Patent No.: ZL 201830753146.2

V1.6

DIGITAL DISPLAY INCLINOMETER

DSMI810/DSMI820

TECHNICAL MANUAL

▶ GENERAL DESCRIPTION

DSMI810/DSMI820 is a digital display inclinometer which took three years to develop professional for various industry angle controling and measuring.The core of this product is using the micro-mechanical control principle, dual-core measurement unit, can use the Y-axis to compensate X-axis during the measurement process,and then to use patent interleaved and temperature compensation model algorithm to play absolute operation advantages of the micro-mechanical electronic principles,to ensure that the instruments measurement with the long-term stability and repeatability. Single and double axis measurement, measurement range ±30° measurement, resolution 0.001°, highest accuracy <0.005° full value、fast response, stable data, products specially designed for the sides and bottom with magnetic adsorption installation, both sides of the benchmark can be measured and using normally,very convenient to use, DSMI810 series has strong scalability, convenient & practical application and industrial reliability, has absolute cost advantage and has an absolute competitive advantage in the international market !

▶ FEATURES

★ Best accuracy：<0.005°
★ Repeatability：0.003°
★ Angle resolution：0.001°
★ Maximum measure range：±30°
★ User can set the alarm value by himself
★ Data store function
★ Absolute/Relative measurement can switch
★ Both sides and bottom can measure
★ Double benchmark strong magnet installation
★ Working Temperature : -10°～ +70℃
★ Auto-angle interleaved compensation function
★ Auto temperature drift compensation
★ User can calibrate ZERO by himself
★ Built-in rechargable industry batteries
★ Night vision fours colors screen
★ IP54 protection class
★ °/mm/m Dual units switch function
★ Filter frequency optional
★ Three kinds of measurement mode selectable (radian, angle, mm)

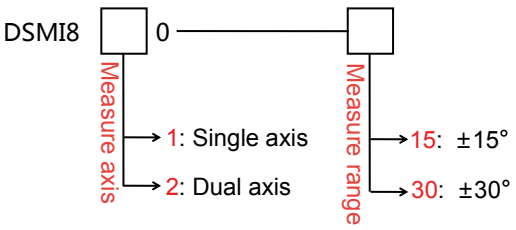
▶ APPLICATION

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

▶ TECHNICAL DATA

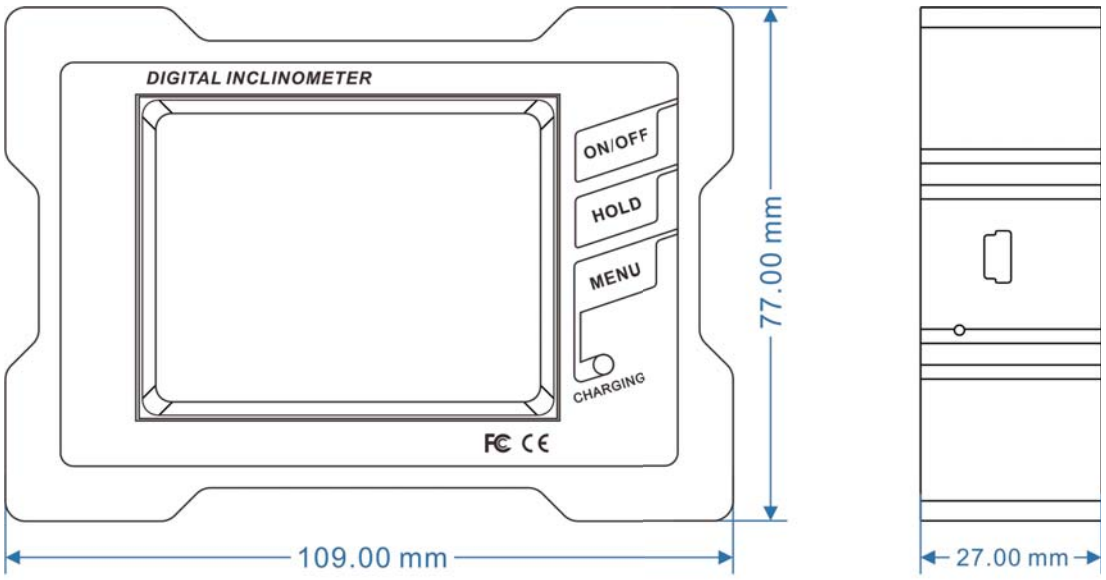
PARAMETER	DSMI810		DSMI820		UNIT
Meausre Axis	Single Axis		Dual Axis		Axis
Angle Measure Range	±15 °	±30 °	±15 °	±30 °	°
Angle Measurement Accuracy(Full Range)	<0.005	<0.01	<0.005	<0.01	°
Angle Measure Resolution	0.001	0.001	0.001	0.001	°
Mm/m Measure Range	267	577	267	577	mm/m
Mm/m Measure Accuracy	0.1	0.2	0.1	0.2	mm/m
Mm/m Measure Resolution	0.02	0.02	0.02	0.02	mm/m
Repeatability	0.003	0.003	0.003	0.003	°
Measurement Mode	Angle、Degree/Minute/Second、Mm/m Three modes can be set				
Working Temperature	-10°~ +70℃				
Working Humidity	85%RH				
Power Supply	3.7V Charging Lithium Battery				
Ideal Charging Time	5h				
Battery Continuous Working Time	11h				
Equipped With Pc Software	Vc Software				
Data Output Signal	Standard USB connector, rechargeable				
Connect Plug In	Standard Usb Connector, Rechargeable				
Shock Resistance	10g@11ms、3 Axial Direction (Half Sinusoid)				
Shock Impact	10grms、10~100Hz				
Waterproof Grade	IP54				
Material	Aluminum Alloy Anodizing				
Lcd	64 True Colors Night Vision Display Screen				
Lcd Visible Area Size	L57.6*W43.2mm				
Size	L107*W75*H27.1mm				
Weight	≤350g				

▶ ORDERING INFORMATION



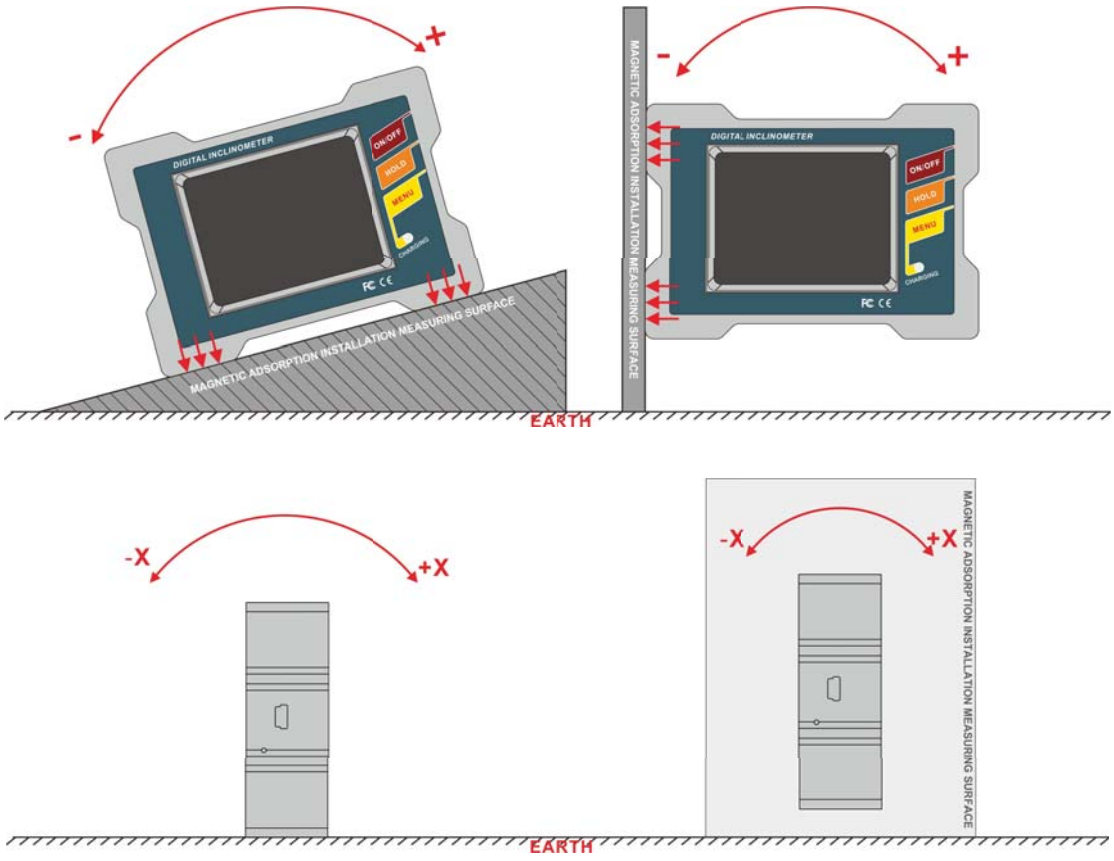
E.g:DSMI810-15:means Single axis / Measure range is ±15°.

▶ PRODUCT DIMENSION DIAGRAM

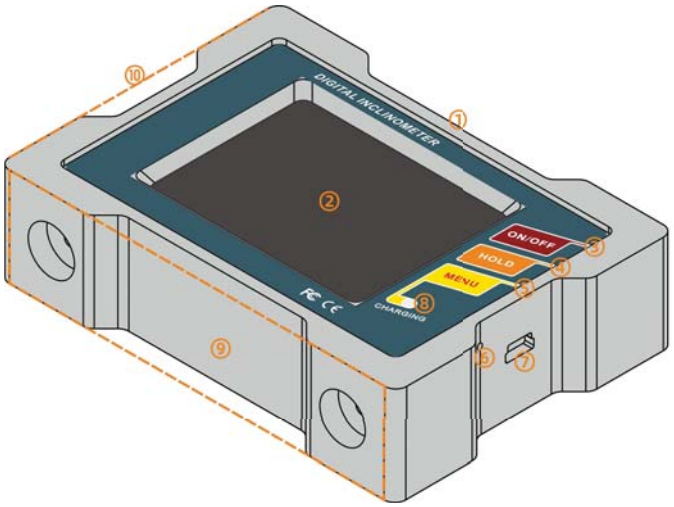


Shell size: L109*H77*W27mm
The left and bottom are the strong magnetic adsorption surface

▶ MEASURE DIRECTION



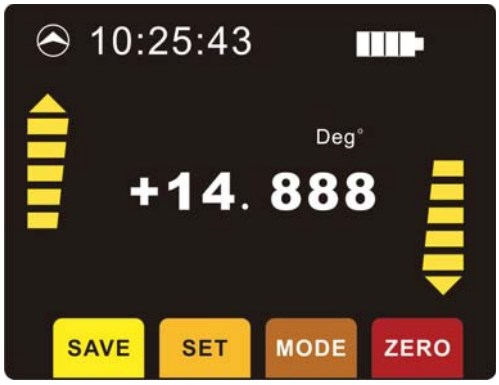
▶ PRODUCT FUNCTIONS



①Metal anti-wear structure
②Display area
③ON/OFF
④HOLD
⑤MENU
⑥Reset hole
⑦USB jack
⑧Charging indicator
⑨Strong magnetic bottom
⑩Side magnetic

①Anti-wear metal: metal shell, hard and durable;
②Display: touch screen display data and operate;
③ON/OFF: press for 3 seconds to turn on or off;
④HOLD: to lock the current data for recording;
⑤MENU: Press to display MENU;
⑥Reset hole: If it crashed, insert a small needle to reset;
⑦USB jack: used for charging and data output;
⑧Charging light: light on when charging, light off when charged fully (do not recommend to use when c harging.)
⑨Strong magnetic base: strong magnet at the bottom measure surface;
⑩Side strong magnet: strong magnet at the left side measure surface;
Note: The USB driver can be downloaded from the website: "DSMI Series Product USB Driv er".

▶ FUNCTIONAL MENU INSTRUCTIONS



1.ON/OFF press 3 seconds or so, when heard "beep..."Let go,startup/shutdown .

2..Press "HOLD" button to lock , re-press to unlock , Upper right corner of the monitor icon display.

3. Press MENU menu disappears, then re-press appears.。

4. Press the " MENU" and "HOLD" keys at same time to enter the touch screen calibration.

4.1 Click "OK" enterinto nex step ,click "EXIT" to Exit touchscreen calibration.

4.2 Click the red dot with a small pen to move the red finish four points automatically exit calibration.

① Click the SAVE button to enter the touch screen save option

A. DELETE ALL DATA

B. SAVE THE SINGLE POINT

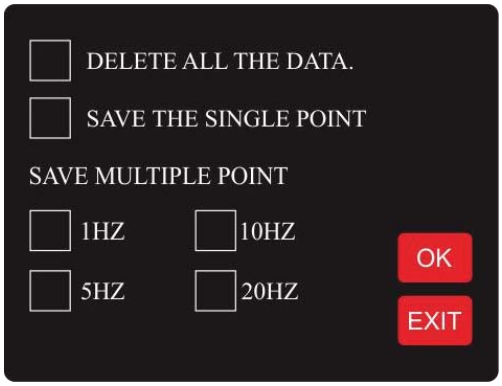
C. SAVE MULTIPLE POINT

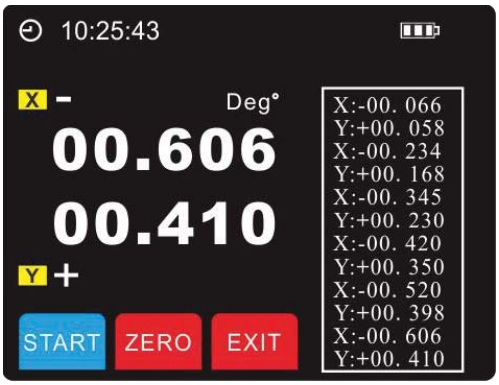
D. Saved frequency selectable：

1Hz/5Hz/10Hz/20Hz

E. Click "OK "to choose "success"

F. EXIT Give up selection to keep the original





SAVE DATA

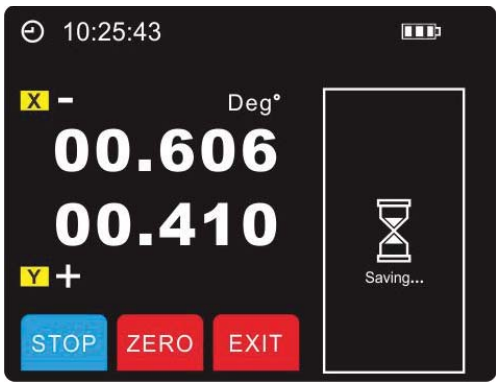
Click START to start saving the relevant data, and the data will be saved in the SD card;

Select single save, the data is displayed in the right frame of the interface, a single axis can display up to 6 groups of data, and a dual axis can display up to 12 rows of data;

Select consecutive multiple saves, the data will not be displayed and will be saved directly to the SD card After the data collection is completed, click STOP to stop saving the data;

ABS/ZERO Switch keys ;

EIXT: Exit saving function.



② SET Click the SET button to enter the setup interface six button options and features:

A. ALARM : Angle alarm value setting

B. CALI. : Calibration setting

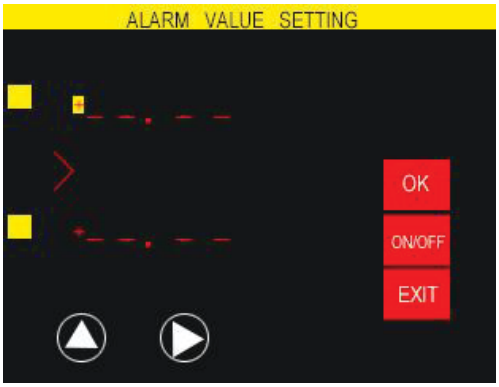
C. FILTER : Filter frequency setting

D. DATE : Date settting

E. FAC.RESET : Factory default setting

F. EXIT : Exit the setting interface

A.ALARM



1. Click ON / OFF and open the angle alarm setting, display numbers, closed setting then shows"_ _ . _ _".
2. Click on the X or Y axis data point select the appropriate axis angle setting.
3. Click ▲: change the data and symbol of the corresponding bit.

▶: Change the corresponding direction key.

The angle symbol is

+: alarm when greater than the corresponding angle

-: alarm when less than the corresponding angle

±: Alarm outside the range

For example:

Set X: +03.00 means when the X axis angle +3.3, is greater than 3 degrees then alarm;

Set Y: -04.00 means when the Y axis angel -4.6 ,is less than -4 degrees then alarm;

Set Y: ±05.00 angle when the Y axis angle -6, exceed -5 to +5 degrees then alarm.

4. Click "OK " to save the setting angle, then to take effect.
5. EXIT: Exit set the angle saving .

B. CALI Click" OK" then to operate according to related action

(Zero calibration requires a high-precision platform, do not operate without this condition)

C.FILTER Default 20HZ

Select 1HZ : Output frequence after filting

OK : Select success

EXIT : Exit selection

D. **DATE** Set date and time The time used to display and save data

▶: Select the year, month, and day of the time, the position of the hour, minute, and second, which can be cycled

▲: Increase the corresponding value

▼: Decrease the corresponding value

OK: save Settings

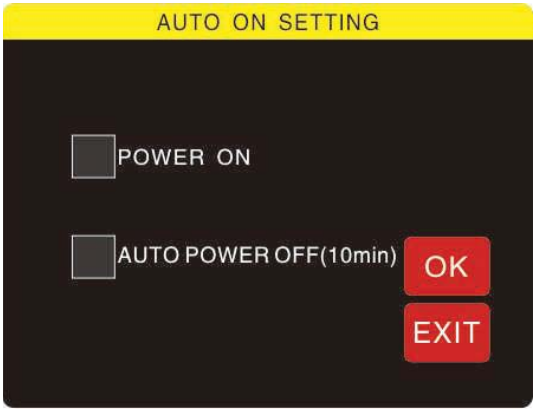
EXIT: quit Settings date interface, no save

E. **FAC.RESET** Restore the factory Settings

The parameters of the recovery has alarm value, filtering frequency,calibration angle

F. LATITUDE local latitude setting
Set the local latitude value. Because the gravity field of the earth varies from place to place, the customer only needs to set the local latitude, and the product automatically calculates the local gravity field to correct the accuracy error.
As shown on the right, click the latitude setting.
1. Click the "▲" button to increase the corresponding digit value 0-9
2. Click the "▼" button to decrease the corresponding digit value 0-9
3. Click the "▶" button to select the corresponding tens place, ones place, tenth place, percentile, and cycle to the right
4. Click OK: save the set latitude
5. Click EXIT: Exit the setting

G. AUTO ON/OFF: Auto power off setting
As shown in the figure on the right, if you select "POWER ON", the product is kept on; if you select "AUTO POWER OFF(10min)" for 10 minutes without operation, the product will automatically shut down (the product defaults to this setting).
OK: save settings
EXIT: Exit without saving settings



③ unit mode selection
MODE Each time you press the displayed unit mode changes DEG, degrees, minutes, seconds, mm/m cycle switch

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: (8 data bits, 1 stop bit, no parity, default rate 115200)

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

Data format: hexadecimal;
Identifier: fixed to 68;
Data length: the length from data length to checksum (including checksum);
Address code: the address of the acquisition module, the default is 00;
Command word: operation command keyword;
Data field: according to the different content and length of the command word changes accordingly;
Checksum: The sum of data length, address code, command word and data field does not consider carry;
For example: 68 04 00 04 08 (length 04 + address code 00 + command word 04 = 08).

2. command word analysis

Command word	Meaning/Example	illustrate
0X04	**Simultaneous reading of angle commands**E.g：***68 04 00 04 08***	Data field (0byte) No data field command
0X84	Sensor response reply E.g:***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**: 4 characters represent the X axis; **CC CC DD DD**: 4 characters represent the Y axis; **EE EE FF FF**: 4 characters represent temperature data; The angle format is the same as the X-axis or Y-axis analysis method: the angle in the left example is: X-axis +00.200°, Y-axis -00.252°; Temperature: 37.7°. (Angle analysis decimals are thousandths, ten-thousandths are discarded; temperature data analysis only keep one decimal.) 0A: Checksum, the hexadecimal sum of all data, excluding the prefix 68.
0X05	**Set relative/absolute zero point:** The current angle can be set to zero for relative measurement, or absolute zero can be set so that no power failure occurs. E.g:***68 05 00 05 00 0A***	Data field (1byte) 00: absolute zero 01: relative zero
0X85	Sensor response reply command E.g:***68 05 00 85 00 8A***	Data field (1byte) The number in the data field indicates the result of the sensor response 00: set successfully FF: Setting failed
0X32	**Read the data saved in the SD card:**E.g:***68 04 00 32 36***	Data field (0byte)
0XA2	Sensor response reply command E.g:***68 18 00 A2 AA AA AA AA AA AA AA BB BB BB BB CC CC***	Data field (19byte) The number in the data field indicates the result of the sensor response

	CC CC DD DD DD DD CS	AA AA AA AA AA AA AA: Year, month, day, hour, minute, second BB BB BB BB: For details of the X-axis data, please refer to the X-axis analysis defined by the data format; CC CC CC CC: For details of the Y-axis data, see the analysis of the Y-axis defined in the data format; DD DD DD DD: reserved.

▶ INCLINOMETER DATA FORMAT DEFINITION

Baud rate： (usually is 115200，special one is 9600 , 8 data bits，1 stop bit，no verification)

Example：X axis：+02.010° Y axis：-00.513° Temperature：+50.50°

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

Prefix, fixed 68

Data length, fixed10

Sensor address ,default 00

Command word ,fixed 84

X axis angle :

The first byte is the sign bit, 00 indicate positive angle ,10 indicate negative angle .

The second byte is the integer bit of the angle, is compressed BCD code .

The third byte is the decimal place of the angle,is compressed BCD code.

The fourth byte is the decimal place of the angle, which is the compressed BCD code.

Y axis angle ：

Format is same as X axis

Temperature data ：

The first byte is the sign bit, 00 indicate positive temperature ,10 indicate negative temperature .

The second byte is an integer bit of temperature, which is a compressed BCD code.

The third byte is the decimal place of the temperature, which is the compressed BCD code.

The fourth byte is reserved byte, fixed 00

The last byte is the sum of all the previous data.

If there is a carry, the lower data is taken.

▶ PRODUCT MAINTENANCE

B. The digital display goniometer uses a 3.7V rechargeable lithium battery. In order to improve the service life of the battery, please charge it when the battery is not completely exhausted.
C. If you turn on the power switch and there is no digital display, please charge it in time.
D. This instrument has strong reliability and can be used in a vibrating environment, but please do not drop the instrument from a high altitude, it will cause permanent damage.
E. If you find that the instrument is damaged, please don't disassemble it by yourself. Please call our company as soon as possible to conduct professional inspection and repair. If you disassemble it yourself, the manufacturer will refuse to repair it.

▶ WARNING NOTICE

1. This product has high-precision sensors and information processing circuits. It is strictly forbidden to drop, bump, or disassemble by yourself, otherwise you will be responsible for the consequences.
2. Don't press multiple buttons at the same time, it will easily affect the service life of the product.
3. This product should be placed in a safe place that is not easy for children to touch.