

*Geodetic Supply & Repair Pty Ltd*  
*T/A GSR Laser Tools*  
Unit 7 - 7 Prindiville Drive, Wangara WA 6065  
P.O.Box 1305, Wangara WA 6065  
Phone : (08) 9409 4058  
A.B.N. 63 950 351 762



# Integrated Compact Inclinometer

## **HMDS0400**



## **INTEGRATED COMPACT INCLINOMETER**

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**THE HUMMINGBIRD INTEGRATED COMPACT INCLINOMETER IS USED TO MEASURE PITCH AND ROLL WITH THE USE OF AN INTEGRATED ACCELEROMETER.**

**IT IS EASY TO OPERATE WITH 3 SOFTKEY PUSH BUTTONS AND A FULL COLOUR DISPLAY.**

## **WARNING & SAFETY INSTRUCTIONS**

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**THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR THE INTEGRATED COMPACT INCLINOMETER.**

**DO NOT OPERATE THE INCLINOMETER UNLESS YOU HAVE READ AND UNDERSTOOD THIS MANUAL AND THE DEVICE IS INSTALLED AS PER THE INSTALLATION INSTRUCTIONS.**

## 2 SPECIFICATIONS

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### TECHNICAL SPECIFICATIONS & ORDERING INFORMATION

PART NUMBER	HMDS0400
MOUNTING SYSTEM	BRACKET DASH MOUNT
INPUT VOLTAGE	9-36V
POWER CONSUMPTION	LESS THAN 1W
DIMENSIONS (DISPLAY UNIT)	70MM (WIDTH) X 50MM (HEIGHT) X 18MM (DEPTH)
OPERATING TEMPERATURE	-40 TO 85 DEGREES

### THE KIT CONTAINS

1. 1.8" DISPLAY SCREEN
2. BRACKET DASH MOUNT



## 3 OPERATION

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### POWERFUL PERFORMANCE

The Integrated Compact Inclinometer requires no costly installation; simply plug in the cigarette adapter or directly connect power and ground to start measuring.

The Integrated Compact Inclinometer requires no external sensor and will update pitch and roll measurements ten times a second.

The full colour screen allows for easy interpretation of pitch and roll angle in both degrees and percent gradient.

The Integrated Compact Inclinometer can be positioned in a range of orientations, allowing for mounting position to be modified to suit individual needs.

This unit is multi voltage and can work in 12V and 24V vehicles.

### Features

- Pitch and Roll measurement
- Configurable warning and alarm levels
- Full colour display
- Internal buzzer
- Password protected menu
- Rugged mounting system
- Multi Voltage

## 4 INSTALLATION

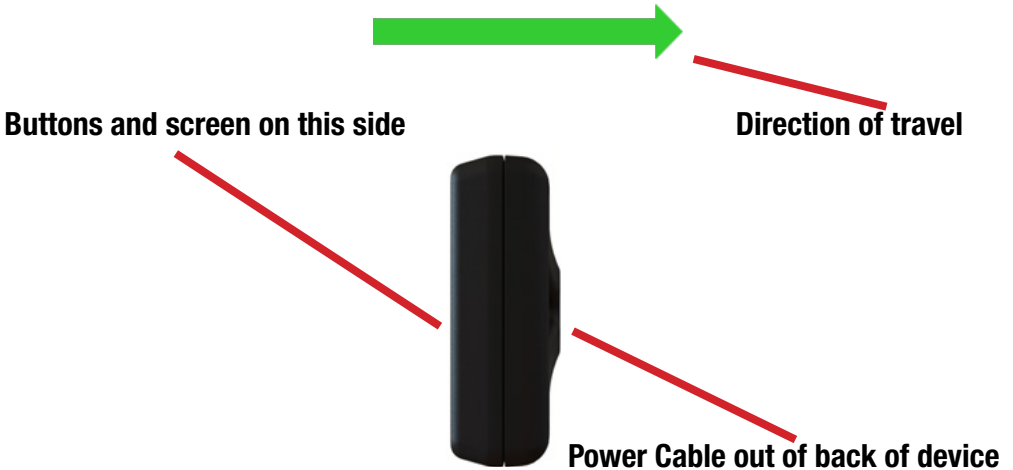
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Ensure the device is mounted securely and safely. To install correctly, the device must be orientated appropriately.

### Determine device orientation

The device must be calibrated in the position it will be used in, with the vehicle on a flat and level surface. This may require mounting the device into the vehicle prior to calibration.

If the unit is positioned with the back of the device facing the forward direction of the vehicle and the device is not tilted, no calibration is needed. This is demonstrated in figures 1 and 2 where the green arrow represents the direction of travel i.e. the 'forward' direction of the vehicle.



**Figure 1**

Side view of device showing orientation without calibration.

**Notice the device is vertically straight.**

## 4 INSTALLATION

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Direction of travel is into the page



**Figure 2**

Front view of device showing orientation without calibration.

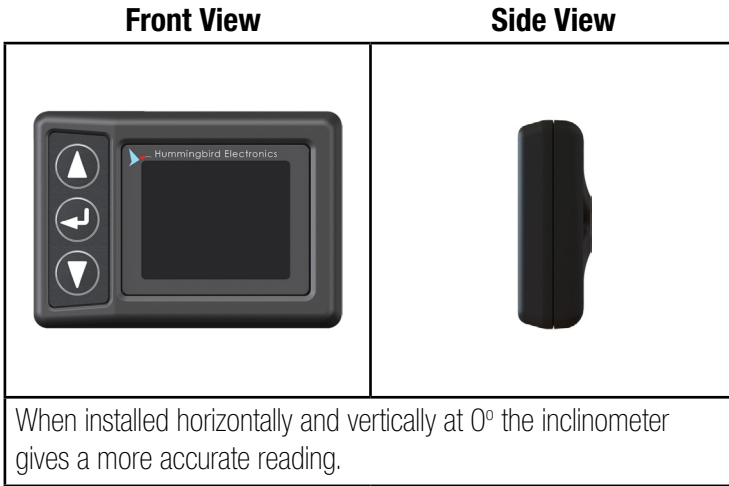
**Notice the device is horizontally straight and not tilted**

If the device is tilted when installed, then a calibration process must occur. The device can be calibrated when tilted up to 40°. See figures 3 and 4 on the next page for installation, where the direction of travel is the same as in figures 1 and 2.

**With tilted angles above 40° an accurate reading cannot be obtained.**

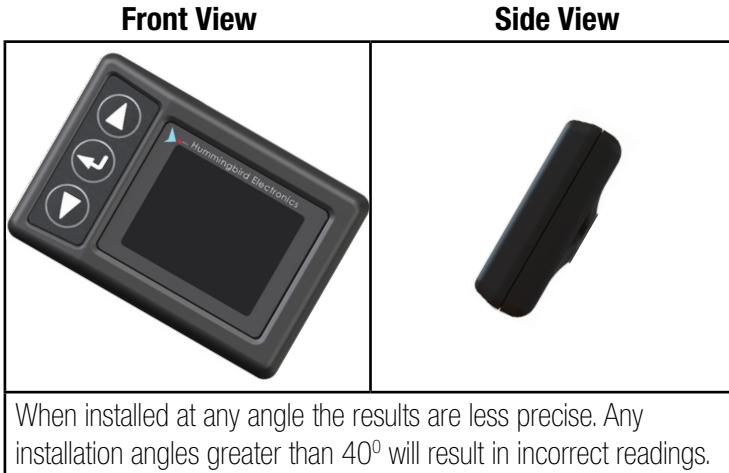
## 4 INSTALLATION

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**The above is an example of the preferred orientation of the device.**

**Figure 3**



**The above is an example of the non preferred orientation of the device.**

**Figure 4**

## 4 INSTALLATION

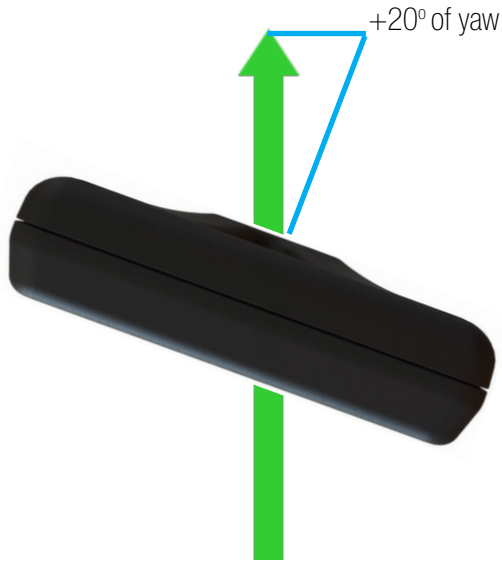
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Yaw is the angle between the direction of travel and the 'forward' direction of the device.

If yaw is present prior to calibration, the yaw angle must be manually entered in before calibration. See the next page for more information on yaw and setting the yaw angle.

**NOTE:** If the device can be installed without yaw, it is highly recommended to do so.

### Determining Device Yaw



**Figure 5**

The above is a top view example of an Inclinometer that is experiencing positive 20° of yaw, where the green arrow is the direction of travel and the blue line is the forward direction of device.



## 4 INSTALLATION

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It is the yaw angle demonstrated in figure 5 that must be entered in to the device to allow for accurate calibration, where clockwise yaw is considered **positive** and anti-clockwise yaw is considered **negative**.

When entering the yaw angle, values can be chosen between +40° and -40°.

To find the correct angle, look from above the device (e.g. a birds eye view) and use figure 5 as a reference guide for positioning the display.

It may be useful to use a protractor to get a more accurate yaw angle.

This process is made more difficult with the device tilted, but the process is the same. Look from above the device and determine the angle between the forward direction of vehicle (green arrow in figure 5) and the forward direction of device (blue line in figure 5).

## CALIBRATION

**NOTE: Ensure the previous pages on device orientation have been understood.**

1. Install device into vehicle in position it will be used in
2. Power the device.
  - NOTE: If the buzzer is sounding, it can be disabled if not required. Enter the menu by pressing the enter button, then use the down arrow to find the "Buzzer: Enabled" tab, select the tab by pressing the enter button again. The tab will turn to the colour red. Then use the down button to switch the buzzer mode from "Enabled" to "Disabled". Press the enter button again and tab will turn a green colour. Then use the down arrow to scroll to the "Back" tab and press the enter button. The buzzer will be off and the main screen will be in view.
3. If the device is mounted with NO pitch, roll or yaw then NO calibration is needed. The device is ready for use. If the device is installed tilted in any way, proceed to step 4.
4. Enter the menu by pressing the enter button and scroll using the up and down buttons to select the tab called "Calibration", then enter the calibration menu.

## 4 INSTALLATION

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5. The tab called "Set Cal." (meaning Set Calibration) will be highlighted in green.
  - a) If the device is mounted with NO yaw present. (See page 8 for determining device yaw), proceed to step 6.
  - b) If yaw is present, skip to step 7.
6. Press the enter button to set the calibration, the device will fade to black for approximately 1 second and an audible beep will occur. After this, the values for pitch and roll should be 0.

The device is now ready for use.
7. After determining yaw angle. (See page 8 for determining device yaw), use the down button to scroll down to the tab "Set Yaw: 0" and tab will be coloured green.
8. Press the enter button to select tab and the tab will be coloured red.
9. Use the up button and down button to select the yaw angle in degrees.
10. After the yaw angle has been selected, press the enter button to confirm choice. The tab will go from red in colour to green.
11. Scroll up by pressing the up button to the tab called "Set Cal." It will be highlighted in green.
12. Press the enter button to set the calibration, the device will fade to black for approximately 1 second and an audible beep will occur.

After this, the values for pitch and roll should be 0 and the device is now ready for use.

## 4 INSTALLATION

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### How to restore default calibration.

1. Press the down button to scroll down the list of tabs.
2. Scroll to the tab called "Calibration".
3. Press the enter button to enter the calibration menu.
4. The tab called "Set Cal." (meaning Set Calibration) will be highlighted in green. Use the down button to scroll down to the tab called "Default Cal." (meaning Default Calibration).
5. Press the enter button to set the calibration to the default calibration. The device will fade to black for approximately 1 second and an audible beep will occur.

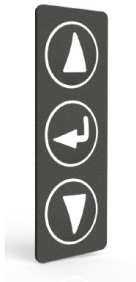
After this, the values for pitch and roll should be 0 and the device is now ready for use.

## 4 INSTALLATION

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### NAVIGATING THE MENUS

The Integrated Compact Inclinometer can be configured using the three buttons on the keypad.



**Up** - press up to increment a value when in configuration screens

**Enter** - press enter to access the configuration menu.

**Down** - press down to decrement a value when in the configuration screens

### CONFIGURATION MENU

Once the configuration menu has been accessed by pressing the enter button, a list of menu items will be shown.

Press down to access the next menu option or up to access the previous one.

Press enter to select an option.

To exit the menu, select the exit icon and press enter.

## 4 INSTALLATION

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### **ALERT THRESHOLDS**

Select "Alert Thresholds" to access the Alert sub-menu.

### **SHOW**

Select "Show", and use the up and down keys, to select whether the Integrated Compact Inclinometer displays pitch, roll, or both.

### **UNITS**

Select "Units", and use the up and down keys, to select whether the Integrated Compact Inclinometer displays angles in degrees or gradient.

### **BRIGHTNESS**

Select "Brightness", and use the up and down keys, to control the brightness of the Integrated Compact Inclinometer's display.

### **SENSOR SPEED**

Select "Sensor Speed", and use the up and down keys, to control the response speed of the Tilt Sensor. A lower speed will cause the reported angle to change more slowly, but will be more resistant to sudden jolts.

### **CALIBRATE**

Select "Calibrate" to access the Calibration sub-menu.

### **BUZZER**

Select "Buzzer", and use the up and down keys, to enable or disable the internal buzzer.

### **LATCH**

Select "Latch", and use the up and down keys, to enable or disable the latch feature. When enabled, the Integrated Compact Inclinometer will remain in an Alarm or Warning state for 10 seconds after the device returns to a safe angle.

## 4 INSTALLATION

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### PASSWORD

Select “Password”, and use the up and down keys, to enable or disable the password. If the password is enabled, you will be prompted to enter the desired password.

### ENTERING A NEW PASSWORD

Change the number using the up and down keys, and press enter to confirm each number, one at a time.

**BE CAREFUL WHEN SETTING A NEW PASSWORD – YOU WILL NOT BE ABLE TO ACCESS THE MENU WITHOUT IT.**

### BACK

Select “Back” to return to the main display.

### ALERT THRESHOLDS MENU

The Alert Thresholds menu contains warning and alarm threshold levels for each of the four tilt axes – Left, Right, Forwards and Backwards.

Use the up and down keys to navigate through the menu, the enter key to select one of the threshold levels, the up and down keys to set the angle and enter to confirm the new setting.

### CALIBRATION MENU

This feature allows the user to orientate the device in a range of possible configurations.

### SET CALIBRATION

Select “Set Calibration” to set the current pitch and roll to 0.

### RESET CALIBRATION

Select “Reset Calibration” to clear the previous calibration.

### BACK

Select “Back” to return to the configuration menu.