TSA1 – Triaxial sonic anemometer with on-board heater (Rev.0 020424)

Description

The TSA1 sensors are triaxial static ultrasonic anemometers for measuring the Cartesian U-V-W components of the wind.
The anemometer is equipped with a heater to prevent snow and ice from accumulating in the entire wind measurement area (transducers, arms and their supports), thus ensuring **accurate measurements in all environmental conditions**.

In addition, its AISI 316 stainless steel construction ensures a long service life and high weather protection, making it suitable for the harshest operating conditions.
In fact, the anemometer meets the requirements of the following standards

- MIL-STD-810G Method 509.6 and EN ISO 9227:2017 (salt spray corrosion test).
- MIL-STD-810F Method 521.2 (frost/freezing rain test)
- EN 60068-2-6:2008 / IEC 60068-2-6:2007 (vibration resistance test)

The following outputs are available

- **RS232, RS485 and RS422** isolated outputs, with proprietary **NMEA, Modbus-RTU and ASCII** protocols. **SDI-12** isolated output. Anemometer output quantities: wind speed and direction, U-V-W components, atmospheric pressure, sonic temperature, tilt angle
- **Three analogue outputs**, for wind speed and direction or Cartesian U-V-W wind components (choice of 4...20mA, 0...5Vdc or 0...10Vdc).

All models are equipped with a small compass that allows the anemometer to be easily oriented to the North

Advantages

- ✓ The absence of moving parts minimizes the maintenance of the instrument;
- ✓ High sensitivity for very low speed detection, not detectable by traditional methods;
- ✓ Low power consumption of the instrument allows installation on remote sites, with power from photovoltaic panel and buffer battery;
- ✓ The integrated heater prevents snow accumulation and ice formation, allowing accurate measurements in all environmental conditions;
- ✓ Fast and easy installation (pole mounting diameter 40mm), integrated alignment facilitated alignment;

Main applications

- ✓ Wind farm monitoring
- ✓ Automatic weather stations (AWS)
- ✓ Monitoring of buildings, constructions and bridges
- ✓ Ports, airports and heliports
- ✓ Road and rail tunnels

Geoves Snc
Via Magg.Piovesana, 155/a 31015 Conegliano (TV) - Italy
C.F. e P.IVA: 04433390269
tel.: +39 0438 22099 fax: +39 0438 420668
E-mail: info@geoves.it http://www.geoves.it

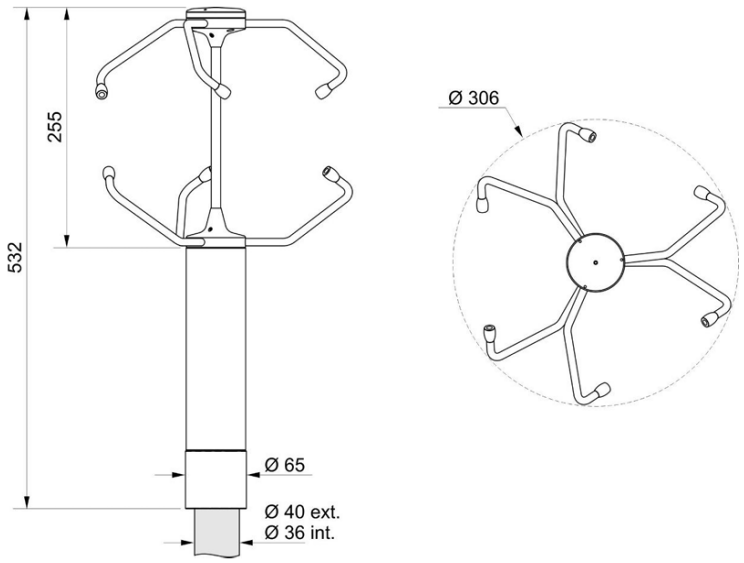
Technical features

Mod. TSA1 Measure:	Wind speed	Wind direction	Atmospheric pressure	Sonic temp.	Tilt
Transducer	Triaxial sonic	Triaxial sonic	Piezoresistive	Calculated meas.	Magnetic
Typ. Range	0…85m/s	Azimuth: 0…360° Elevation: ±60°	300…1100hPa	-40…+60 °C	/
Resolution	0,01 m/s	0,1°	0,1 hPa	0,1 °C	0,01°
Accuracy	±2% of the meas. (0…65 m/s); ±3% of the meas. (> 65 m/s)	±2° RMSE (2…65 m/s); ± 3° RMSE (> 65 m/s)	±0,5hPa (700…1100hPa) @ 20°C; ±1hPa (500…1100hPa); ±1,5hPa (300…500hPa) @ T=0…60°C	±1°C	±1°

Generic features

Power supplì *	12…30Vdc (15…30 Vdc for 0…10V output) / < 8 W
Heater power supply **	24 Vdc ± 10% / 105 W
Serial outputs and Communication protocols	Insulated RS232, RS485, RS422 and SDI-12 NMEA, Modbus-RTU, SDI-12, proprietary ASCII
Analog outputs	n.3 outputs for wind speed and direction or for the U-V-W cartesian components of the wind speed. Output types: 4…20mA, 0…5 or 0…10Vdc Depending on the model: Load max 500Ω for current output; min 10 kΩ for voltage output Analog outputs updating rate: 4Hz
Measurement sampling	From 1 to 4Hz (measurements/s)
Wind speed averaging and wind gust calculation intervals	Configurable from 1 second to 10 minutes
Electrical connecytion	19-pole M23 male connector
Working conditions	Temperature: -40…+70°C; Wind speed max: 100m/s
Installation	On vertical pipe øe40mm and øi36mm
Protection degree	IP67 (EN 60529)
Anti-corrosion test Anti-icing/freezing rain test Vibration resistance test	MIL-STD-810G Method 509.6 (48 hours of exposure + 48 hours of drying) EN ISO 9227:2017 MIL-STD-810F Method 521.2 EN 60068-2-6:2008 IEC 60068-2-6:2007
Housing	AISI 316 stainless steel
Dimensions and weight	ø306 x h532 mm, 2.600g

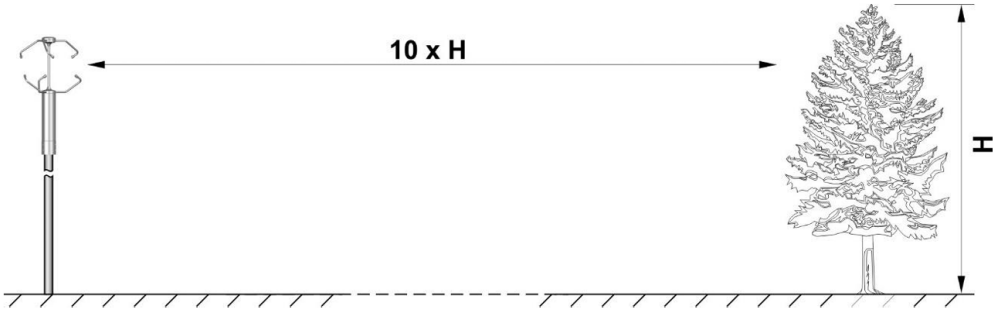
(*) The main power supply of the instrument also powers the sensors heating, which cannot be disabled. The max. consumption occurs when the sensor heating is on. (**) Heating of sensor support arms is independent of the main instrument power supply and can be disabled.



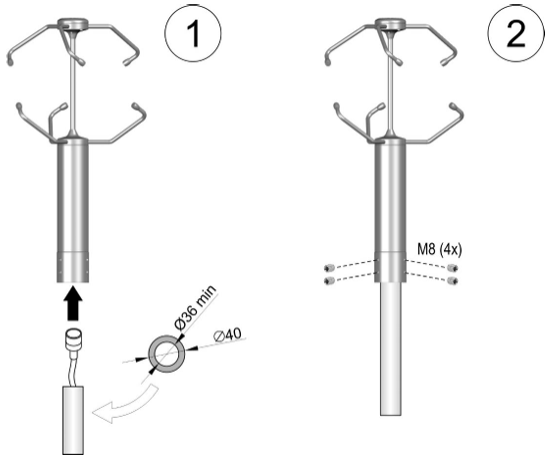
Geoves Snc
Via Magg.Piovesana, 155/a 31015 Conegliano (TV) - Italy
C.F. e P.IVA: 04433390269
tel.: +39 0438 22099 fax: +39 0438 420668
E-mail: info@geoves.it http://www.geoves.it

Mounting

The instrument must be installed in the exactly vertical position and open field, away from surrounding objects that can alter the natural airflow. Any surrounding objects (buildings, trees, trellises, etc.) must be at a distance of at least 10 times their height. In the presence of surrounding objects it is advisable to install the instrument at about 10m in height.



The support pole must be placed on a stable surface to avoid vibrations and must have a maximum outer diameter of 40mm and internal of ø36mm (s. picture ❶). Fastening to the pole is done by means of 4 M8 grub screws as shown in the figure ❷.

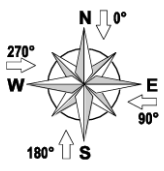


Installation in base of the application

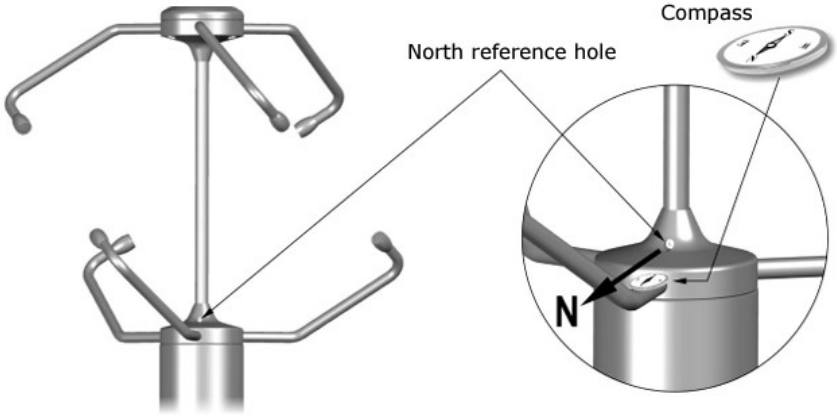
Application	Installation height	Localization
Meteorology (ref. WMO Annex 8)	2…10m from the ground	Installation in open field, at the top of the pole and in any case not exceeding 10m in height, away from vertical obstacles at least 10 times the height of the obstacle. The sensor should be usually installed on the top of the main support pole. Installation on top of hills or buildings where turbulence may be present is not recommended.

Instrument orientation

The instrument measures the wind direction with respect to a reference on the housing: the hole on the lower arm support disc. The reference must be aligned with geographic north. Alignment can be done using the magnetic compass on the lower arm protruding from the reference hole, taking into account the magnetic declination (angular difference between geographic north and magnetic north) of the place where the instrument is installed.
If the wind speed and direction values (azimuth) are given in polar co-ordinates, an angle of 0° corresponds to a wind from the north.

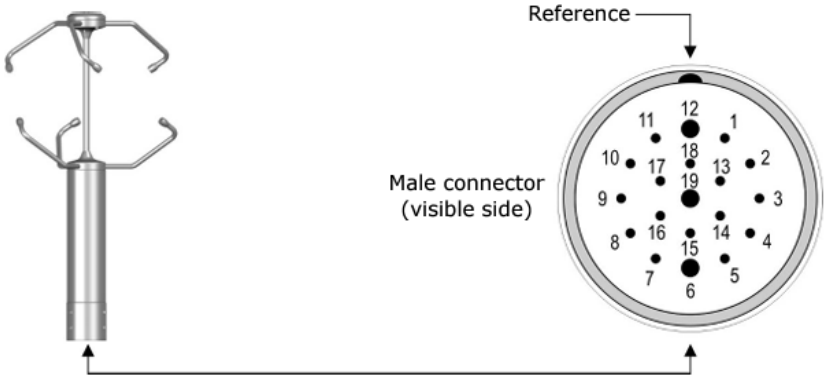


Geoves Snc
Via Magg.Piovesana, 155/a 31015 Conegliano (TV) - Italy
C.F. e P.IVA: 04433390269
tel.: +39 0438 22099 fax: +39 0438 420668
E-mail: info@geoves.it http://www.geoves.it



Electrical Connection

All connections are made via the 19-pin male connector located at the bottom of the instrument. The following figure and table show the numbering and meaning of the connector contacts:



Connector pin number	CPM23-19.x wire color	Symbol	Description
1	White/Red	AOUT3	Analog output 3 positive
2	White/Grey	SDI-12	SDI-12 output
3	Yellow/Brown	RX+	Serial receive (input) positive
4	Brown/Green	HEAT-	Arms heating power supply negative
5	Violet	HEAT+	Arms heating power supply positive
6	Brown	HEAT-	Arms heating power supply negative
7	Grey/Brown	HEAT+	Arms heating power supply positive
8	Yellow	DGND	Digital ground (isolated from V –) (*)
9	Grey	TX-	Serial transmission (output) negative "DATA –" main RS485 output
10	White/Yellow	AUX_B	"DATA +" auxiliary RS485 output (D+)
11	White	AUX_A	"DATA –" auxiliary RS485 output (D-)
12	Black	V-	Instrument power supply negative
13	Green	RX-	Serial receive (input) negative
14	Pink/Brown	AOUT1	Analog output 1 positive
15	Blue	AGND	Analog ground (isolated from V –) (*)
16	Red/Blue	AOUT2	Analog output 2 positive
17	White/Green	TX+	Serial transmission (output) positive "DATA +" main RS485 output
18	--		Not connected
19	Red	V+	Instrument power supply positive
--	Grey/Red	SHIELD	Cable shield / Connector shell / Anemometer housing

(*) DGND and AGND are internally shorted.

Note: the TX and RX signal connection depends on choseen serial connection type.

Geoves Snc
Via Magg.Piovesana, 155/a 31015 Conegliano (TV) - Italy
C.F. e P.IVA: 04433390269
tel.: +39 0438 22099 fax: +39 0438 420668
E-mail: info@geoves.it http://www.geoves.it