FA13
Wind Speed Sensor

Products description and application

FA13 is an industrial wind speed sensor with strong environmental adaptability. Built-in sensitive temperature sensor, it can be automatically heated in low temperature environment to ensure reliable operation of the sensor. The wind cup of the product is connected with the main body in a labyrinth structure, using imported Japanese bearings, high-quality aluminum alloy materials, the surface is anodized, and the internal circuit is sealed with three-proof paint and glue, which can effectively prevent water, salt spray, sand and dust from affecting the product life. Impact. There are multiple signal output methods, easy to install and maintenance-free. It has been widely used in ports, construction machinery, meteorological and environmental protection, electric power, transportation and other fields.

Features

- Adopt non-contact magnetic sensor measurement principle.
- The collected data has high accuracy and strong reliability.
- The wind speed measurement range is wide, and the starting wind speed is low.
- Adopt full metal shell, surface anodic oxidation, good corrosion resistance, strong wind resistance ability of wind cup.
- The wind cup is made of magnesium-aluminum alloy and mature mechanical connection, which can meet the requirements of various industrial harsh environments.
- Compact design, integrating wind speed measurement, automatic heating functions, easy on-site installation and maintenance.
- Adopting fault-tolerant design, the sensor will not be damaged when the wrong wire is connected.
- Multi-level lightning and surge protection design.
- Can work in a wide voltage range.

General Specifications

Standards			
CE： IEC 61326			
Electrical		**Mechanical**	
Rated voltage	12VDC～30VDC[1]	Colour	Anodized black
Operating current	50mA Max[2]	Housing material	6061/ Anodizing
Heating voltage	18VDC~30VDC[3]	Wind cup material	5052/ Anodizing
Heating power	≤50W	Bearing material	stainless steel 440C
Heating type	PTC auto-heating	reference weight	0.6kg
Lightning surge	IEC61000-4-2 Contact discharge:±8kV Air discharge:±15kV	Installation method	OD φ50mm pipe installation φ27-φ30mm through board installation
	IEC61000-4-5 Wire to wire:±2kV Wire to ground:±4kV	Operating Working humidity	-40˚C ~ +70˚C IEC60068-2-3 0~100% RH
Principle	Non-contact magnetic code scanning	Vibration resistance level	5-10Hz，d=3mm
Wiring	Aviation socket[4]		10-500Hz，a=2g
Cable	6-core shielded cable with	Enclosure rating	IEC60529 IP65

configuration[5]	aviation plug 6*0.5mm²+1*0.5mm²	Salt spray grade	ISO9227	720h

Meteorological parameters	
Starting wind speed	≤0.5m/s Vu=20 C
Anti-wind level	＞70m/s
Range	0~50m/s[6]
Accuracy	±0.5m/s（VL<5m/s）or ±3% VL(VL>5m/s)
Resolution	0.1m/s

1.Refer to the selection table for specific working voltage.

2.Signal terminal working current.

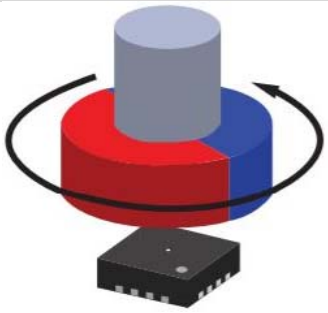
3.Insufficient sensor heating power will affect heating performance.

4.Refer to the selection table for specific outlet methods.

5.The cable is purchased separately and is not included in the sensor.

6.Refer to the selection table for the specific measurement range.

Sensor measurement principle



FA13 uses the classic three-cup rotation to measure the wind speed. The electromechanical conversion circuit is realized by the combination of the magnet on the end of the rotating shaft and the imported magnetic encoding chip on the circuit board. The analog-to-digital conversion and data processing by the single-chip microcomputer can ensure the wind speed output by the sensor. The signal is accurate and reliable.

Installation Environment

In order to make the data measured by the wind sensor representative and reduce the uncertainty of the test data, the installation site environment should be selected reasonably. The specific requirements are as follows:

A. Meteorological industry use:

1. The wind sensor must be installed at a height of more than 10 meters from the ground and there are no obstacles on the ground, or the distance between the wind sensor and the obstacle is at least ten times the height of the obstacle itself. If this requirement cannot be met, then wind measurement The sensor should be placed about 6 to 10 meters above the obstacle.

B. General industrial applications:

1. When the wind sensor is installed on the roof, it should be installed in the center of the flat roof. Do not install it sideways to avoid the influence of a certain direction. It should be 6 meters higher than the roof, and at least 2 to 5 meters if it cannot be satisfied.
2. When the wind sensor is installed on the top of the tower, the installation height is greater than 2 times the tower diameter.
3. If there must be an obstacle around the installation plane, the distance from the obstacle is L=4* (the height of the obstacle-the installation height of the wind sensor).

C. Wind power industry application:

1. If the instrument is installed on the wind tower, please refer to Appendix G of IEC 614000-12-1 for installation.
2. If the instrument is installed in the wind turbine cabin, please refer to Appendix A of IEC 61400-12-2 for installation.

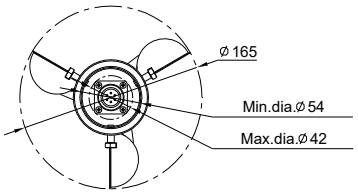
D. The wind speed sensor and wind direction sensor crossbar are installed side by side:

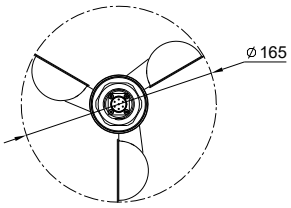
1. When the wind speed sensor and the wind direction sensor are installed side by side through the

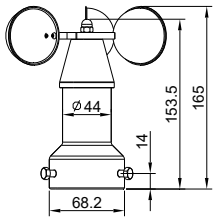
crossbar, the distance between the installation centers of the two sensors should be greater than 1m~1.5m, or greater than the sum of the maximum gyration radius of the wind vane and twice the gyration radius of the wind cup.

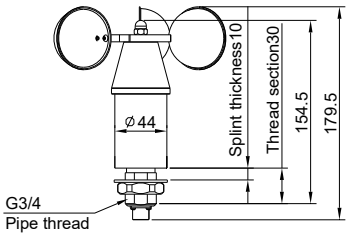
Mounting dimensions

Unit:mm



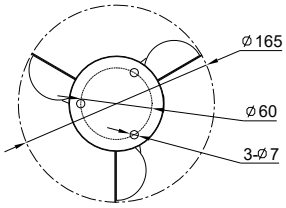


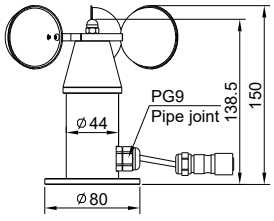




Tube installation method:

1. Insert the aviation plug with the cable into the aviation socket at the bottom of the sensor and lock the thread(Pay attention to the direction of the pins to avoid damaging the pins).
2. Install the wind speed sensor on the high point of the equipment and fasten it with 3 M6 hexagon head bolts.





G3/4 threaded plate installation method:

1. Install the sensor in the mounting hole (φ27~φ30mm) of the equipment bracket; fix the sensor with a serrated lock washer and a G3/4 hexagon nut.
2. Insert the aviation plug with the cable into the aviation socket at the bottom of the sensor and lock it(Pay attention to the direction of the pins to avoid damaging the pins).

Flange installation method:

1. Install the sensor on the flange plane of the device, and insert 3 sets of M6 bolts (plus flat washers and spring washers) through the sensor φ7 hole and the flange plane hole (the flange plane hole size is recommended to be φ7), and Lock nut on the back.
2. Insert the aviation plug with cable into the aviation socket on the side of the sensor and lock it(Pay attention to the direction of the pins to avoid damaging the pins).

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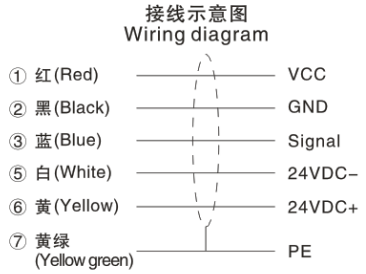
Wiring diagram



Asynchronous serial port output: The communication cable adopts RVVP/0.5mm²/copper core/high and low temperature resistant shielded flexible wire; the maximum communication distance is 200m.

Caution:

1. Must be used with FA101C display.
2. The blue signal line number tube of the outgoing line is marked as Signal, which means the wind speed signal output.
3. The actual communication distance is related to the field application.

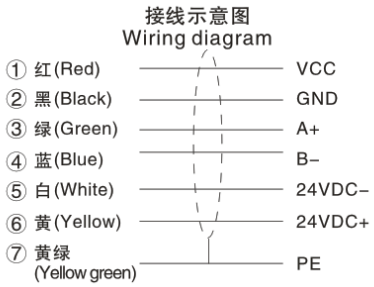
4-20mA current signal output: it is recommended to use RVVP/0.5mm² /copper core/high and low temperature resistant shielding cable, maximum communication distanct is 1000m.

Caution:

1. Blue wire is the signal line, marked as *Signal*, indicates the wind speed signal ouput.
2. Actual communication distance is in accordance with onsite environment.

Caution：

1. Ensure cable connection is correct before power on.
2.Cable shield layer and housing must be well grouded.
3. Its suggested to return product to facotry for calibrating every 18 months.



RS485 signal output: it is recommended to use RVVP/0.5mm/copper core/high and low temperature resistant shielding cable, maximum communication distanct is 1000m.

Caution:

1. The outgoing green signal line number tube is marked as A+, and the blue signal line is B-.

The actual communication distance is related to the field application.

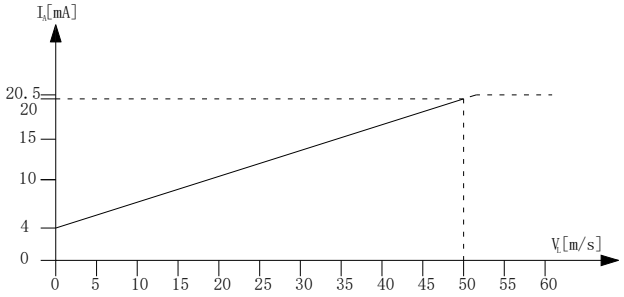
NPN signal output: it is recommended to use RVVP/0.5mm² /copper core/high and low temperature resistant shielding cable, maximum communication distanct is 1000m.

Caution:

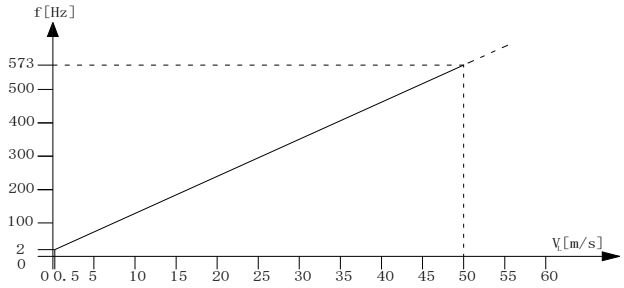
1. Blue wire is the signal line, marked as *Signal*, indicates the wind speed signal ouput.
2. Actual communication distance is in accordance with onsite environment.

Output characteristic curve

4-20mA Current output characteristic curve：



2-573Hz Pulse output characteristic curve：



Protocol

UART Protocol:

Baud rate:

300bit/s, 8bit data, no parity check, one stop bit, signal amplitude0~VCC.

Data definition: auto-output a frame per 1s, total 6 bytes.

0xAA	0x03	0xXX	0xXX	0x00	checksum

Byte definition: 0xAA is synchronoushead, 0x03 is message length, nexttwo bytes combine a word which indicate wind speed,checksum=0x03+0xXX+0xXX+0x00, indicate checksum.

For example: 0xAA 0x030x00 0x6A 0x000x6D

Wind speed is 0x006A = 10.6m/s(data is binary number, convert to decimal number indicate wind speed)
Checksum is 0x6D=0x03+0x00+0x6A+0x00

Caution:

1. Product output signal only, signal transmittion distance is maximum 200m by usinglow baud rate.

2 .Product must be fit with Nanhua FA101C wind data logging kit.

RS485 protocol:

(Baud rate: 9600bit/s(factory setting), 8bit data,
no parity check, one stop bit.)
Factory setting baud rate: 9600bit/s
Factory setting wind speed sensor address: 21H
Factory setting wind direction sensor address: 23H
1 Protocol descrption
1.1 Query wind speed data
1.1.1 Data definition (default address: 21H):
Command: xxH 04H 00H 06H 00H 01H CRCL CRCH
Response: xxH 04H 02H xxH xxH CRCL CRCH
1.1.2 Byte definition
xxH is slave address in the command, 04H is function code,00H, 06H are the high and low address of the first register,00H, 01H are the high and low quantity of register, CRCH, CRCL are the high and low of previous six bytes‘ CRC check code.
xxH is salve address in the response, 04H is function code, 02H is byte, xxH, xxH are high and low byte of returned wind speed data, e.g. 01H, 31H it is 305, indicate wind speed 30.5m/s, CRCH, CRCL are high and low of previous five returned bytes‘ CRC check code.
1.1.3 Instruction of wind speed sensor query address is 21H
PC command: 21H 04H 00H 06H 00H 01H D6H ABH
Sensor response: 21H 04H 02H xxH xxH CRCL CRCH
1.2 Query Wind direction data
1.2.1 Data definition (default address: 23H):
PC Command: xxH 04H 00H 07H 00H 01H CRCL CRCH
Sensor Response: xxH 04H 02H xxH xxH CRCL CRCH
1.2.2 Byte definition
xxH is slave address in the command, 04H is function code,00H, 07H are the high and low address of the first register,00H, 01H are the high and low quantity of register, CRCH, CRCL are the high and low of previous six bytes‘ CRC check code.
xxH is salve address in the response, 04H is function code, 02H is byte, xxH, xxH are high and low byte of returned wind speed data, e.g. 0AH, F0H is 2800, indicate wind direction 280°, CRCH, CRCL are high and low of previous five returned bytes CRC check code.
1.2.3 Instruction of wind direction sensor query address is 23H
PC command: 23H 04H 00H 07H 00H 01H 86H 89H
Sensor response: 23H 04H 02H xxH xxH CRCL CRCH
1.3 Modify address command
1.3.1 Data definition
PC command: xxH 06H 00H 00H 00H xxH CRCL CRCH
Sensor response:xxH 06H 00H 00H 00H xxH CRCL CRCH
1.3.2 Byte definition
xxH is original address in the command, 06H is function code, 00H, 00H are the address register, 00H, xxH are the new address(01H~7FH can be used), CRCH, CRCL are the high and low of previous five bytes‘ CRC check code.
xxH is new salve address in the response, 06H is function code, 00H,00H are the address register; 00H xxH are the new address, CRCH, CRCL are high and low of previous five returned bytes‘ CRC check code.
1.3.3 Instruction of sensor address change from 21H to 01H
PC command: 21H 06H 00H 00H 00H 01H 4FH 6AH
Sensor response: 01H 06H 00H 00H 00H 01H 48H 0AH
1.4 Broadcast to return factory setting command
1.4.1 Data definition:
Command:00H 06H 00H 00H 21H 23H D1H 92H
1.4.2 Byte definition
00H is broadcast address in the command, 06H is function code, 00H, 00H are the address register, 21H, 23H are the default address of sensor(wind speed sensor default address is 21H, wind direction sensor default address is 23H), 92H, D1 are the high and low of previous six bytes‘ CRC check code.
1.5 Broadcast to modify baud rate command
1.5.1 Data definition
PC Command: 00H 06H 00H 01H 00H 0xH CRCL CRCH
1.5.2 Byte definition
00H is broadcast address in the command, 06H is function code, 00H, 01H are the address register, 00H, 0xH are the baud rate setting value of sensor(baud rate 00H=2400 bit/s,01H=4800 bit/s,02H=9600 bit/s,03H=19200 bit/s), CRCH, CRCL are the high and low of previous six bytes‘ CRC check code.
1.5.3 Instruction of Baud rate change to 4800bps
PC Command: 00H 06H 00H 01H 00H 01H 18H 1BH
2Additional instruction
2.1 Please mark when modified the address, one bus can connect to 32 slave devices.
2.2 Error address and command not be responsed. 。
2.3 CRC chek uses ANSI CRC16: polynomial is X16+X15+X2+1。
2.4 Interval is not less than 300ms between two frames.
2.5 All slave devices excute broadcast command, but they do not response data.

Precautions

1. Please connect to the rated working voltage when using.
2. The cable shielding layer must be reliably grounded.
3. The sensor cable must be bound firmly.
4. The sensor should be installed vertically upwards on a horizontal surface, and it must be fixed firmly and stably to prevent it from falling off.
5. The sensor should be installed in the lightning protection zone LPZ 0B, and be reliably grounded through the shielded ground wire of the sensor cable.
6. Direct lightning strikes or induced lightning may cause damage to the sensor or malfunction. It is recommended that customers install a separate lightning protection device.
7. When replacing and maintaining the sensor, the power supply should be cut off first, and the operation should be performed by professionals.
8. Please read the manual carefully before use, if you have any questions, please contact our company.

How to Order					
P/N	**Model**	**Rated voltage**	**Signal output**	**Heating**	**Mount**
1000463_001	FA133	12VDC-30VDC	4-20mA Current,0-50m/s	Heating power (≤50W)	Ø54 mast tube mount,7-pin aviation scoke
1000463_002	FA135	5VDC-30VDC	NPN;0-50m/s=0-75Hz	Heating power (≤50W)	Ø80 flange mount;0.2m direct wire; 4-core Hualun aviation socket
1000463_004	FA133	12VDC-30VDC	4-20mA Current,0-30m/s	heating power (≤50W)	Ø80 flange mount, 0.2m direct wire; 4-core Hualun aviation socket
1000463_006	FA13		No PCB board	Without heating	Ø54 mast tube mount,7-pin aviation scoke
1000463_008	FA131	12VDC-30VDC	UART, Baud rate 300bps, 0-60m/s	heating power (≤50W)	G3/4 threadmount,7-pin aviation scoket
1000463_009	FA134	5VDC-30VDC	RS485,modbus protocol, Baud rate 9600bps,0-70m/s	heating power (≤50W)	Ø54 mast tube mount,7-pin aviation scoke
1000463_012	FA131	12VDC-30VDC	UART, Baud rate 300bps, 0-60m/s	heating power (≤50W)	Ø54 mast tube mount,7-pin aviation scoke
1000463_015	FA131	12VDC-30VDC	UART,Baud rate 300bps, 0-60m/s	Without heating	Ø54 mast tube mount,5-pin aviation scoke
1000463_016	FA133	12VDC-30VDC	4-20mA Current,0-30m/s	heating power (≤50W)	Ø54 mast tube mount,7-pin aviation scoke
1000463_017	FA133	12VDC-30VDC	4-20mA Current,0-50m/s	heating power (≤50W)	G3/4 threadmount,7-pin aviation scoket
1000463_019	FA133	12VDC-30VDC	4-20mA Current,0-60m/s	heating power (≤50W)	Ø54 mast tube mount,7-pin aviation scoke
1000463_020	FA133	12VDC-30VDC	4-20mA Current,0-30m/s	heating power (≤50W)	Ø80 flange mount, 0.5m direct wire; 4-core BaiTong aviation socket
1000463_022	FA134	5VDC-30VDC	RS485,modbus protocol, Baud rate 9600bps,0-70m/s	heating power (≤50W)	G3/4 threadmount,7-pin aviation scoket

Thanks for choosing our products, NANHUA Electronics is the professional brand of signal transmission and high quality industrial lighting which is trusted and loved by global users from various industries.
Read and understand these instructions completely and carefully. Wrong installation and operation may lead to fires, electric shock, and others. Due to our continued efforts to improve our products, product specifications are subject to change without notice.