

Ultrasonic Windsensor USA-1



- Accurate Measurement of 3 Wind Components
- No Moving Parts: High Reliability
- Efficient Sensor Heating
- High Sample Rate for Wind- and Temperature Fluctuations
- Extendable to Complete Weather Stations
- On-line Calculation of Turbulence Parameters
- Measuring Range: 0.05 - 60 m/s

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General

The UltraSonic Anemometer USA-1 has proven its reliable all weather type operation, outstanding flexibility and high rated system performance in widespread applications.

- Solid state measurements of 3-D wind components x,y,z plus temperature T derived from sound velocity
 - No moving parts, practically no maintenance efforts
 - Extraordinary data availability
 - On-line data quality check and on-line report
 - Comprehensive list of adjustable parameters
- | | | | | |
|------------------------------|-----------------------------------|-----|-------|---------|
| Average time | 1 | ... | 3600 | s |
| Average number | 1 | ... | 65365 | samples |
| Sampling rate | 0.1 | ... | 25/50 | Hz |
| Azimuth alignment | 0 | ... | 359 | ° |
| Transfer rate | 300 | ... | 19200 | Baud |
| Output data set | x,y,z,T/vel,dir,z,T (plus analog) | | | |
| Averaging method | scalar, vectorial | | | |
| Output protocols | standard, checksum, NMEA | | | |
| Data output | async, polling, time synchronized | | | |
| Flow distortion compensation | on-line, on/off | | | |
- Heater option on, off, auto
 - Turbulence option on-line calculation
 - Logger option internal / external: 1 MB/< 64MB
 - Power supply 9...36 VDC/ 3W (5W for options)
 - Ranges 0...60m/s,-30...+55°C,5...100%

Measuring Principles of USA-1

Ultrasound pulses are transmitted by 3 pairs of transducers orientated 120° different in azimuth angle along 3 independent paths of 45° zenith angle in opposite directions. Subtracting traveling times on each path for opposite directions eliminates density dependent and transducer related terms. The residual time difference is a measure for the radial component of the wind field parallel to this path. Adding up traveling times eliminates the radial components and yields the scalar sound velocity which is a good measure for the virtual temperature. Comprehensive signal checks validate each instantaneous sample.

Benefits of USA-1

Without moving parts USA-1 avoids shortcomings of conventional wind sensors.

- No bearings subject to wear and tear, no shift of calibration parameters, negligible thresholds
- Perfect linearity within 0.05... 60 m/s
- Absence of inertial masses avoids low pass filtering effects of turbulent fluctuations
- High resolution in time (max. 25/50 Hz) and measured data (0.02 m/s, 0.01 K for instantaneous samples)

Optimized Sensor Heads

USA-1 offers two sensor head types and two configurations of the electronic to optimize the performance.

- Standard sensor (center bar) for best flow characteristics / Ruggedized outer bar sensor for extreme applications
- Electronic integrated in sensor fixture for easy mounting / Electronic separated from sensor head by 8 m cable for easy integration of external sensor.

Sensor Head Heating (Option)

USA-1 can be extended with an efficient sensor head heating to prevent icing or riming in harsh environments.

- Independent heating of transducers (max. 20 W) and sensor head (35 W), automatic or manual control
- Option: Function monitoring
- High powered heating for extreme conditions. max. 50 W for transducers and 70 W for sensor head

Analog Output Channels (Option)

USA-1 can be easily integrated to analog data acquisition systems using 4 analog output ports.

- 0...2.5 or 0...5 or 0...10 VDC, single ended, 12 Bit
- 0...20 mA or 4...20 mA (current loop)
- Adjustable number ranges for x,y,z,vel,dir,T

Analog Input Channels (Option)

Adding analog input channels which are sampled synchronized to the sonic data the USA-1 can be used as a complete weather station or as an eddy-correlation system.

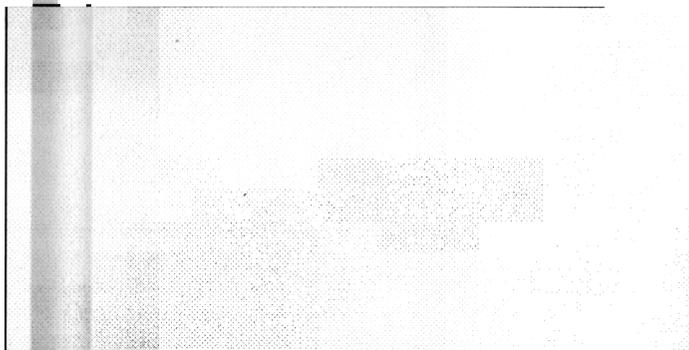
- Version A: 2 x counters (16 Bit), 6 analog channels (12 Bit, ± 2.5 or ± 5 or ± 10 VDC, single ended)
- Version B: see A, but add: 2 x PT 100 and 2 x analog
- Version C: all channels with 16 Bit resolution

Quality Check and Status Codes

USA-1 assures accuracy and reliability of the data by sophisticated on-line checks on each instantaneous measurement. Occasional spurious spike signals (for ex. in heavy rain/hail showers) are detected and rejected from further evaluation enabling USA-1 as a real all weather type sensor. Rejected data are automatically reported to initiate preventive inspection and servicing in time.

On Site Calibration Procedure

If the system does not comply with the calibration (for ex. accidental misalignment of the sensor head) the customer can perform a simple calibration routine at the site.



All specifications are subject to change without any notice

