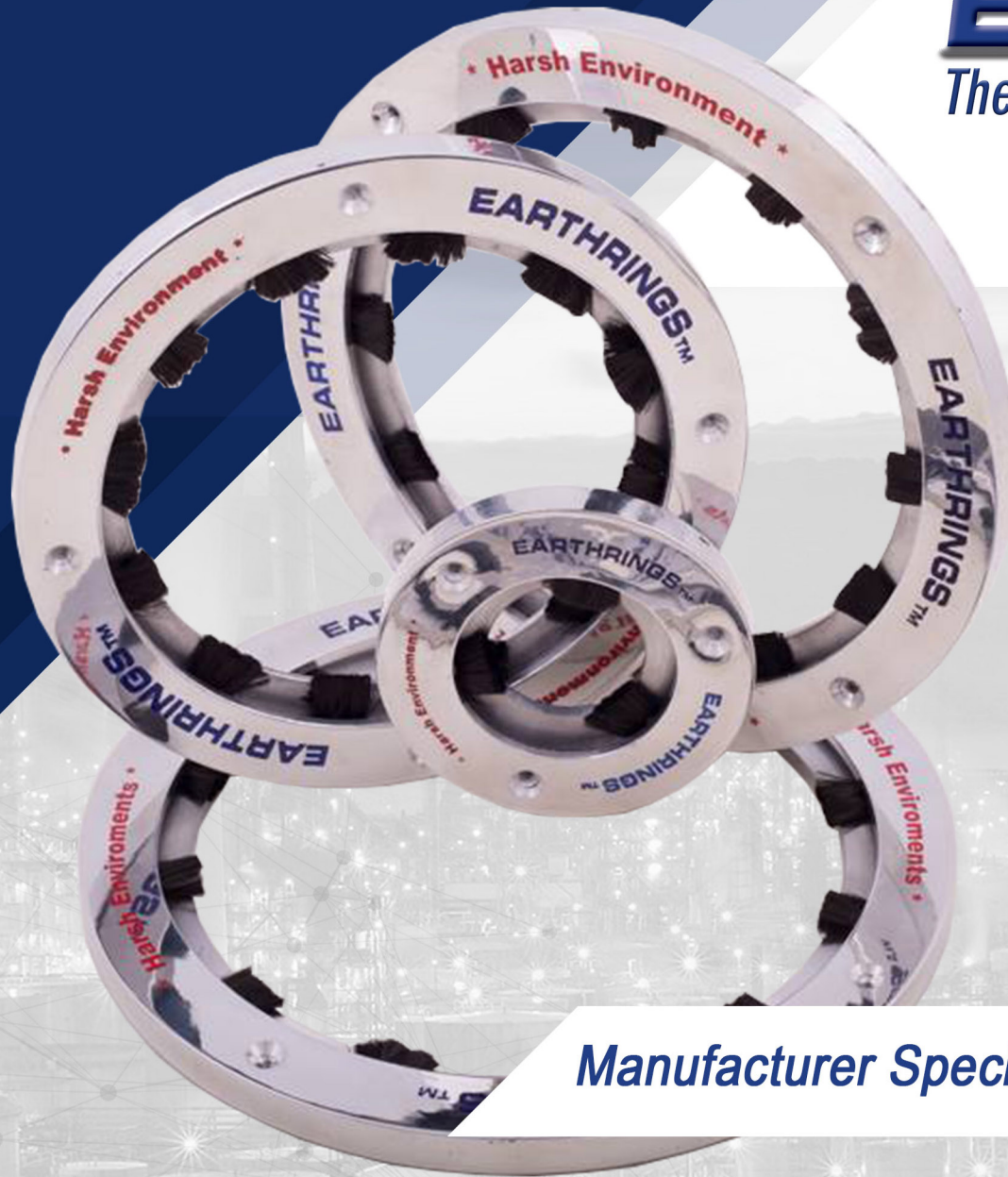


EARTHRINGS™

The Longest Lasting Shaft Grounding Solution



Manufacturer Specifications

Earthrings Shaft Grounding Ring
LV (Low Voltage) & HV (Large Motors)

Product Application

Earthing's are used to protect bearings from the negative side effects of high shaft voltages that are present from modern day variable speed drives (VFD) operated by pulse width modulation (PWM) for both AC and DC motors as well as eddy currents and static currents from driven equipment such as fans, pumps and rollers.

Bearing Damage From VFD Induced Shaft Voltages

Variable frequency drives induce shaft voltages due to parasitic capacitance. The voltages in the shaft try to find the shortest path to ground which is through the bearings, thereby causing electric discharge machining (EDM) on the bearing raceways, inner ring, outer ring or balls.

Protecting Attached Equipment

The Earthings not only protects the electric motor bearings' but can also protect the attached driven equipment such as, pumps, gearboxes and fans.

Application Recommendations For Low Voltage Motors

The Earthings LV is used on all low voltage electric motors up to 690 volts and 400kw and unlike other shaft grounding solutions and manufacturers, Earthings will protect both Electric motor bearings from EDM arcing and does not require an insulated bearing or housing up to 400kw.

Application Recommendations For High Voltage Motors

The Earthing HV High Voltage Earthings are custom made for all large electrical motors rated above 400kws or 690 volts. They are 6.5mm thicker than the LV Earthings, have 3 x more fiber, use different materials and are custom manufactured to the exact specifications of each electrical motor taking all factors into account such as the KW, Amps, Rpm, Volts, Shaft size etc. These exact specifications are necessary due to the considerably higher shaft currents as well as higher costs of these larger motors.

Product Composition

The Earthing is made of a conductive aluminum ring (please get Material Sheet for aluminium from Earthings offices if required), which has highly conductive Pan based Carbon Microfibers (which is Proprietary knowledge of Earthings (PTY) Ltd) imbedded within. The Microfibers' are placed around the inner circumference of the ring, and each ring is manufactured for specific shaft sizes.

Product Functionality

Earthings are placed over the shaft of an electric motor, the aluminum housing is secured to the end-shield of the electric motor (fastening the housing and creating an earthing / grounding point of contact) and the microfiber bristles are circumferentially arranged around the diameter of the shaft and are touching the shaft surface. This contact / and non-contact (ionization) of the microfibers are highly conductive (0.005 ohms per cm) which allows for a lower impedance path to earth for the shaft voltages, thereby allowing most of the voltage to bypass the bearings by passing through the Earthings instead, thereby preventing arcing of the bearings.

Fiber Wear Technology

Wear of the fibers is designed to be less than 0.03mm every 10 000 operating hours, this is achieved due to the extremely low friction rate from very fine and light fiber shaft contact. The wear rate is based on operating conditions, but the Proprietary Microfibers are designed to "Wear to Fit" which means they wear to the shape of the shaft, so even once the microfibers have worn they are able to dissipate voltage to ground due to ionization (small air gaps between fibers and shaft that still allow for electrical discharge) and the ability of the extremely thin microfibers to be physically attracted to the static voltage of the shaft, thereby dissipating the voltage to earth, even without constant shaft contact.

Fiber Flexibility

Microfibers are made of a Proprietary carbon fiber blend that is heated and treated at a specific temperature to create the desired flexibility and fiber memory. Specific heat treatment and proprietary manufacturing process are used to make sure Earthings microfibers are highly flexible and have the most conductive fibers available. The length of fiber that overlaps or touches the shaft is also critical in obtaining the correct shaft contact and fiber flexibility during electron transfer from shaft to fiber to ground.

Dirt / Dust In Operating Conditions

Dirt or dust in most environments has no effect on the fibers and still allows for dissipation of voltages.

Friction

As described above, extremely low friction based on the correct fiber shaft overlap, creating extremely low fiber pressure and light weight thin diameter (less than 0.007mm) fibers create a microfiber that lasts for years on all low voltage motors. Even once the fibers have worn to the shape of the shaft electron transfer still allows for static dissipation and electron attraction to carry on dissipating voltages when the voltages get high and cross over the airgap (0.001mm) between the shaft and fibers due to gaseous exchange.

Oil And Grease

Small amounts of oil and grease on the motor shaft are acceptable as the fibers will sweep away the oil and grease, as well as the rotational forces of the shaft dissipating the oil and grease in a very short time period. Fibers will not operate in continuously submerged oil.

Maximum Surface Speed / RPM

There is no Maximum surface rate, Earthings have been tested up to 7000 rpm with excellent results, and at present theoretically shaft speed is unlimited.

Maximum Temperature Rating

220 Degrees Celsius is the highest Recommended operating temperature, but our fibers have been used in applications up to 400 degrees Celsius.

Minimum Temperature Rating

- 85 Degrees Celsius is the lowest tested temperature.

Humidity

- 0 to 90% Humidity levels are acceptable.

CE And UL Marks & Requirements

Earthings is classified as a component and as such "Marks" are not applicable to this product.

Corrosion Protection

Shafts should be clean of rust and where rust it is likely to accumulate the Earthings "Silver Shaft Coating" can be used as well to prevent excessive rust buildup. Most application do not require this and is more of a concern for High Voltage electric motors.

Excessive Vibration

Lock washers or Earthings "Conductive Silver Epoxy" can be used as a threading compound.

Thread Locking Compound

Thread locking compound should never be used as it is an insulator, Conductive Silver Epoxy can be purchased from Earthings (Pty) Ltd that can be used instead.

Wash Down Duty & Severe Duty Applications

Although water does not affect the Earthing, in extremely harsh environments the Earthing may be placed inside the electric motor or on the non-drive end between the endshield and the cooling fan. - (Please consult with your Earthings agent or the

Shaft Surface Condition

Shaft surface must be free of rust or coatings before installation of the Earthings, shaft surface should be 0.0033 finish or better.

Earthings Maintenance

The LV and HV Earthings do not require any maintenance.



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