



Integrated Compact Inclinometer

HMDS0400



INTEGRATED COMPACT INCLINOMETER

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

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

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

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

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.

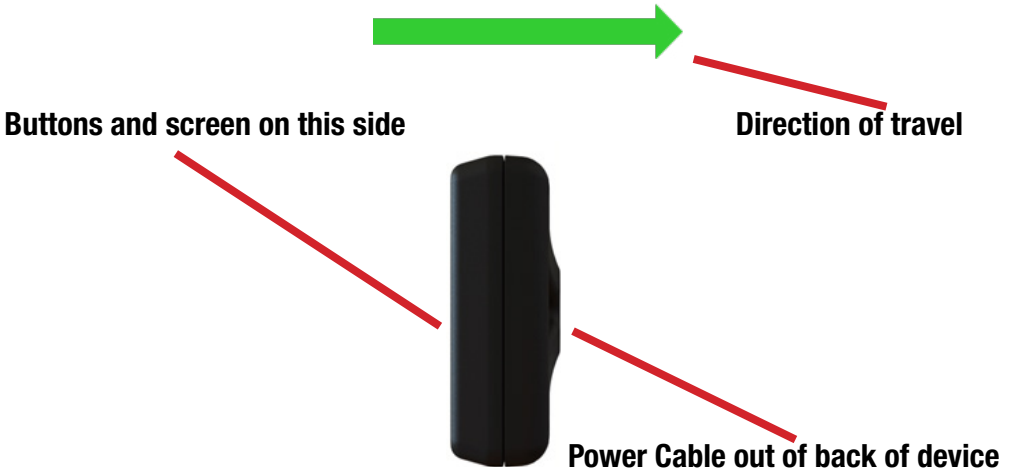


Figure 1

Side view of device showing orientation without calibration.

Notice the device is vertically straight.

4 INSTALLATION

Direction of travel is into the page



Figure 2

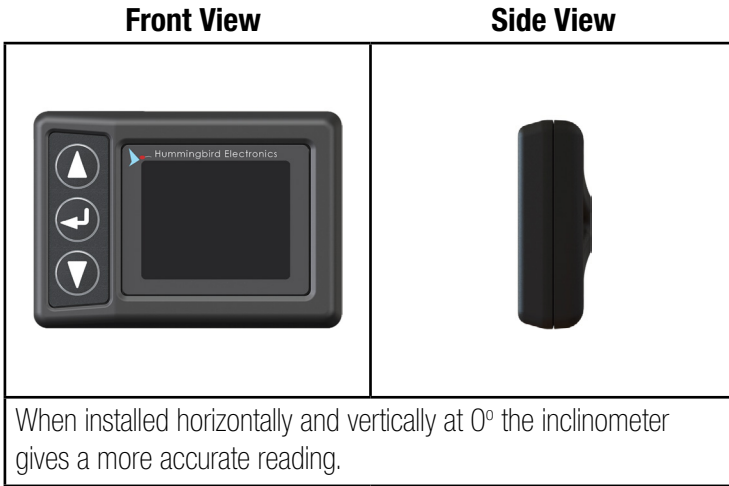
Front view of device showing orientation without calibration.

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.

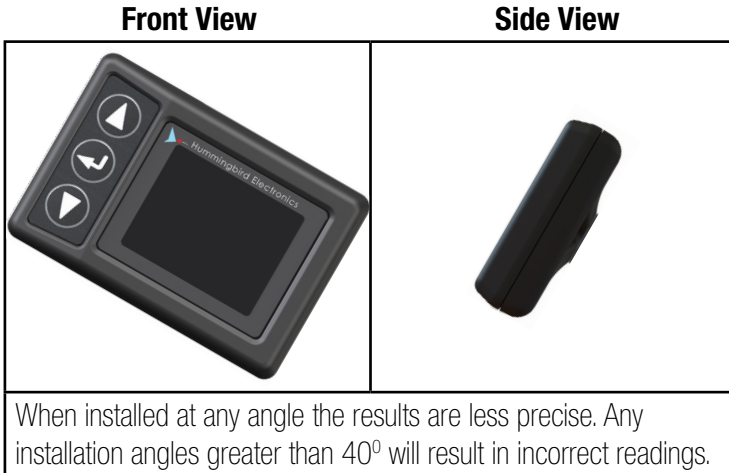
With tilted angles above 40° an accurate reading cannot be obtained.

4 INSTALLATION



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

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

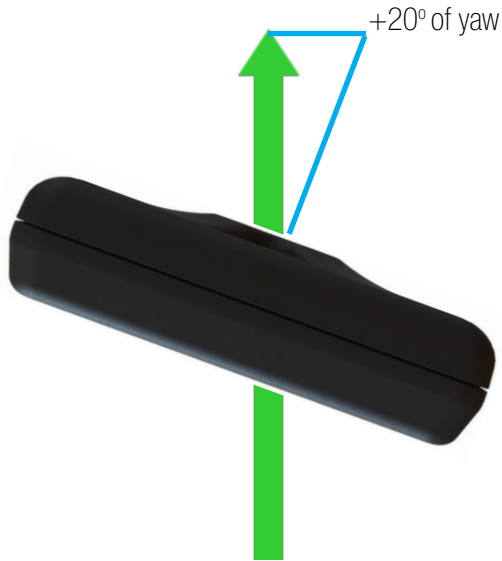


Figure 5

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

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

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

How to restore default calibration.

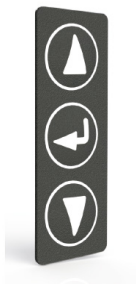
1. Press the down button to scroll down the list of tabs.
2. Scroll to the tab called "Calibration".
3. Press the enter button to enter the calibration menu.
4. The tab called "Set Cal." (meaning Set Calibration) will be highlighted in green. Use the down button to scroll down to the tab called "Default 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

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

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

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.

5 DISCLAIMER

USE OF PRODUCTS

1. You, (the "Purchaser"), acknowledge that you have the sole responsibility of satisfying yourself that the goods supplied by Redarc Electronics Pty Ltd (ACN 009 971 794) atf the Redarc Trust trading as Hummingbird Electronics ("Hummingbird Electronics") are suitable for the use of the Purchaser or any contemplated use of the Purchaser and that the Purchaser has conducted its own investigations and has not relied upon any information, statement, advice or representation by Hummingbird Electronics of or in relation to:

1.1 the operating and/or performance parameters of the goods;

1.2 the outcomes that the goods may achieve;

1.3 the suitability of the goods to any particular application, installation or physical environment; and

1.4 the appropriateness of the use of the goods outside Australia.

2 The Purchaser acknowledges and agrees that:

2.1 any representation as to the operating parameters of the goods provided by Hummingbird Electronics are representative of laboratory conditions;

2.2 the actual performance of the goods in situ might be affected by external factors (including without limitation environmental conditions) beyond Hummingbird Electronics' control;

2.3 incorrect and/or negligent installation, application or use of the goods may cause loss of life, injury and/or damage to property;

2.4 Hummingbird Electronics makes no representation, warranty or assurance as to any of the matters listed in clause 1 and that Hummingbird Electronics shall not be liable for any loss or cost arising from those matters to the maximum extent permitted by law.

3. Hummingbird Electronics gives the warranties specified in the Warranty as being given by Hummingbird Electronics, and subject to and to the maximum extent permitted by law, excludes all other warranties in relation to the goods, whether express or implied, including without limitation any warranty regarding merchantability or fitness for a particular purpose.

4. To the maximum extent permitted by law, Hummingbird Electronics excludes all liability in respect of the goods. To the extent that Hummingbird Electronics is not able to exclude liability under law, then to the maximum extent permitted by law Hummingbird Electronics' liability under the Warranty or otherwise in respect of the goods is limited as in accordance with the Warranty.

5 DISCLAIMER

5. Other than specifically stated in this document and to the maximum extent permitted by law, Hummingbird Electronics is not liable for and the Purchaser hereby releases Hummingbird Electronics from any consequential loss or damages of any type including without limitation incidental, special, indirect, punitive or otherwise, including loss of profit, whatever the claim (tort, breach of contract or warranty or otherwise) and whatever the forum, whether arising out of or in connection with the goods or any other cause whatsoever.

6. The Purchaser releases Hummingbird Electronics from all liability, in respect of personal injury or death or damage or loss of property of any person including the Purchaser or the Purchaser's employees agents or contractors, arising wholly or in part from the Purchaser's acts, omissions, negligence, breach of duty or breach of contract.

7. In any event and without limiting the generality of the foregoing, Hummingbird Electronics' liability for any breach of a term, condition or warranty not excluded in this document will be limited to the replacement of goods delivered or the payment of the cost of replacing the goods or acquiring equivalent goods from an alternate supplier and/or the resupply of any services rendered or the cost of having those services resupplied.

8. The Purchaser shall be responsible for and indemnify and hold harmless Hummingbird Electronics from and against all claims, damages, costs (including without limitation legal costs on a full indemnity basis), losses, liabilities and expenses caused by the Purchaser's acts, omissions, negligence, breach of duty or breach of contract.

6 WARRANTY

Our goods come with guarantees that cannot be excluded under the Australian Consumer Law. You are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Hummingbird Electronics offers a warranty in respect of its Products where the Products are purchased from an authorised distributor or reseller of Hummingbird Electronics by the Purchaser, on the terms and conditions, and for the duration, outlined below in this document ("Warranty"). The benefits of this Warranty are in addition to other rights and remedies available at law in respect of the Products and shall not derogate from any applicable mandatory statutory provisions or rights under the Australian Consumer Law.

9. In this Warranty, the term Products means:

9.1 all products manufactured or supplied by Hummingbird Electronics; and

9.2 any component of or accessory for any product in clause 9.2 manufactured or supplied by Hummingbird Electronics.

Offer and duration of product warranties

10. Hummingbird Electronics warrants that its Products will be free, under normal application, installation, use and service conditions, from defects in materials and workmanship affecting normal use, for 12 months from the date of purchase ("Warranty Period").

11. Where a Product malfunctions or becomes inoperative during the Warranty Period, due to a defect in materials or workmanship, as determined by Hummingbird Electronics, then subject to further rights conferred by the Australian Consumer Law on the Purchaser, Hummingbird Electronics will, in exercise of its sole discretion, either:

11.1 repair the defective Product;

11.2 replace the defective Product; or

11.3 provide a refund to the Purchaser for the purchase price paid for the defective Product, without charge to the Purchaser.

12. The warranty given by Hummingbird Electronics in clause 11 covers the reasonable costs of delivery and installation of any repaired or replaced Products or components of Products to the Purchaser's usual residential address notified to Hummingbird Electronics, together with the reasonable costs of removal and return of any Products determined by Hummingbird Electronics to be defective.

6 WARRANTY

13. If the Purchaser incurs expenses of the nature referred to in clause 12 in the context of making a claim pursuant to this Warranty that is accepted by Hummingbird Electronics, the Purchaser will be entitled to claim for reimbursement of those expenses which Hummingbird Electronics determines, in exercise of its sole discretion, to be reasonably incurred, provided that the claim is notified to Hummingbird Electronics in writing at the postal address or email address specified in clause 29 and includes:

13.1 details of the relevant expenses incurred by the Purchaser; and

13.2 proof of the relevant expenses having been incurred by the Purchaser.

Exclusions and limitations

14. This Warranty will not apply to, or include any defect, damage, fault, failure or malfunction of a Product, which Hummingbird Electronics determines, in exercise of its sole discretion, to be due to:

14.1 normal wear and tear or exposure to weather conditions over time;

14.2 accident, misuse, abuse, negligence, vandalism, alteration or modification;

14.3 non-observance of any of the instructions supplied by Hummingbird Electronics, including instructions concerning installation, configuring, connecting, commissioning, use or application of the Product, including without limitation choice of location;

14.4 failure to ensure proper maintenance of the Product strictly in accordance with Hummingbird Electronics' instructions or failure to ensure proper maintenance of any associated equipment or machinery;

14.5 repairs to the Product that are not strictly in accordance with Hummingbird Electronics' instructions;

14.6 installation, repairs or maintenance of the Product by, or under the supervision of, a person who is not a qualified auto electrician or technician, or if non-genuine or non-approved parts have been fitted;

14.7 faulty power supply, power failure, electrical spikes or surges, lightning, flood, storm, hail, extreme heat, fire or other occurrence outside the control of Hummingbird Electronics;

14.8 use other than for any reasonable purpose for which the Product was manufactured;

14.9 any indirect or incidental damage of whatever nature outside the control of Hummingbird Electronics.

6 WARRANTY

15. Warranty claims in respect of a Product must be made in writing to Hummingbird Electronics at the postal address or email address specified in clause 29 within the Warranty Period. Such claims must include the following:

- 15.1 details of the alleged defect or fault and the circumstances surrounding the defect or fault;
- 15.2 evidence of the claim, including photographs of the Product (where the subject of the claim is capable of being photographed);
- 15.3 the serial number of the Product, specified on the label affixed to the Product; and
- 15.4 proof of purchase documentation for the Product from an authorised distributor or reseller of Hummingbird Electronics, which clearly shows the date and place of purchase.

The return of any Products without the prior written instructions of Hummingbird Electronics will not be accepted by Hummingbird Electronics.

16. Without limiting any other clause in this Warranty, Hummingbird Electronics has the right to reject any Warranty claim made by a Purchaser pursuant to this Warranty where:

- 16.1 the Purchaser does not notify Hummingbird Electronics in writing of a Warranty claim within the Warranty Period;
- 16.2 the Purchaser does not notify Hummingbird Electronics in writing of a Warranty claim within 1 month of becoming aware of the relevant circumstances giving rise to the claim, so that any further problems with the Product are minimised;
- 16.3 the serial number of the Product has been altered, removed or made illegible without the written authority of Hummingbird Electronics;
- 16.4 the Purchaser is unable to provide proof of purchase documentation in accordance with clause 15.4 or evidence that the Product was properly installed and removed (if relevant), and that proper maintenance has been performed on the Product, by, or under the supervision of, a qualified auto electrician or technician, in accordance with the instructions of Hummingbird Electronics.

17. If the Product is found to be working satisfactorily on return to Hummingbird Electronics or upon investigation by Hummingbird Electronics, the Purchaser must pay Hummingbird Electronics' reasonable costs of testing and investigating the Product in addition to shipping and transportation charges. Where Hummingbird Electronics is in possession of the Product, the Product will be returned to the Purchaser on receipt of the amount charged.

18. Any replaced Products or components of Products shall become the property of Hummingbird Electronics.

6 WARRANTY

19. Hummingbird Electronics may, in exercise of its sole discretion, deliver another type of Product or component of a Product (different in size, colour, shape, weight, brand and/or other specifications) in fulfilling its obligations under this Warranty, in the event that Hummingbird Electronics has discontinued manufacturing or supplying the relevant Product or component at the time of the Warranty claim, or where such Product or component is superior to that originally purchased by the Purchaser.

Other conditions of Warranty

20. If the Purchaser acquired a Product for the purpose of resupply, then this Warranty shall not apply to that Product.

21. In particular, the sale of a Product via an online auction, online store or other internet website by a party that is not an authorised distributor or reseller of the Product will be deemed to be a resupply within the meaning of the Australian Consumer Law and will render this Warranty void, as Hummingbird Electronics has no control over the storage, handling, quality or safety of Products sold by such persons.

22. A Purchaser shall only be entitled to the benefit of this Warranty after all amounts owing in respect of the Product have been paid.

23. While Hummingbird Electronics warrants that the Products will be free from defects in materials and workmanship in the circumstances set out in this Warranty, to the maximum extent permitted by law Hummingbird Electronics does not warrant that the operation of the Products will be uninterrupted or error-free.

24. To the maximum extent permitted by law, Hummingbird Electronics' determination of the existence of any defect and the cause of any defect will be conclusive.

25. Spare parts or materials for the Products are guaranteed to be available for a period of 12 months after purchase of the Products.

26. The agents, officers and employees of any distributor or reseller of the Products and of Hummingbird Electronics are not authorised to vary or extend the terms of this Warranty.

6 WARRANTY

27. Hummingbird Electronics shall not be responsible or liable to the Purchaser or any third party in connection with any non-performance or delay in performance of any terms and conditions of this Warranty, due to acts of God, war, riots, strikes, warlike conditions, plague or other epidemic, fire, flood, blizzard, hurricane, changes of public policies, terrorism and other events which are beyond the control of Hummingbird Electronics. In such circumstances, Hummingbird Electronics may suspend performance of this Warranty without liability for the period of the delay reasonably attributable to such causes.

28. If a clause or part of a clause in this Warranty can be read in a way that makes it illegal, unenforceable or invalid, but can also be read in a way that makes it legal, enforceable and valid, it must be read in the latter way. If any clause or part of a clause in this Warranty is illegal, unenforceable or invalid, that clause or part is to be treated as removed from this Warranty, but the rest of this Warranty is not affected.

Hummingbird Electronics' contact details

29. Hummingbird Electronics' contact details for the sending of Warranty claims under this Warranty are:

29.1 Redarc Electronics Pty Ltd

23 Brodie Road (North), Lonsdale SA 5160

Email: power@redarc.com.au Telephone: +61 8 8322 4848

Free technical assistance!

please contact

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