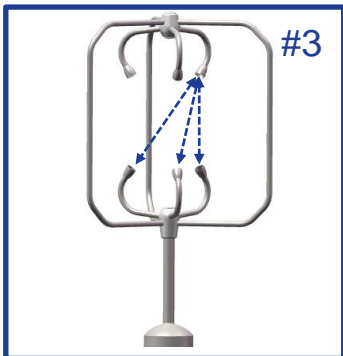
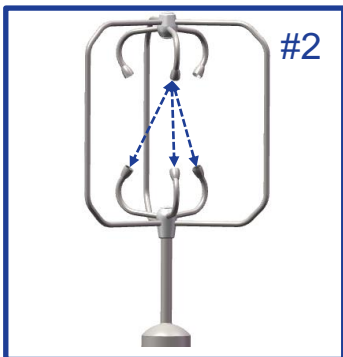
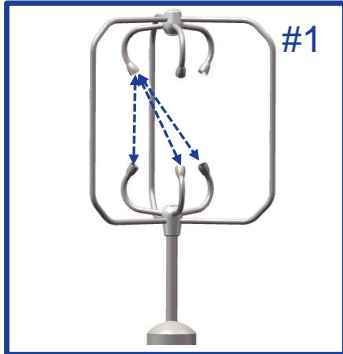


Ultrasonic Wind Sensor

uSonic-3 Cage *MP*



- Innovative approach in 3D wind and turbulence sensing
- Patented “**Multi-Path**” measuring technique
- 3 x 3D sonic arrays in one sensor head
- 3 x 3 Radial wind components
- 3 x Directly measured vertical wind components
- 3 x 3 Acoustic temperatures
- Minimum flow distortion by optimized design of sensor head and sonic transducers
- Ideal omni-directional sonic probe for mast top
- Effective signal control and data validation
- Efficient sensor head heating (option)
- Internal mass storage on SD card (option)
- Convenient communication and data output by RS422 and optional Ethernet ports
- Remote control of system performance
- High quality measurements in routine and scientific applications (e.g. at eddy covariance sites)

Ultrasonic Wind Sensor uSonic-3 Cage **MP**

Typical instrumental applications

- Operational measurements of turbulence parameters
- Research in atmospheric turbulence
- Eddy covariance sites
- Climatological studies
- Observation of low turbulence (e. g. arctic / antarctic areas)
- Remote research stations
- Compact mobile set-ups

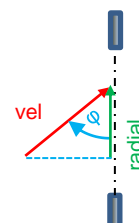
The ultrasonic anemometer **uSonic-3 Cage MP** uses a patented innovative method for highest performance in atmospheric wind and turbulence sounding. Based on the well proven METEK ultrasonic sensor family uSonic-3 the Multi-Path concept allows that a single pulse transmitted by one transducer is received quasi-simultaneously by all three adjacent transducers of the opposite array. The independent measurements of the air flow along all 3 x 3 measuring paths of one sensor head yield in total 3 x 3 = 9 radial winds. This redundancy enables an automatic selection of a triple of radial winds positioned most advantageously in view of minimum flow distortion including one directly measured vertical wind component.

The sensor outputs all 9 radial wind components and all 9 acoustic temperatures, the 3 optimally derived Cartesian wind components and temperature (x, y, z, t) as raw data and/or as averaged data with adjustable interval lengths.

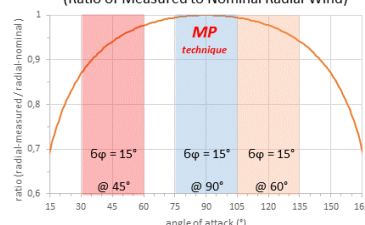
An embedded 2-axis inclination sensor (option) provides tilt angles of the sensor head thus allowing remote control of correct instrumental set-up.

Due to its compact design and the omni-directional sensor head the **uSonic-3 Cage MP** fits perfectly to top mast installations.

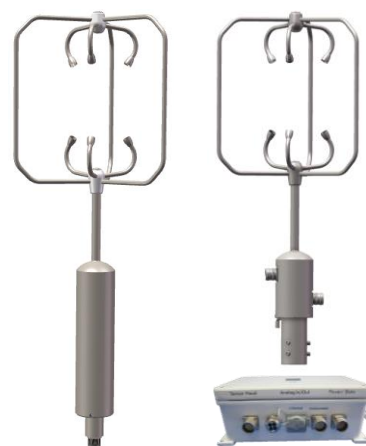
Minimum flow distortion by vertically aligned measuring paths



Minimized Flow Distortion by MP-Technique (Ratio of Measured to Nominal Radial Wind)



Sensor configurations



Left: Standard version

Right: Separation of sensor head and electronics, here incl. 2-axis inclinometer

Ambient conditions	- 40 ... + 60 °C, 5 ... 100 % rH, 0 ... 50 m/s
Average time / number	1 ... 3600 s / 1 ... 65365 samples
Sampling rate	max. 30 Hz (→ max. 3 x 30 = 90 Hz sampling)
Measuring ranges	max. 40 m/s, - 40 ... + 60 °C
Accuracy wind component	Acceptance angles ± 180 ° (omni-directional)
- max. dev.	± 1 % @ 5 m/s, 0 ° ... 10 ° inclination
- rms	± 2 % @ 5 m/s, 10 ° ... 20 ° inclination
- resolution	0.5 % @ 5 m/s, 0 ° ... 10 ° inclination
	1 % @ 5 m/s, 10 ° ... 20 ° inclination
Accuracy wind direction	Acceptance angles ± 180 ° (omni-directional)
- max. dev.	± 1,5 ° @ 5 m/s, 0 ° ... 20 ° inclination
- rms	1 ° @ 5 m/s, 0 ° ... 20 ° inclination
Accuracy temperature	
- resolution	0.01 K
Output data set	9 radial components (incl. 3 x vertical), 9 temperatures, x, y, z, T, vel, dir, system status, signal quality
Output protocols	Async, checksum, NMEA, FTP (Ethernet)
Synchronisation	1 x digital in, 1 x digital out, ntp, ptp on request
Turbulence module (option)	online calculation of means, variances, covariances, heat flux, momentum flux, Monin-Obukhov length, etc.
Internal memory	SD card 8 GB (optionally 64 GB)
Power supply	10 ... 36 VDC / 2.5 W (without options)
Sensor head heating (option)	10 ... 24 VDC / max. 55 W, incl. smart energy saving mode
Communication ports	RS422 (max. 115200), Ethernet (option), SD card, all ASCII
Analog output (option)	4 x 16 bit nom., 0 ... 5/10 VDC or 0/4 ... 20 mA (max. load 250 Ω), adjustable ranges (x, y, z, T)
Measuring paths	6 x 53.2 ° / 3 x 90 °, L = 6 x 165 mm / 3 x 135 mm
Inclinometer (option)	2 axis, resolution 0.1 °, response time ≈ 1 s

*all specifications are subject to change.

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