



An Industry Standard World Wide

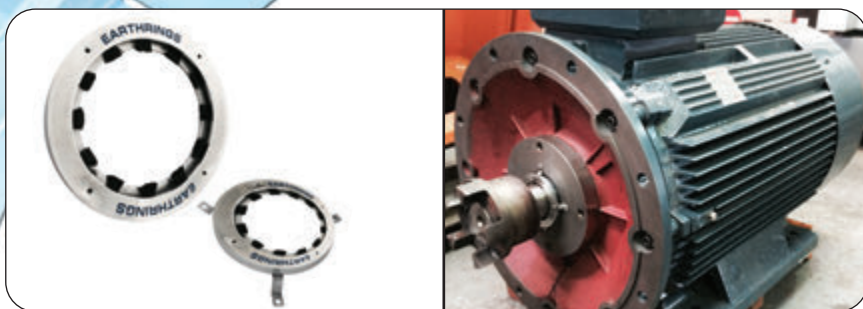
EARTHRINGS™

VFD ELECTRIC MOTOR BEARING PROTECTION

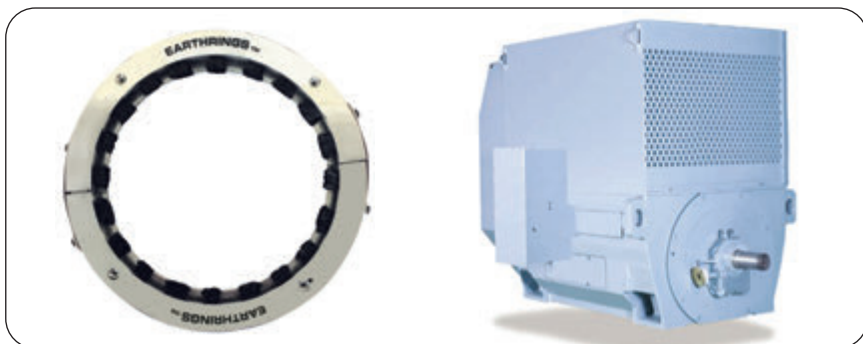


"Proven as the most Solid, Harsh Environment Ring on the Market"

“Your Electric motors are failing prematurely due to VSD drives – you just don’t know it. But the rest of the world does, and protects their motors !”

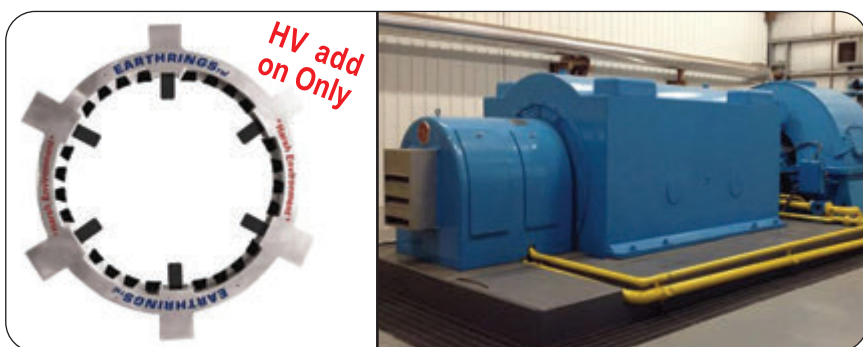


Our **LV Earthing** is the #No 1 Best Selling VSD Bearing Protection Ring in South Africa. Priced and designed for the South African Market and tested in some of the best known and largest blue chip companies in South Africa with a 100% Performance record at every factory. **Earthing LV** is for motors from 0.75 kw to 400 kw.



HV Earthing

High Voltage Earthings are custom made for all large electrical motors rated above 400kws or 600 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.



High Current Earthing (HC) HV Add on Only

This is an Add-On product to the High Voltage Earthing and is used on very large motors and Generators where “Current Surges” have been identified as a recurring problem. The HC Earthing is designed to attach to the High Voltage Earthing so as to absorb excessive surges, ensuring better protection and longer operating life. (The combination of Fibers and Silver brushes makes this the “Highest Current” carrying solution on the market today.)



Split-Earthing

These rings are available in LV and HV Earthings, and are used for on-site installations where removal of the coupling is not required. It comes with copper strip clamps on both sides to easily clamp the Earthing around the shaft before fitting. The Split-Earthing is well designed and extremely solid once it is closed (unlike many other options out there), which makes for easier fitting on-site as well as a much more solid alternative compared to other brands.

On-site Installation

Earthings (Pty) Ltd is the only manufacturer that offers on-site installation throughout Sub-Saharan Africa. We have installed Earthings in Nigeria, Malawi, Swaziland, Zambia etc. The installation is very easy and staff normally go on to doing it themselves.



On-site Installations of Earthings at SAFFEL STEEL



On-site Installations of Earthings at SAPPI SAICCOR

VSDs ARE THE LARGEST SINGLE SOURCE OF BEARING FAILURES IN THE WORLD TODAY.

There is a 57% increase in bearing failures worldwide, which is due to the introduction of IGBT Variable Speed Drives.

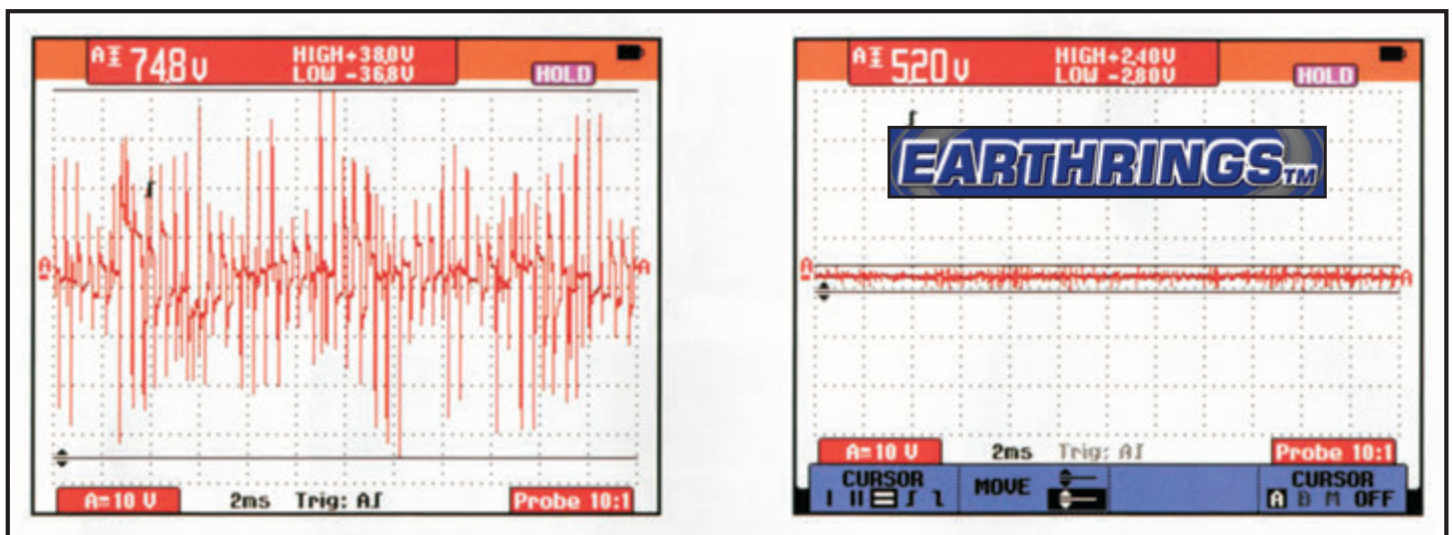
So what are these high shaft currents and how do they damage bearings? Damaging voltages are induced on the shafts of AC and DC motors controlled by Variable Frequency Drives (VFD). The extremely high on/off switching speeds of the Pulse Width Modulation (PWM), generated by the Insulated Gate Bipolar Transistors (IGBT), induce damaging voltages onto the motor shaft through parasitic capacitive coupling between the stator and rotor. This common mode shaft voltage seeks a path to ground, usually through the motor's bearings.

Damaging currents arc through the di-electric oil film between the rolling elements and the bearing race. This is known as Electrical Discharge Machining (EDM) effect. EDM causes fusion craters, severe pitting, and eventually bearing fluting (a washboard-like pattern in the bearing race) which results in premature bearing failure.

One of the most frequently asked questions is, "Will electrical bearing damage always occur in a VSD application?" The answer is "Yes - with no alternate path to discharge shaft current, pitting of the motor bearing will take place during VSD operation. These discharges will continue and will always seek the path of least resistance - usually through the motor bearings". Yes, many motors still last for some time on a VSD application but bearing life is drastically reduced by up to 50 percent, even when the problem is not critical.

Older VSDs operated at a lower switching frequency and did not create many bearing problems, with the advent of the newer IGBT VSDs, the higher switching frequencies have created more unbalance and thereby creating higher shaft currents that increase motor failure.

Bearing current problems are nothing new to engineers, but it is the alarming rate of increase in this problem that is becoming a worry to factories and mines. SGS, a company in the USA, undertook a survey on 1000 AC motors on Variable Speed Drives. 250 of the motors monitored had bearing faults appearing by month 18, and of motors averaging 24 months production time, 65% had electrical bearing faults appearing.



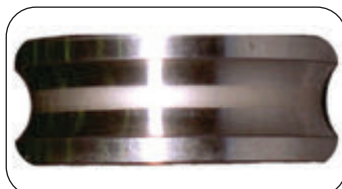
PROBLEM

SHAFT VOLTAGE READING WITHOUT EARTHRINGS

Bearing Damage Failures:



Brown marks from electrical arcing



Frosting: a dull matt effect from arcing



Fluting



Light brown marks and pitting

Bearing Grease Failures:



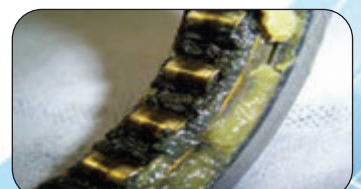
Hardening of Grease, stops Relubrication



Oil destroyed in grease, only Polymer remains



Initial Arcing causing High temperature Stress of Grease



Hardened oxidation of Grease stops new Grease entering Rollers

SOLUTION

SHAFT VOLTAGE READING WITH EARTHRINGS

CONFIRMING THE THREAT :- ACTUAL ON-SITE TESTING IN SOUTH AFRICAN FACTORIES



Earthrings Technician Testing for Shaft Voltages on-site



Motor Name	KW	VSD	DOL	Voltage read		Pass/Fail	Comments
				Fluke	EDD		
2D PX0351	45		SS	0.9			
6H PC1633	18.5		SS	0.7			
3K PX1624	11		SS	1			
PX-03-38	75		SS	1	120	FAIL	Arcing SKF pen
PX 0336	75		SS	1.3	60	FAIL	Arcing SKF pen
PX 0918	15		SS	1	52	FAIL	Arcing SKF pen
PX 0818	30	VSD		14	56	FAIL	Excessively High
PX 0414	30		SS	1.4	103	FAIL	Arcing SKF pen
PX 0312	75		SS	1	73	FAIL	Arcing SKF pen
5C PX 0310	75	VSD		5.5			Higher than 5v but low risk
PC 0115	85	VSD		15	324	FAIL	Excessively High
11E PC 11-10	45		SS	0.9			
CF-0574/504A/5A	380	VSD		19	13	FAIL	Excessively High
	110	VSD		8.2			Higher than 3v but low risk
16A CF-1227	110	VSD		11.4			Excessively High
7I CF-1221	110	VSD		4.2			
1G CF-1213 (CF-003)	110	VSD		6.3			Higher than 5v but low risk



Motor Name	KW	VSD	DOL	Voltage read		Pass/Fail	Comments
				Fluke	EDD		
F150	375	VSD		0.2	120	Pass	Has a carbon block installed but still arcs, there should be no arcing with any shaft grounding device installed.
F151	110	VSD		5.5			Higher than 5v but low risk
SE3	160	VSD		12.1	682	FAIL	Excessively High
SE2	160	VSD		65	91	FAIL	Excessively High
F140	375	VSD		3.6	105	FAIL	Arcing SKF pen
F141	110	VSD		8			Higher than 5v but low risk
E22	18.5	VSD		14.6	792	FAIL	Excessively High
E26	37	VSD		56		FAIL	Arcing SKF pen, Flange Mounted
E27	22	VSD		751		FAIL	Arcing SKF pen, Flange Mounted
E25	22	VSD		661		FAIL	Arcing SKF pen, Flange Mounted
E16	45	VSD		17.7			Excessively High
E24	37	VSD		174		FAIL	Arcing SKF pen
E21	22	VSD		338		FAIL	Arcing SKF pen
E15	18.5	VSD		11.1	821	FAIL	Excessively High



Some of our Customers:



www.earthrings.co.za