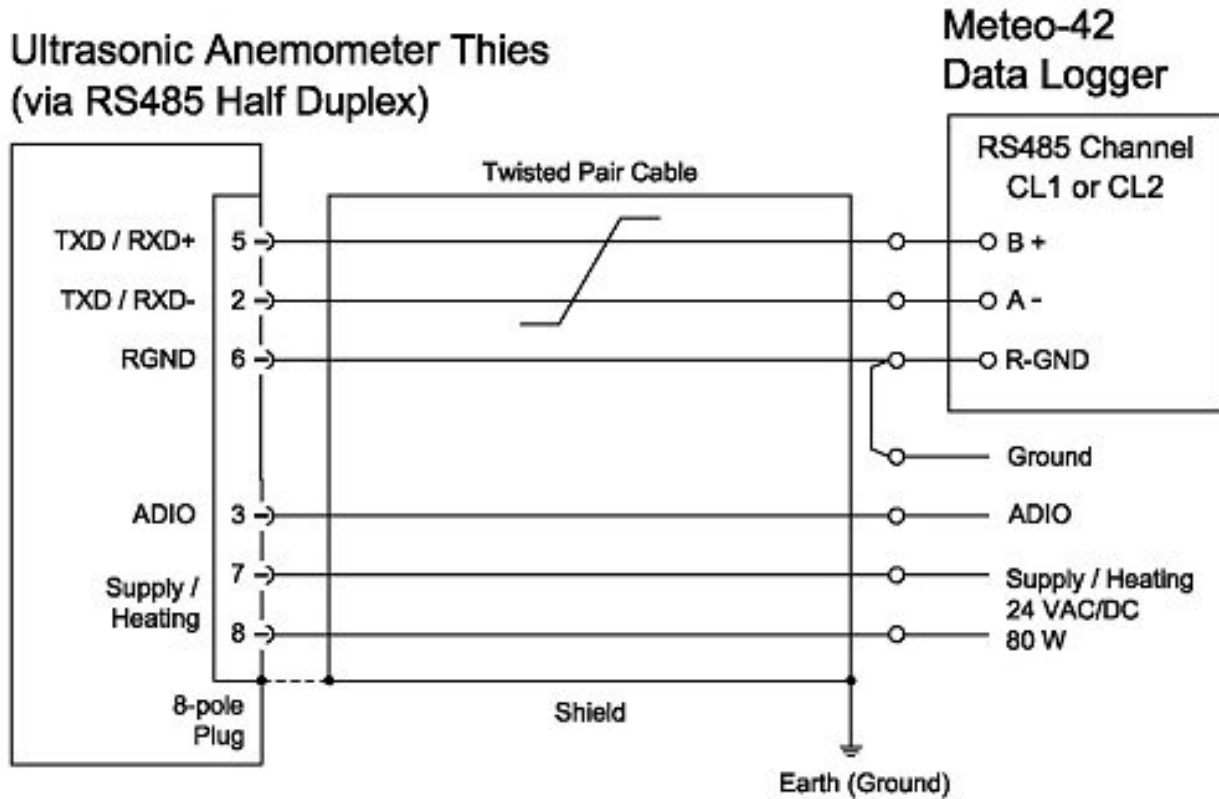
The Ultrasonic is able to acquire measuring data with high accuracy even in unheated state at temperatures down -40 °C. There is no temperature-depending quality of the measuring data. The heating is necessary only for avoiding ice formation on the instrument construction and the associated blockage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

## Specifications

<b>Wind Speed</b>	
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)
<b>Wind Direction</b>	
Measuring range	0 ... 360°
Accuracy	± 1°
Resolution	1° (standard), < 1°(user-defined)
<b>Virtual Temperature</b>	
Measuring range	-50 ... +70°C
Accuracy	± 0.5 K to 35 m/s
Resolution	0.1 K (standard)
<b>Data Output Digital</b>	
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

<b>Wind Speed</b>	
Status identification	Heating, measurement path failure, $\Delta T$ path temperatures
<b>Data Output Analog</b>	
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
<b>Analog Inputs</b>	
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	$\pm 1\%$ of meas. value in the range $-40 \dots +70^\circ\text{C}$
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)
<b>General</b>	
Temperature range	Oper. temperature: $-50 \dots +80^\circ\text{C}$ (heated), $-30 \dots +80^\circ\text{C}$ (unheated) Storage: $-50 \dots +80^\circ\text{C}$ (Measuring operation possible with heating down to $-75^\circ\text{C}$ )
Internal measuring rate	Up to 400 measurements per second at $20^\circ\text{C}$
Operating voltage	Power supply electronics: 8 ... 78 V DC, 1.5 VA, max. 2.5 VA
S82100H	Power supply electronics + heating: 24 V AC/DC $\pm 15\%$ : typ. 80 VA, max. 90 VA @ 24V
S82200H	Power supply electronics + heating: 24 V AC/DC $\pm 15\%$ : typ. 85 VA, max. 90 VA @ 24V
S82300H	Power supply electronics + heating: 48 V AC/DC $\pm 15\%$ : typ. 280 VA, max. 310 VA @ 48V
S82800H	Power supply electronics + heating: 24 V AC/DC $\pm 15\%$ : typ. 85 VA, max. 90 VA @ 24V
Electr. connection	8-pole plug
Mounting	Mast tube 1 1/2", 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

