Statement of Work
For
Large Diameter Slip Ring Assembly

1.0 **Description:** This Statement of Work defines the technical requirements and specifications for a quantity of one (1) Slip ring and brush block system. The slip ring will connect the main machine side power and data communication circuits to the electro-mechanical hardware assembly of the machine. This statement of work's defined requirements and deliverables are to be used in the selection and procurement of a quantity of one (1) Large Diameter Slip Ring Assembly

2.0 **Scope:** The scope of this project includes a quantity of one (1) large diameter slip ring assembly, to include all necessary brush block assemblies, electrical & communication wire leads, accessories & hardware. and/or software, and technical documentation needed for proper installation and operation detailed in the requirements section of this statement of work.

3.0 **Product Description:**

3.1 Operational Functionality:

3.1.1 The large diameter slip ring assembly will provide power and data communication connection to electro-mechanical systems that are mounted to a rotating structure capable of continuous 360-degree rotation. This shall be achieved while experiencing negligible levels of noise or variation in the power and communication circuits.

3.1.2 The slip ring disc and mounting brace/backer will be mounted to the rotating structure and will be the moving/rotating element of the assembly.

3.1.3 The brush blocks will be mounted as a pair, opposed 180-degrees from each other, in a stationary position to the frame or base that the rotating structure is mounted to. There will be one pair of blocks for power and one pair of blocks for communication.

3.2 Assembly Description:

3.2.1 The slip ring disk design will consist of two (2) split halves that are a matched pair of identical half disks. Each half will include alignment pins and holes to ensure sufficient alignment of the two halves during assembly. The wire leads for power and data communication will protrude from the back face of the slip ring and will be routed between it and the mounting brace. The wire leads will be routed towards the ID of the slipring assembly. There will be threaded studs, or threaded holes, on the back face with accompanying dowel pins for affixing the slip ring to the mounting brace.

3.2.2 The mounting brace will be a two (2) piece slip halve design, similar to the slip ring disks. The mounting brace will be located concentrically and fastened to the shaft of the machine's rotating structure. There will be an anti-rotating pin or pin hole on each half for ease of assembly. These pins will be of loose fit design to prevent over constraining the assembly and

causing unnecessary stresses or loads. Final assembly, prior to installation, will be that the slip ring disk is mounted with the seam rotated 90-degrees offset from the split seam of the mounting brace.

3.2.3 Each brush block will incorporate 3 or 4 spring loaded contactor elements per conductor ring on the slip ring. The contactor elements will be easily replaceable using threaded caps to secure them. Each brush will have threaded terminal studs for connecting the wire leads to the contactors.

4.0 **Requirements:** The contractor shall provide a final product that conforms to the following minimum required specifications:

4.1 Dimensions:

Parameter	**Dimension**	**Units**
Bore Diameter Mounting Brace	550	mm
Inner Dia. Conductor Ring Section	650	mm
Outside Diameter (max)	1000	mm
Slip Ring Mounting Bolt Circle Dia.	600	mm
Assembled Slip Ring Thickness (max)	40	mm
Slip Ring Mounting Bolt Size	M8	
Brush Block Arc Section (width)	15-30	deg
Brush Block Thickness	40	mm
Brush Block Mounting Screw Size	M3	

4.1.1 These dimensions are for the assembled configuration.

4.2 Performance Specifications:

4.2.1 **Table:**

Parameter	**Value**
Limiting Speed	10 RPM
Nominal Operating Speed	5 RPM
Power Circuit Voltage	240VAC/ 3phase
Power Circuit Amperage	75 Amps
Data/Communication Protocol	EtherCat
Data/Communication Rate	100 Mbps
Brush Block Stand-off Distance to Slip Ring	2.5mm
Radial Runout (max/nom)	1.0 mm / 0.1 mm
Axial Runout (max/nom)	1.0 mm / 0.1 mm

4.2.2 Uninterrupted power and communication electrical continuity during rotation of the slipring.

4.3 Features:

4.3.1 Slip Ring

4.3.1.1 Designed as two split ring halves to facilitate ease of installation.

4.3.1.2 Alignment dowel pins are used to ensure accurate mechanical fit and create a seamless mechanical and electrical joint at the separation.

4.3.1.3 Mounting threaded holes or studs for attaching the slipring to the mounting brace/backer.

4.3.1.4 The divider rings/bodies will be raised slightly to prevent accidental arcing or shorting of circuits.

4.3.1.5 Four (4) conductor rings for power. Phase 1,2,&3 and ground.

4.3.1.6 Eight (8) conductor rings for communication/data.

4.3.2 Mounting Brace/Backer

4.3.2.1 Designed as two split ring halves to facilitate ease of installation.

4.3.2.2 Integrated clearance channels to accommodate routing of wires radially towards the ID of the assembly.

4.3.2.3 Locating details on the ID surface and back-face of the brace shall be of steel construction to ensure alignment accuracy and minimize thermal physical effects.

4.3.2.4 Brace must have ten (10) equally spaced through holes for mounting fasteners (M8 socket head cap screws), with a bolt circle of 600mm.

4.3.3 Brush Block

4.3.3.1 One pair of blocks for the power circuit and one pair of blocks for the communication/data circuit.

4.3.3.2 Multiple contact element positions for each conductor ring in each brush block.

4.3.3.3 Contacting elements for the brush block will be spring loaded silver-graphite contactors.

4.3.3.4 Mounting holes protected by grommets or rivets and sized to accommodate M3 metric socket head cap screws.

4.3.4 Wires/Cables:

4.3.4.1 Power wires will be a minimum of 12 AWG or bigger to accommodate 240VAC 3 Phase at 75A peak operating.'

4.3.4.2 Power wires will be labeled and color-coded utilizing current ASME standards.

4.3.4.3 Communication wires will be color-coded and 22AWG.

4.3.4.4 Wire leads will be free flying and unterminated. Benet/WVA will be terminating the leads into connectors or pins.

4.3.4.5 Power and communication wires will be routed on the backside of the slip ring, through a channel in the mounting brace. The wires will be routed radially towards the ID of the slipring.

4.3.4.6 The length of the wires will be a minimum of 1.5 meters for the slip ring.

4.3.4.7 The slip ring and brush blocks will have threaded stud terminals for connecting wires terminated with eyelet ring connectors.

5.0 Hardware Deliverables

5.1 The contractor shall manufacture and deliver the following components meeting the requirements and specifications listed in this Statement of Work:

5.1.1 One (1) Large Diameter Slip Ring Assembly with the following components:

5.1.1.1 Two (2) Slip Ring Conductor Ring halves.

5.1.1.2 Two (2) Slip Ring Mounting Brace halves.

5.1.1.3 Two (2) Power Circuit Brush Block assemblies.

5.1.1.4 Two (2) Data/Communication Circuit Bruch Block assemblies.

5.1.1.5 All wires, cables, and electrical connectors.

5.1.1.6 Hardware, spare components, and accessories necessary for proper operation of system.

6.0 Written Deliverables

6.1 The contractor shall prepare and provide certificate of compliance for all the components that are stated in section 3.0 & 4.0. (DI-MISC-81356A)

6.2 The contractor shall provide all instruction, operating, and maintenance manuals for each component stated in section 3.0 & 4.0.

6.3 The contractor shall provide technical information, drawings, 3D Models, and requirements for each component stated in section 4.0.

7.0 Warranty

7.1 The Contractor shall offer a standard commercial warranty, including onsite service warranty on labor, parts, and materials for a minimum period of one (1) year from the date of installation. Additionally, the contractor shall provide application and technical support free of charge.

8.0 Final Acceptance:

8.1 Shall be done at Watervliet Arsenal/Benet Laboratories upon completion of inspection.

9.0 General Requirements and Information

9.1 Delivery shall be executed over twenty-four (24) weeks from the date of award.

9.2 This effort is Unclassified.

9.3 The slip ring assembly and all necessary accompanying hardware will be delivered to the technical Point of Contact.