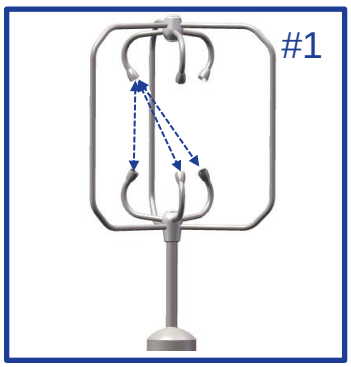
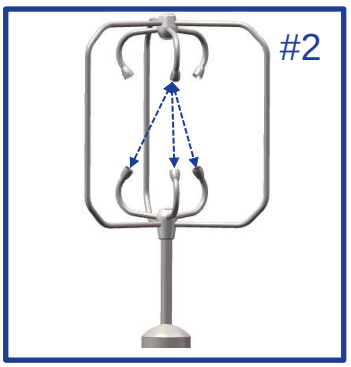
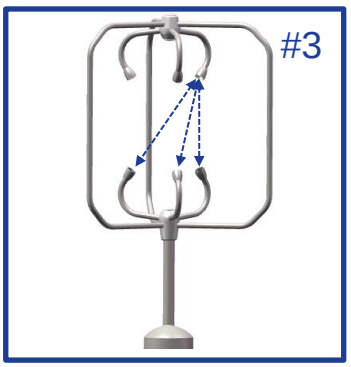
Ultrasonic Wind Sensor

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**
- **Optional analog input channels with synchronized sampling**
- **High quality measurements in routine and scientific applications (e.g. at eddy covariance sites)**

METEK

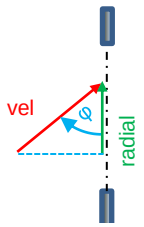
METEK Meteorologische Messtechnik GmbH

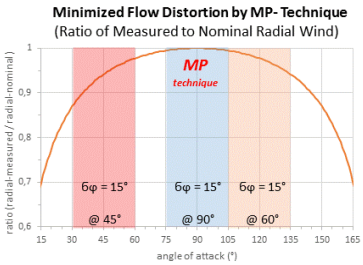
Ultrasonic Wind Sensor uSonic-3 Cage *MP*

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

Minimum flow distortion by vertically aligned measuring paths



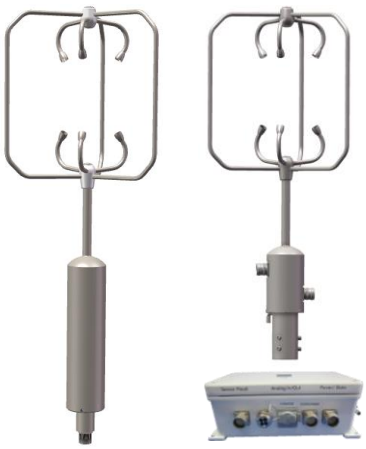


The ultrasonic anemometer **uSonic-3 Cage *MP*** uses a patented innovative method for highest performance in atmospheric wind and turbulence sounding. Based on the well proven METEK ultrasonic sensor family uSonic-3 the Multi-Path concept allows that a single pulse transmitted by one transducer is received 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 9 radial wind components and 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.

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 - max. dev. - rms - resolution	Acceptance angles ± 180 ° (omni-directional) ± 1 % @ 5 m/s, 0 ° ... 10 ° inclination ± 2 % @ 5 m/s, 10 ° ... 20 ° inclination 0.5 % @ 5 m/s, 0 ° ... 10 ° inclination 1 % @ 5 m/s, 10 ° ... 20 ° inclination 0.006 m/s (vertical), 0.01 (horizontal)
Accuracy wind direction - max. dev. - rms	Acceptance angles ± 180 ° (omni-directional) ± 1,5 ° @ 5 m/s, 0 ° ... 20 ° inclination 1 ° @ 5 m/s, 0 ° ... 20 ° inclination
Accuracy temperature - resolution	 0.01 K
Analog input channels	8 analog input channels, 20/17 bit resolution (nom., eff.)
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 16/14 bit nom./eff. resolution, 0 … 5/10 VDC or - 5/-10 … 5/10 VDC or 0/4 … 20 mA, 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.

Sensor configurations



Left: Standard version

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

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