INSTRUCTION MANUAL

POLE FINDER

NS-5

Ver1.1



Kernel Hardware Engineering Inc.

【Overview】

◎ This product is an electronic compass designed to support the polar alignment of portable equatorial mounts during astronomical observation and photography.
◎ Equipped with a built-in 9-axis sensor, it allows you to quickly and easily set the equatorial mount's polar axis (direction of the North Star) for a specified latitude.
◎ It is suitable for wide-field star and constellation photography with relatively short exposures. For long exposures or telephoto lens photography, high-precision adjustment using a polar scope or similar equipment is required.

【Precautions】

◎ If the product is brought in from a cold place to a warm environment, condensation may occur. If condensation forms, allow it to dry naturally or leave it in the same environment for a long time until all moisture has disappeared before use.
◎ Do not operate the product in the rain, with water droplets attached, or with wet hands.
◎ Please note that the company assumes no responsibility whatsoever for any damages, lost profits, or claims from third parties arising from external factors such as product failures, malfunctions, defects, or power outages.

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【Package Contents】

1. POLE FINDER NS-5 Main Unit 1
2. Instruction Manual (Download) 1

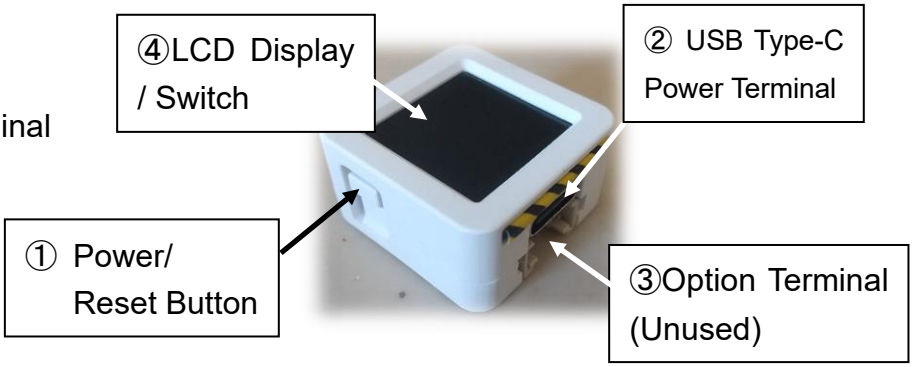


* Note: A USB cable for power supply and a USB power source are not included with this product.

【Part Names and Functions】

■ NS-5 Main Unit

① Power / Reset Button
② USB Type-C Power Terminal
③ Option Terminal (Unused)
④ LCD Display / Switch



■ Screen display

① Start screen
② Sensor Calibration screen
③ Main screen



① Start screen



② Sensor Calibration screen



③ Main screen

1 Power Connection and ON/OFF

Connect a USB Type-C cable (not included) to the USB Type-C port on the NS-5 main unit. Connect the other end of the USB cable to a USB charging power source or a portable USB battery.

When external power is supplied via the USB cable, the display screen automatically switches in the order of: Start Screen (a few seconds), → Sensor Calibration Screen (60-second wait) → Main Screen.

Pressing the Power/Reset Button once performs a reset (turns the power back ON), displaying the Start Screen → Sensor Calibration Screen → Main Screen in order

Pressing and holding the Power/Reset Button for a few seconds turns on the button LED and powers off the unit (OFF).

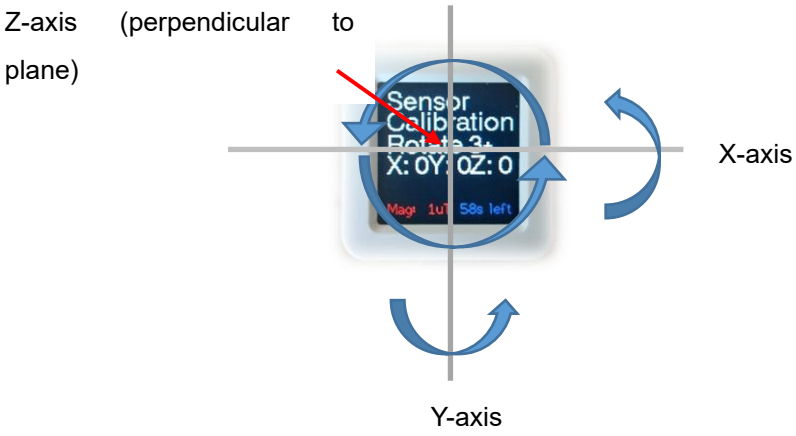
*Note: The NS-5 operates on external power and does not have a built-in rechargeable battery.

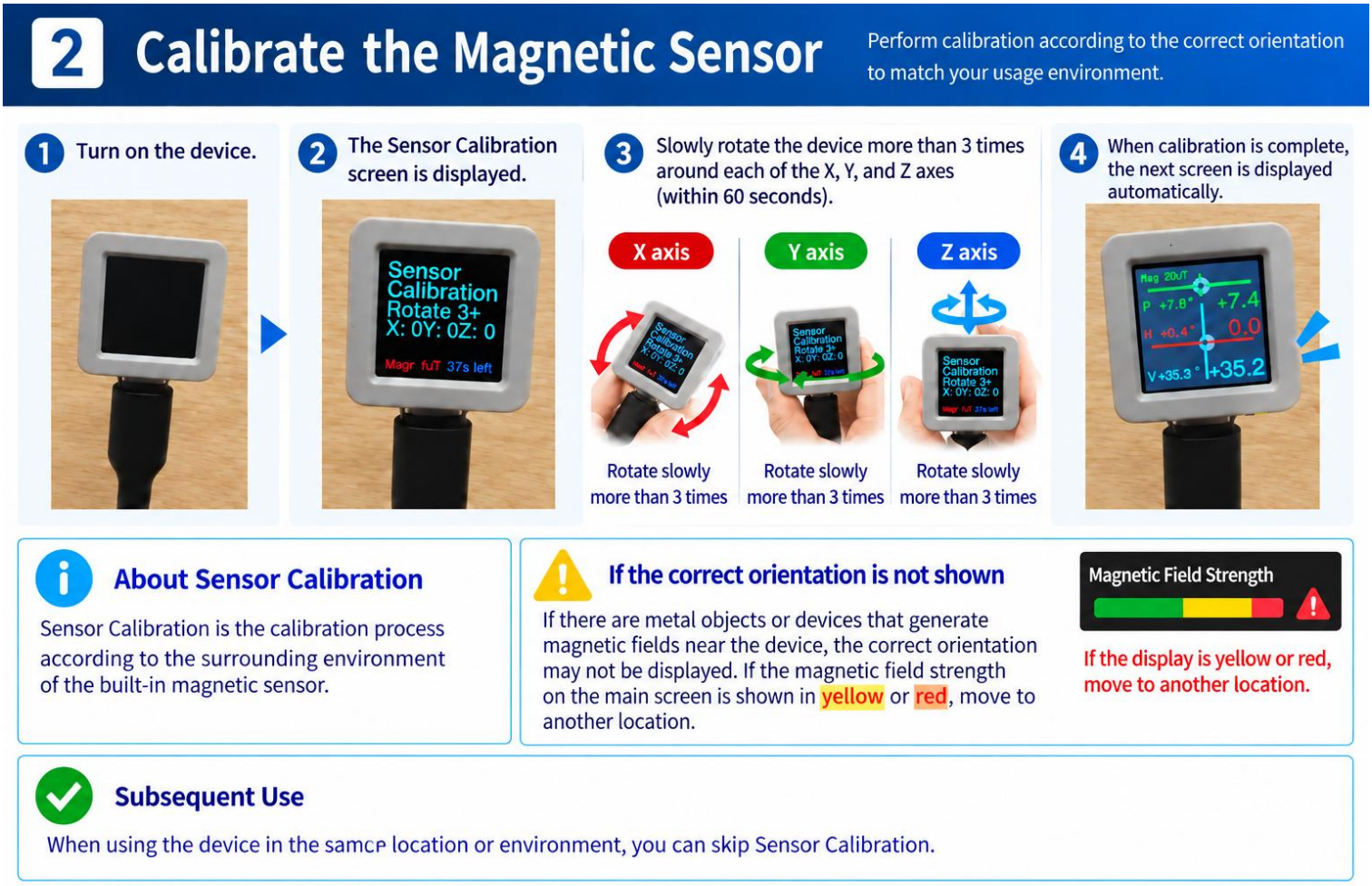
2 Calibrating the Magnetic Sensor

When the Sensor Calibration screen appears after turning on the power, slowly rotate the main unit at least 3 times around each of the X, Y, and Z axes (time limit: 60 seconds).

Sensor Calibration is the process of calibrating the built-in geomagnetic sensor to match the surrounding environment. If magnetized metals or magnetic devices are nearby, it will not indicate the correct direction. If the magnetic intensity indicator on the main screen turns yellow or red, please move to a different location.

If you plan to use the device in the same location and environment next time, you can skip Sensor Calibration. Press the screen switch while the Sensor Calibration screen is displayed to exit magnetic sensor calibration.





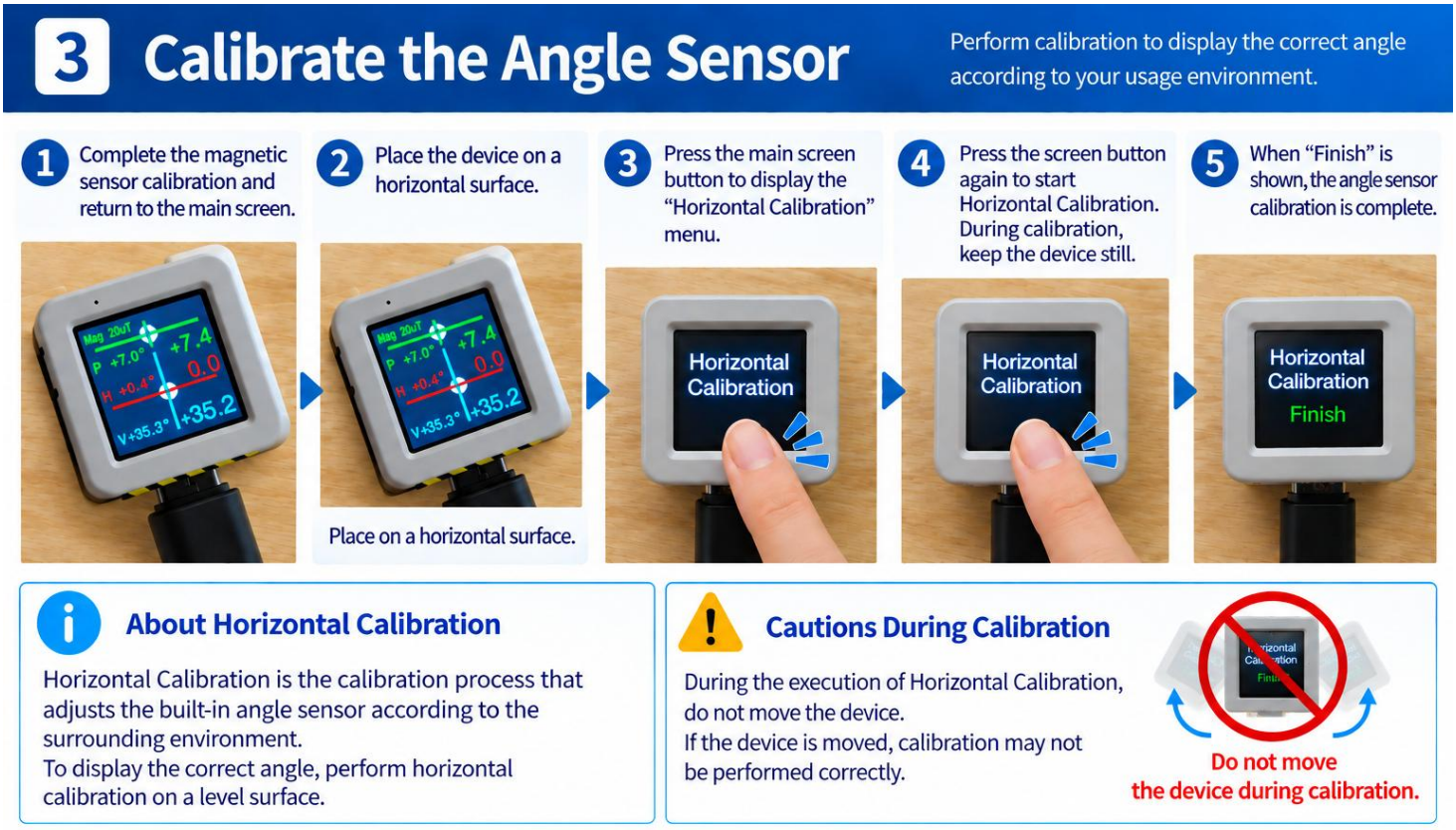
3 Calibrating Crystal/Angle Sensors

Complete the magnetic sensor calibration and display the main screen.
Place the main unit on a flat, horizontal surface.
Pressing the main screen button displays the Horizontal Calibration menu screen.
Press the screen button again to execute Horizontal Calibration. Do not move the sensor during this calibration. "Finish" will appear, indicating that the angle sensor calibration is complete.
If the sensor is tilted at an angle other than horizontal, the unit will display setting menu screens other than Horizontal Calibration (dM, Lat, LCD).
Pressing and holding the screen button for a few seconds returns you to the main

screen.

Calibrating the angle sensor once after purchase is sufficient. Perform it again only if you notice an error in the horizontal display.





4 Adjusting Screen Brightness

From the main screen, press the screen button to display the setting menu screen. Tilted the unit in various directions by approximately 90 degrees switches the setting menu (Horizontal Calibration, dM, Lat, LCD).

With the LCD menu displayed, press the screen button to select the LCD brightness setting menu.
You can increase or decrease the LCD brightness setting value depending on the tilt direction of the unit.
Pressing and holding the screen button for a few seconds returns you to the main screen.



5 Magnetic Declination and Latitude for the Location

Set the magnetic declination (dM) and latitude (Lat) corresponding to your usage location.
From the main screen, press the screen button to display the setting menu screen.
Tilt the unit in various directions by approximately 90 degrees to cycle through the setting menus (Horizontal Calibration, dM, Lat, LCD).

With the dM menu displayed, press the screen button to select the magnetic declination setting menu. You can adjust the value based on the tilt direction.
With the Lat menu displayed, press the screen button to select the latitude setting menu. You can adjust the value based on the tilt direction.
Pressing and holding the screen button for a few seconds returns you to the main screen.

*Note: Magnetic declination is the angle of deviation between magnetic north and true north. This device treats counterclockwise direction as a positive value following the Geographical Survey Institute of Japan notation (generally, clockwise is treated as positive).

For example in Japan, the information can be seen on the Geospatial Information Authority of Japan website.
http://maps.gsi.go.jp/

In USA, you can find the data on NOAA website
https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml?useFullSite=true

For detailed setup instructions, please refer to the "POLE FINDER NS-5" section on the following website:
https://khe.jp/en/products/

Magnetic Declination and Latitude of Major Prefectural Capitals in Japan

Declination	dM (°)	Latitude Lat (°)	
Sapporo		+9.3	+43.0
Sendai	+8.1		+38.3
Tokyo	+7.2		+35.7
Nagoya	+7.4		+35.2
Kanazawa	+8.0		+36.6
Osaka	+7.2		+34.7
Tokushima	+7.2		+34.1
Hiroshima	+7.3		+34.4
Fukuoka	+7.2		+33.6
Kagoshima	+6.4		+31.6
Okinawa	+5.0		+26.2

5 Set the Magnetic Declination for Your Location

Set the magnetic declination dM according to the location where the device will be used.

1. From the main screen, press the screen button to display the settings menu.
2. Tilt the unit about 45° to the left or right, and the magnetic declination dM setting menu appears.
3. With the dM menu displayed, press the screen button to select the magnetic declination dM setting menu.
4. Depending on the direction the unit is tilted, you can increase or decrease the magnetic declination setting value.
5. Press and hold the screen button for a few seconds to return to the main screen.



About Magnetic Declination dM

Magnetic declination dM is the setting used to correct the difference between true north and magnetic north. Set it to the magnetic declination value of the location where the device will be used.

Cautions During Setting

While the menu is displayed, tilt the unit slowly left and right.
Sudden movements may prevent proper operation.

To Return to the Main Screen

Press and hold the screen button for a few seconds to return to the main screen.

5 Set the Latitude for Your Location

Set the latitude Lat according to the location where the device will be used.

1. From the main screen, press the screen button to display the settings menu.
2. When the unit is tilted about 90° to the right, it switches to the Lat setting menu.
3. With the Lat menu displayed, press the screen button to select the Lat latitude setting menu.
4. Depending on the direction the unit is tilted, you can increase or decrease the latitude setting value.
5. Press and hold the screen button for a few seconds to return to the main screen.



About Latitude Lat

Set Latitude Lat according to the location where the device will be used.
Set it to the latitude value of the place of use.

Cautions During Setting

While the menu is displayed, tilt the unit slowly.
Sudden movements may prevent proper switching.

To Return to the Main Screen

Press and hold the screen button for a few seconds to return to the main screen.

6 Mounting to an Equatorial Mount

Fix the unit using a non-magnetic plate (such as aluminum, resin, or wood, preferably 20 cm or longer) sandwiched between your portable equatorial mount and tripod. Install the unit so that its central axis is parallel to the rotation axis of the equatorial mount.

The top of the NS-5 main unit (connector side) points toward the north celestial pole of the equatorial mount. Set it so that the display surface faces upward.



For easy attachment and removal, it is convenient to secure the main unit to the plate or other surfaces using plastic clamps, rubber bands, or anti-vibration adhesive sheets.





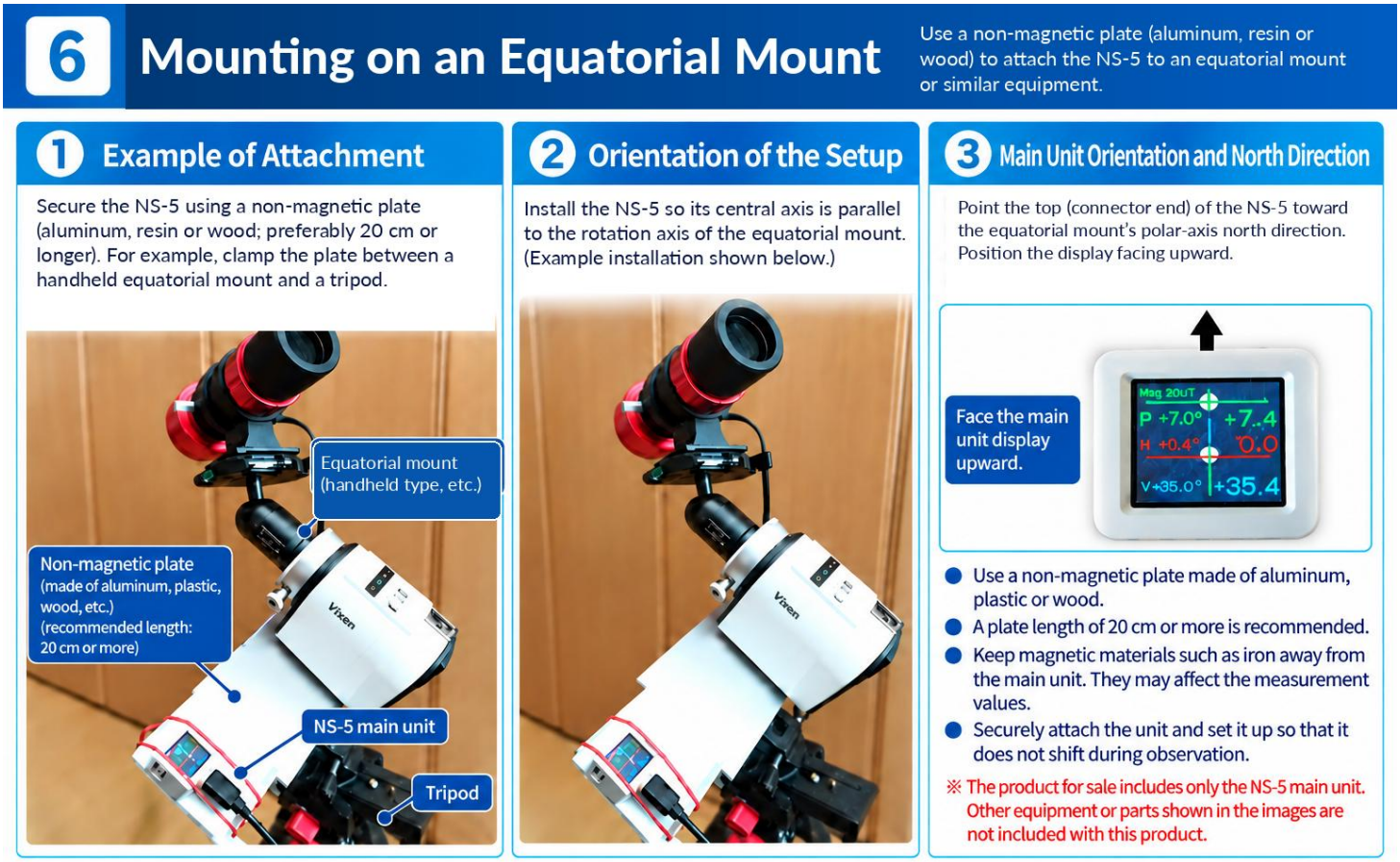
① Secured with an aluminum plate and plastic clamps

② Fixed with an aluminum plate and a rubber band

*For the Southern Hemisphere: Position the unit on the mounting plate so that the bottom of the unit points toward the celestial south pole of the equatorial mount (use the unit upside down, with the top facing north and the bottom facing south). Treat the magnetic declination value for the southern hemisphere as the angle value rotated 180 degrees from the northern hemisphere side.

*If there is an angle between the equatorial mount's rotation axis and the mounting surface, compensate for that angle when setting the latitude value on the main unit. Similarly, this angle compensation also enables use in the Southern Hemisphere.

*Usable latitude range: -10° to +70° (negative for the southern hemisphere, positive for the northern hemisphere).

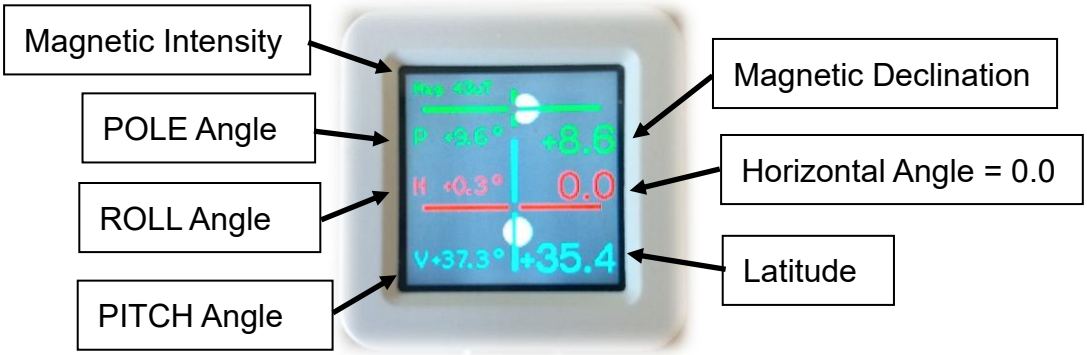


7 Aligning the Polar Axis

Turn on the NS-5 main unit and place it on the plate connected to the equatorial mount. Adjust the tripod or fine-adjustment platform so that the two circular markers on the screen graphic overlap the intersection of each axis.

When the circular markers completely overlap the intersection, the displayed values for POLE and PITCH will match the pre-set magnetic declination and latitude values, and the ROLL value will be 0 (horizontal).

After completing the polar axis alignment, turn off the power by pressing and holding the power button or disconnecting the USB cable.



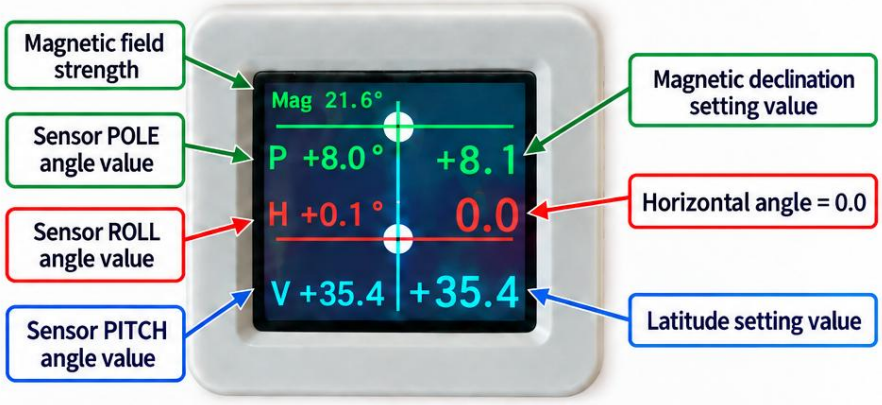
(Caution) If the magnetic intensity indicator turns yellow or red, it indicates a strong magnetic source near the unit. Reset the unit (press the power/reset button once) and perform a Sensor Calibration very close to that location. If it is not resolved, change the position of the unit.

7 Align the Polar Axis

1. Power on the NS-5, then place it on the plate attached to the equatorial mount. Adjust the tripod or fine-adjustment mount until the two ● markers on the screen overlap the intersections of the corresponding axes.

2. When the two ● markers completely overlap at the intersection of each axis, the values for POLE and PITCH will automatically match the set magnetic declination and latitude, and the ROLL value will become 0 (horizontal).

3. After alignment is complete, press and hold the power button, or disconnect the USB cable, to turn off the main unit.



Guideline for Polar Axis Alignment

When the two ● markers on the screen completely overlap at the intersection of each axis, the POLE and PITCH values will automatically match the set magnetic declination and latitude, and the ROLL value will become 0 (horizontal).

【Specifications】

Product Name:	POLE FINDER NS-5
Target Regions:	Worldwide (excluding magnetic anomaly regions)
Azimuth Range:	-30°～ +30°
Latitude Range:	-10°～ 70°
Horizontal Range	-10°～ +10°
Display LCD:	128 x 128 Color TFT LCD
Internal Battery	None
Power Input	5V / 100 mA（via USB Type-C）
Operating Temperature	5℃ ～ 35℃
Operating Humidity:	20%～80%　(non-condensing)
Storage Temperature	-10℃～50℃
Storage Humidity	10%～90% (non-condensing)
Dimensions	24×24×13mm
Weight	approx.7 g
Warranty Period	1 year from purchase

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