User Manual

Ultrasonic Anemometer - AN30 Infitech

Infitech's ultrasonic anemometer AN30 measures horizontal components of wind speed and direction. It uses the time travel method, which consists in detecting the time that an ultrasonic wave takes to travel between two transducers.

Wind speed and direction values are available in one of the following ways:

- Analog output current - 4-20 mA;
- Modbus-RTU register - RS-485 or RS-422 interface;
- SDI-12.

The power supply and communication hardware have electronic protections against surge voltage and reverse connection.

The equipment has a stainless steel body with polyurethane paint and is very resistant against corrosion. It has no moving parts, so it doens't need regular maintenance or periodic calibration.

Figure 1. Ultrasonic anemometer AN30

· Wind power systems;

· Meteorological systems;

· Climatology;

· Sport events;

· Navigation, aviation and traffic engineering.

Electrical characteristics:

- Supply voltage: 12 ~ 28 Vdc;
- Maximum power consumption: 2 W;

Wind speed:

- Range: 0 ~ 40 m/s;
- Accuracy: +-3%;
- Resolution: 0.1 m/s;

Wind direction:

- Range: 0 ~ 360°;
- Accuracy: +- 2°;
- Resolution: 1°.

Outputs:

- Digital:
  - -Interfaces: RS-485, RS-422, SDI-12;
  - -Communication protocols: Modbus RTU, SDI-12.
- 2 Analogs(speed and direction):
  - -Type: 4-20 mA;
  - -Maximum load: 600 Ω;
  - -Resolution: 12 bit;
- Output rate: 2 Hz.

General:

- Protection: IP66;
- Weight: 2,2 kg;
- Housing material: Stainless steel (316L) with polyurethane coating;
- Operating temperature: 0 ~ 55 °C.

Certifications:

- Wind: MEASNET;
- EMC: IEC 61000-4-4, IEC 61000-4-2;
- Protection class: IEC 60529.

Sensor orientation:

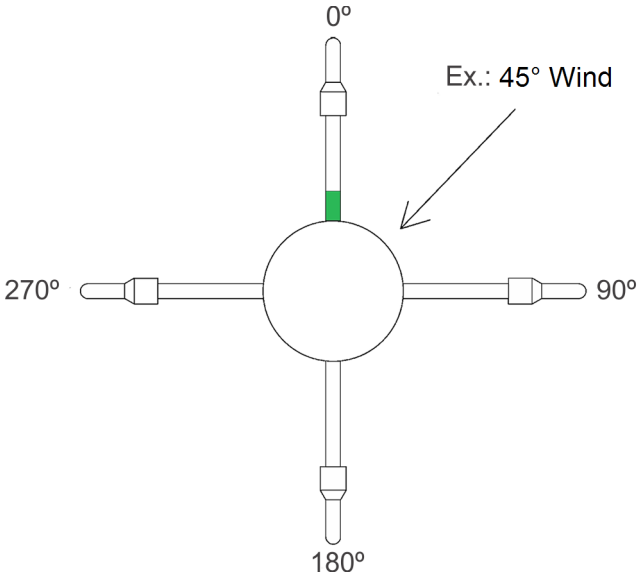


Figure 2. Ultrasonic anemometer AN30 top view

Dimensions:

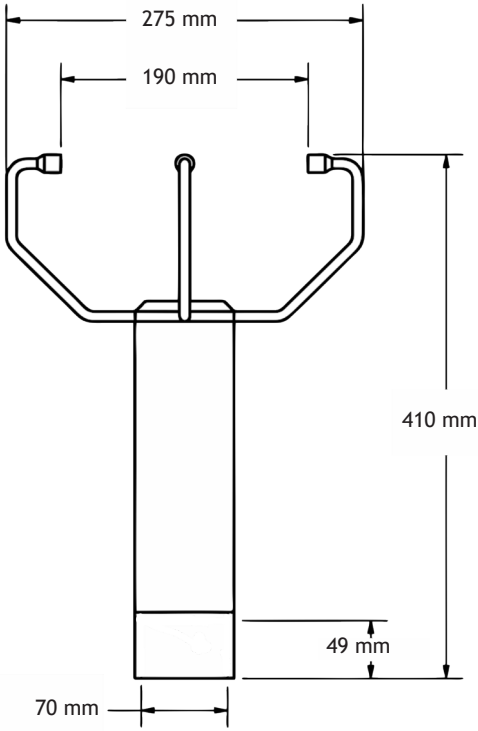


Figure 3. Ultrasonic anemometer AN30 front view

Fasten the connector located at the bottom of the anemometer. Place the anemometer in a mast tube, north align the marked sonic transducer and firmly tight the fixation screws of the device, according to Figure 4.

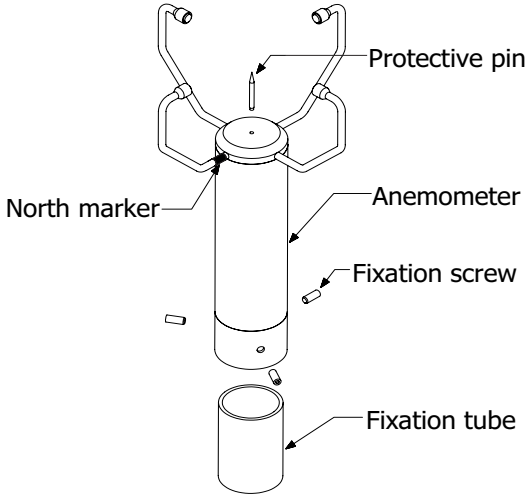


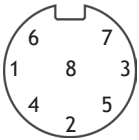
Figure 4. Ultrasonic anemometer AN30 installation

The anemometer has a protective pin to prevent birds from landing at the equipment. To install it, simply thread it in its proper place according to Figure 4.

Install the ultrasonic anemometer AN30 in tubes of 68 mm maximum external diameter and 25 mm minimum internal diameter, due to its connector, according to Figure 5.

Figure 5. Ultrasonic anemometer AN30 bottom view

Connection:

8 Pins circular connector	Pinout			Description	Function	Color (cable)
	RS-485	RS-422	Analog			
	-	1	-	Z (TX-)	Serial interface	Yellow
	2	2	-	A (RX+)	Serial interface	Blue
	3	3	3	Vdc 12-28 (+)	Supply voltage	Red
	4	4	-	B (RX-)	Serial interface	White
	5	5	-	Gnd Iso	Isolated Ground Serial interface	Green
	-	6	-	Y (TX+)	Serial interface	Orange
	7	7	7	Gnd (-)	Ground	Black
	-	-	2	Speed (4-20 mA)	Analog output	Blue
	-	-	5	Direction (4-20 mA)	Analog output	Green

Communication characteristics:

Communication		Default values
Interface	RS-485 / RS-422	-
Protocol	Modbus-RTU	-
Baud rate (bps)	1200 ~256000	9600
Parity	None, Odd, Even	None
Stop Bits	1 or 2	1
Data Bits	8	8
Slave Address	1 - 247	200

RS-485 interfaces allows connecting up to 32 devices to the same communication bus without repeaters.

Modbus RTU

The RS-485/422 Modbus-RTU Interface has reading and writing Modbus-RTU functions for data acquisition and configuration registers changes.

The registers 1000, 1001 and 1002 set the device communication, according to Table 1.

Table 1. Configuration registers.

Register	Register Address		Data	Description
	Write (06/10)	Read (03)		
Baud Rate	1000	1000	01/ 02/ 03/ 04/ 05/ 06/ 07/ 08/ 09/ 10/ 11	1200/ 2400/ 4800/ 9600/ 14400/ 19200/ 38400/ 56000/ 57600/ 115200 / 256000
Slave address	1001	1001	01 - 247	Device slave address (ID)
Parity	1002	1002	01/ 02/ 03	None/Even/Odd

The following example changes the device Baud Rate to 115200 bps.

Slave address (ID)	Function	Register Address	Data	CRC
200	06	1000	10	38996

Averaging

The Infitech's anemometer can average the speed and direction data. The averaging period can be set from 0 to 3600 seconds and is configurable through Modbus RTU registers, according to Table 2.

*Note: Averaging can also be set in the analog output model, but the user must inform the factory before ordering.

Table 2. Averaging configuration registers.

Register	Register Address		Data	Description
	Write (06/10)	Read (03)		
Speed averaging configuration	1003	1003	0 ~ 3600	Averaging period in seconds
Direction averaging configuration	1004	1004	0 ~ 3600	Averaging period in seconds

The wind speed and direction are available through analog current outputs or Modbus RTU protocol.

Analog current output

The anemometer has two analog current outputs proportional to wind speed and direction. These outputs are active (with power supplied by the AN30), within range from 4 to 20 mA, with maximum load of 600 Ω.

For the conversion of the current signal into speed (m/s), use the following equation:

$$\text{Speed (m/s)} = \frac{\text{current (mA)} - 4}{16} \times 40$$

The convertion of the current signal into direction (°) is performed in a similar way, according to the equation bellow:

$$\text{Direction (°)} = \frac{\text{current (mA)} - 4}{16} \times 360$$

Modbus RTU

The wind speed and direction data are available in registers 2000 and 2001, or 2002 and 2003 for averaging values, according to Table 3.

Table 3. Data register reading.

Measurement data registers		
Function(03)	**Register Address**	**Description**
Speed	2000	Wind speed multiplied by 10 (m/s)
Direction	2001	Wind direction (°)
Average speed	2002	Average wind speed according to averaging period set on register 1003, multiplied by 10 (m/s)
Average direction	2003	Average wind direction according to averaging period set on register 1004

Note[1]: The registers 2000 and 2002 returns the value of the wind speed multiplied by 10.

Note[2]: The data output rate of the average registers (2002 and 2003) is equal to the averaging period set on their respective configuration registers (1003 and 1004).

The following example reads the wind speed and direction of the device with slave id 200.

Slave Address (ID)	Function	Starting address	Quantity of registers	CRC
200	03	2000	2	54559

The device will return the actual measurement value.

Slave Address (ID)	Function	Byte count	Data (2000)	Data (2001)	CRC
200	03	04	11	309	4986

The data fields have the values of wind speed and direction.

In the example above, the wind speed register (2000) has a value of 11, which must be divided by 10 to represent the real value of 1.1 m/s. The wind direction register (2001) has the value of 309, which represents the real value 309°.

Fault detection

The anemometer has a fault detection system that can detect obstructions on the measurement path of the sensors or considerable changes on the ideal distance between the sensors. When detected any of these faults, the anemometer will constantly output:

-Analog outputs: 4 mA (wind speed and direction);
-Modbus RTU: Register 2000 -> 50 m/s (speed)
Register 2001 -> 400 °C (direction)
Register 2004* -> 0, 1 or 2.

*Users can alternatively read Register 2004 that indicates if a pair of transducers is in fault (0 for none, 1 for pair 0° and 180°, 2 for pair 90° and 270°).

To return the device to its default configuration it is necessary to:

•Configure the serial communication: 9600 bps, no parity, 8 data bits and 1 stop bit.

•Turn on the power and send in up to 2 seconds the following frame through serial port: 0x44,0x50,0x4D. (Values shown in hexadecimal)

EX: AN30.D485.M01

Product identification

Output interface	
D485	RS-485
D422	RS-422
D012	SDI-12
A420	4-20 mA

Cable lenght	
M00	Connector only
M01	1 meter
M10	10 meters
M15	15 meters

Infitech - DPM Engenharia LTDA
Av. Ministro José Américo, 275
Parque Iracema - Fortaleza
SAC: (85) 3276-4074
www.infitech.com.br