

Thies Ultrasonic Anemometer 2D

Order-No: P 6004 H

- Measurement of wind direction and wind velocity and virtual temperature
- Highest precision
- Maintenance free / with heating
- Digital & Analog outputs



Description:

Range of Application

The Ultrasonic Anemometer 2D is designed to acquire the horizontal components of wind velocity and wind direction as well as the virtual temperature. Due to the high measuring rate, the instrument is ideal for the inertia free measurement of gusts and peak values. The accuracy of the air temperature measurement (virtual temperature) surpasses that of the classic method where the temperature transmitter is used in a weather and thermal radiation shield. The measured data are available as analogue signals or as a data telegram via a serial interface. The sensors as well as the instrument body are automatically heated, in case of critical ambient temperatures. Thus, the function is guaranteed even in case of snowfall or freezing rain, and the risk of icing is extensively avoided.

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 wind direction. A wind velocity component in the direction of the propagation of the sound supports the speed of propagation, thus leading to an increase in the speed. A wind velocity component opposite to the direction of propagation, on the contrary, leads to a reduction of the speed of propagation. The speed of propagation resulting from the 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 is very dependent on the air temperature, the propagation time of the sound is measured on both of the measurement paths in both directions. In this way, the influence of the temperature dependent speed of sound on the measurement result can be eliminated. By combining the two measuring paths which are at right angles to each other, one obtains the measurement results of the sum and the angle of the wind velocity vector. Afterwards, one receives the angle and the sum of the wind velocity by transformation into polar coordinates.

Virtual Temperature

As previously mentioned, the speed of the propagation of sound is highly dependent on the air temperature, but is hardly affected by air pressure and humidity. Thus these physical properties of gases can be used to measure air temperature. As this is a measurement of gas temperature which is made without thermal coupling to a measurement sensor, it is called the "virtual temperature". The advantages of this measured variable is, on the one hand, its inertia free reaction to the actual gas temperature, and, on the other, the avoidance of measurement errors such as those which occur when a solid state temperature sensor is heated up by radiation.

Specification Thies Ultrasonic Anemometer 2D: P 6004 H

Wind Speed:

Measuring Range	0....75 m/s, scaling of the analog output is free selectable
Accuracy	± 0.1 m/s, in the range 0...5 m/s; or ± 2 % of measurement value, from > 5 m/s
Resolution	1° (standard)

Wind Direction:

Measuring Range	0....360°
Resolution	1° (standard)
Accuracy	$\pm 1^\circ$

Virtual Temperature

Measuring Range	-50...+70°C
Accuracy	± 0.5 K to 35 m/s

Data Output Digital

Interface	RS 485 / RS 422
Baud rate	1200 -230400 selectable
Output	Instantaneous value, wind speed & direction & acoustic, mean value
Output rate	1 per 1 msec to 1 per 60 sec., selectable in msec
Status recognition	Heating, measurement path failure, ΔT path temperatures

Data Output Analog

Electr. Output	0/2...10 V or 0/4...20 mA, wind velocity, Wind direction and virt. temperature
Output	Instantan. values, gliding mean values 0,5 sec to 100 min free selectable
Output rate	Up-date rate 1 Hz to 100 Hz
Load	current output max. 400 Ohm voltage output min. 4000 Ohm
Resolution	16 Bit
Analog Input Number	Up to five analog inputs possible. 3 x standard, 2x optional
Analog Input Resolution	16 Bit
Scanning rate	0.1 Hz to 100 Hz per channel
Input range	0-10 V
Data processing	Output of the measuring values in the user-specific telegram
Accuracy	± 0.1 % in the range -50...+70°C
Linearity, integral	INL: type < 6 LSB
Effective low-noise bits	Type 14 Bit at DC-supply for avoidance of cross-talking in the connection line
Temperature Range	operating -50....+70°C; storing -50....+80°C; with heating up to -75°C
Internal measuring rate	400 Hz at 25°C
Operating voltage	Power supply electronics, 8-42 V DC, 1.5 VA, max. 2.5 VA Power supply heating, 12 V to 30 V AC typ. 80 VA, max. 90 VA @ 24V
EMC	EN 55022: 1998 class B; EN 55024: 1998; EN 61326:1997; A3:2003
Housing Material	Stainless steel, seawater proof, mounting on mast tube
Electr. Connection	8 pole plug
Dimensions, weight	200 x 129 mm, approx. 2.5 kg
Manufacturer	Thies