

Ultrasonic Anemometer TF 2D S86200H / S86220H / S86240H / S86260H

S86200H - with transducer heating
 S86220H - with transducer and brackets heating
 S86240H - with transducer, brackets and coverage heating
 S86260H - with transducer, brackets, coverage and body heating

- Measurement of wind speed, wind direction and virtual temperature
- Maintenance-free
- Different heating options available
- Digital & Analog outputs



Description

The 2D Ultrasonic Anemometer is designed for simultaneous measurement of horizontal wind speed and wind direction parameters as well as the acoustic temperature, without use of any moving parts. It is equipped with the latest technology and is air-flow optimized. The 2D Ultrasonic Anemometer is a very precise, durable and multi-functional sensor.

Thanks to its robust design and its optional heating, the sensor is suitable particularly for heavy duty tasks, such as wind energy measurement or measurement under extreme climatic conditions. Various simultaneously available outputs enable a high degree of flexibility in use.

The 2D Ultrasonic Anemometer measures horizontal wind speed and wind direction, resp. wind vector parameters by means of 2 orthogonally placed measuring tracks. Wind vector components x and y, as well as the acoustic temperature are determined from sonic pulses runtime measurement.

Horizontal wind speed and wind direction are calculated from these vectors. The temperature value is derived from the sonic speed and is therefore not identical with the regular dry temperature, measured by a thermometer, but comes close to the meteorological virtual temperature, considering the humidity content.

The sonic velocity depends on the air density (scalar value) and the interfering wind speed (vectorial value). By calculating the difference of runtime between way there and way back, scalar values (temperature, humidity, density) are eliminated and the result comprises wind speed, only. By calculating the addition of runtime, on the other hand, the wind speed is eliminated, so that the "acoustic" temperature can be determined. This temperature, however, also depends on the ambient air pressure and humidity. For sea level conditions, it may be assigned to the "virtual temperature" which considers the relative humidity, hereby resulting in values 1...2.5 K above those obtained from an ordinary "dry" thermometer. Basing on this principle, the wind components are measured independent from ambient air pressure, air temperature and relative humidity, while the acoustic temperature varies with these parameters.

The calibration parameters are not influenced by aging, as there are no moving mechanical parts involved. As well, all further disadvantages from mechanically moving cup anemometers and wind vanes are avoided. Operation under ice conditions is realized by optional built-in heating devices.



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Alignment towards North

For precise measurement of the wind direction the sensor must be aligned towards North. The transducer bracket marked with **NORTH** must point to the direction of geographic north. Procedure for north adjustment:



1. A prominent landmark-sharp should be chosen in north direction.
2. Turn the sensor or the mast until the North-South measuring track is lined up in this direction.
3. Local magnetic variations on basis of annoying magnetic fields, generated, e.g., by close iron parts, are to be considered.
4. Tighten the M8 set screws in a way that all of them are screwed into the sensor base thread in about the same depth and fixed tightly.

Another NORTH mark in the form of a North-borehole is located in the footpart of the sensor.



The NORTH - borehole is in alignment with one transducer bracket, labeled as NORTH. With the help of an additional North-Mastfoot the sensor can be aligned simply to true north. Just mount the North-Mastfoot once to the pole, set it to geographic north and fix it. This North-Mastfoot will remain in that position. When re-mounting a sensor to the mast, make sure the North-borehole of the sensor fits into the north pin of the North-Mastfoot.



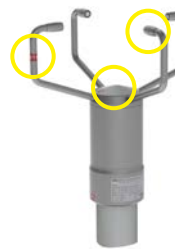

The exact dimensions for the North-borehole are provided in the dimensional drawing. The North-Mastfoot is not included in the delivery but can be provided on request.

Using Ultrasonic anemometers for wind energy assessments in cold climates

Ultrasonic anemometers have proven to be ideally suited for harsh winter conditions in comparison to traditional cup anemometers. Advantages of ultrasonic anemometers are:

- Very effective heating system including all relevant parts of the sensor
- Distinct failure notice in cases of icing
- No "slowing down"-effects due to icing
- No influence of the heating on mechanical and aerodynamic features of the sensor

The 2D Ultrasonic Anemometer is available with different heating options:

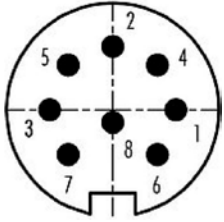
Order No.	S86200H	S86220H	S86240H	S86260H
Heating options	<ul style="list-style-type: none"> • Transducers 	<ul style="list-style-type: none"> • Transducers and brackets 	<ul style="list-style-type: none"> • Transducers, brackets and coverage 	<ul style="list-style-type: none"> • Transducers, brackets, coverage and body
				

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Wind Speed	
Measuring range	0 ... 75 m/s
Accuracy	± 0.1 m/s @ ≤ 5 m/s ± 1.5 % of meas. value @ > 5 m/s
Resolution	0.1 m/s or <0.01 m/s (depends on telegram type)
Wind Direction	
Measuring range	0 ... 359°
Accuracy	± 0.6° RMS (@ 8m/s), ± 1° absolute
Resolution	1° or 0.1° (depends on telegram type)
Virtual Temperature	
Measuring range	-55 ... +70°C
Accuracy	± 0.5 K @ > 0.6 m/s
Resolution	0.1 K or 0.01 K (depends on telegram type)
Data Output Digital	
Interface	RS485 (HD) / RS422 (FD), selectable (Bus mode with 99 participants possible)
Baud rate	1200 ... 115200 Baud, selectable
Update rates (<i>Instantaneous/Averaging</i>)	0.000278 ... 100 Hz (10 ms to 60 s), selectable for wind speed, direction and virtual temperature
Output rate	0.0167 ... 1000 Hz (1 ms to 60 s), selectable
Status identification	Heating, internal voltage error, blocked measurement track, ΔT track deviation, plausibility
Protocols	Modbus RTU
Data Output Analog	
Electr. output	0/4 ... 20 mA or 0/2 ... 10 V, freely selectable for wind speed and direction
Update rates (<i>Instantaneous/Averaging</i>)	0.000278 ... 100 Hz (10 ms to 60 min), selectable for wind speed, direction and virtual temperature
Output rate	0.0167 ... 1000 Hz (1 ms to 60 s), selectable
Resolution	16 bit
General	
Temperature range	Oper. temperature: -55...+70°C (with body heating), -40 ... +70 °C
Internal measuring rate	2000 samples per second @ 20°C 500 measurement values per second @ 20°C
Operating voltage	S86200H Power supply electronics + heating: 20 W @ 24 V DC S86220H Power supply electronics + heating: 85 W @ 24 V DC S86240H Power supply electronics + heating: 125 W @ 24 V DC S86260H Power supply electronics + heating: 230 W @ 24 V DC
Electr. connection	8-pole plug M16 from Binder series 423
Mounting	Mast tube ø 48 ... 50 mm
Protection	IP 67
Weight	1.4 kg
Housing material	Stainless steel V4A
Manufacturer	Theodor Friedrichs / MESA
Ammonit Meteo-40	RS485-M (Half duplex, 2-wire, baudrate: 38400 bps)
Accessory	Module set M83575 (set includes module M83570 and isolated repeater M84100)

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Connector Pin Assignment (Serial interface, half-duplex and analog outputs)

Plug Pin No.	Allocation	Function	Ammonit wire color	Solder terminal of coupling socket
1	RX-*			
2	TXD- / RXD-	Serial interface	brown	
3	Control / GPI**	Function configurable	green	
4	RX+*			
5	TXD+ / RXD+	Serial interface	white	
6	AGND		yellow	
7	VIN+	Supply +	red, pink	
8	VIN-	Supply -	blue, grey	

* If configured by Ammonit, Pin not used.

** If heating is managed by the Meteo-40 data logger, Pin 3 is configured to switch the sensor heating. (configuration by Ammonit)

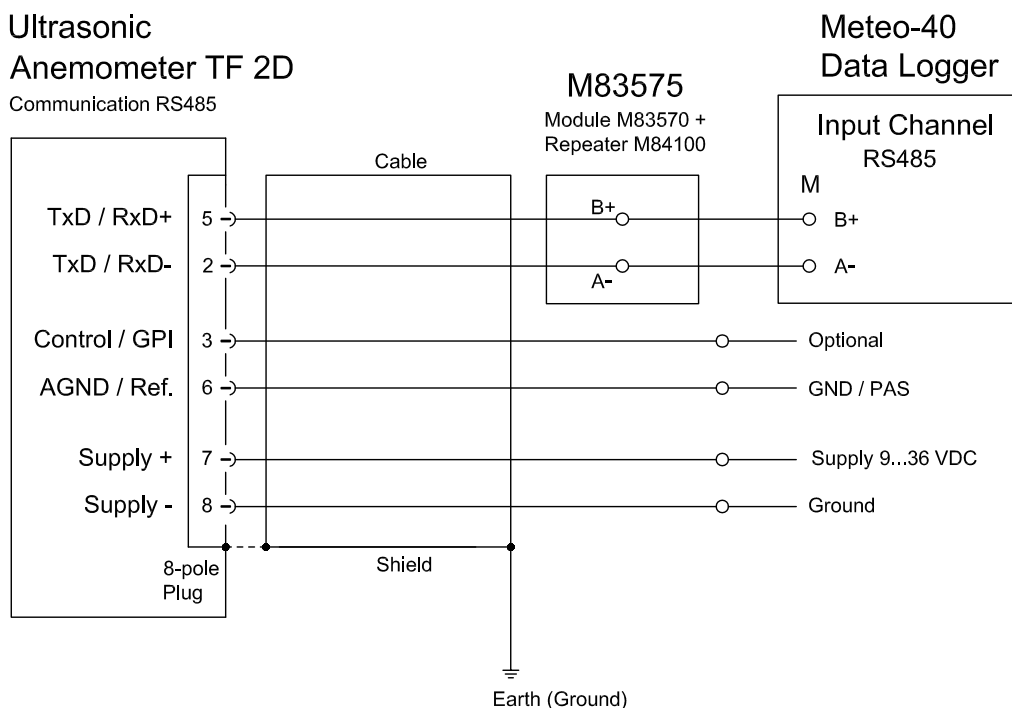
The pins of the power supply and the pins 1 to 6 are among each other and the housing galvanically isolated.

Cable type without heating: LiYCY 4 x 2 x 0.25mm²

Cable type with heating: Contact Ammonit for cable type.

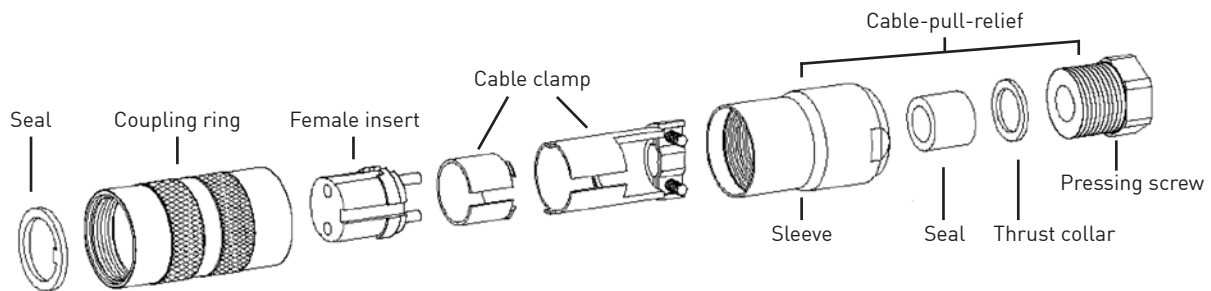
Sensor Connection to Ammonit Meteo-40 Data Loggers

In order to connect the Ultrasonic sensor to the Ammonit Meteo-40 data logger, an additional module set (M83575) has to be installed between sensor and data logger.



Plug and cable assembly

Coupling socket, Type: Binder, Serial 423, shielded



1. Stringing parts on cable acc. to plan given above.
2. Stripping cable sheath 20 mm
Cutting uncovered shield 15 mm
Stripping wire 5mm.

Cable mounting 1

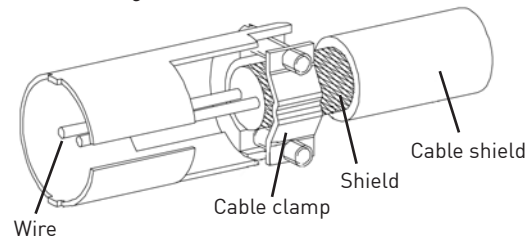
Putting shrink hose or insulating tape between wire and shield.

Cable mounting 2

If cable diameter permits, put the shield backward on the cable sheath.

3. Soldering wire to the insert, positioning shield in cable clamp.
4. Screwing-on cable clamp.
5. Assembling remaining parts acc. to upper plan.
6. Tightening pull-relief of cable by screw-wrench (SW16 und 17).

Cable mounting 1



Cable mounting 2

