

Manufacturer's Specification AEGIS Bearing Protection Ring™



Product Application:

Shaft grounding for AC electric induction motors controlled or operated by pulse width modulation (PWM) variable frequency drives (VFD).

Sustainable (Green) Building Design:

Incorporates design characteristics for both energy savings and sustainability. Variable Frequency Drives save energy but require sustainable motor specifications to protecting motor bearings from VFD induced electrical bearing fluting failure. Conductive micro fiber shaft grounding ring

Bearing Damage from VFD Induced Shaft Voltage in all motors:

Variable frequency drives induce voltage onto the shaft of the driven electric motors through parasitic capacitance. These voltages seek a path to ground through the motor bearings causing electrical currents which result in pitting and fluting damage and motor failure.

Bearing Damage from High Frequency Circulating Currents on Motors above 100 HP (75 kW):

VFD induced high frequency circulating currents result from the magnetic flux imbalances in the motor's stator. High frequency circulating currents through the motor bearings cause destructive bearing currents which may result in fluting damage and motor failure.

Shaft Grounding Ring for VFD Induced Voltage on Electric Motors (all power ratings):

Application of shaft grounding rings is required on all VFD driven motors to provide a conductive discharge path away from the motor bearings to ground. AEGIS Bearing Protection Ring™ provides a maintenance free circumferential ring of conductive micro fibers that discharges voltages to ground.

Manufacturer's Application Recommendation for VFD Driven Motors:

Motors up to 100 HP (75 kW):

Install on AEGIS Bearing Protection Ring on either the drive end or the non-drive end of the motor in accordance with manufacturer's installation instructions.

Motors 100 HP to 1000 HP (75 kW to 750 kW):

Insulate one bearing journal or install ceramic bearing, usually on the non-drive end of the motor. Install AEGIS Bearing Protection Ring on the opposite end in accordance with manufacturer's installation instructions.

Note: For medium voltage motors and motors above 1000 HP (750kW) or for high current applications contact sales@est-aegis.com

Protecting Attached Equipment from VFD Induced Bearing Currents:

VFD induced shaft voltages may also discharge through the bearing in attached equipment including gear boxes, pillow block bearings, break motor bearings, encoders etc. Applying AEGIS Bearing Protection Ring to the motor shaft will discharge induced electrical voltages to ground and prevent voltages from seeking a discharge path through the attached equipment.

Note: Install minimum one AEGIS Bearing Protection Ring in all applications where motor has insulated bearings or ceramic ball bearings installed on DE and NDE.

Design Specification (Electrical or Mechanical Section):

Whenever variable frequency PWM drives are installed to control AC motors, a maintenance free, circumferential, conductive micro fiber shaft grounding ring (AEGIS SGR) shall be installed on the AC motor to discharge shaft currents to ground.

Recommended part: AEGIS SGR™ Bearing Protection Ring

Material Specification:

AEGIS Bearing Protection Rings for Shaft Diameters: 0.311” to 6.02” (7.9 mm to 152.9 mm)

Component	Material	RoHS Compliant
Ring Frame and Internal Components	6061 Aluminum	Yes
Conductive Micro Fibers	Proprietary material	Yes
Aluminum Mounting Bracket	6061 Aluminum	Yes
Socket Head Cap Screw (SHCS)	Black alloy steel	Yes
Internal tooth Lock Washer	Zinc clear plated steel	Yes
Sulfur Content	None	n/a

Material Specification applied to following part numbers:

- SGR-6.9-1-1 to SGR-150.9-1 (Standard with mounting brackets and English SHCS)
- SGR-6.9-1-2 to SGR-150.9-2 (Standard with mounting brackets and metric SHCS)
- SGR-6.9-1-3 to SGR-150.9-3 (Bolt through mounting and metric SHCS)
- SGR-6.9-1-2A4 to SGR-150.9-2A4 (Split Ring with mounting brackets and English hardware)
- SGR-6.9-1-0A6 to SGR-150.9-0A6 (Press Fit mounting, interference fit)
- SGR NEMA Kits (SGR-0.625-NEMA to SGR-3.375-NEMA)
- SGR Split Ring NEMA Kits (SGR-0.625-NEMA-1A4 to SGR-3.375-NEMA-1A4)
- SGR IEC Kits (SGR-19-IEC to SGR-95-IEC)
- SGR Split Ring IEC Kits (SGR-19-IEC-2A4 to SGR-95-IEC-2A4)

Installation Specifications: Detailed instructions available at www.est-aegis.com

SGR NEMA Kits

SGR-0.625-NEMA to SGR-3.375-NEMA

1. Select correct part number by cross referencing motor NEMA frame to AEGIS NEMA kit part number in catalog.
2. Drill and tap installation holes in the motor end bracket per manufacturer’s installation instructions and drawings.
3. Install AEGIS Bearing Protection Ring per installation instructions



- 1 AEGIS SGR™
- 1 mounting plate
- 3 screws (inches or metric)
- 3 washers
- 3 lock washers
- 3 spacers*

SGR Split Ring NEMA Kits

SGR-0.625-NEMA-1A4 to SGR-3.375-NEMA-1A4

1. Select correct part number by cross referencing motor NEMA frame to AEGIS NEMA kit part number in catalog..
2. Drill and tap installation holes in the motor end bracket per manufacturer’s installation instructions and drawings.
3. Install AEGIS Bearing Protection Ring per installation instructions



- 1 AEGIS Split Ring SGR™
- 1 split mounting plate
- 3 screws (inches or metric)
- 3 washers
- 3 lock washers
- 3 spacers*

SGR IEC Kits

SGR-19-IEC to SGR-95-IEC

1. Select correct part number by cross referencing motor IEC frame to AEGIS IEC kit part number in catalog.
2. Drill and tap installation holes in the motor end bracket per manufacturer's installation instructions and drawings.
3. Install AEGIS Bearing Protection Ring per installation instructions



- SOLID**
- 1 AEGIS SGR™
 - 1 mounting plate
 - 3 screws (inches or metric)
 - 3 washers
 - 3 lock washers
 - 3 spacers*

SGR Split Ring IEC Kits

SGR-19-IEC-2A4 to SGR-95-IEC-2A4





1. Select correct part number by cross referencing motor IEC frame to AEGIS IEC kit part number in catalog.
2. Drill and tap installation holes in the motor end bracket per manufacturer's installation instructions and drawings.
3. Install AEGIS Bearing Protection Ring per installation instructions



- SPLIT**
- 1 AEGIS Split Ring SGR™
 - 1 split mounting plate
 - 3 screws (inches or metric)
 - 3 washers
 - 3 lock washers
 - 3 spacers*

AEGIS SGR Kit Cross Reference for NEMA and IEC Motor Frames

NEMA Motors Solid	NEMA Motors Split		
Catalog Number	Catalog Number	Motor shaft diameter "u" NEMA Frame	Plate OD
SGR-0.625-NEMA	SGR-0.625-NEMA-1A4	0.625" 56	3.75"
SGR-0.875-NEMA	SGR-0.875-NEMA-1A4	0.875" 143T, 145T	5.60"
SGR-1.125-NEMA	SGR-1.125-NEMA-1A4	1.125" 182T, 184T	5.60"
SGR-1.375-NEMA	SGR-1.375-NEMA-1A4	1.375" 213T, 215T	5.60"
SGR-1.625-NEMA	SGR-1.625-NEMA-1A4	1.625" 254T, 256T	6.30"
SGR-1.875-NEMA	SGR-1.875-NEMA-1A4	1.875" 284T, 286T, 324TS, 326TS, 364TS, 365TS	6.30"
SGR-2.125-NEMA	SGR-2.125-NEMA-1A4	2.125" 324T, 326T, 404TS, 405TS	6.60"
SGR-2.375-NEMA	SGR-2.375-NEMA-1A4	2.375" 364T, 365T, 444TS, 445TS, 447TS, 449TS	6.60"
SGR-2.875-NEMA	SGR-2.875-NEMA-1A4	2.875" 404T, 405T	7.30"
SGR-3.375-NEMA	SGR-3.375-NEMA-1A4	3.375" 444T, 445T, 447T, 449T	7.60"
IEC Motors Solid	IEC Motors Split		
Catalog Number	Catalog Number	IEC shaft diameter IEC Frame	Plate OD
SGR-19-IEC	SGR-19-IEC-2A4	19mm IEC 80 (2, 4, 6, 8 pole)	142mm
SGR-24-IEC	SGR-24-IEC-2A4	24mm IEC 90S, 90L (2, 4, 6, 8 pole)	142mm
SGR-28-IEC	SGR-28-IEC-2A4	28mm IEC 100L, 112M (2, 4, 6, 8 pole)	142mm
SGR-38-IEC	SGR-38-IEC-2A4	38mm IEC 132S, 132M (2, 4, 6, 8 pole)	160mm
SGR-42-IEC	SGR-42-IEC-2A4	42mm IEC 160M, 160L (2, 4, 6, 8 pole)	160mm
SGR-48-IEC	SGR-48-IEC-2A4	48mm IEC 180M, 180L (2, 4, 6, 8 pole)	160mm
SGR-55-IEC	SGR-55-IEC-2A4	55mm IEC 200L (2, 4, 6, 8 pole); IEC 225S, 225M (2 pole)	168mm
SGR-60-IEC	SGR-60-IEC-2A4	60mm IEC 225S, 225M (4, 6, 8 pole) ; IEC 250M (2 pole)	168mm
SGR-65-IEC	SGR-65-IEC-2A4	65mm IEC 250M (4, 6, 8 pole); IEC 280M, 280S, 315S, 315M, 315L (2 pole)	185mm
SGR-75-IEC	SGR-75-IEC-2A4	75mm IEC 280S, 280M (4, 6, 8 pole); IEC 355M, 355L (2 pole)	193mm
SGR-80-IEC	SGR-80-IEC-2A4	80mm IEC 315S, 315M, 315L (4, 6, 8 pole)	193mm
SGR-95-IEC	SGR-95-IEC-2A4	95mm IEC 335L, 335M, 355L, 355M (4, 6, 8, 10 pole)	211mm

<p>SGR-6.9-1-1 to SGR-150.9-1 Standard with mounting brackets and English SHCS</p> <p>SGR-6.9-1-2 to SGR-150.9-2 Standard with mounting brackets and metric SHCS</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Drill and tap installation holes in the motor end bracket per manufacturer's installation instructions and drawings. 3. Install AEGIS Bearing Protection Ring per installation instructions 	
<p>SGR-6.9-1-3 to SGR-150.9-3 Bolt through mounting and metric SHCS</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Drill and tap installation holes in the motor end bracket per manufacturer's installation instructions and drawings. 3. Install AEGIS Bearing Protection Ring per installation instructions 4. Torque Specification: 85-90 IN-OZ. 	
<p>SGR-6.9-1-2A4 to SGR-150.9-2A4 Split Ring with mounting brackets and English hardware</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Drill and tap installation holes in the motor end bracket per manufacturer's installation instructions and drawings. 3. Install AEGIS Bearing Protection Ring per installation instructions 	
<p>SGR-6.9-1-0A6 to SGR-150.9-0A6 Press Fit mounting, interference fit</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Prepare bore per catalog specification for correct interference fit. 3. Press AEGIS SGR into bore using arbor press or equivalent fixture. 4. Install AEGIS Bearing Protection Ring per installation instructions 	
<p>Specifications:</p>	
<p>Shaft Surface/finish:</p>	<p>Shaft surface must be conductive and be free of any coatings or finishes that reduce conductivity. Standard steel shaft finish from motor manufacturer is suitable for AEGIS shaft grounding ring application. A nominal 130 micron finish or better.</p>
<p>Current rating:</p>	<p>10 amps high frequency current</p>
<p>Fiber wear</p>	<p>Less than 0.001" in 10,000 hours. Fiber wear length designed for expected life 200,000+ hours based on testing.</p>
<p>Friction</p>	<p>No fiber pressure applied to shaft. Extremely light contact only. Designed for minimal friction with no reduction in motor performance.</p>
<p>Maintenance Requirements</p>	<p>None</p>
<p>Oil and Grease on Motor Shaft</p>	<p>Small amounts of oil and/or grease are acceptable as long as the shaft surface remains conductive.</p>

Dirt/dust	Small amounts of dust and/or small particles are acceptable. Fibers “sweep” particles from shaft surface during operation. Shaft surface must remain conductive.
Maximum surface rate/RPM:	No Maximum rating - There is no theoretical RPM limit as there is virtually no frictional contact with the shaft at high RPM. Verify specific application with AEGIS engineering.
Maximum temperature rating	300 F/150 C - Verify application specific temperatures with AEGIS engineering.
Minimum temperature rating	-40 degrees F/C - Verify application specific temperatures with AEGIS engineering.
Humidity	0 to 90% - Verify application specific acceptable humidity with AEGIS engineering
RoHS Test Results: Directive 2002/95/EC for the Restriction of the use of certain Hazardous Substances in electrical and electronic equipment applies	All materials used in manufacture of AEGIS SGR™ products are in compliance with Directive 2002/95/EC, Restriction of the use of certain Hazardous Substances in electrical and electronic equipment. No RoHS banned substances are present in excess of the maximum concentration values (MCV). <ol style="list-style-type: none"> Following substances were found to be less than 0.1% by weight in homogeneous materials (required by RoHS directive): <ul style="list-style-type: none"> Lead (Pb) Mercury (Hg) Hexavalent chromium (Cr(VI)) Polybrominated biphenyl (PBB) Polybrominated diphenyl ether (PDPE) Following substance is less than 0.01% by weight in homogeneous materials (required by RoHS directive): <ul style="list-style-type: none"> Cadmium (Cd)
Additional Installation Notes:	
Corrosion Prevention:	Apply a fast drying silver paint such as Ted Pella #16040-30, on shaft surface to prevent corrosion.
Thread Locking compound:	Do not use Loctite or any other non-conductive material to secure the screws.
Excessive Vibration:	Installation bolts should be tightened and lock washers used. In some critical applications it may be also be desirable to use a thread locker. In this case you must use a conductive silver epoxy such Chemtronics. Conductive Silver Epoxy CW2400
Outdoor installations:	A cover should be installed to prevent rust on the shaft. Use Ted Pella fast drying silver paint on motor shaft to help retard rust.
Wash Down Duty Applications	High pressure water should not be directed onto the conductive micro fibers. Install o-ring or slinger to AEGIS SGR.
Severe Duty Environments	Install an o-ring or slinger against the AEGIS SGR to prevent ingress of excess grease or particles.
Technical information:	Technical information contained in this specification is rendered in good faith. User must assume responsibility to determine suitability of the product for intended use. Contact AEGIS Engineering by calling customer service: 207.998.5140 or email sales@est-aegis.com .