

Manufacturer's Specification

AEGIS™ Bearing Protection Ring / AEGIS™ SGR (Shaft Grounding 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 and Manufacturing 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: Low Voltage (up to 1000 v AC rms)

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 over 100 HP (75 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-6.9-1-0AW to SGR-150.9-0AW (Conductive Epoxy mounting)
- SGR-6.9-1-0A4W to SGR-150.9-0A4W (Split Ring with Conductive Epoxy mounting)
- 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



SOLID
1 AEGIS SGR™
1 mounting plate
spacer/screw kits in 3 different lengths* (inches or metric)

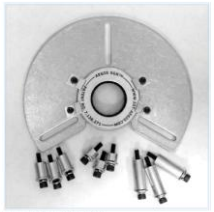
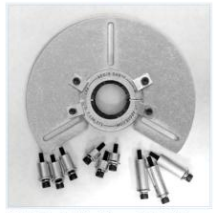
SGR Split Ring NEMA Kits

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








SPLIT
1 AEGIS Split Ring SGR™
1 mounting plate
spacer/screw kits in 3 different lengths* (inches or metric)



<p>SGR IEC Kits SGR-19-IEC to SGR-95-IEC</p> <ol style="list-style-type: none"> 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 	<p style="text-align: center;">SOLID</p>  <p>1 AEGIS SGR™ 1 mounting plate spacer/screw kits in 3 different lengths* (inches or metric)</p>
<p>SGR Split Ring IEC Kits SGR-19-IEC-2A4 to SGR-95-IEC-2A4</p> <ol style="list-style-type: none"> 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 	<p style="text-align: center;">SPLIT</p>  <p>1 AEGIS Split Ring SGR™ 1 mounting plate spacer/screw kits in 3 different lengths* (inches or metric)</p>

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>SGR-6.9-1-0AW to SGR-150.9-0AW Standard with conductive epoxy mounting</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Remove paint from end bell. 3. Install AEGIS™ Bearing Protection Ring per installation instructions. 4. Heat Gun may be used to speed up the hardening process of the conductive epoxy. 	

<p>SGR-6.9-1-0AW to SGR-150.9-0AW Standard with conductive epoxy mounting</p> <ol style="list-style-type: none"> 1. Select correct part number by measuring motor shaft diameter. Refer to catalog part number chart. 2. Remove paint from end bell. 3. Install AEGIS™ Bearing Protection Ring per installation instructions 4. Heat Gun may be used to speed up the hardening process of the conductive epoxy. 		
<p>Specifications:</p>		
<p>Shaft Surface Condition:</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.</p>	
<p>Shaft Surface finish:</p>	<p>130 micron finish or better.</p>	
<p>Conductive Shaft Surface Coating:</p>	<div style="display: flex; align-items: center;">  <p>Enhances the conductivity of the motor shaft surface by filling in the machined surface with engineered silver <1 um flake. Silver is applied 360 degrees around the motor shaft where the fibers. Silver particles are polished into the shaft surface by the AEGIS™ SGR's conductive micro fibers.</p> <ul style="list-style-type: none"> • RECOMMENDED: (1) All AEGIS™ installations for motors below 100HP (75kW); (2) All motors above 100HP (75kW) when non-drive end bearing is insulated and AEGIS™ SGR is on opposite end. • REQUIRED: (1) Motors with cylindrical bearing; (2) All Vertical Motor applications; (3) Critical Applications </div>	
<p>Current rating:</p>	<p>10 amps high frequency current up to 100 Mhz</p>	
<p>Fiber Flexibility:</p>	<p>AEGIS™ SGR is constructed with patented AEGIS™ FiberLock™ channel to allow conductive micro fibers to bend and flex within their elastic design limits.</p>	
<p>Fiber wear:</p>	<p>Usually less than 0.001” in 10,000 hours. Fiber wear length designed for expected life 200,000+ hours based on testing. Wear rate may vary depending on conditions in individual applications.</p>	
<p>Friction:</p>	<p>Little or no frictional axial or radial 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. Fibers are designed to maintain contact with the motor shaft and “sweep” oil away from surface.</p>	
<p>Dirt/dust</p>	<p>Small amounts of dust and/or small particles are acceptable. Fibers “sweep” particles from shaft surface during operation. Shaft surface must remain conductive.</p>	
<p>Directional rotation:</p>	<p>Motor may be operated in clockwise or counter clockwise rotation. Motor may change directional rotation without limitations.</p>	
<p>Maximum surface rate/RPM:</p>	<p>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.</p>	
<p>Maximum temperature rating</p>	<p>410 F/210 C - Verify application specific temperatures with AEGIS™ engineering.</p>	
<p>Minimum temperature rating</p>	<p>-112 degrees F/-80C - Verify application specific temperatures with AEGIS™ engineering.</p>	

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	<p>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).</p> <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) <p>Note: Request RoHS Certification Letter from sales@est-aegis.com or call 866-738-1857</p>
Hazardous areas:	Not certified for Class 1 Division 1, Division 2 or Class 1 Zone 1, Zone 2
CE and UL requirements	AEGIS™ SGR is classified as a “component” and as such is not subject to the requirements of any Directive. The application of CE or UL Mark is not applicable to this component.
Additional Installation Notes:	
Installation Instructions:	Detailed instructions available at www.est-aegis.com
Corrosion Prevention:	Do not install AEGIS™ SGR on rust covered shafts or where rust is likely to accumulate on motor shaft surface. To assist in prevention of rust or oxidation apply AEGIS™ Colloidal Silver Shaft Coating PN CS015 on clean shaft surface.
Thread Locking compound:	Do not use thread locking compound or any other non-conductive material to secure the screws of AEGIS™ SGR. The screws are part of the conductive path for shaft voltages.
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 as EP2400 available from sales@est-aegis.com or 866-738-1857
Outdoor installations:	A cover should be installed to prevent rust on the shaft. Use AEGIS™ Colloidal Silver Shaft Coating PN CS015 on motor shaft to help retard rust.
Wash Down Duty Applications	High pressure water should not be directed onto the conductive micro fibers. Contact sales@est-aegis.com or call 866-738-1857 for recommendations regarding washdown duty applications.
Severe Duty Environments	For severe duty applications use AEGIS™ SGR installed inside Garlock Klokure® Guardian™ Bearing Isolator.
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 .