AS400 Series

High sensitive low zero drift 3-Axis accelerometer

Technical Manual

V3.0

AS400
High sensitive low zero drift 3-axis accelerometer

Introduction

AS400 is a high-sensitivity low-zero drift digital output triaxial accelerometer developed by Bewis Sensing Company. It is suitable for different industrial fields such as vibration monitoring and impact testing. The product adopts digital interface and has communication such as RS485/RS232/TTL. AS400 frequency bandwidth is DC-100Hz, three-axis measurement, can work in the temperature range of -40°~+85°C. Detailed specifications can be found in the technical data

Feature

- Measurement range: ±3.6g
- Linearity: 0.02%
- Working temperature range: -40 – 85℃
- Noise: 20μg/√Hz
- Zero drift: 0.01%/year
- Power supply: 9~36V

Application

- Wind Fan shake monitoring
- Building monitoring
- Seismic signal detection
- Bridge deflection monitoring
- Tunnel and dam monitoring
- Machinery and equipment health monitoring

Product Feature

Electrical index

Parameter	Condition	Min	Typ	Max	Unit
Power supply		9		36	V
Working current	No load	20	30	40	mA
Operating temperature		-40		+85	℃
Storage temperature		-55		+100	℃

Performance index

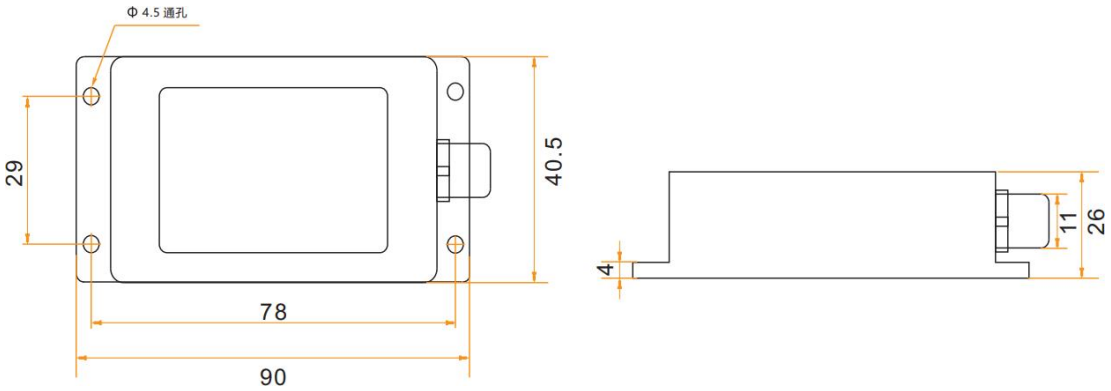
Technical Parameters	Condition	Index parameter	Unit
Measuring range	Tria-xial	±3.6	g
Resolution		0.1	mg
Zero bias	±3.6g	0.5	mg
Linear error		0.02	%
Noise density		20	μg/√Hz
RMS total noise		0.06	mg
Response bandwidth		100	Hz
Sampling rate		100	Hz
Temperature drift	-40 ~125℃	2	mg
Zero drift		0.01	%
Resonance frequency		1K	Hz
Operating temperature		-40 - 85	℃
Protection level		IP67	
Power		≤0.5	W

Mechanical Index

Connector	Metal joint （cable 1.5m)
Protection level	IP67
Shell material	Magnesium alloy oxidation
Installation	Three M4 screws

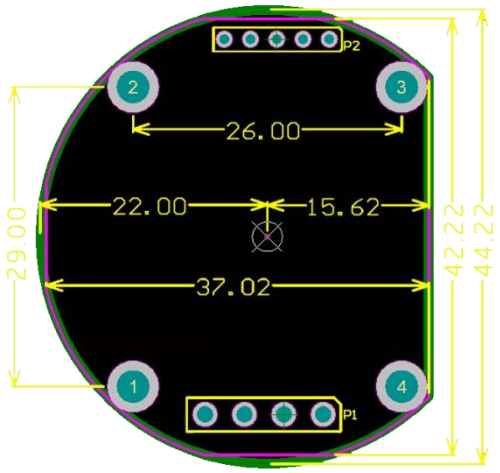
Package size

Product size：L90*W40.5*H26（mm）



PCB size

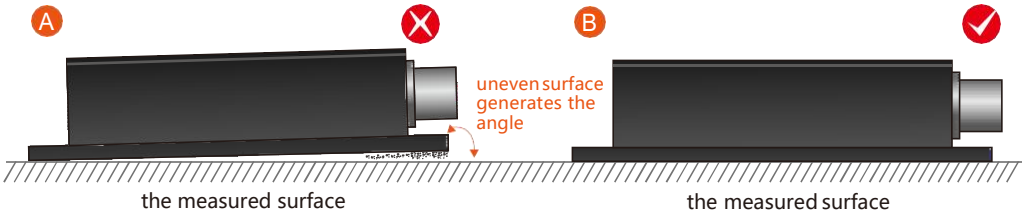
The front device is 3.85mm, the back is 2.5mm, and the board thickness is 2.0mm

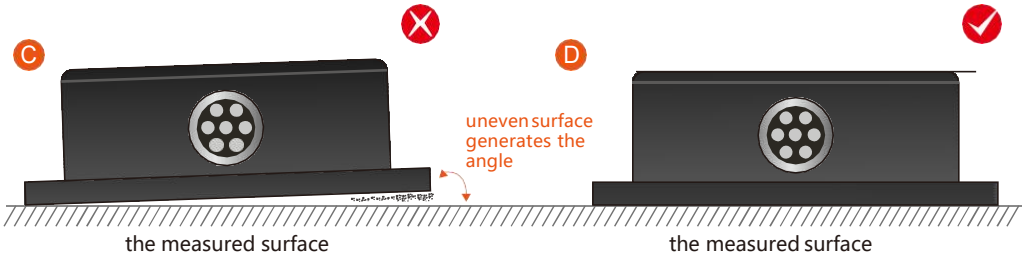


Installation

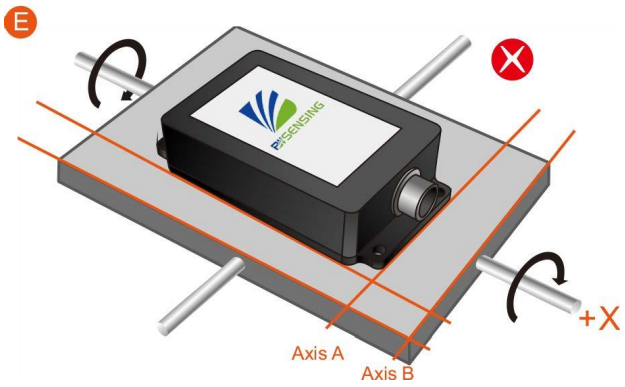
The correct installation method can avoid measurement errors. When installing the sensor, please do the following:

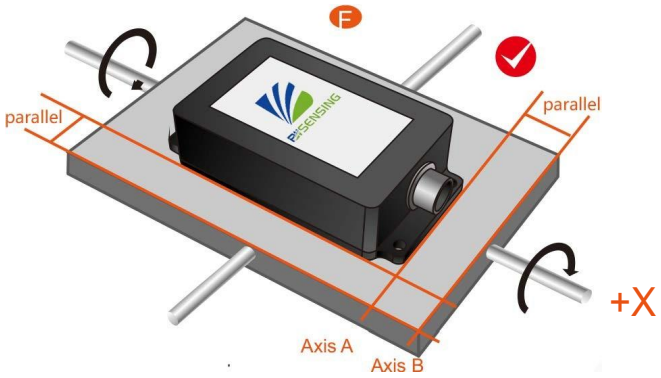
First of all, make sure that the sensor mounting surface is completely close to the measured surface, and the measured surface should be as level as possible. There should be no included angles as shown in Figure A and FigureC. The correct installation method is shown in Figure B and Figure D.





Secondly, the bottom line of the sensor and the axis of the measured object cannot have an angle as shown in Figure E, and the bottom line of the sensor should be kept parallel or orthogonal to the axis of rotation of the measured object during installation. This product can be installed horizontally or vertically (vertical installation needs to be customized), and the correct installation method is shown in Figure F.

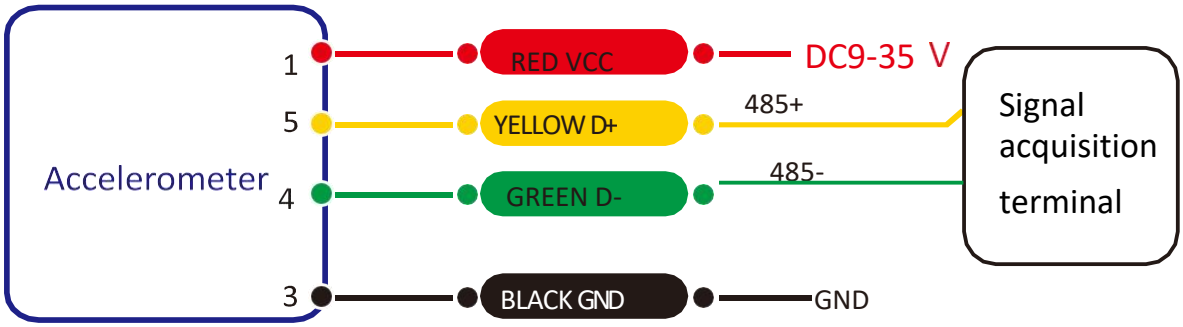




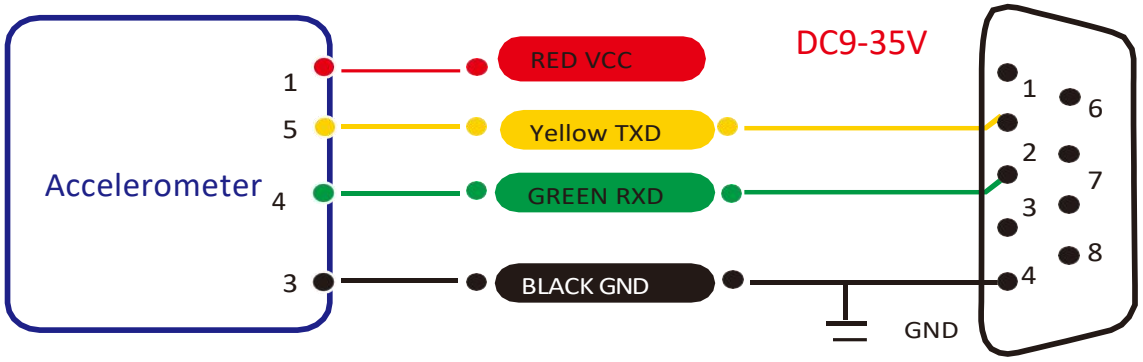
Finally, the mounting surface of the sensor and the surface to be measured must be tightly fixed, smooth in contact, and stable in rotation Please refer to the actual installation direction for the actual installation direction.

Electrical connections

	RED	BLUE	BLACK	GREEN	YELLOW
Wiring color	1	2	3	4	5
function	VCC DC 9-35V	NC	GND	RXD (B、D-)	TXD (A、D+)



RS 485 Wiring diagram



RS 232 Wiring diagram

Debugging software

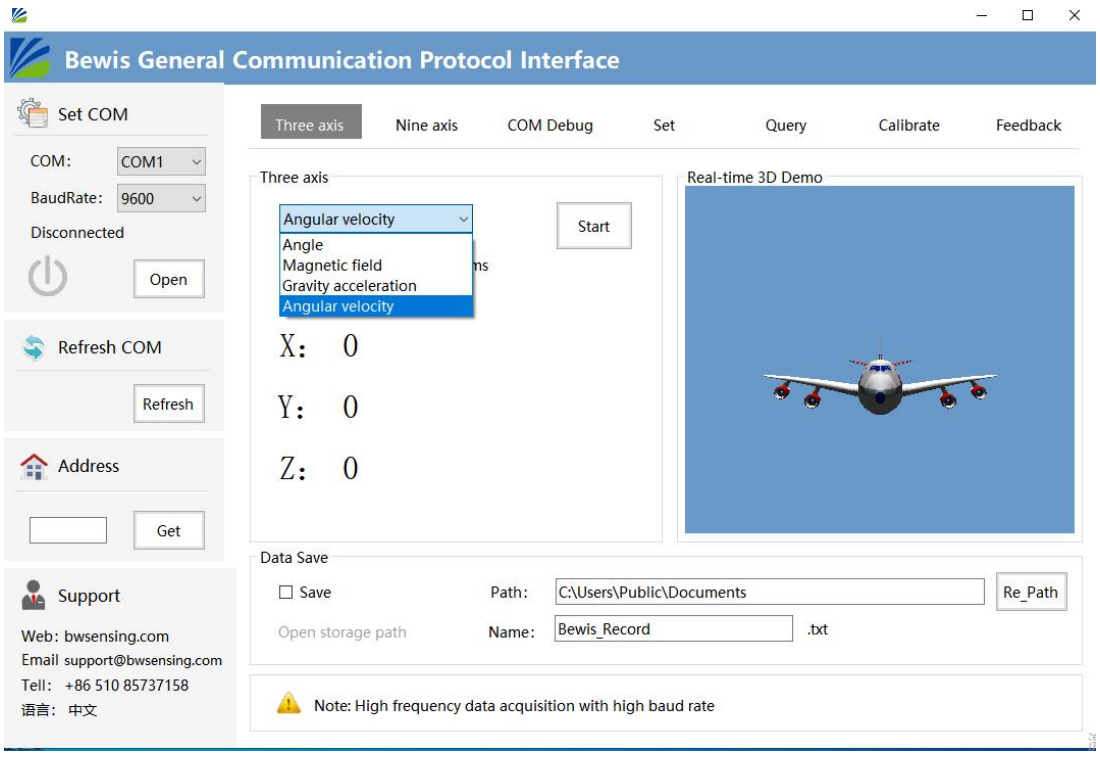
You can download the serial debugging assistant directly in the official website (Technical Service->Download Area), or you can use the more convenient and intuitive PC software. The BWAS400 serial port debugging software can connect the acceleration sensor to the computer for
data display. The software debugging interface is shown in the figure below, and other parameters
can be modified and set.

Steps:

① Connect the serial port hardware of the accelerometer correctly and connect the power supply.

② Select the computer serial port and baud rate and click to connect to the serial port.

③ Click Start and the current data will be displayed on the screen.



Protocol

1 Data frame format: 1 (8 data bits, 1 stop bit, No parity check, default baud rate 9600)

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (Xbyte)	Checksum (1byte)
0x77H					

Data Format: Hexadecimal Identifier: Fixed to 77
Data Length: Length from Frame Length to Checksum (included)
Address code: The address of the acquisition module, the default is 00
Data area: Content and length variable according to Command
Checksum: Accumulated sum of data length, address code, command word and data field in hexadecimal system. (If there is a carry, please take the last two digits.)
Note: When the command word or data field changes, the calibration sum will change. When you change the data field, please change the checksum accordingly.

2 Command format:

2.1 Read X, Y axis angle Send command: 77 04 00 04 08

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (0byte)	Checksum (1byte)
0x77	0x04		0x04		

Answer command:

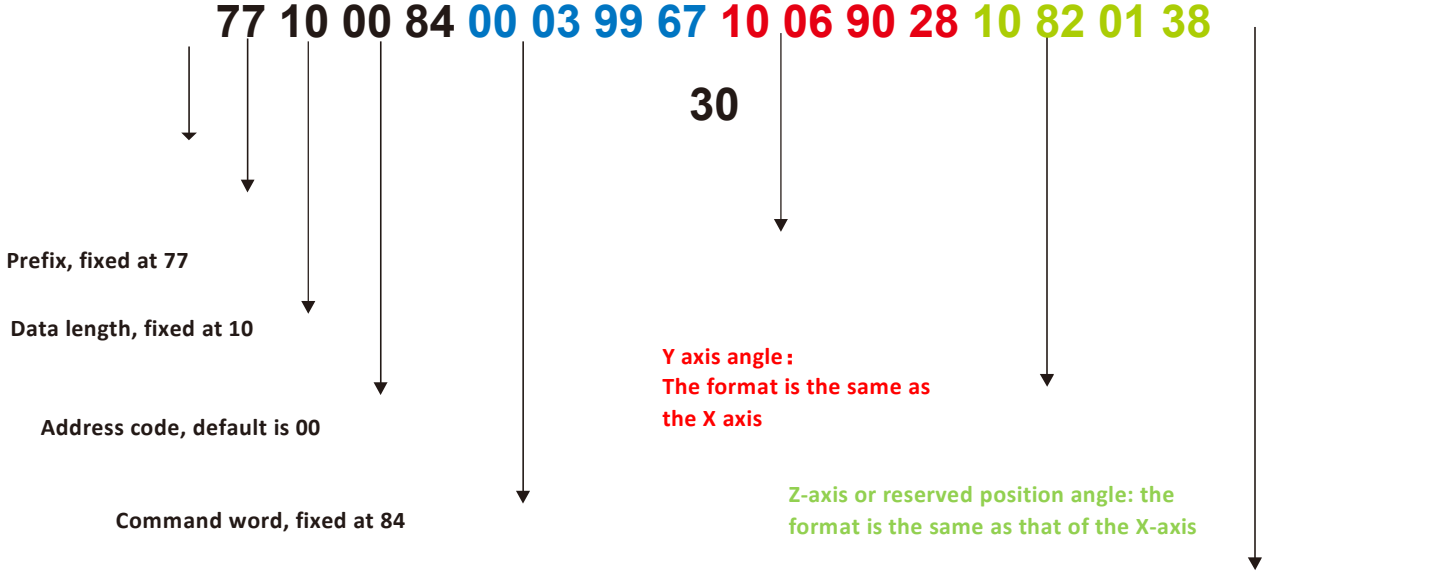
Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (12byte)	Checksum (1byte)
0x77	0x10		0x84	3 group SXXX.YY	

Note: For example: X axis: +003.9967°, Y axis: -006.9028°, Z axis: -082.0138°
Z axis refers to the angle between the common perpendicular of the sensor installation plane and the horizontal plane.

X axis: +003.9967°, Y axis: -006.9028°, Z axis: -082.0138°

77 10 00 84 00 03 99 67 10 06 90 28 10 82 01 38

30



2.2 Set communication rate Send command: 77 05 00 0B 02 12

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05		0x0B	XX	

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05		0x8B	0x00: Success 0xFF: failed	

Note: 0x00 means 2400; 0x01 means 4800; 0x02 means 9600; 0x03 means 19200; 0x04 means 115200; the default value is 0x02:9600.
Each time the communication baud rate is successfully changed, the response command will be sent back at the original baud rate, and then the device communication baud rate will be changed immediately. Note: If high frequency output is required, please set the baud rate to 115200 and modify the baud rate. No need to send the save command, it will take effect immediately.

2.3 Set module address Send command: 77 05 00 0F 01 15

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05	Correct	0x0F	New address	

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05	New address	0x8F	0x00: Success 0xFF: Failed	

Note: For example, the following command "77 05 00 0F 0A 1E" means to change the address of the product from hexadecimal address 00 to 0A.

2.4 Query current address Send command: 77 04 00 1F 23

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (0byte)	Checksum (1byte)
0x77	0x04	0x00	0x1F		0x23

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05	New address	0x1F	New address	

Note: The query address command fixes this command.

2.5 Set output frequency Send command: 77 05 00 0C 00 11

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05		0x0C	XX	

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x05		0x8C	0x00: Success 0xFF: Failed	

The sent data field XX is the automatic output frequency option: 00 means the response mode,

01 means 5Hz automatic output corresponding data type parameter
02 means 10Hz automatic output corresponding data type parameter
03 means 20Hz automatic output corresponding data type parameter
04 means 25Hz automatic output corresponding data type parameter
05 means 50Hz automatic output corresponding data type parameter
06 means 100HZ automatic output corresponding data type parameter
Note: 1. When the automatic output frequency is set higher, the baud rate needs to be set to a high baud rate. In some data types, 100HZ cannot be output due to the limitation of the baud rate.
2. The automatic output data type parameter is determined according to the following data type selection command, and the default is automatic output angle.

2.6 Query acceleration of gravity G value

Send command: 77 04 00 54 58

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (0byte)	Checksum (1byte)
0x77	0x04		0x54	-	

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (12byte)	Checksum (1byte)
0x77	0x10		0x54	3 group SXYYYY	

Note: S is the sign bit in the data field, X is the integer bit, and Y is the decimal bit.
If the return value is "77 10 00 54 10 01 51 00 00 04 47 00 11 05 00 00 27", it represents the X axis: -0.0151g,
Y axis: 0.0447g, Z axis: -1.05g

2.7 Save settings

Send command: 77 04 00 0A 0E

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (0byte)	Checksum (1byte)
0x77	0x04		0x0A		

Answer command:

Identifier (1byte)	Data length (1byte)	Address code (1byte)	Command word (1byte)	Data area (1byte)	Checksum (1byte)
0x77	0x04		0x8A	00: Set successfully FF: Set failed	

Note: It is not necessary to save the settings to set the baud rate, and all other setting items need to be sent to save the settings.

Order information

AS400-1-485	RS 485	IP67 package/metal joint
AS400-1-232	RS232	IP67 package/metal joint
AS400-1-TTL	TTL	IP67 package/metal joint

Executive standard

- Enterprise Quality System Standard: ISO9001:2015 Standard (Certificate No.064-21-Q-3290-RO-S)
- CE certification (certificate number: M.2019.103. U Y1151)
- ROHS (certificate Number: G 190930099)
- GB/T 191 SJ 20873-2003 General specification for inclinometer and level
- GBT 18459-2001 The calculation method of the main static performance index of the sensor
- JJF 1059.1-2012 Evaluation and expression of measurement uncertainty
- GBT 14412-2005 Mechanical vibration and shock Mechanical installation of accelerometer
- GJB 450A-2004 General requirements for equipment reliability
- GJB 909A Quality control of key parts and important parts
- GJB899 Reliability appraisal and acceptance test
- GJB150-3A High temperature test
- GJB150-4A Low temperature test
- GJB150-8A Rain test
- GJB150-12A Sand and dust experiment
- GJB150-16A Vibration test
- GJB150-18A Impact test
- GJB150-23A Tilt and rock test
- GB/T 17626-3A Radio frequency electromagnetic field radiation immunity test
- GB/T 17626-5A Surge (impact) immunity test
- GB/T 17626-8A Power frequency magnetic field immunity test
- GB/T 17626-11A Immunity to voltage dips, short-term interruptions and voltage changes

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