NAJM
Inclined to Perfection

HDI-NANO Manual

High-Accuracy Digital Display Inclinometer
with Dual-Axis Full-Range Measurement

Table of Contents

HDI-NANO Inclinometer

User Manual

Product Introduction

Display inclinometer, is a handheld inclinometer. It is dual axis, which is designed to measure the slope of surfaces in the range of ±180° and with an accuracy of better than 0.030°. Absolute and relative measurement, temperature compensation and fast calibration capability have made Display inclinometer a reliable product for operational environments and industrial applications.

owing to the low power design, intelligent power saving and the use of a 2600mAh Lithium Ion rechargeable battery, Display inclinometer promises up to 10 hours of battery life on a single charge.

The 2.4" touch screen and graphical user interface, measurement in units of degrees and seconds of arc, and the possibility of changing the resolution and response speed are among the features that have made measurement easier with Display inclinometer.

Utilizing MEMS sensors and 3-Axis acceleration process, Display Inclinometers maintain their accuracy throughout the measuring range of ±180°.

Also, owing to temperature compensation and the use of technology "Multi-factor temperature calibration", the temperature error of the device is less than 0.030° in the entire temperature range (40~0°C).

Features

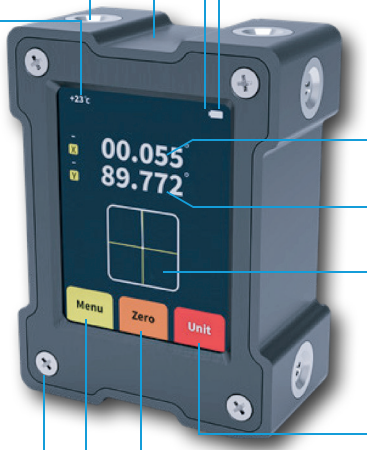
- The measuring range is ±180° in two axes (X, Y)
- User Quick Calibration
- 2.4" Touch LCD
- Measurement Accuracy of 0.030° with 0.001° resolution
- Maintaining accuracy in the entire range with "3D processing of acceleration data"
- Temperature compensation in the entire operating range (40~0°C)
- More than ten hours of work with one charge
- five measurement reference level with Neodymium Magnet
- Absolute and Relative Measurement Capability (Relative Zero)
- The possibility of measuring the relative rotation on a page 1

Applications

- Adjusting axes in CNC machines and industrial robots
- Deflection measurement of huge pipelines
- Dimensional quality control of parts in steel industry
- Accurate alignment in the installation of rail structures
- Calibrating linacs and other sensitive medical equipment
- Local terrain adjustment of radars
- Testing and control of tables with several degrees of freedom

1- Plane-Mode (For More Detailes, See Page 7)

Quick User Guide



ON/OFF Switch

Neodymium Magnet

Temperature

Charging Status

Battery SOC (State of Charge)

The device's X-axis angle to ground (see figs 5&3)

The device's Y-axis angle to ground (see figs 5&4)

Graphical Plummet

Measurement Unit (Degree or Second of Arc)

Relative/Absolute Mode

Setting Menu

Reference Surface of the Device

* The device incudes 12 measurement reference points in 5 reference levels (refer to figure 6)

Device Reference Levels

As you can see in the following pictures, for the inclinometer display, there are 12 measurement reference points in 5 reference levels of the device, which are as follows;
4 points on the back of the device, 2 points on the left and 2 points on the right, 2 points on the bottom and 2 points are on the top of the device. The tolerance of parallelism and Orthogonal of all reference faces is less than %0.01

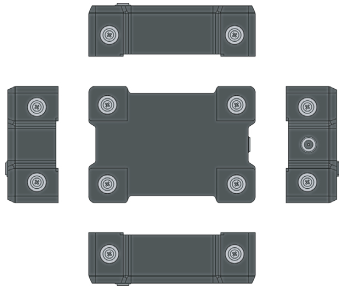


Fig 6

Measuring Axes

Fig 3:
+30˚ angle
to the X axis

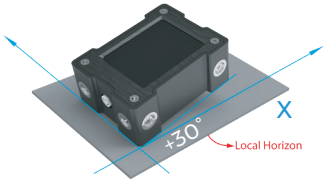


Fig 4:
+30˚ angle
to the Y axis

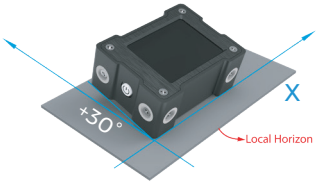
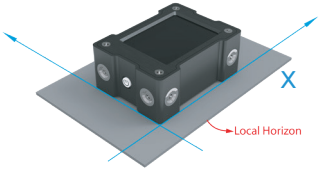
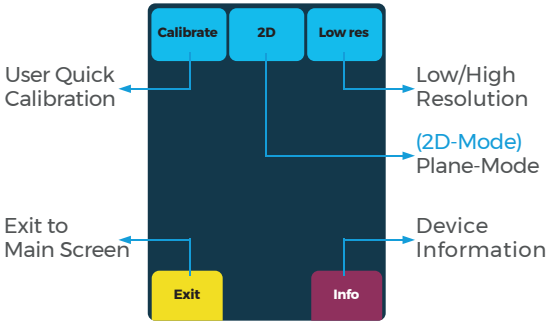


Fig 5:
0˚ angle to
X and Y axis

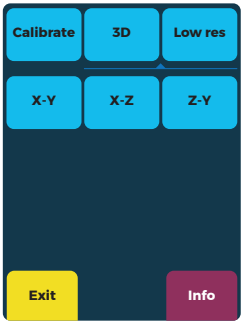


Menu Description



- Quick Calibration: The calibration steps are fully explained on page 10.
- Two-Dimensional mode or Plane-Mode: In this mode, you can limit the measurement of the device to a certain plane and measure the rotation of the device only in one plane. To learn more about this feature of the device, refer to page 11.
- Resolution setting: High Resolution mode for 0.001˚ resolution and Low Resolution mode for 0.01˚ resolution.

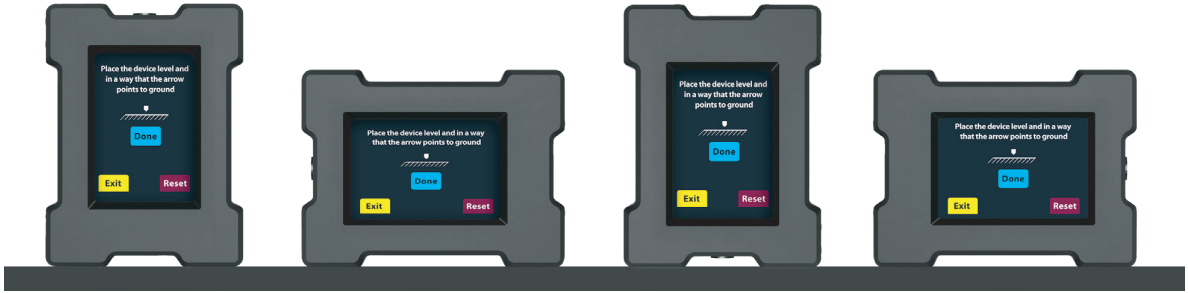
Menu Description



- We can use this menu to measurebetween x-y, x-z and y-z planes.

Quick Calibration

By using this quick calibration option, you can calibrate the device periodically. Due to long-term bias error 2, it is necessary to recalibrate the device every six months through this menu and by placing the device on the reference level. This is pratically a zero reset of the device. To restore the calibration settings to the factory state, you can use the reset option under the calibration menu. To do this, by following the steps explained on the screen, in four 90 degree rotations, place the device so that the direction of the arrow is facing the Bottom.

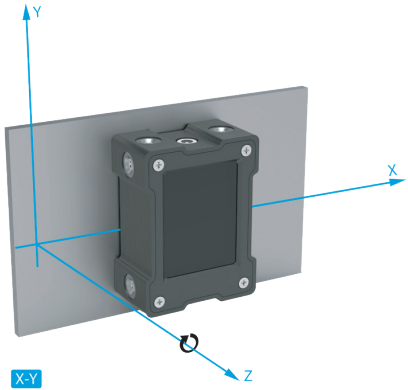


stage 1 stage 2 stage 3 stage 4

2-Long-Term Zero Bias Drift of MEMS Accelerometers

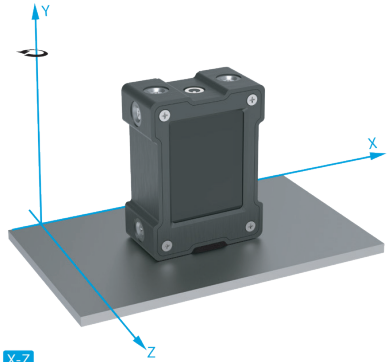
Plane Mode

In this case, you can limit the measurement of the device to a specific page. This option is used in cases where your measurement surface has only one degree of freedom or you want to measure its time only within one page. In this type of applications, since the angle of the screen itself with the local horizon is unimportant for your measurement, you can use the two-dimensional measurement mode. The figure below shows the different modes of this option.



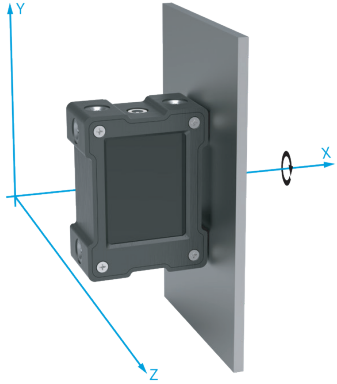
X-Y

Rotation around the Z axis limited to the X-Y plane



X-Z

Rotation around the Y axis limited to the X-Z plane

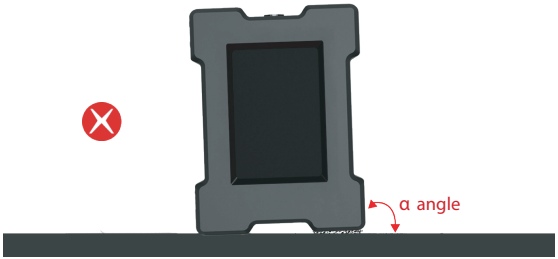


Z-Y

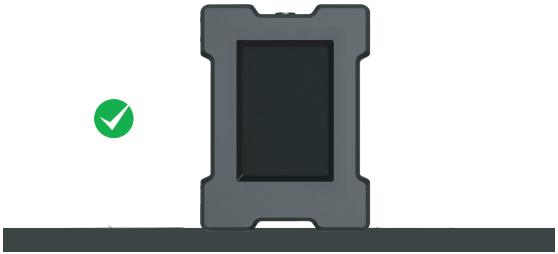
Rotation around the X axis limited to the Z-Y plane

Considerations for Correct Use

To use the device correctly and avoid measurement errors, pay attention to the following points:



stage 1



stage 2

- 1.It is necessary that the surfaces of the device and the horizontal surface used are clean so that the contact surface of the device and the measurement reference surface are completely parallel to each other. In Figure 1, the α angle created makes the device data invalid for your system.

- 2.The surface used should have a surface smoothness better than 3μm and an alignment better than 1 arc second.

Considerations for Correct Use

- 3.For correct measurement, the device must be at the same temperature as the environment. If there is a difference between the temperature of the environment and the device, it is necessary to wait until it is same temperature.

- 4.To avoid creating a temperature gradient in the device, it is better to use suitable gloves when working with the device. In this case, the device will be at its best temperature performance. Due to the resistive touch screen, you can easily operate the screen while wearing gloves.

- 5.Due to the presence of several strong Neodymium Magnets in the reference surfaces of the device, when using the device on magnetic surfaces such as Iron and Steel, the device may hit the surface strongly when bringing the device close to the measuring surface, and this problem causes. The device is out of calibration for a long time. For this purpose, it is better to first touch the device diagonally with the surface and then move it to the desired position for measurement with a rotation.

Maintenance Considerations

- Avoid hitting the device as much as possible. Strong shocks may cause the device to go out of calibration or even cause permanent damage to the device.

- To maintain the accuracy of 0.030 degrees, recalibrate the device preferably every 6 months through the menu option of the Calibrate section. Also, when the device has experienced severe temperature changes (thermal shock), be sure to recalibrate the device through the above menu.

- If you encounter the "Battery Low" message and the device turns off, first charge the device and then use it. Turning on the device continuously in "Battery Low" mode may damage the battery.

- If you do not use the device for long periods of time, it is preferable to store the device in a fully charged state. It is also recommended to fully charge unused devices at least once a year.

- The best storage temperature for the device, especially for long-term storage, is 25 degrees Celsius.

Maintenance Considerations

- To avoid battery damage, do not use a non-standard charger to charge the device. The standard charger of the device is a 5 volt charger with a current of 2 amps.

- If the battery charge becomes too low due to unreliable sensor data, the device will automatically turn off and will not allow the user to use it.

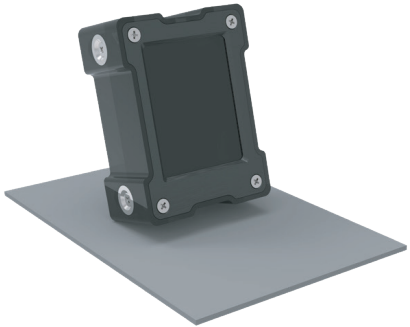


Fig 1

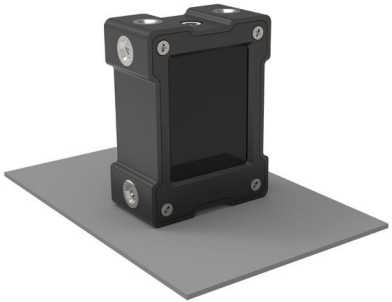


Fig 2

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