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V1.1

Bluetooth electronic level

DMI820-BL

Technical Manual

○ Revision time:2026-8-7

○ Product functions, parameters, appearance, etc. will be adjusted with technology upgrades,please contact the company's pre-sales business to confirm when buying.

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DMI820-BL Bluetooth electronic level

◆ PRODUCT INTRODUCTION

The DMI820-BL is an electronic level designed for angle control and measurement in various industrial settings. Its core technology utilizes micromechanical control principles and a dual-core measurement unit. During measurement, the Y-axis compensates for the X-axis. Employing Ruifen's patented interpolation and temperature compensation model algorithms, it leverages the absolute computational advantages of micromechanical electronics to ensure long-term stability and repeatability. It features a built-in BLE5.2 Bluetooth module. Dual-axis measurement with a range of ±30°, a resolution of 0.001°, a maximum accuracy of <0.005° across the entire range, fast response, and stable data. The product is specially designed with strong magnetic adsorption for mounting on the side and bottom, allowing for measurement from both reference points, providing significant convenience. This product boasts data storage capabilities, three selectable measurement modes (angle, degrees/minutes/seconds, mm/m), strong expandability, practical applicability, industrial reliability, and a strong cost-performance ratio, giving it a highly competitive edge in the international market.

◆ FEATURES

★ Optimal Accuracy: <0.005° ★ Repeatability: 0.003° ★ Angular Resolution: 0.001°
★ Maximum Measurement Range: ±30° ★ Switchable Absolute/Relative Measurement
★ Data Storage Function ★ Measuring from the Side and Bottom
★ Dual-Reference Strong Magnetic Mounting ★ Operating Temperature: -10℃ to +70℃
★ Automatic Angle Interleaving Compensation
★ Alarm Angle Setting ★ Built-in Rechargeable Industrial Battery
★ Night Vision Four-Color Screen ★ Dual Unit Switching (Angle or Length)
★ 3 Selectable Measurement Modes ★ Selectable Filtering Frequency
★ IP54 Protection Rating

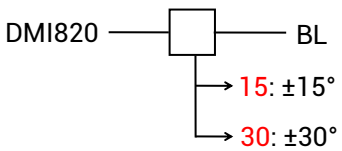
◆ APPLICATION

★ Building construction ★ Automobile four-wheel testing ★ Road slope
★ Machinery installation ★ Piping installation
★ Industrial platform ★ Turntable testing ★ Pan unit angle detection
★ Production fixtures ★ Medical instruments

◆ SPECIFICATIONS

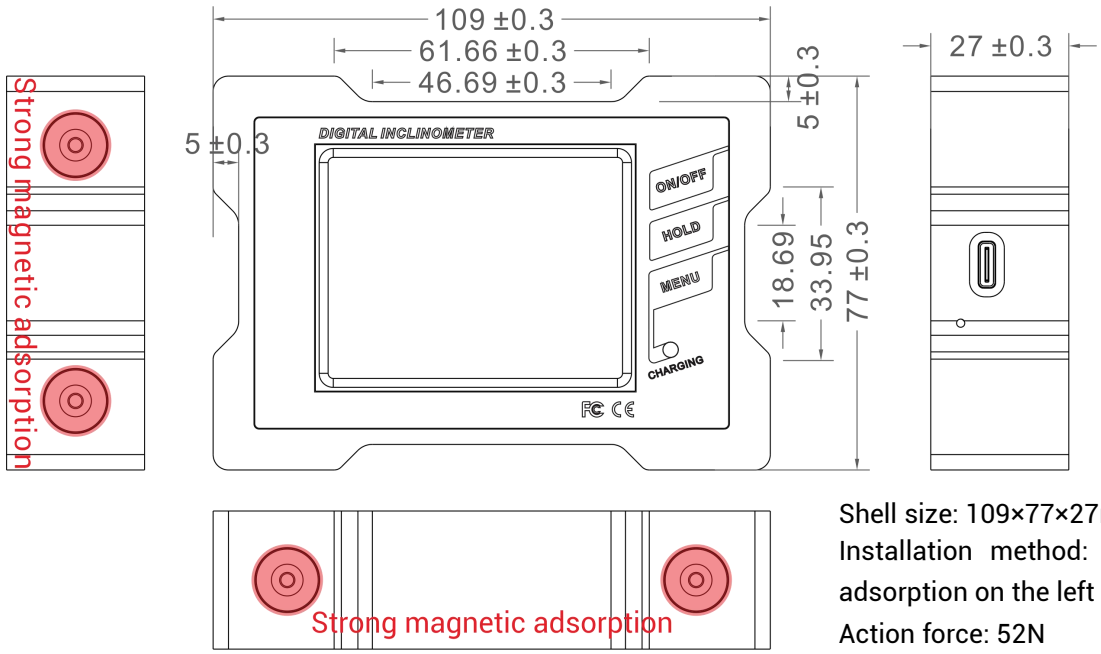
DMI820-BL		PARAMETER		unit
Measuring Axis		±15°	±30°	°
Angle measurement accuracy (full range)		<0.005	<0.01	°
Angle measurement resolution		0.001	0.001	°
mm/m measurement range		267	577	mm/m
millimeter/meter measurement accuracy		0.1	0.2	mm/m
mm/m measurement resolution		0.02	0.02	mm/m
Repeatability		0.003	0.003	°
Measurement mode		Three modes are available: angle, degrees/minutes/seconds, and millimeters/meters.		
Operating temperature		-10℃ ~ +70℃		
Operating humidity		85%RH		
power supply		3.7V rechargeable lithium battery		
Ideal charging time		5 hours		
Battery continuous working time		11 hours		
Data output		Type-C		
Includes host computer software		VC application software		
Bluetooth parameters	Operating frequency band	2402~2480MHz		
	Receiver sensitivity	-96dBm		
	Transmit power	1dBm		
	Bluetooth Specification	5.2		
	wireless standards	802.15.1		
Vibration resistance		10g@11ms、Three-axis (half-sine wave)		
Impact resistance		10grms、10 ~ 100Hz		
Waterproof rating		IP54		
Shell material		Aluminum alloy anodizing		
LCD screen		64True Color Luminous Display Screen		
LCD View area size		L57.6*W43.2mm		
Casing size		L109×W77×H27mm		
weight		≤350g		

◆ ORDERING INFORMATION



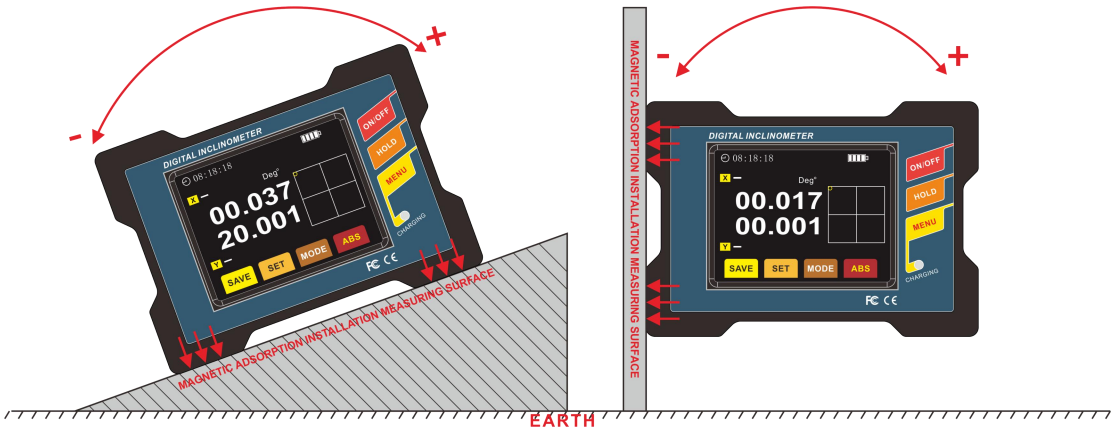
E.g: DMI820-15-BL: Measurement range is±15°.

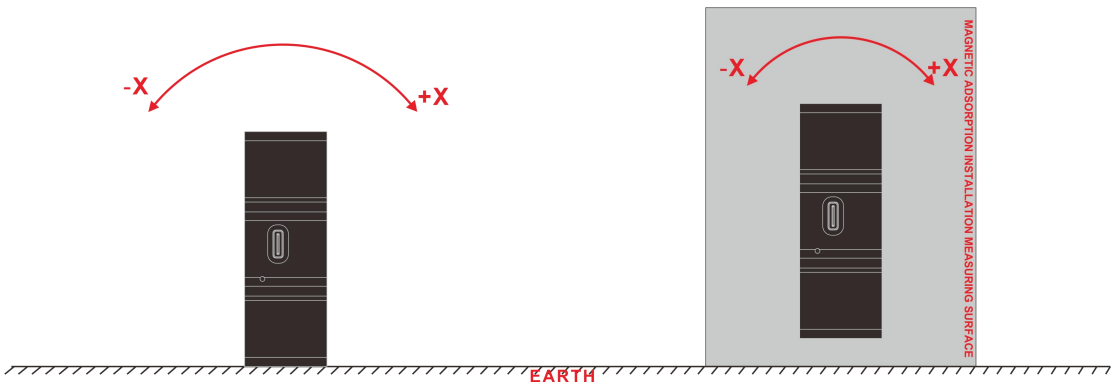
◆ SHELL SIZE



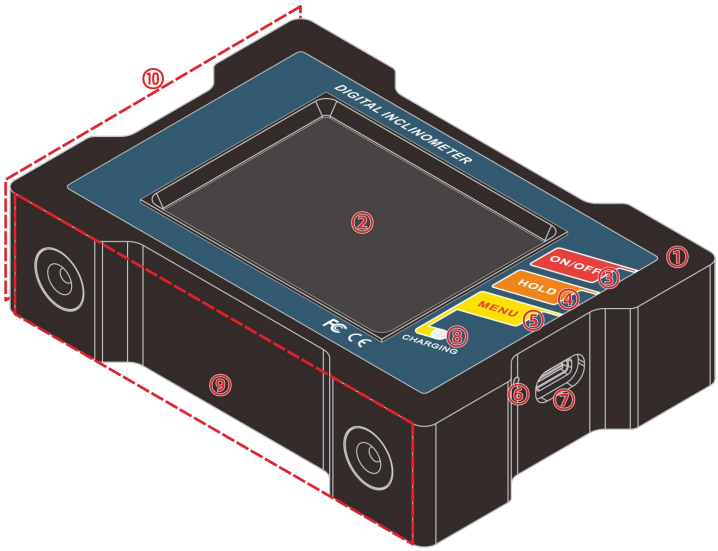
Shell size: 109×77×27mm
Installation method: Strong magnetic adsorption on the left side/bottom
Action force: 52N

◆ MEASURE DIRECTION





◆ PRODUCT FUNCTIONS



①Metal anti-wear structure

②Display area

③ON/OFF

④HOLD

⑤MENU

⑥Reset hole

⑦Type-C socket

⑧Charging indicator

⑨Strong magnetic bottom

⑩Side magnetic

① Metal wear-resistant structure: Metal outer shell, hard and durable

② Display area: The area where data is displayed on the touchscreen.

② ON/OFF: Press and hold for 3 seconds to turn the device on or off;

③ HOLD: This key can lock the current data for easy recording by the customer;

④ MENU: Press the MENU button to make the menu disappear, press it again to make it reappear;

⑤ Reset Hole: If a system freezes or other issues occur, press the reset button in the small hole below the Type-C interface to reset the system.

⑥ Type-C interface: used for charging and virtual serial port output data;

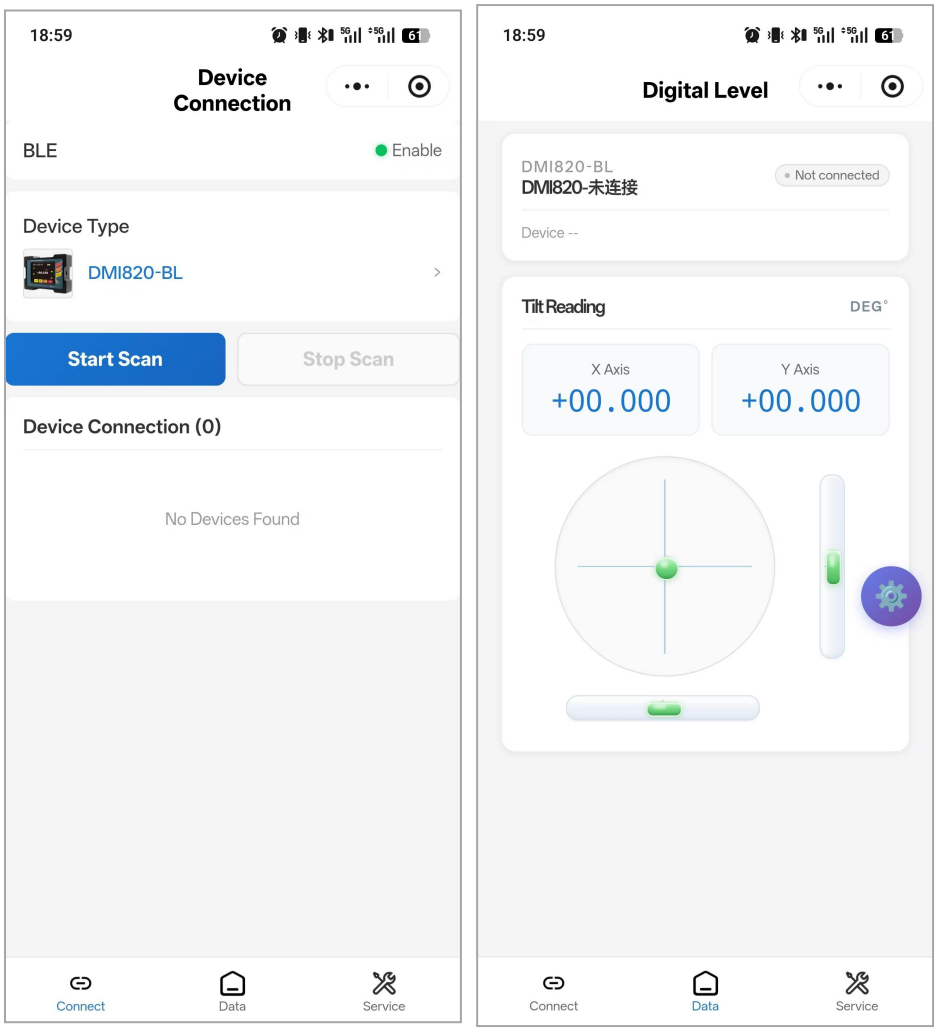
⑦ Charging indicator light: Light on indicates charging, light off indicates fully charged; (To ensure battery lifespan, do not use the device while charging.)

⑧ Strong magnet at the bottom: Strong magnet at the bottom attracts the mounting surface;

⑨ Strong magnet on the side: Strong magnet on the left side attracts the mounting surface.

Note: The USB driver can be downloaded from the Ruifen official website as "DMI Series Product USB Driver".

◆ MINI PROGRAM INTERFACE INTRODUCTION



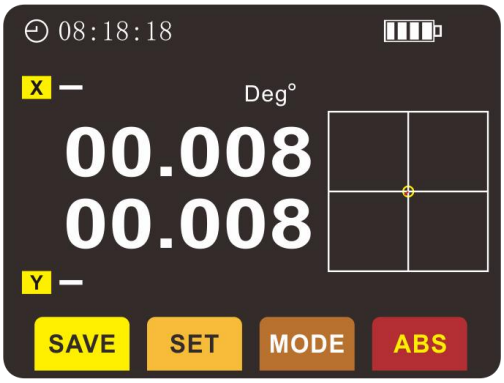
Users can complete device network configuration and link handshake by searching for the WeChat mini-program "RION Technology+", and then query and save the tilt angle data in real time. This provides a lightweight mobile data support platform for equipment operation and maintenance. For detailed operation steps, please refer to the mini-program's operation instructions.

◆ FUNCTION MENU OPERATION INSTRUCTIONS

1. Product right-side button operation:

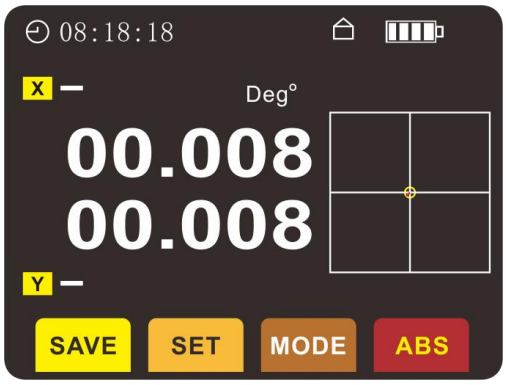
1.1 ON/OFF Power button: Press and hold for 3 seconds until you hear a "beep..." to turn on the device. The same operation applies to turn it off.

Boot screen

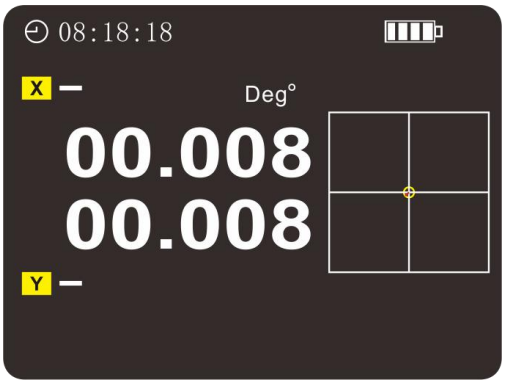


After booting up the interface

1.2 HOLD Lock key: To lock the angle data, press once to lock the data, then press again to unlock. An icon will appear in the upper right corner of the screen.
1.3 MENU Menu button: Click to hide the menu bar, then click to show the menu bar;



Data lock screen display

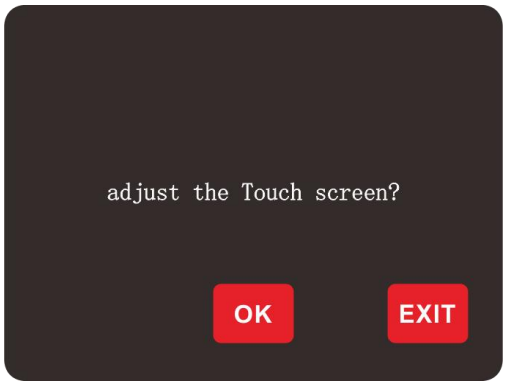


Menu bar hidden interface display

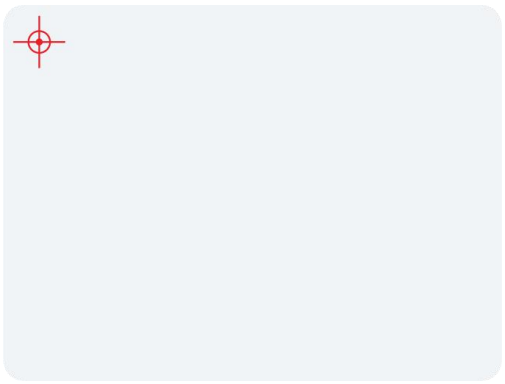
1.4 Press MENU and HOLD simultaneously to enter touch screen calibration;

1.4.1 Click OK to enter touchscreen calibration, click EXIT to exit touchscreen calibration.;

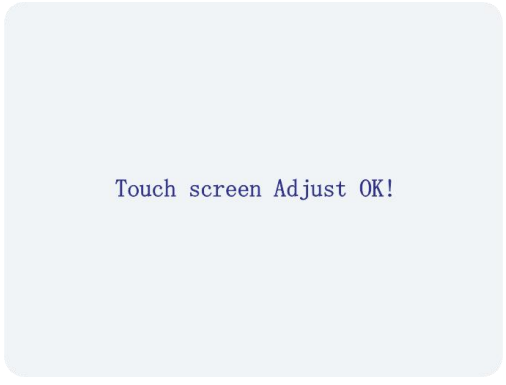
1.4.2 To enter touchscreen calibration, tap the small red dots in the four corners of the screen in sequence. Each tap moves the red dot once, and the calibration will automatically exit after the red dot has moved four dots.



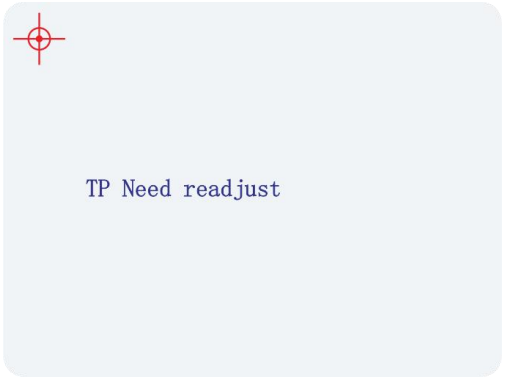
Enter the touchscreen calibration interface



Calibrate the interface in the touchscreen



Touch screen calibration success prompt interface



Touchscreen calibration error message prompting recalibration

2. Bottom menu function:
2.1Click the SAVE button on the touchscreen to access the save option.
2.1.1 DELETE ALL DATA Delete saved data;

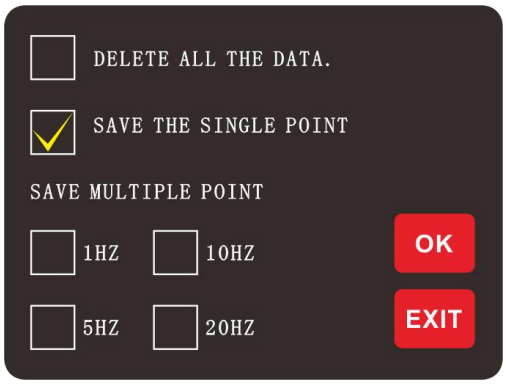
2.1.2 SAVE THE SINGLE POINT Single save;

Click START to start saving the relevant data. The data will be saved to the SD card.;

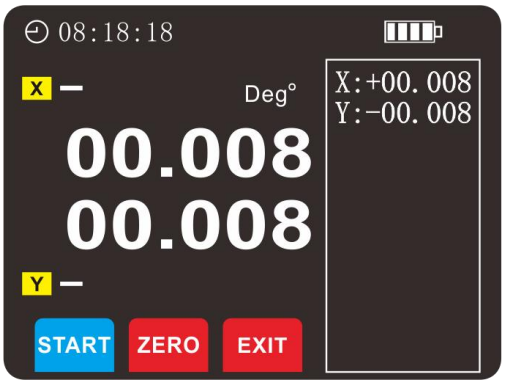
Select Single Save， Data is displayed in the right frame of the interface. A single axis can display up to 6 sets of data, and a dual axis can display up to 12 rows of data; ABS/ZERO switch key; EIXT: save data and exit the interface.

2.1.3 SAVE MULTIPLE POINT Save multiple times in a row（Save frequency is selectable 1Hz/5Hz/10Hz/20Hz）;

Select to save multiple times consecutively; the interface will not display the data, and it will



Single save selection interface



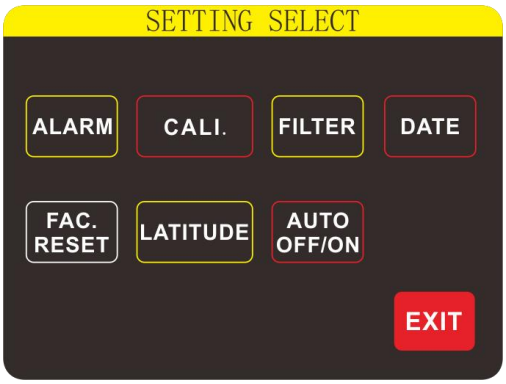
Single save data display interface

be saved directly to the SD card. After the data acquisition is complete, click STOP to stop saving the data; ABS/ZERO switch button; EIXT: save data and exit the interface.

2.1.4 OK Save and exit the interface;

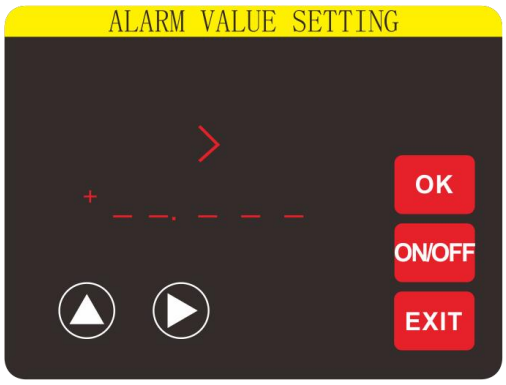
2.1.5 EXIT Abandon the exit screen.

2.2 Tap the SET button on the touchscreen to enter the settings interface. (Six function buttons): （If you don't need to select anything, simply click EXIT to exit.）

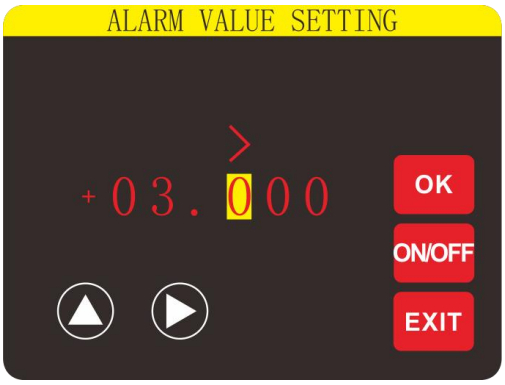


Multiple consecutive single save selection interface

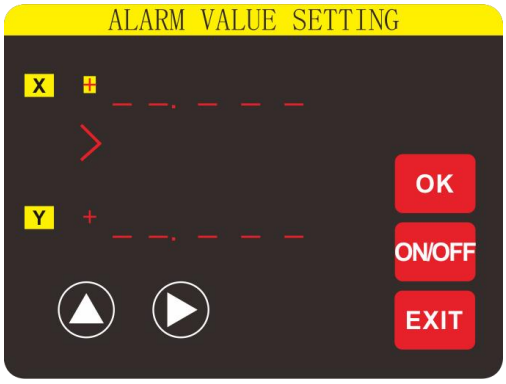
2.2.1 ALARM（Alarm Angle Settings）



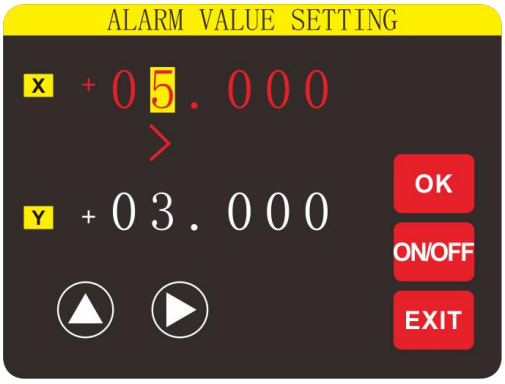
Single-axis alarm angle interface



Single-axis alarm angle setting



Dual-axis alarm angle interface



Dual-axis alarm angle setting

illustrate:

1. Click ON/OFF to open the alarm angle setting, which will display numbers. After closing the setting, it will display "_ _ . _ _".
2. For dual-axis products, click on the X or Y axis data angle and select the corresponding axis angle setting..
3. Click▲: Set the data for the corresponding bit..

◆: Select the corresponding bit for which you need to set the data..

Angle symbol is +: An alarm will sound when the angle exceeds the corresponding value.

-: An alarm will sound when the angle is less than the corresponding angle.

±: Alarm when outside the range

For example:

Setting X:+03.00 will trigger an alarm when the X angle is +3.3° or greater than 3°.

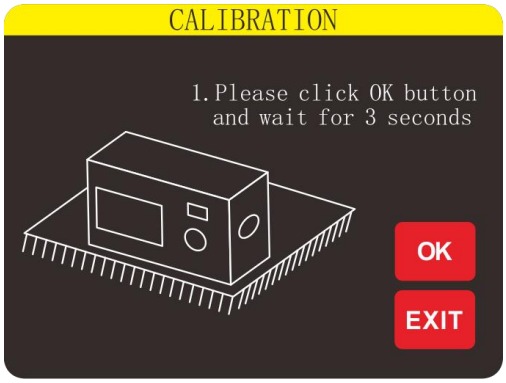
Setting Y:-04.00 will trigger an alarm when the Y angle is -4.6° or less than -4°.

Setting Y:±05.00 will trigger an alarm when the Y angle is -6° and exceeds -5° to +5°.4. 点击OK Save the angle settings for them to take effect.

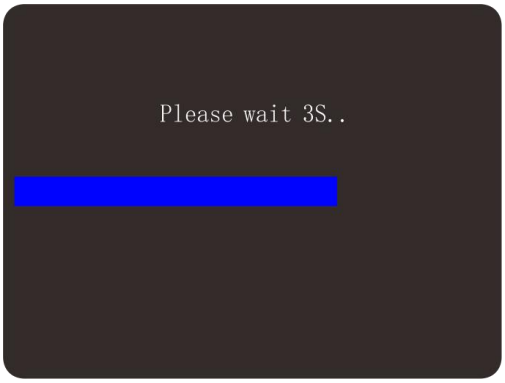
5. EXIT: Exit settings and save angle.

2.2.2 CALI（Calibration settings）

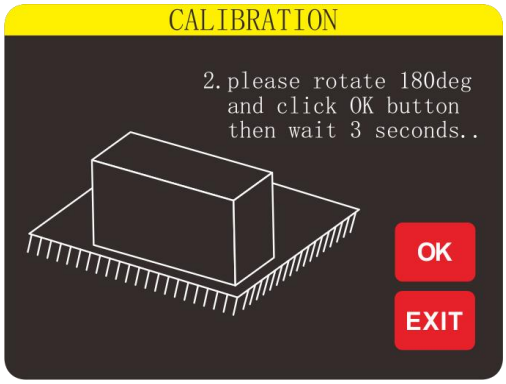
Click OK and follow the prompts to perform the relevant actions. （Zero-point calibration requires a high-precision platform; please do not proceed if this is not available.）



Product calibration interface



Waiting for calibration interface

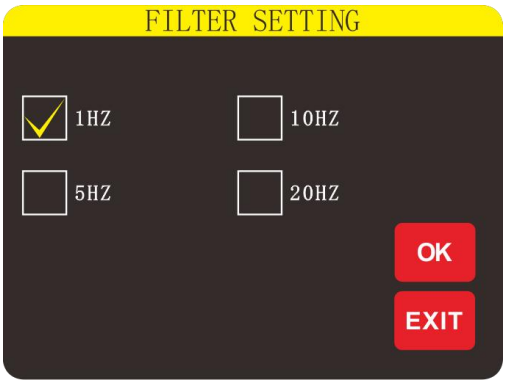


Product calibration interface

Product calibration successful prompt screen

2.2.3 FILTER（Filter frequency setting） The factory default is 20Hz

Select the desired filtered output frequency; OK: Selection successful; EXIT: Exit selection.



Filter frequency setting interface

2.2.4 DATE（Date settings）

Set the date and time for when the data is displayed and saved;

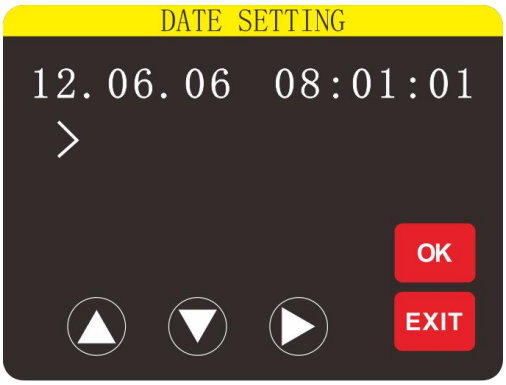
◆: Select the year, month, day, hour, minute, and second; you can cycle through the options.;

▲: Increase the corresponding value;

▼: Reduce the corresponding value;

OK: Save settings;

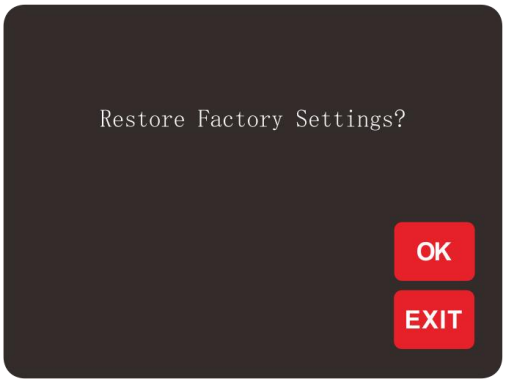
EXIT: Exit the date settings interface without saving.



Date settings interface

2.2.5 FAC.RESET（Set to factory reset）

The parameters that are restored include alarm angle, filter frequency, and calibration angle.

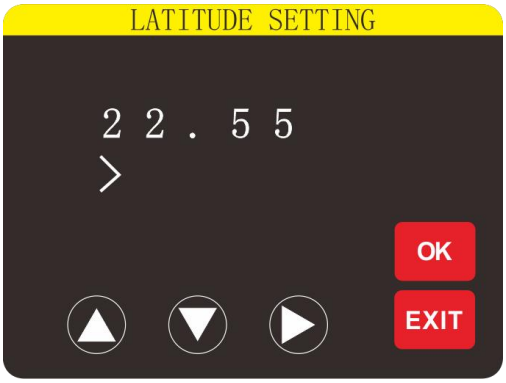


Factory reset screen

2.2.6 LATITUDE（Local latitude setting）

By setting the local latitude value, the product automatically calculates the local gravity field and corrects for accuracy errors, as the Earth's gravity field varies from place to place.
As shown in the image on the right, click on Latitude Settings.

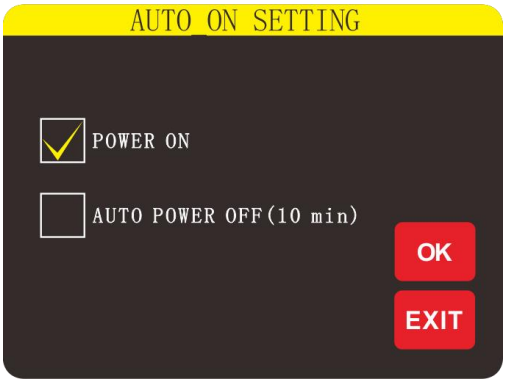
1. Click the "▲" button to add the corresponding value 0-9.;
2. Click the "▼" button to decrease the corresponding digit value from 0-9.;
3. Click the "◆" button to select the corresponding place value (tens, ones, tenths, hundredths) to the right, then cycle through.;
4. Click OK: Save latitude and longitude settings;
5. Click EXIT: Exit settings.



Local latitude settings interface

2.2.7 AUTO ON/OFF（Automatic shutdown settings）

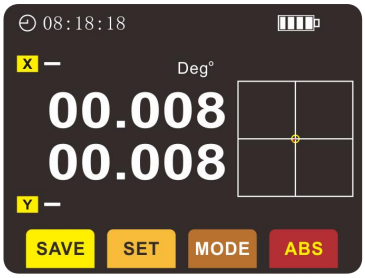
As shown in the right figure,
Selecting "POWER ON" keeps the product powered on; selecting "AUTO POWER OFF (10min)" will automatically power off the product after 10 minutes of inactivity (this is the default setting for the product).
OK: Save settings
EXIT: Exit without saving settings

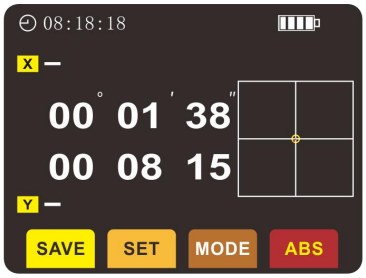


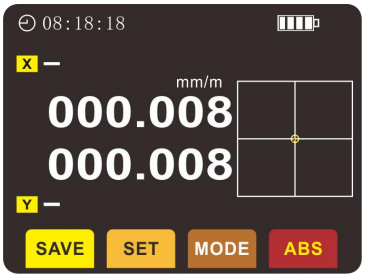
Automatic shutdown setting interface

2.3 Data unit mode selection

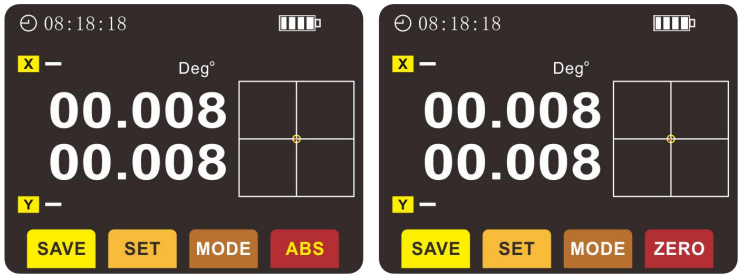
MODE　Each press can switch between three unit modes: degrees, degrees minutes and seconds, and millimeters per meter.







2.4 ZERO/ABS Absolute Relative
Zero: Click to set the current angle to zero.
ABS: Click to switch to absolute zero.



◆ PRODUCT COMMUNICATION PROTOCOL

1. Data Frame Format: （8Bit data bits，1 Stop bit，No verification, default speed 115200）

Identifier (1byte)	Data length (1byte)	address code (1byte)	Command word (1byte)	Data field	Checksum (1byte)
68					

Data format: hexadecimal;
Identifier: Fixed at 68;
Data length: The length from the data length to the checksum (including the checksum);
Address code: The address of the data acquisition module, the default value is 00;
Command words: Keyword for operation commands;
Data field: varies according to the content and length of the command word;
Checksum: The sum of data length, address code, command word, and data field, without considering carry.;
For example: 68 04 00 04 08 (length 04 + address code 00 + command word 04 = 08).
2. Command word parsing

CMD	Meaning/Example	illustrate
0X04	**Simultaneously read angle command** eg: ***68 04 00 04 08***	Data field (0byte) No data field command
0X84	Sensor response eg: ***68 10 00 84 00 00 20 08 10 00 25 28 00 37 70 00 C0***	Data field (12byte) **AA AA BB BB CC CD DD DD EE EE FF FF** **AA AA BB BB**: Four characters represent the X-axis; **CC CC DD DD**: Four characters represent the Y-axis; **EE EE FF FF**: 4 characters representing temperature data; The angle format and parsing method are the same as for the X-axis or Y-axis: In the example on the left, the angles are: X-axis +0.200°, Y-axis -0.252°.°; Temperature: 37.7°C. （Angle data is analyzed with the decimal place set to the thousandths place and discarded for the ten-thousandths place; temperature data is analyzed with only one decimal place.. ） 0A: Checksum: the hexadecimal sum of all data, excluding the first letter.68.
0X05	**Set relative/absolute zero point:** The current angle can be	Data field (1 byte) 00: Absolute Zero 01: relative zero point

	set to zero degrees for relative measurement, or it can be set to absolute factory zero degree and saved after power failure.eg: ***68 05 00 05 00 0A***	
0X85	Sensor response command eg: ***68 05 00 85 00 8A***	Data Domain（1byte） The numbers in the data domain represent the results of the sensor response. 00: Setup successful FF: Setup failed.
0X32	**Read data stored on SD card:** Eg: ***68 04 00 32 36***	Data field (0byte)
0XA2	Sensor response command 例: ***68 18 00 A2 AA AA AA AA AA AA AA BB BB BB BB CC CC CC CC DD DD DD DD CS***	Data field（19byte） The numbers in the data domain represent the results of the sensor response. AA AA AA AA AA AA AA : Year Month Day Hour Minute Second BB BB BB BB: For details on the X-axis data, please refer to the X-axis parsing in the data format definition.; CC CC CC CC: YFor details on the Y-axis data, please refer to the Y-axis parsing in the data format definition.; DD DD DD DD: Reserved.

◆ RIEFENSTAHL DATA FORMAT DEFINITION

baud rate: 115200， 8 Bit data bits，1 Stop bit，No verification.

For example: X-axis: +02.010° Y-axis: -00.513°

68 10 00 84 00 02 01 03 10 00 51 32 00 50 50 00 93

The prefix is fixed at 68.

Data length is fixed at 10.

Sensor address code, default is 00

Command word, fixed at 84

X-axis angle:
The first byte is the sign bit, where 00 represents a positive angle and 10 represents a negative angle;
The second byte is the integer part of the angle, which is the compressed BCD code;
The third byte is the decimal part of the angle, which is the compressed BCD code;
The fourth byte is the decimal part of the angle, which is the compressed BCD code.

Y-axis angle: Format is the same as X-axis.

Temperature data:
The first byte is the sign bit, 00 for positive temperature and 10 for negative temperature;
The second byte is the integer part of the temperature, in compressed BCD code;
The third byte is the decimal part of the temperature, in compressed BCD code;
The fourth byte is a reserved byte, fixed at 00.

The last byte is the sum of all the preceding data. If there is a carry, the least significant byte is used.

◆PRODUCT MAINTENANCE

1. 1. The digital angle meter uses a 3.7V rechargeable lithium battery. To improve battery life, please charge the battery before it is completely depleted.
2. If there is no digital display when you turn on the power switch, please charge it promptly.
3. This instrument is highly reliable and can be used in a vibrating environment. However, please do not drop the instrument from a high altitude, as it may cause permanent damage.
4. If you find any damage to the instrument, please do not disassemble it yourself. Please call our company immediately for professional guidance and repair. If you disassemble it yourself, the manufacturer will refuse to repair it.

◆WARNING

1. 1. This product has high-precision sensors and information processing circuits. Dropping, impact, or self-disassembly are strictly prohibited. Otherwise, you will be responsible for the consequences.
2. Do not press multiple buttons at the same time, as this may affect the product's lifespan.

3. This product should be placed in a safe location out of the reach of children.