



Isolation Verification Module

HML1005



ISOLATION VERIFICATION MODULE

THE ISOLATION VERIFICATION CONTROL MODULE FROM HUMMINGBIRD ELECTRONICS IS A 12/24VDC DEVICE DESIGNED TO IMPLEMENT A SAFE WORKING ENVIRONMENT FOR ALL EMPLOYEES AND TO TEST IF YOUR MACHINE IS ISOLATION COMPLIANT.

WARNING & SAFETY INSTRUCTIONS

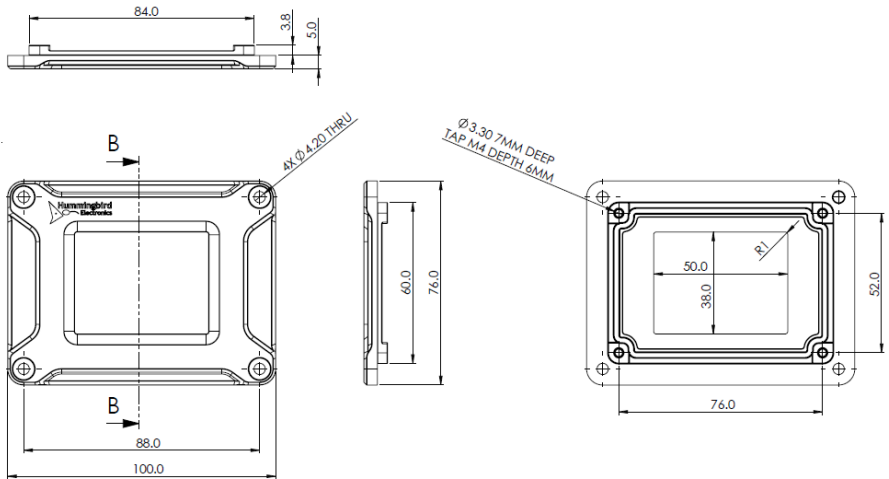
THIS MANUAL CONTAINS IMPORTANT INSTRUCTIONS FOR THE ISOLATION VERIFICATION CONTROL MODULE.

DO NOT OPERATE THE CONTROL MODULE 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	HMLI005
INPUT VOLTAGE	9 - 32V DC
DIMENSIONS	100MM WIDTH X 135MM LENGTH X 76MM HEIGHT
ENCLOSURE MATERIAL	ALUMINIUM



Enclosure Dimensions

Powerful Performance

The Isolation Verification Control Module aims to deliver a safer working environment for your employees by verifying the true isolation state of a vehicle before any electrical work commences on it.

Accurate monitoring, giving you peace of mind and keeping your employees safe.

Features

- Dual pole isolation verification
- Output for remote isolation indicator
- Voltage status indication
- Over/under voltage warning and voltage control interlock
- Available for 12 or 24V vehicles
- Isolation voltage drop and open circuit protection
- Variants for battery isolation or starter isolation confirmation

3 OPERATION

SYSTEM OVERVIEW

The voltage indication is a true reference voltage with isolation verification. Two options are available through an easy selection process on an internal DIP SWITCH and a second DIP SWITCH for voltage application of either 12V or 24V DC.

The Isolation Verification Control Module also measures the difference between the isolator battery and machine side and determines if there is a voltage drop to capture isolator internal connection failures, and also if it is the case that the machine's isolator is turned off whilst the machine is running, the isolation control will measure the voltage drop between the battery and the machine to determine this occurrence and will activate a warning led/alarm and with a 20 second delay interlock relay to cut out either ignition or start solenoid depending on the customers requirements.

OPTIONAL CONTROL FEATURE

1. Battery Isolation Control
2. Starter Motor Isolation



3 OPERATION

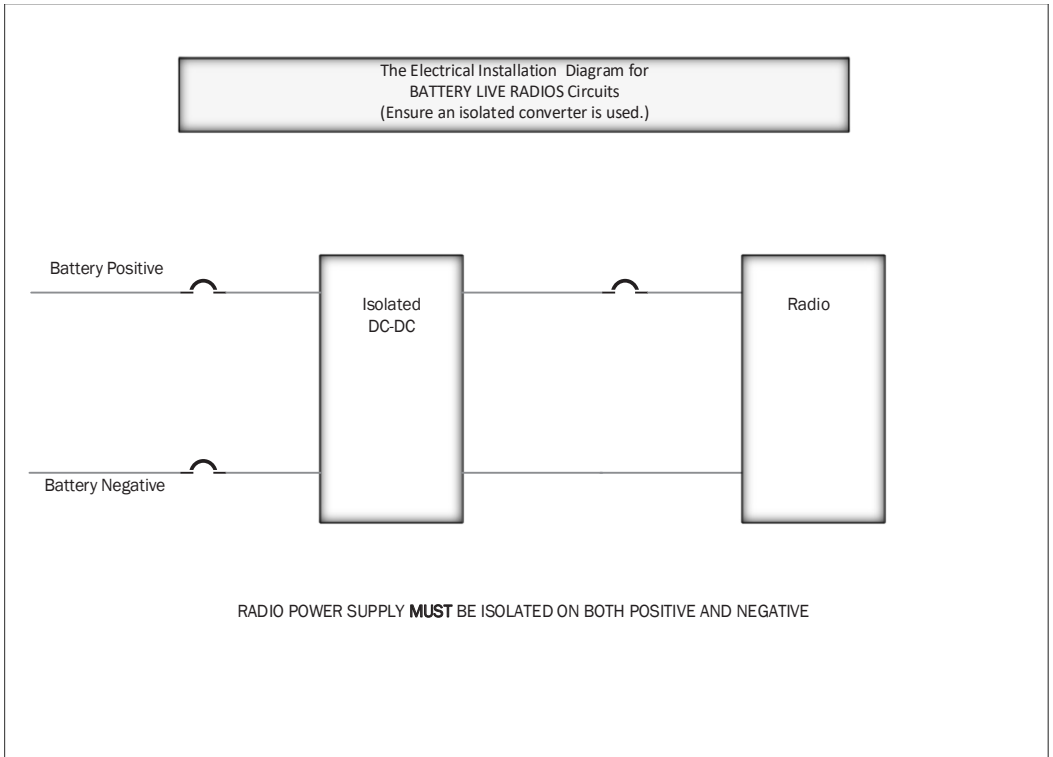
IMPORTANT INSTRUCTIONS

System Awareness Warning

This system is a visual isolation reference and verifies isolation electronically. Always perform a positive verification on any system at any time if risks apply.

A recommendation to ensure regular maintenance and system checks are completed every 500 hours on the isolation verification controlling system and replace the unit every 2 years if working in any harsh environments including the mining industry.

To ensure the Isolation Verification Control Module operates and functions correctly, if the machine or system has a radio system or two way system wired to the battery side of the isolation switch, the diagram below shows the correct circuit diagram and also the correct isolated voltage converter that must be used to ensure that the verification system will function correctly.



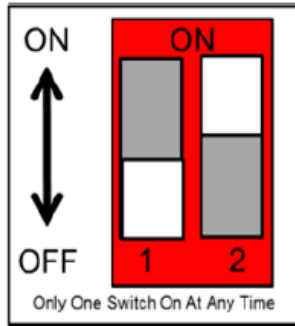
3 OPERATION

THE OPERATING VOLTAGE SELECTION SWITCH DIP SWITCH

The HMLI005 Isolation Verification Control Module from Hummingbird is 12/24VDC. The VOLTAGE DIP SWITCH selection is located in the rear of the enclosure and by removing the 4 screws from the rear panel, the DIP SWITCH can be accessed to adjust the settings to the correct operating voltage.

Selection DIP SW Settings Sensitivity Setting

S1- 12 VOLT DC
S2- 24 VOLT DC



3 OPERATION

THE FUNCTION SELECTION DIP SWITCH

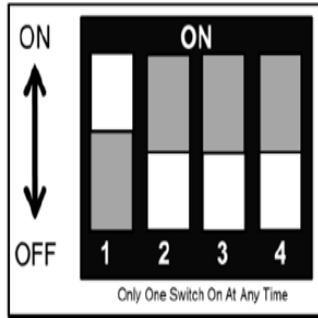
The Isolation Verification Control Module's voltage indication is a true reference voltage with isolation verification, 2 options are available through an easy selection process on an internal DIP SWITCH which is accessed by removing the rear panel.

By selecting the required DIP SW, the below image screen will change to suit the desired options available.

Ensure that whenever you are adjusting the DIP SWITCH settings, the supply voltage must be turned OFF.

DIP SW Settings Selection

- S1- Battery Isolation**
- S2- Starter Motor Isolation**



3 OPERATION

SWITCH 1 BATTERY ISOLATION VERIFICATION

ISOLATION VERIFICATION

Measures / illustrates positive isolation and verifies with a visual status of either ON or OFF, measuring both the positive and negative sides of the dual battery isolation switch.

By measuring the difference between the battery positive and machine vehicle positive, also the difference between the battery negative and vehicle negative to confirm this isolation.

ISOLATION CONTROL INTERLOCK

When the isolation is verified and safe, the LCD Screen will confirm with a visual isolation OFF display, with the interlock external relay device option, the interlock function can isolate either, key supply or ignition control wires to suit the customer requirement.

The isolation verification control also measures the difference between the isolator battery and machine side and determines if there is a voltage drop to capture isolator internal connection failures.

Also if the case is that the machine's isolator is turned off during the running of the machine the isolation control will measure the voltage drop between the battery and the machine to determine if this has occurred and will activate a warning led/alarm with a 20 second delay interlock relay to cut out ignition.

ISOLATION INDICATION

The LCD screen illustrates the positive isolation status, and has a second external option to have a LED visual in a required location such as the dashboard in the cabin.

3 OPERATION

VOLTAGE STATUS

The LCD display will show the current voltage status whenever the machine battery isolation switch is turned on, or if the isolation switch is turned off but still shows a voltage reference.

Whenever it is the case that the isolation switch is turned off and allowing for a tolerance of up to 5Vdc for above ground surface backfeed, the voltage is confirmed that the status is zero, the display will show battery isolation OFF with an indication of ZERO VOLTS reference, this is when the display will confirm isolation and the screens changes colour to GREEN for safe operation maintenance.

OVER /UNDER VOLTAGE WARNING/INDICATION & INTERLOCK

The control module measures and controls the over and under voltage status to protect not only the machine electrics but assists in the service life expectancy of the batteries, protecting them from over and under voltage cell damage.

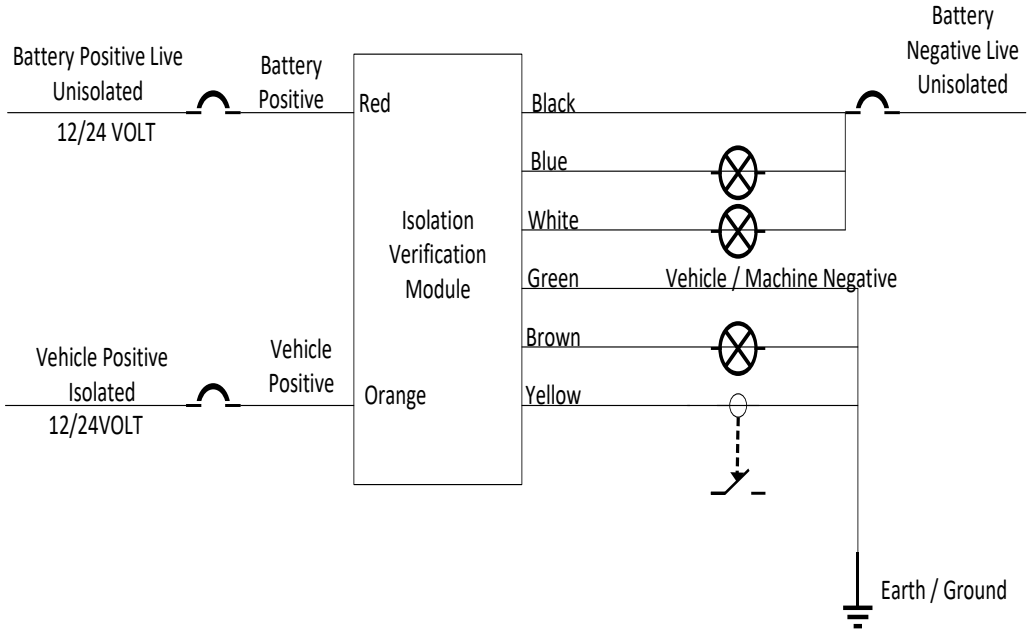
12 volt application - When the system falls below 9 volts or above 15 volts

24 volt application – When the system falls below 18 volts or above 30 volts

In the circumstance where over or under voltage is detected with a slosh period of 20 seconds, the control module in normal system operation will have a positive output to engage a relay. If an over or under voltage fault occurs or a system fault, the output signal will drop away after 20 seconds to open circuit the desired control system either key supply, ignition supply or start control wiring to prevent any further damage to the battery service life, with an external LED/ALARM combo to alert the operator.

3 OPERATION

WIRING DIAGRAM BATTERY ISOLATION VERIFICATION



WIRING COLOURS

- Red** - Battery Positive
- Black** - Battery Negative
- Orange** - Vehicle Positive
- Green** - Vehicle Negative
- Blue** - Isolation Verification Indicator
- Brown** - Isolation Live Verification Indicator
- Yellow** - External Interlock
- White** - System Warning

3 OPERATION

SWITCH 2 STARTER MOTOR ISOLATION VERIFICATION

ISOLATION VERIFICATION

Measures / illustrates positive isolation and verifies with a visual status either ON/OFF.

The starter motor isolation device measures the positive starter motor isolation only, by measuring the difference between the vehicle positive and starter motor positive, accurately indicating isolation verification.

ISOLATION CONTROL INTERLOCK

When the isolation is verified and safe, the LCD Screen will confirm with a visual isolation OFF display, with the interlock external relay device option, the interlock function can isolate either, key supply/ ignition or start control wires to suit the customer demand/ preferences.

ISOLATION INDICATION

The LCD screen illustrates the positive isolation status, with a second external option to have a LED visual in a required location like the dash console in the cabin.

VOLTAGE STATUS

The LCD display will show the current voltage status when ever the machine battery isolation switch is turned on, or if the isolation switch in the case is turned off but still shows a voltage reference.

When ever the case the isolation switch is turned off and the voltage is confirmed that the status is zero (with tolerance of up to 5volts dc to allow for above ground surface back feed voltages) the display will show battery isolation OFF with an indication of ZERO VOLTS reference, this is when the display confirms isolation and the screens changes colour to GREEN for safe operation maintenance.

3 OPERATION

OVER/UNDER VOLTAGE WARNING/INDICATION & INTERLOCK

The control module measures and controls the over and under voltage status to protect not only the machine electrics but assists in the service life expectancy of the batteries, but protecting them from over and under voltage cell damage.

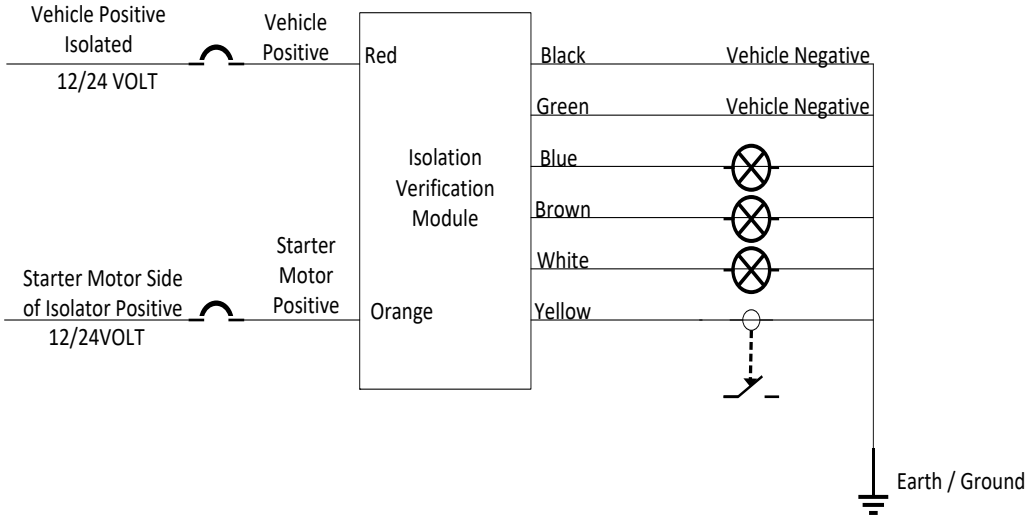
12 volt application - When the system falls below 9 volts or above 15 volts

24 volt application – When the system falls below 18 volts or above 30 volts

In the case of over or under voltage is detected with a slosh period of 20 seconds, the control module in normal system operation will have a positive output to engage a relay, if an over or under voltage fault occurs or a system fault, the out put signal will drop away after 20 seconds to open circuit the desired control system either key supply, ignition supply or start control wiring to prevent any further damage to the battery service life, with an external LED/ALARM combo to alert the operator.

3 OPERATION

WIRING DIAGRAM STARTER MOTOR ISOLATION VERIFICATION



WIRING COLOURS

Red - Vehicle Positive

Black - Vehicle Negative

Orange - Starter Motor Positive

Green - Vehicle Negative

Blue - Isolation Verification Indicator

Brown - Isolation Live Verification Indicator

Yellow - External Interlock

White - System Warning

4 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.

4 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.

5 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.

5 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.

5 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.

5 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.

5 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

Hummingbird Electronics

Unit 1.03 Building E

1 Technology Place

Williamtown NSW 2318

Australia

Ph: 1300 155 541(Within Australia)

Ph: +61 2 9043 0052(From overseas)

Email: admin@hmbe.com.au

www.hmbe.com.au