

SENSOR / IMAGING SYSTEMS AND PAYLOAD SOLUTIONS

Rotary components for data and power transfer



Many applications require that sensors such as cameras or other imaging devices have continuous 360 degree of rotation. This can be implemented using a slip ring. Moog has been supplying slip rings to the commercial and military sensor payload market for over 30 years and has the design solutions and background to solve your difficult problems.

There are three primary challenges for slip rings in high-performance sensor applications.

1. Volume on these platforms is often at a premium so the circuit density must be high. Contact materials and design features must be suitable for very tight packaging of circuits.
2. HD video as well as other serial data formats are pushing the data rate above 1 Gbps. Reliable data transfer in these high-speed data systems again require the right materials and design strategies. In some cases, fiber optic capability must be present.
3. And finally, the slip ring must be reliable and maintenance free. Typically buried deep in the platform, the slip ring is responsible for both power and data transfer to and from the sensor itself and is therefore mission critical.

Moog offers a line of slip rings, fiber optic rotary joints and multiplexers / media converters that have been optimized for sensor / imaging systems. Flexibility is offered in circuit configuration, wiring schemes and mounting provisions using core modules that have millions of hours of operating heritage. From the 1940s when aircraft inertial guidance platforms used slip rings to handle sensitive analog data to the present when electro-optic payloads use slip rings to handle digital HD-SDI camera data, Moog, the world's oldest and largest designer and manufacturer of slip rings, has played a leadership role.



ADVANTAGES

- Field proven hardware
- Dense circuit packaging
- HD video and GigE capable
- Application specific designs
- Copper and fiber optic solutions

APPLICATIONS

- UAV sensor and imaging payloads
- Surveillance cameras
- Rotating sensor heads (e.g., pipe inspection)
- Small sensor pedestals (e.g., radar)

SOLUTIONS OVERVIEW

WHEN SIZE MATTERS: MINIATURE SLIP RINGS FOR SMALL PAYLOADS OR PLATFORMS

Moog has hundreds of designs that have been successfully implemented in sensor platforms. The table below shows a few standard miniature pre-engineered units. All of these units have extensive field experience in sensor systems and a number have been tested to environmental military specifications (e.g., MIL-HDBK-5015) to demonstrate COTS suitability. These slip ring capsules have various circuit options for power and signal combinations.

Model Number	Dia (in.)	Length (in.)	# CKTS	Ethernet Capable	HD Video Capable
SRA-73799	.44	1.16	14	Yes	Yes*
SRA-73798	.61	1.80	20	Yes	Yes*
AC7203	.87	1.41-1.98	10-22	Yes	Yes
AC7195	1.0	3.5	56	Yes	Yes

* Non-standard coaxial wiring is required

SMALL ASSEMBLIES THAT ALLOW INSTALLATION OF MINIATURE CAPSULE, FORJ, OR RF CHANNELS

Moog has units with a small through-bore that allows for the installation over a shaft or allows a sensor, miniature capsule, fiber optic rotary joint, or an RF rotary joint to be installed. These slip ring assemblies typically have a higher electrical current capacity than a miniature assembly. However, all of these units are capable of carrying Gigabit Ethernet and HD video. These units are small enough to be incorporated into medium to large sized payloads.

LARGER ASSEMBLIES WITH THROUGH-BORES FOR INSTALLATION OF MINIATURE CAPSULE, FORJ, OR RF CHANNELS. THESE SLIP RINGS ARE APPROPRIATE FOR PEDESTAL APPLICATIONS.

Larger sensor pedestal applications such as radar typically require higher power. Moog has units capable of up to 10 amps per circuit and circuits can be wired in parallel to achieve a higher rating. Our AC 7212 product integrates an AC4598 and an AC7195 to provide power and data in a compact unit. There are many other combinations available and larger power modules are available that provide even higher power channels as well as a larger through-bore.

FIBER OPTIC DATA TRANSMISSION

Fiber optic data transmission can be desirable both for bandwidth and EMI considerations. Moog has a full line of Fiber Optic Rotary Joints (FORJ) both single and multi-channel. These FORJ's come in both single and multi-mode. The real value of fiber optic communication however becomes apparent when multiplexing is used to combine multiple channels on a single fiber to take full advantage of the wide bandwidth capabilities of fiber.

SOLVING A CHALLENGE USING MOOG PRODUCTS

Challenge: Platform had need for multiple power and signal channels to transfer along with high speed imaging or communication data.

Moog Solution:

- Miniature slip ring with 36 or 56 rings
- Ethernet and HD video capable
- 1.0 inch diameter
- Power channels up to 10 amps



Challenge: Through-bore is required to accommodate shaft, FORJ, or signal slip ring or additional power channels are required than can be provided by miniature capsule.

Moog Solution:

- Small through-bore slip ring
- Ethernet and HD video capable
- 0.5 inch through-bore



Challenge: Multiple high speed channels are required and most cost effective method of transfer is to multiplex across a single optical channel. Similar configuration is available with RF rotary joint

Moog Solution:

- Outer slip ring with FORJ in center
- Electrical and fiber channels in one integrated unit
- Can be used with multiplexer to provide multiple fiber channels on one fiber



MOOG SLIP RING AND FIBER OPTIC ROTARY JOINT PRODUCT MATRIX





The chart below shows Moog’s solutions for sensor applications and is intended to show the range of solution offerings. With our modular design approach we can easily configure a solution for any power or data rotary transfer problem.

Product	Model	Features / Advantages
	SRA-73801 / SRA-73808 Ethernet Slip Ring Capsule	- Most compact through-bore solution - 0.5 inch bore, less than 2 inch total length - Ethernet plus 12, 2 amp circuits
	AC6438 Through-bore Miniature Slip Ring Capsule	- 0.5 inch through-bore with fiber brush technology - Available with Ethernet plus multiple 5 amp circuit options
	AC6349 Through-bore Various Circuit Slip Ring	- 1 inch through-bore with fiber brush technology - Available with Ethernet plus multiple 15 amp circuit options
	AC4598 Through-bore Slip Ring	- Industrial through-bore product now with Ethernet capability - Multiple configurations available
	AC7212 Integrated Slip Ring Capsule	- Integrated AC4598 / AC7195 for highly compact, multi-circuit product configurations
	Single Channel Fiber Optic Rotary Joint (FORJ)	- Single channel: multi-mode or singlemode
	Dual Channel Fiber Optic Rotary Joint (FORJ)	- Two channel: One channel multi / singlemode, second channel multi-mode
	Multi-Channel Fiber Optic Rotary Joint (FORJ)	- 3-52 channels - multi or singlemode

SOLUTIONS OVERVIEW

MOOG MULTIPLEXER AND MEDIA CONVERTERS PRODUCT MATRIX

The chart below shows some of Moog's solutions for fiber optic multiplexing and media conversion. With our flexible approach we can easily configure a solution for any optical data transfer application.

Product	Model	Features / Advantages
	907-GEM Gigabit Ethernet Multiplexer	<ul style="list-style-type: none">- 4x multiplexed Gigabit Ethernet channels- Low latency, non-switched- 2.5 Gb/s data throughput- Serial data expansions options
	924-HDE HD Video, Serial Data and Ethernet Multiplexer	<ul style="list-style-type: none">- 3x 3G / HD-SDI- 1x Gigabit Ethernet- 4x RS422- Low latency, non-switched
	914-HDE HD Video, Serial Data and Ethernet Multiplexer	<ul style="list-style-type: none">- 1x 3G / HD-SDI- 1x Gigabit Ethernet- 2x serial data- Low latency, non-switched- Expansion options for composite video, ethernet and serial data
	914-HDV2 Dual HD Video Media Converter	<ul style="list-style-type: none">- 2x 3G / HD-SDI- Low latency media converter

For product information, visit www.moog.com

For more information or the office nearest you, contact us online, rotarysolutions@moog.com

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Moog EO Sensor / Imaging Systems and Payloads: Slip Ring Solutions
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