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Kestrel Interface Module Type 1001 OD

For the following models of type 1001 Interface Module

Type 1001 OD-3000-048	60A
Type 1001 OD 3000-600	15A

With Conditional Two Year Warranty



Users Manual

Warranty Registration

Please complete and return this page within three months after the product delivery date or within one month following the commissioning date.

Kestrel will be pleased to receive images of your installation!

Name of Product: _____
Product Serial Number _____
Delivery Date _____ or Commissioning Date _____
<i>Name and Address of Owner</i>

<i>Telephone:</i> _____
<i>Email:</i> _____
<i>Installation / Site Address (GPS co-ordinates are appreciated)</i>

Send to: Kestrel Wind Turbines, P.O. Box 3191, North End
Port Elizabeth, 6056, Eastern Cape, South Africa

Or email to: kestrel.marketing@eveready.co.za

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Revision History

Revision	Date	Comments	Author
1.1	10/10	Full Revision	J. Carpy
1.0	06/09	First Issue	J. Carpy

Note: This outdoor interface module Type 1001 OD is supplied complete with an internal blocking diode and safety overvoltage protection

Disclaimer

Kestrel Wind Turbines makes every effort to give accurate information in this manual and is in no way liable for any error or omission. The user of this manual assumes full responsibility and risk

We appeal to your common sense to read and apply the safety notes. Consult a professional engineer and take advice if you are unsure.

1 Safety and Warning Notes

Accidents can easily occur and there are always inherent dangers associated with any type of electrical equipment. Always work carefully and have an assistant wherever possible. Consult installation professionals if you lack experience or confidence.

Use good handling methods and take precautions to avoid physical injury during installation and maintenance/repair procedures. Be responsible when using all tools whether manual or powered.

Always short the output wires together when the turbine is disconnected. Do not work on the system when the turbine is running or when lightning is possible.

Disconnecting any wire may result in a spark. The presence of explosive hydrogen from battery charging is always a possibility. Adequate ventilation must be provided for battery installations. Wire sizes must be correct for the powers supplied. Fire can result from shorts created on a battery. Respect the system and use common sense. Consult a qualified electrician if you are unsure.

Slack bolts, poor workmanship and loose electrical connections must be avoided. The turbine blades are dangerous. Respect a rotating turbine. Always shut the turbine down before approaching by operating the brake switch on the controller or shorting the generator output. Preventative maintenance is always the best. Checks are best carried out in calm weather conditions. Avoid any maintenance or inspection during windy weather.

1.1 Safety Symbols

The symbols shown are used throughout this manual to highlight safety points

General caution warning



Danger of hand injury



Danger of electrical shock



Work Instructions

- * Asterisk denotes a special instruction or reminder.
- ▶ Arrow head denotes an assembly/build instruction.

2 INTERFACE MODULE OVERVIEW

2.1 Module Description

IMPORTANT: This product is a complete interface module requiring no other components. Note that the correct module must be used in the application.

The Kestrel Type 1001 OD interface module incorporates the necessary elements to connect the Kestrel e400i wind turbine to a charge controller or gridtie inverter. An internal diode blocks any feedback currents from equipment connected to the output. The product uses no technology that would cause electrical noise disturbance during operation. This quality is paramount when powering any communication or computer equipment.

Power from the wind turbine is delivered through the module to either a charge controller or gridtie inverter. The product is supplied to order for the specific application. All electrical connections for the chosen application are included within the module. The controller is housed in a steel galvanised enclosure is suitable for indoor or outdoor mounting. A turbine brake switch is included on the module.

2.2 Identification and Markings

Removing the front cover reveals the product rating plate. A connection diagram is adhered inside the cover.

kestrel wind turbines			
PRODUCT RATING LABEL			
TYPE	1001 OD-3000-048		
RATED VOLTAGE	48 Vdc	MAX. VOLTAGE	100 Vdc
RATED CURRENT	65 Adc	MAX. CURRENT	80 Adc
RATED POWER	3000 Wdc	MANUFACTURED	Mar 09
SERIAL NUMBER	00000000		
MADE IN SOUTH AFRICA BY	Evereedy Diversified Products (Pty) Ltd T/A Kestrel Wind Turbines P.O. Box 3191, Struandale, North End Port Elizabeth, 6056 RSA		

2.3 Applications and Uses

The Kestrel Interface Module Type 1001 OD is used with Kestrel wind turbines that are installed for battery charging or gridtie connection. Each application may require specific additional electrical equipment. Consult manuals supplied with other equipment.

Type 1001 OD 3000-48 (For Battery Charging)

This product connects the Kestrel e400i 3kW 48Vdc wind turbine to a suitable MPPT charge controller.

Type 1001 OD 3000-600 (For Gridtie Inverters)

This product connects the Kestrel e400i 3kW 250Vdc wind turbine to a suitable gridtie inverter.

3 UNPACKING THE MODULE

3.1 Components Supplied

The following components are supplied.

- a) Interface Module assembly

3.2 Components Not Supplied

The following components are necessary to complete an installation

- b) Electrical crimp terminals
- c) Wall fixing screws or bolts
- d) 20mm cable glands

3.3 Tools Required

The following hand tools are required for the charge controller installation.

- a) Small size electrical screwdriver
- b) Medium size electrical screwdriver
- c) Wire strippers for electrical connections
- d) Electrical crimping pliers
- e) Tape measure for positioning
- f) Electric drill tools for mechanical wall mounting

3.4 Unpacking

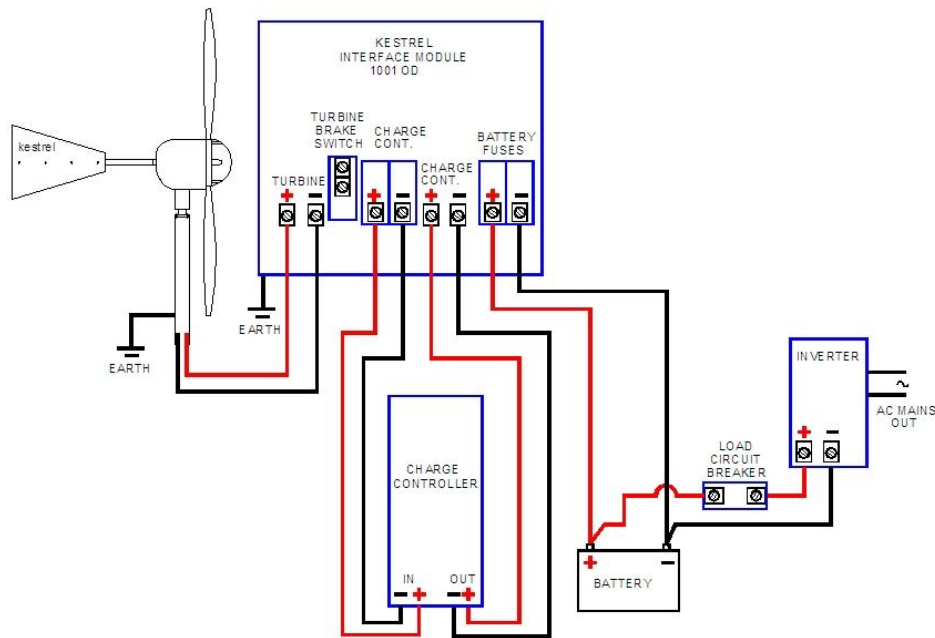
Open the packaging container and check for any transit damage. The parts contained are listed in section 3.1 and on the included packing slip. Lay out and identify the parts.



4 INSTALLATION INSTRUCTIONS

4.1 Typical Installation Example

A typical battery charging installation is shown below. The system comprises a Kestrel wind turbine, Kestrel interface Module and a charge controller. The inverter is additional and converts the battery dc power into standard ac power such that common mains powered appliances can be supplied.



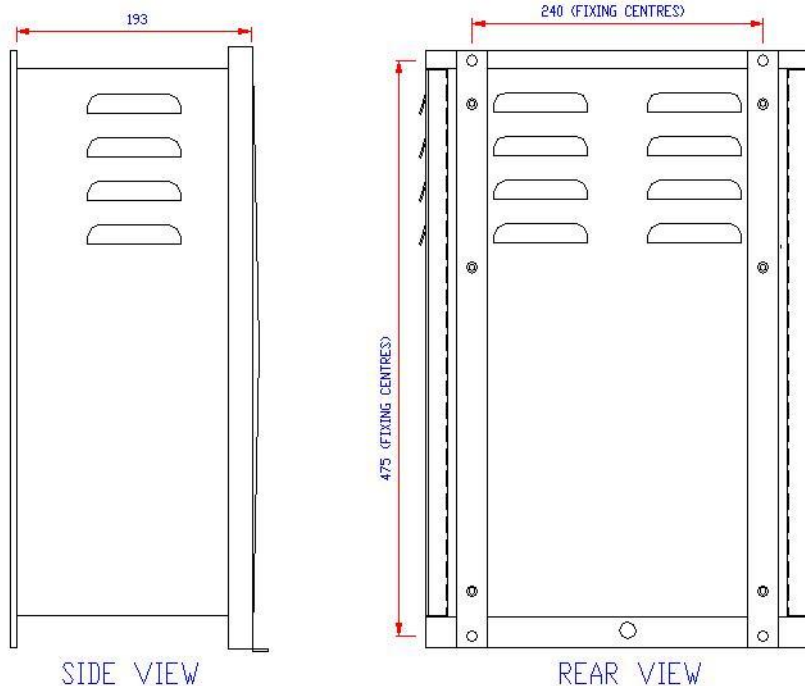
NOTE: A battery circuit breaker is fitted within the Interface Module. The load circuit breaker and inverter are additional equipment and not supplied with the charge controller. The diversion resistor is supplied as a separate item.



4.2 Mounting The Module

The Kestrel Interface Module Type 1001 OD is suitable for indoor or outdoor installation. The unit must be vertically mounted using the four external fixing holes provided. Use secure fastening with suitable wall plugs or bolts. Allow a minimum of 100mm (4") space all around the unit for cooling. It is normal for the top of the enclosure to become quite hot at times as it dissipates energy.

Do not place any objects on the top of the enclosure. The unit relies on the free passage of air through the heat sink for cooling.



4.3 Electrical Wiring

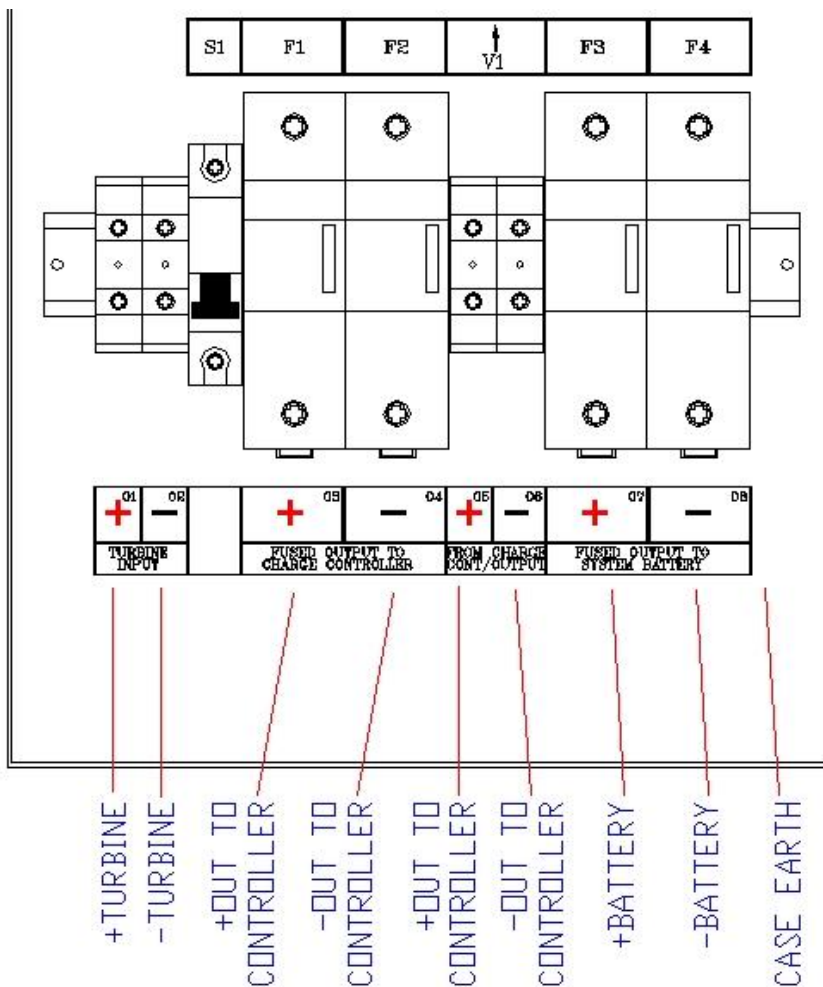
NOTE: Local codes may require an independent isolating switch to be fitted between the turbine and the interface. This switch is not supplied.



Observe the Polarity at all times. Only connect +VE RED cables to +VE RED terminals and -VE BLACK cables to -VE BLACK terminals. Otherwise, equipment damage may result and any warranty will be invalidated.

IMPORTANT: Be sure to refer to the correct wiring for the unit supplied. One is for battery charging, the other is for gridtie.

4.3.1 Interface Modules for Battery Charging



PLEASE FOLLOW THE INSTRUCTIONS BELOW !

CONSULT SECTION 5 FOR WIRE SIZE RECOMMENDATIONS

Wiring is as follows:

Turbine output wires to 01 and 02 “Turbine input +ve and –ve”.

Charge controller input to 03 and 04 “Fused Output to charge controller +ve and –ve”

Charge controller output to 05 and 06 “From charge controller output +ve and –ve”.

Battery feed to output 07 and 08 “Fused output to system battery.

The turbine brake switch “S1” stops the turbine by creating an electrical short on the turbine input. When operated, this prevents high turbine open circuit voltages being developed. The switch is flicked DOWN (OFF) for normal operation.

The wind turbine should not be rotating during this installation. If turbine access is not possible, short the two turbine power wires together. Observe the Polarity at all times. Only connect +VE RED cables to +VE RED terminals and -VE BLACK cables to -VE BLACK terminals.

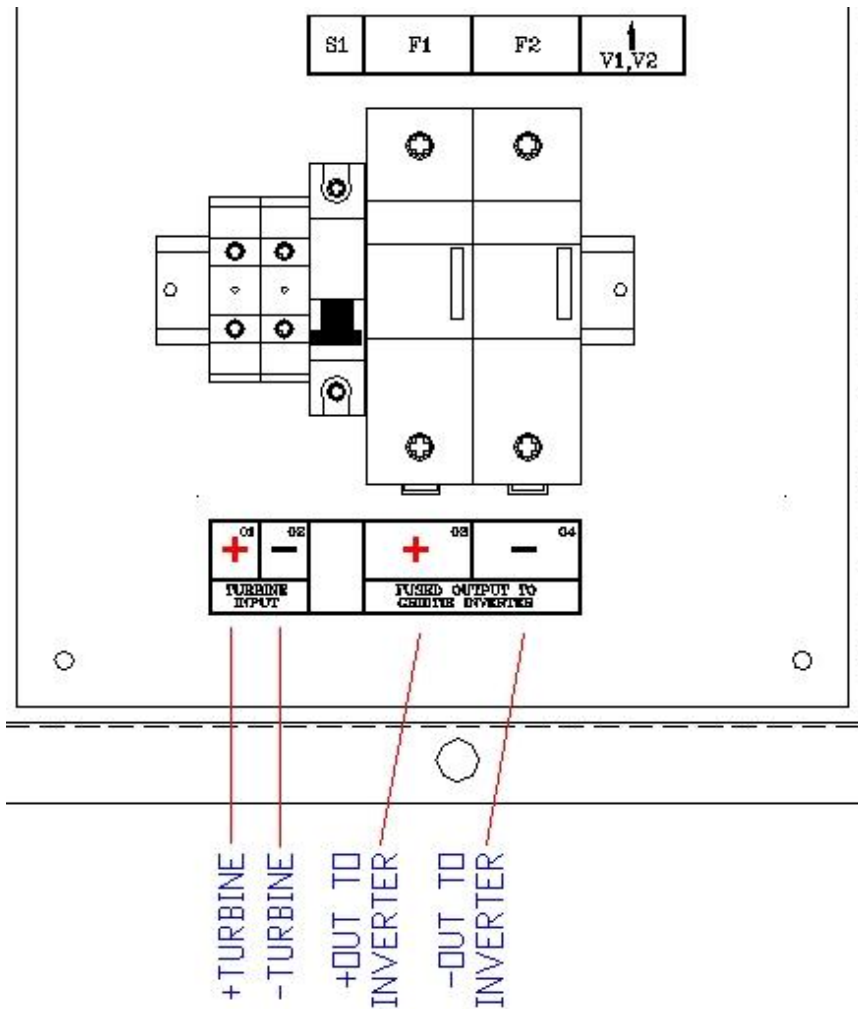
- a) Arrange the wires from the turbine, charge controller and the battery ready for connection.
- b) Open the fuse disconnectors and remove the fuses. Check that the battery wires are disconnected from the battery or that any additional battery fuse or circuit breaker is disabled.
- c) Check that the TURBINE BRAKE SWITCH (S1) is switched ON. (Flicked UP).
- d) Connect an electrical earth wire to the marked earth screw terminal provided.
- e) Connect the turbine wires to the module turbine terminals 01+VE and 02–VE observing polarity.
- f) Connect the output wires from 03 +VE and 04-VE to the charge controller input terminals.
- g) Connect the wires from the charge controller output back to the module terminals 05+VE and 06-VE.

- h) Check once again that the battery cables are isolated from the battery and that the battery fuses are removed in the interface module.
- i) Connect the battery cables to the module terminals 07VE and 08-VE.
- j) Check all connections. Insert the battery fuses F3 and F4 and close the fused isolator.
- k) The charge controller will initialise. Set the controller up as per the controller manual.
- l) Insert the Turbine fuses F1 and F2 and close the isolator.
- m) Release the turbine brake switch by switching S1 OFF (Flicked DOWN)

If enough wind is present to activate the wind turbine, charging will show on the controller.

The instructions are reversed for de-commissioning. First brake and isolate the wind turbine and then the battery or switch the battery off.

4.3.2 Interface Modules for Gridtie Inverters



PLEASE FOLLOW THE INSTRUCTIONS BELOW !

CONSULT SECTION 5 FOR WIRE SIZE RECOMMENDATIONS. ALSO PLEASE CONSULT THE INVERTER MANUAL TAKING NOTE OF RELEVANT INSTRUCTIONS. If you are unsure, consult a qualified electrician.

Wiring is as follows:

**Turbine output wires to 01 and 02 (Turbine input +ve and -ve).
Gridtie inverter input from 03 and 04 (Fused Output to gridtie inverter +ve and -ve)**

The turbine brake switch “S1” stops the turbine by creating an electrical short on the turbine input. When operated, this prevents high turbine open circuit voltages being developed. The switch is flicked DOWN (OFF) for normal operation.

The wind turbine should not be rotating during this installation. If turbine access is not possible, short the two turbine power wires together. Observe the Polarity at all times. Only connect +VE RED cables to +VE RED terminals and -VE BLACK cables to -VE BLACK terminals.

- n) Arrange the wires from the turbine and the inverter ready for connection.
- o) Open the fuse disconnectors and remove the fuses. Check that the inverter wires are disconnected or that any additional inverter fuse or circuit breaker is disabled.
- p) Check that the TURBINE BRAKE SWITCH (S1) is switched ON. (Flicked UP).
- q) Connect an electrical earth wire to the marked earth screw terminal provided.
- r) Connect the turbine wires to the module turbine terminals 01+VE and 02-VE observing polarity.
- s) Connect the output wires from 03 +VE and 04-VE to the inverter input terminals.
- t) Check all connections. Insert the inverter fuses F1 and F2 and close the fused isolator.
- u) Insert the Turbine fuses F1 and F2 and close the isolator.
- v) Release the turbine brake switch by switching S1 OFF (Flicked DOWN)

If enough wind is present to activate the wind turbine, power will be delivered to the inverter.

The instructions are reversed for de-commissioning. First brake and isolate the wind turbine and then the inverter.

4.4 Voltage Adjustments

All settings cannot be changed and are set in the factory. There are no user setup or adjustment procedures within the interface module. The module cannot charge a battery. All system setup is carried out on the connected charge controller or inverter. Please consult the charge controller or inverter manual supplied with that product.

5 WIRE AND CABLE SIZES

5.1 Wind Turbine Wiring

Kestrel wind turbines produce dc power and output on two double insulated output wires (tails). The RED wire is POSITIVE and the BLACK wire is NEGATIVE

Observe the Polarity at all times. Only connect +VE RED cables to +VE RED terminals and -VE BLACK cables to -VE BLACK terminals. Otherwise, equipment damage may result and any warranty will be invalidated.

The following suggestions are made as a guideline. If you are in doubt, consult an electrician.

The output wires must be extended as required for the installation. Choose the wire size that is suggested for the turbine rating with consideration of the electrical current and the distance from the turbine to the charge controller. Good wire connections are absolutely essential to avoid poor power delivery and high temperatures at the connection. All electrical systems lose energy because cables have a resistance. The mounting structure must be directly earthed for lightning. The power cable is usually brought down the inside of the mounting structure to give some protection. Supply cables should never be spanned or suspended from the turbine structure and should be buried at least one half metre deep in a suitable plastic or steel conduit.

5.2 Battery Wiring

The battery wiring is usually chosen to be the same size as the turbine power wiring but a smaller wire diameter can be used because the distance is usually much shorter between the charge controller and the battery.

5.3 Lightning protection

Proper grounding is essential to protect the system from induced voltages and static and also operator safety. The installation must comply with local requirements for electrical installations. Ensure that the interface enclosure is earth bonded to the any mounting structure and that the structure is earthed.

For battery charging installations, do not earth the generator output wires. The negative battery connection is usually earthed using a ground point close to the battery. Single point earthing is recommended. Consult and comply with the grounding requirements of the charge controller or inverter being used. The wire size for grounding should be the same size as the power cables. Commercial lightning arrestors are available at electrical stores and can be fitted at the bottom of the structure or pole or at the interface module input.

5.4 Wire Tables

Cable Installation

The tower power cable must be fitted inside the tower and should be buried underground. The cable must either be armoured or run in underground electrical conduit.

Cable Sizes

The Kestrel e400i 48Vdc is rated at 55Vdc and 65A. Measure the distance from the tower top to the controller. Select a suitable cable from the table.

- * The distance is one way and allows for both +ve and –ve wires
- * Distance is in metres and (feet)
- * Wire size is in square millimeters and American wire gauge (AWG)
- * Wiring must comply with local standards. Consult a professional in your area for compliance
- * % power loss means more power is lost as cable size reduces

Wire Size Table for Kestrel e400i 3kW 48Vdc 65A

One Way Distance	3% Power loss	4% Power loss	5% Power loss
20m (66ft)	25mm ² (3)	25mm ² (4)	16mm ² (5)
40m (130ft)	50mm ² (0)	50mm ² (1)	35mm ² (2)
60m (200ft)	95mm ² (000)	70mm ² (00)	50mm ² (0)

The power cable should be run down the inside of the pole or structure and then buried in a suitable underground conduit at least 500mm below the ground surface.

Wire lengths account for a double cable run (both +ve and -ve together) being given in metric metres (m) and imperial feet ('). Wire cross sectional area is given in metric sq mm. and American Wire Gauge AWG.

6 Technical Details

6.1 Technical Specification

General: Switchgear assembly to telecommunication specification with 3kW capability and overvoltage protection for simple connection of suitable series connected charge controllers and inverters.

Product Identification		1001-3000-048 ID 1001-3000-600 ID
Maximum Power		3300W
Input voltage and variation		0-150Vdc and 0-600Vdc
Efficiency		>98% at full load
Input frequency		N/A dc input
Input power factor	N/A dc input	
Output Voltage	Factory set (no user adjustment)	0 - 135Vdc Max. 0 – 580Vdc Max.
Output overvoltage protection		Power crowbar
Output voltage regulation		+0% - 5%
User control	Turbine brake, input/output fused isolator/circuit breaker	
LED Indication		None
Cooling		Natural Convection
Maximum Ambient		45deg C
IP Rating	Outdoor/Indoor Installation	IP54
Cabinet Dimensions (wall mounting)		260Wx500Hx200D
Cabinet finish		Galvanised.
Product mass		15kg unpacked
Certification	Complies with EMC requirements CIS22 Class B	

6.2 Overvoltage Protection

The interface module includes a dc blocking diode and an overvoltage protection circuit. The blocking diode prevents any reverse discharge current feeding back from the input to the connected charge controller or inverter. The overvoltage protection consists of an electronic voltage detection circuit that immediately shuts the turbine down in the event of any overvoltage. The protection circuit locks on and will only release the turbine after it has completely stopped. When the turbine stops, the overvoltage protection circuit will reset and release the turbine. If another overvoltage occurs, the protection circuit will again shut the turbine down. The cycle of shutting down and re-starting will repeat until any fault is corrected. The overvoltage protections can be manually reset by switching the turbine brake switch on and off again.

7 MAINTENANCE

The Kestrel Type 1001 OD Interface Module is designed for continuous operation on 100% duty cycle and requires no regular part replacement. Keep the unit clean and ensure that no foreign objects reduce the airflow through the unit. Clean the case only with a soft damp cloth.

8 WARRANTY CONDITIONS

1. General Terms and Conditions

- 1.1) The user must complete and return the Warranty Form within one month from the date of installation or within three months after receipt of the Kestrel product.
- 1.2) All requested information in the Warranty Form including site location, tower details, equipment serial numbers and pictures must be provided.
- 1.3) The product under warranty must be in normal use for which it is intended.
- 1.4) The product must be installed and commissioned in accordance with the instructions provided in the product manual.
- 1.5) The product installation must be inspected by a registered Kestrel dealer either prior to or during final commissioning.
- 1.6) Kestrel retains the right to have any remedial work required during the warranty period to be completed by any agent, dealer, re-seller or other appointment by Kestrel.
- 1.7) Written notice of any defect must be delivered to an authorized Dealer or to the Kestrel factory within fifteen days of the failure date.
- 1.8) The remaining warranty period at any time is transferable.
- 1.9) Kestrel reserves the right to change or update this warranty at any time.

2. What the Warranty Covers

- 2.1) Kestrel warrants that the product complies to standard specification upon delivery and for a period of 24 months after the Warranty Form registration.
- 2.2) Any product failure traceable to defective design, material, component or sub-assembly.
- 2.3) During the warranty period, Kestrel will at its sole discretion repair, replace or refund the purchase price of defective components or sub-assemblies.
- 2.4) Repaired or replaced product may be new, upgraded, re-manufactured or refurbished at the sole discretion of Kestrel.
- 2.5) Kestrel will provide return shipping to customers within South Africa or to the nearest port of entry for customers outside South Africa.

3. What the Warranty Does Not Cover

- 3.1) Any Costs incurred due to the site removal and re-installation of any defective product.
- 3.2) Any shipping costs for product delivery to Kestrel or any appointed Dealer or alternative repair facility.
- 3.3) Any equipment not manufactured by Kestrel
- 3.4) Product that has undergone modification or tampering.
- 3.5) Damage or loss caused by wind speeds in excess of 60m/s (134mph)
- 3.6) Any form of abuse, misuse or vandalism
- 3.7) Damage resulting from windstorm, lightning, hail, fire or any other insurable loss under standard and extended coverage policies generally available for endorsement to the wind system consumer.
- 3.8) Tower or support structure failures including any foundations.
- 3.9) All acts of God including tornadoes and all other cyclonic windstorms.
- 3.10) Damage due to voltage irregularities including lightning and utility system failures.
- 3.11) Damage due to impact by flying objects or debris.
- 3.12) Failures caused by not servicing and maintaining the product in accordance with the instructions supplied by Kestrel
- 3.13) Components that in the opinion of the manufacturer have been subject to overload, mechanical abuse, improper installation, use with any unsuitable power source, or any other non-warranty condition.
- 3.14) Any damage to the product during shipping.
- 3.15) There is no obligation to implement any future product design changes or improvements on previously manufactured product.

NOTE: SPECIFICATIONS MAY CHANGE DUE TO CONTINUOUS DEVELOPMENT. CONSULT THE FACTORY OR AN APPOINTED DEALER.