FA21
Wind Combined Sensor

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Products description and application

FA21 is an industrial wind speed and direction sensor with strong environmental adaptability. The product has a built-in sensitive temperature sensor, which can be automatically heated in a low temperature environment to ensure the reliable operation of the sensor. The wind cup/weathercock and the main body of the product are connected by a labyrinth structure, using imported Japanese bearings, high-quality stainless steel and 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, The impact of sand and dust on product life. There are multiple signal output modes, ingenious structure, convenient installation, 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.
- Low starting wind speed.
- Adopt full metal shell,surface anodic oxidation, good corrosion resistance and strong wind vane resistance.
- The weather vane is made of carbon fiber.
- Compact design,integrating wind speed measurement,automatic heating functions in one,easy on-site installation andmaintenance.
- 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

standard			
CE：			
IEC 61326			

Electrical		**Mechanical**	
Rated voltage	12VDC~30VDC[1]	Colour	Anodized black
Operating current	100mA Max[2]	Housing material	6061/ Anodizing
Heating voltage	12VDC~30VDC[3]	Wind cup material	5052/ Anodizing
Heating power	≤100W	Vane material	Carbon fiber +SUS304
Lightning surge	PTC auto-heating	Bearing material	SUS440C
Lightning surge	IEC61000-4-2	Reference weight	1.1kg
	Contact discharge:±8kV Air discharge:±15kV	Installation method	Lateral cantilever bracket
	IEC61000-4-5		Elbow vertical mounting bracket
	Wire to wire:±2kV Wire to ground:±4kV	Operating	-40°C ~ +70°C
Principle	Non-contact magnetic code scanning	Working humidity	IEC60068-2-3 0~100% RH
Wiring	Aviation socket[4]	Vibration resistance level	5-10Hz，d=3mm
Cable	6-core shielded cable with		10-500Hz，a=2g

configuration[5]	aviation plug			
	6*0.5mm²+1*0.5mm²	Enclosure rating	IEC60529　IP65	
		Salt spray grade	ISO9227　720h	
Meteorological parameters				
Starting wind speed	≤0.5m/s Vu=20 C	Range	0 m/s ~50 m/s	
Anti-wind level	＞70m/s	Resolution	0.1 m/s	
Range	0°~360°	Accuracy	±0.5m/s（V_L<5m/s）	
Accuracy	±2°		±3%VL (V_L>5m/s)	
Resolution	0.35°			

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.

Sensor measurement principle
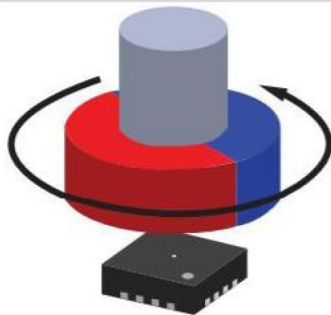
FA21 uses the classic tail wing to measure the direction of the wind, and the three-cup rotation measures the wind speed. The electromechanical conversion circuit is realized by the combination of the magnet on the end of the measuring shaft and the imported magnetic encoding chip on the circuit board. , Can ensure that the wind speed and direction signal output by the sensor 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. Side flange mounting sensor:
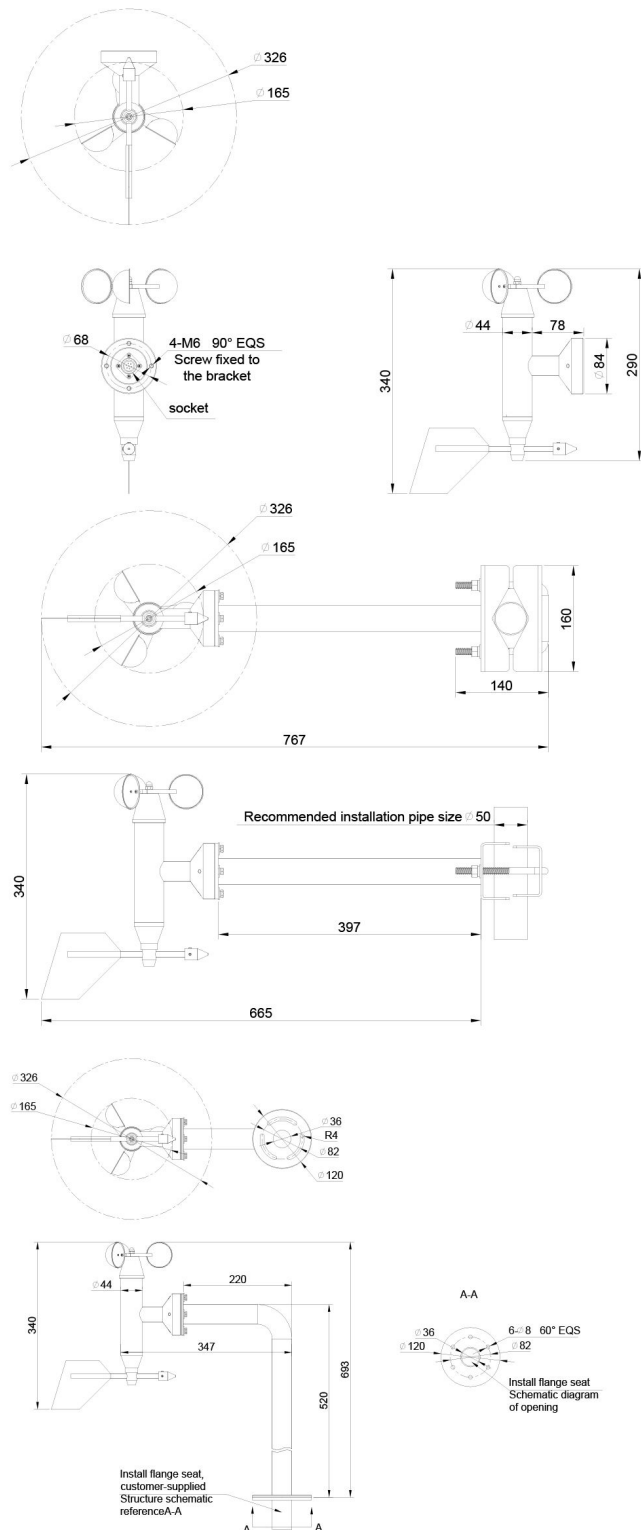1. For the side-mounted wind sensor, please make sure that the mounting side bracket is on the leeward

side (leeward side) to avoid the influence of the mounting side bracket on the measurement accuracy.

Mounting dimensions

Unit:mm

FA21 installation method:
1. Insert the aviation plug into the aviation socket at the bottom of the sensor and lock the threads.
2. Directly fixed on the customer's self-made mounting rack.

Please refer to FA21 outline dimension drawing for fixing hole position and size.

FA21+PJ310H installation method:
1. Insert the aviation plug into the aviation socket at the bottom of the sensor, and lock the thread. Pass the cable through the PJ310H bracket, and fix the bracket on the FA21.
2. Fix the PJ310H bracket on the installation pipe provided by the customer.

FA21+PJ320F installation method:
1. Insert the aviation plug into the aviation socket at the bottom of the sensor and lock the thread,

Pass the cable through the PJ320F bracket and fix the bracket on the FA21.
2. Use three screws to fix the PJ320F bracket on any three equally divided through holes of the flange seat provided by the customer; it can be adjusted by 360°, which is convenient for adjusting the sensor's north position.

Caution: When installing, ensure that the sensor is in a vertical state, the wind cup is at the upper part, and the wind indicator is at the lower part.
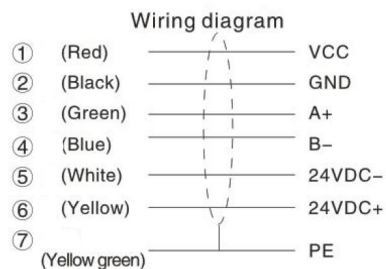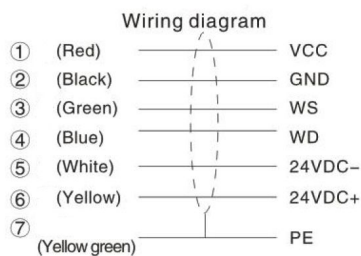
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The marked point on the sensor is N, which means that when the head of the wind vane coincides with this point, the corresponding wind direction angle is 0° or 360°. For example, when the wind vane 4-20mA signal is output, 4 mA corresponds to the wind direction. 0°

Wiring diagram

Wiring diagram
①	(Red)	VCC
②	(Black)	GND
③	(Green)	WS
④	(Blue)	WD
⑤	(White)	24VDC−
⑥	(Yellow)	24VDC+
⑦	(Yellow green)	PE

Wiring diagram
①	(Red)	VCC
②	(Black)	GND
③	(Green)	A+
④	(Blue)	B−
⑤	(White)	24VDC−
⑥	(Yellow)	24VDC+
⑦	(Yellow green)	PE

4-20mA current signal output: it is recommended to use RVVP/$0.5mm^2$/copper core/high and low temperature resistant shielding cable, maximum communication distance 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.

RS485 signal output: it is recommended to use RVVP/0.5mm/copper core/high and low temperature resistant shielding cable, maximum communication distance is 1000m.
Caution:
1.The outgoing green signal line number tube is marked as A+, and the blue signal line is B-.
2.The actual communication distance is related to the field application.

Precautions:
1.Make sure the wiring is correct before powering on.
2.The cable shielding layer and shell must be reliably grounded.
3.It is recommended to return to the factory for verification every 18 months.

Output characteristic curve

4-20mA Current output characteristic curve：
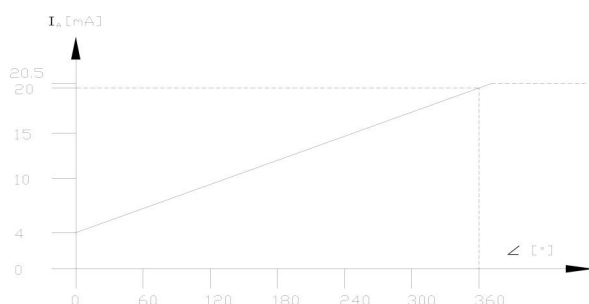
4-20mA Pulse output characteristic curve：

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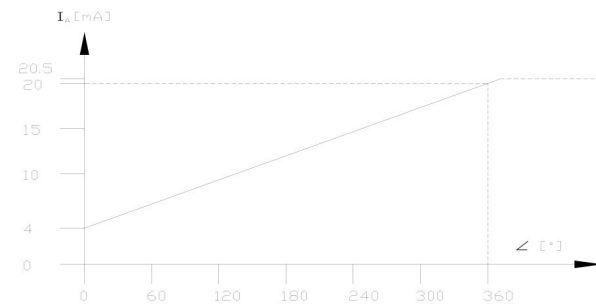
Protocol

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.

1.2 Modify address command

1.2.1 Data definition

Command: xxH 06H 00H 00H 00H xxH CRCL CRCH

Response:xxH 06H 00H 00H 00H xxH CRCL CRCH

1.2.2 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 six bytes' CRC check code.

xxH is new salve address in the response, 06H is function code,00H,00H are the address register, CRCH, CRCL are high and low of previous five returned bytes' CRC check code.

1.3 Broadcast to return factory setting command

1.3.1 Data definition:

Command:00H 06H 00H 00H 21H 23H CRCL CRCH

1.3.2 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), CRCH, CRCL are the high and low of previous six bytes' CRC check code.

1.4 Broadcast to modify baud rate command

1.4.1 Data definition

Command: 00H 06H 00H 01H 00H 0xH CRCL CRCH

1.4.2 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.

2 Additional 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 responded. 。

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
1000462_001	FA213	12VDC-30VDC	4-20mA Current，0-50m/s;0-360°	Heating power (≤100W)	Flat installation(4-M6),7-pin aviation scoke
1000462_002	FA214	5VDC-30VDC	RS485,modbus protocol,Baud rate9600bps，Wind speed 0-60m/s, wind direction 0-360°	Heating power (≤100W)	Flat installation(4-M6),7-pin aviation scoke
1000462_003	FA214	5VDC-30VDC	RS485,modbus protocol,Baud rate4800bps，Wind speed 0-60m/s, wind direction 0-360°	Heating power (≤100W)	Flat installation(4-M6),7-pin aviation scoke