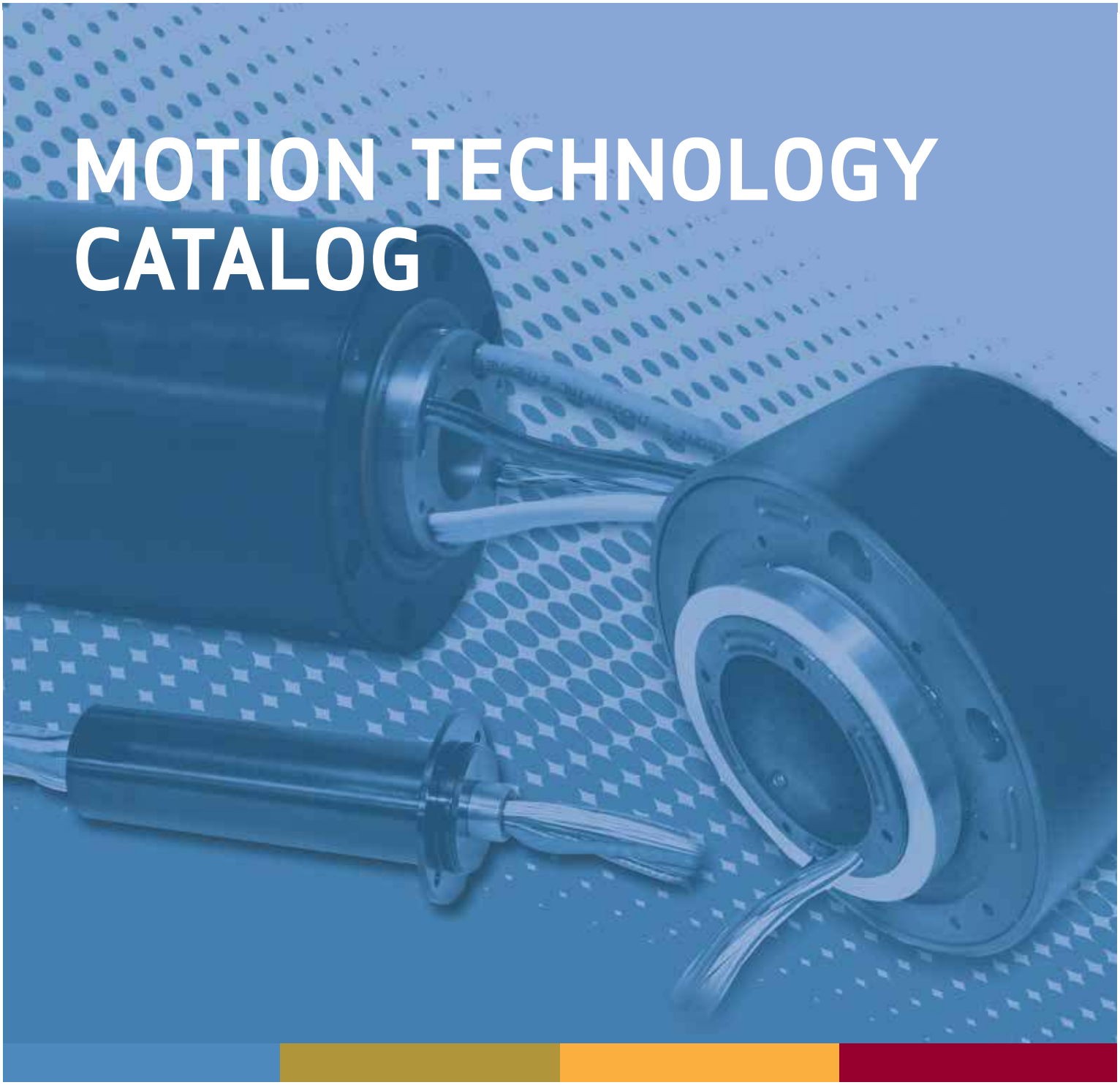
MOTION TECHNOLOGY CATALOG



SLIP RINGS, FIBER OPTIC ROTARY JOINTS,
MULTIPLEXERS AND FLUID ROTARY UNIONS

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Motion Technology Catalog Index











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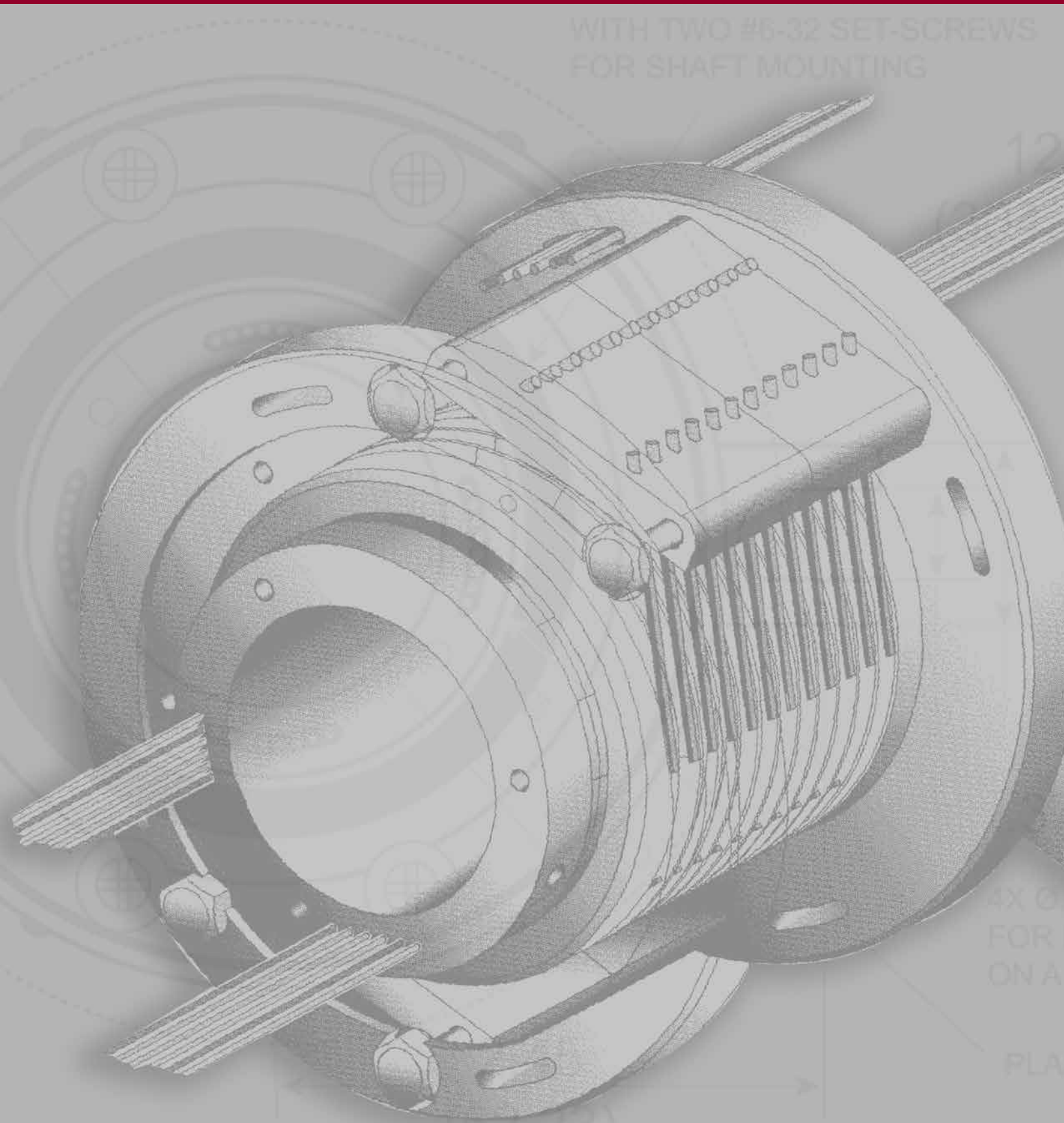
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How To Specify A Slip Ring

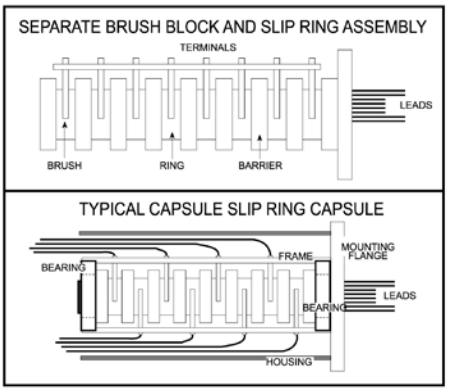
Many of the more than 10,000 slip ring designs are available for use in their existing configuration or they may be modified to meet your specific requirements. New designs can also be created to meet the most demanding specifications.

Our engineers are experienced in a wide range of slip ring applications. A very active in-house quality program solicits the best inputs from all of our many concurrent engineering groups, from start to finish.

This section is designed to guide you through the process of specifying a slip ring. We've outlined below the major considerations that a slip ring engineer will need to know about your application.

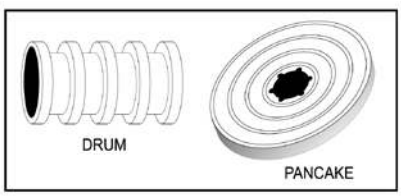
Basic Slip Ring Design

Throughout these pages, you will see three basic terms used for slip rings:
1. Slip Ring Capsule - A fully integrated unit with a housing and bearings.
2. Slip Ring Separates - Separate slip ring rotor and brush blocks for mounting in your system.
3. Twist Capsule - A limited rotation device used typically in scanning applications where continuous rotation is not required.



There are two basic slip ring configurations to consider based on space allocation in your system:

1. The more common drum approach where each ring is adjacent to the next along the centerline, somewhat like the threads on a bolt and
2. The platter approach where the rings are concentric with one another like the grooves on a flat surface. The pancake approach is used when length is at a premium but diameter is less restrictive.

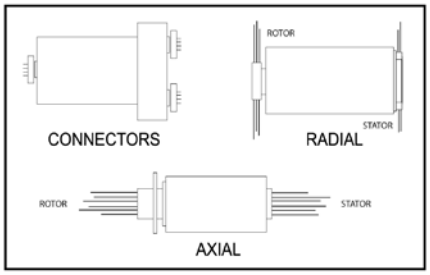


Defining the Mechanical Envelope

The envelope is, of course, largely dictated by the space available in the system. The slip ring engineer should be given the maximum space available in the system so all existing candidate designs can be considered. It is imperative that the space required for the slip ring be specified in the early stages of the system design and that it be consistent with the structural and electrical demands.

Defining System Interface Requirements

The slip ring engineer will need to know these system interface considerations:
1. Can the slip ring mount directly on the center line or is a through-bore required in the slip ring? A through-bore can be used to mount the slip ring on a shaft or used for routing hydraulic lines, pneumatic lines, fiber optic rotary joint, wave guide. etc.
2. How will the slip ring attach to the system? A slip ring must be mounted with a flexible coupling on one side of the unit. Hard mounting on both the rotor and stator will cause the slip ring to fail prematurely by translating system load into the slip ring bearing structure.
3. How should the electrical connections to the slip ring be made? Is it desirable to have connectors integral with the slip ring on both the rotor and stator, or would flying leads on one or the other ends be desirable? And if flying leads are preferred, should they exit the rotor / stator in a radial or axial direction, and what length should the leads be?



Defining Electrical Requirements

The specified current enables the slip ring engineer to propose a unit with the appropriate cross-sectional area of the rings, brushes and lead wires. The specified voltage dictates the spacing between adjacent rings and brushes. It is helpful in achieving the most cost effective and smallest practical envelope not to rate all circuits at the maximum level. For example, if you need 20 circuits total, three of which must carry ten amps, designate three for high current. Don't insist on 100% functional interchangeability by specifying that all 20 circuits carry ten amps. And, if ten amps is a surge current with a continuous current of only two amps, tell us that, too. There is no reason for you to pay for ten amps continuous capacity when you only need two amps.

Be aware that voltage surges and spikes are the major cause of system slip ring failures. Moog uses a conservative approach to circuit design, however, it is not uncommon in some power supply systems to see voltage spikes ten or more times the normal operating voltage. We strongly recommend surge protection on all power supplies.

Most smaller slip rings will satisfactorily conduct signals to 50 megabits / sec. Special slip rings can be used to pass broadband signals from DC to 1 gigahertz and data rates of 500 megabits or even higher. Cross-talk, insertion loss and bit error rate information can be projected, if tested for actual values, when data rates, formats and impedances are defined. The appropriate shielding techniques will be incorporated to meet the system requirements.

Defining Mechanical Requirements

1. Operating speed (rpm) is an important design parameter. Almost any slip ring can operate successfully at speeds to 100 rpm although many applications only require operation at a few rpm. Slip rings are routinely used to instrument test jet turbine engines operating at speeds in excess of 20,000 rpm. The operating speed, in conjunction with the diameter, dictates the surface speed of the ring relative to the brush and hence the internal design approach and material selection.
2. What rotational life is necessary for your application? Will the unit oscillate or rotate at a continuous speed?

Defining the Environment

The environment in which the slip ring must survive is a key factor. Operating temperature range is important in specifying the proper lubricant. And if the slip ring will operate exposed to the elements or to a hostile environment, integral seals must be included in the design. Any unusual shock or vibration should also be specified.

Your Slip Ring Requirements

For assistance on your slip ring requirements, please complete the *Slip Ring Application Specification Sheet* located on page 7, you can either fax or call and speak with one of our engineers about your optimum slip ring solution.

Many of the slip ring designs and manufacturing processes described are proprietary and are covered under one or more U.S., European or Japanese patents. The information provided is intended to assist the system engineer in initial discussions and is not intended as a specification.

Slip Ring Application Specification Sheet

Please provide as much information as possible, enter NA for those questions that are not critical or important to you. Do not be concerned if you do not have all of the specifications that are requested, we are happy to work with as little or as much information as you can provide. However, the more complete your response, the more thorough our analysis.

Company Information

Company Name _____ Contact _____

Division _____ ❑ Buyer

Address _____ ❑ Engineer

_____ ❑ Other _____

City _____ State/Country _____ Zip/Post Code _____

Phone _____ FAX _____ E-mail _____

1) Description of Application: _____

_____

_____

❑ Commercial
❑ Industrial
❑ Military
❑ Other

2) Type of Slip Ring ❑ Capsule ❑ Separate Brush Block ❑ Other _____
❑ Separate Slip Ring ❑ Poly-Twist (for ± °) _____

3) This Application is: ❑ New ❑ Retrofit / Replacement Type of Application: _____

Current Supplier: _____ Part Number: _____

4) Estimated Annual Quantity: _____ Price Target: _____ Production Start Date: _____

Estimated Life of Program: _____ Tooling $ Available: _____

5) Size Constraints - Mechanical and additional requirements (i.e. resolver, motor, hydraulics, pneumatics, optical channel, etc):

_____

_____

6) Specifications:

Number of Rings: _____

Size: Length _____

Diameter _____

Bore _____

Wear (Life): Hours (or Yrs) _____

at Duty Cycle _____

Operating Temp Range (°C):

Min _____ Max _____ Norm _____

Pressure: Norm _____ Min _____

Vibration: ____ g's @ ____ Hz Shock ____ g's

Sealing: ❑ None ❑ Dust & Splash
❑ Water Spray ❑ Submersion

Rotational Speed: Norm _____

Oscillatory Motion: Yes _____ No _____

Torque: Max Starting _____ gm-cm

Weight (Max): _____

Lead Length: Rotor _____ Stator _____

Connectors: Rotor _____ Stator _____

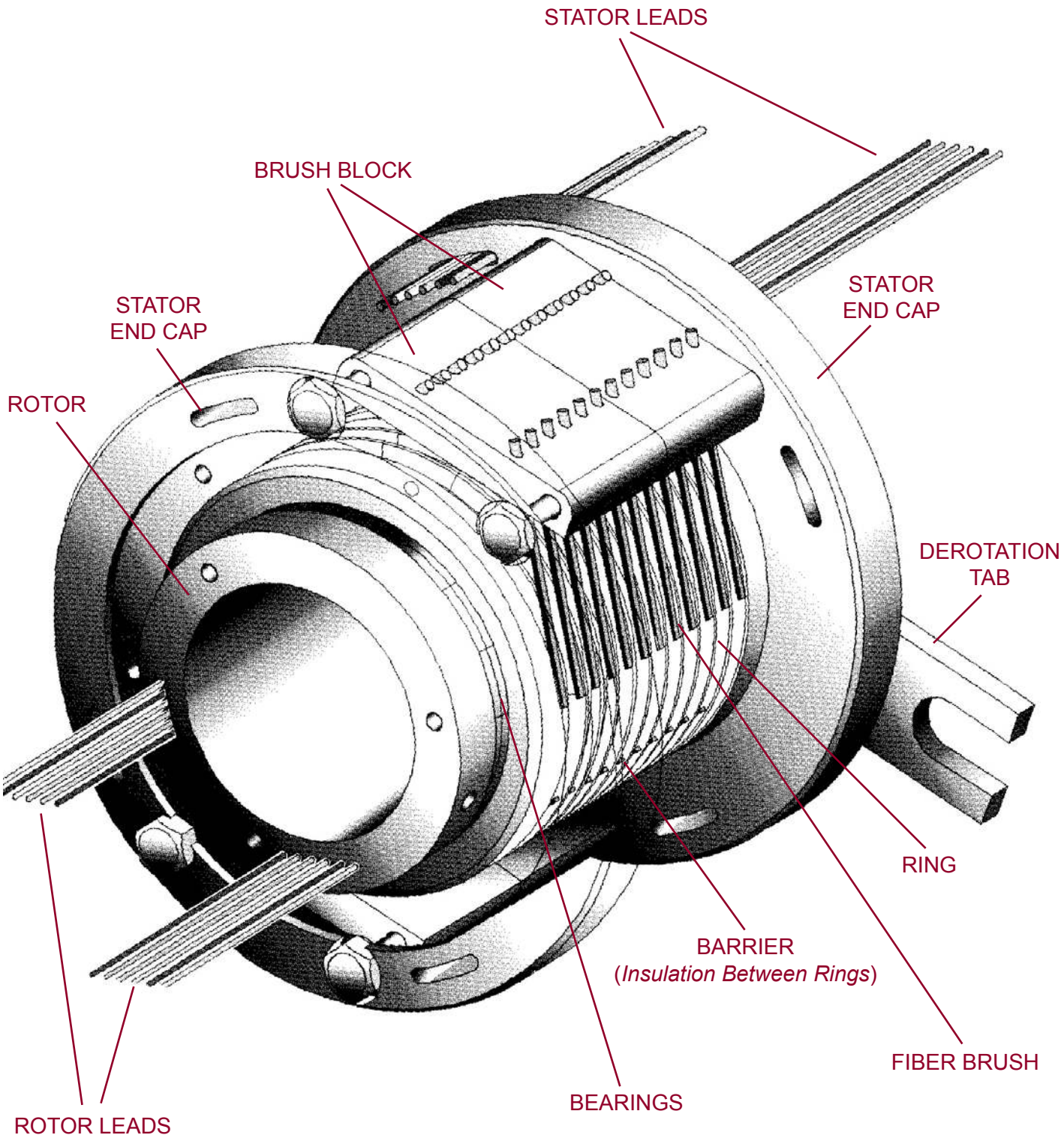
Lead Exits: Rotor Axial ____ Radial ____
Stator Axial ____ Radial ____

Circuit Function	No. Ring	Current (amps)		Working Volts	Data Protocol	Digital Risetime* or Freq. (Hz)	Crosstalk Isolation (dB)
		Normal	Max				

If unknown please specify protocol or data rate.

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Components Of A Slip Ring



Note: Outer housing is removed for clarity.

Commercial Slip Ring Specification Matrix

Slip Rings with Through-Bores

Part #	# Rings	Continuous Current (amps)						Coaxial		Standard Operating Voltage (AC)				Size	Bore	Rated Speed	Page #
		2	5	10	15	30	50	RG178	RG179	120	240	440	600	DIA" x LG"	DIA"	RPM	
SRA-73683-6	6	6									X			1.38 x 1.07	.5	250	15
SRA-73683-12	12	12									X			1.38 x 1.37	.5	250	15
SRA-73683-18	18	18									X			1.38 x 1.67	.5	250	15
SRA-73683-24	24	24									X			1.38 x 1.97	.5	250	15
AC6438-6	6		6								X			2.1 x 1.75	.5	250	17
AC6438-12	12		12								X			2.1 x 2.3	.5	250	17
AC6438-18	18		18								X			2.1 x 2.9	.5	250	17
AC6438-24	24		24								X			2.1 x 3.4	.5	250	17
AC6349-6	6				6							X		3.07 x 2.9	1	250	19
AC6349-12	12				12							X		3.07 x 4.1	1	250	19
AC6349-18	18				18							X		3.07 x 5.3	1	250	19
AC6349-24	24				24							X		3.07 x 6.5	1	250	19
AC6875	IP 65 sealed version of AC6349													3.07 x 2.9 - 6.5	1.0	250	21
AC4598-6	6			6									X	3.9 x 2.13	1.5	250	22
AC4598-12	12			12									X	3.9 x 3.07	1.5	250	22
AC4598-18	18			18									X	3.9 x 4.01	1.5	250	22
AC4598-24	24			24									X	3.9 x 4.94	1.5	250	22
AC6200-12	12	12									X			3.9 x 2.13	1.5	250	24
AC6200-24	24	24									X			3.9 x 3.07	1.5	250	24
AC6200-36	36	36									X			3.9 x 4.01	1.5	250	24
AC6200-48	48	48									X			3.9 x 4.94	1.5	250	24
AC6200-6P/12S	18	12		6							X (2A)		X (10A)	3.9 x 3.07	1.5	250	24
*AC6200-6P/24S	30	24		6							X (2A)		X (10A)	3.9 x 4.01	1.5	250	24
AC6200-6P/36S	42	36		6							X (2A)		X (10A)	3.9 x 4.94	1.5	250	24
AC6200-12P/12S	24	12		12							X (2A)		X (10A)	3.9 x 4.01	1.5	250	24
AC6200-12P/24S	36	24		12							X (2A)		X (10A)	3.9 x 4.94	1.5	250	24
AC6200-18P/12S	30	12		18							X (2A)		X (10A)	3.9 x 4.94	1.5	250	24
AC6419	IP 65 sealed version of AC4598 and AC6200 series													3.9 x 2.3 - 5.1	1.5	250	26
AC6815	Up to 128	X	3.5	X						2A/60	3.5A/110	10A/220		4.32 x 3.01 - 5.94	1.5	250	27
AC6428-060	60	60									X			3.9 x 6.6	1.375	250	29
AC6428-072	72	72									X			3.9 x 7.5	1.375	250	29
AC6428-084	84	84									X			3.9 x 8.45	1.375	250	29
AC6428-096	96	96									X			3.9 x 9.34	1.375	250	29
AC6429-006	54	48		6							X (2A)	X (10A)		3.9 x 7.5	1.375	250	29
AC6429-012	60	48		12							X (2A)	X (10A)		3.9 x 7.5	1.375	250	29
AC6275	Up to 144		X	X		X	X	X	X		X (5A)		X	6.63 x 6.6 - 20.5	2.75	1000	31
AC6793	IP 65 sealed version of AC6275													6.63 x 6.6 - 20.5	2.75	1000	33
AC6098	Up to 72			X		X	X	X	X				X	8.0 x 4.6 - 14.4	4	250	34
Std W Series	Up to 24		X			X		X	X		5A/250		30A	5.0 x 1.89 - 5.89	1.5	60	36
Std W Series	Up to 24		X			X		X	X		5A/250		30A	6.5 x 1.89 - 5.89	3.0	60	36
Fiber W Series	Up to 48		X			X		X	X		5A/250		30A	5.0 x 2.43 - 10.38	1.5	250	38
Fiber W Series	Up to 48		X			X		X	X		5A/250		30A	6.5 x 2.32 - 10.38	3.0	250	38
Fiber W Series	Up to 48		X			X		X	X		5A/250		30A	7.5 x 2.18 - 10.38	4.0	250	38
Fiber W Series	Up to 48		X			X		X	X		5A/250		30A	9.5 x 2.19 - 10.38	6.0	250	38
Fiber W Series	Up to 48		X			X		X	X		5A/250		30A	12.5 x 2.43 - 10.38	9.0	250	38

Continued on next page

Commercial Slip Ring Specification Matrix

Split Slip Rings

Part #	# Rings	Continuous Current (amps)						Coaxial		Standard Operating Voltage (AC)				Size	Bore	Rated Speed	Page #
		2	5	10	15	30	50	RG178	RG179	120	240	440	600	DIA" x LG"	DIA"	RPM	
56814-950	8	8									X			4.134 x 1.969	2.953	250	41
56871-951	4	4									X			7.165 x 0.787	5.984	250	41
57165-950	5	5									X			2.102 x 1.220	1.652	250	41
57622-950	8	8									X			9.291 x 1.575	7.01	150	41

Slip Ring Capsule (Compact)

Part #	# Rings	Continuous Current (amps)								Coaxial		Standard Operating Voltage (AC)				Size	Bore	Rated Speed	Page #
		2	5	7	10	14	15	30	50	RG178	RG179	120	240	440	600	DIA" x LG"	DIA"	RPM	
SRA-73540-6	6	6										X				.44 x .64		250	43
SRA-73540	12	12										X				.44 x .64		250	43
SRA-73625	18	18										X				.44 x 1.16		250	45
AC6373-6	6	6										X				.5 x .8		100	47
AC6373-12	12	12										X				.5 x 1.07		100	47
SRA-73762-12	12	12											X			.61 x 1.79		250	53
SRA-73762-18	18	18											X			.61 x 1.79		250	53
SRA-73762-24	24	24											X			.61 x 1.79		250	53
SRA-73526	6, 18	X											X			.87 x .57 - 1.11		250	49
SRA-73528	12	X											X			.87 x .76		250	49
SRA-73599	24	X											X			.87 x 1.24		250	49
AC6023-6	6	6											X			.87 x 1.14		250	51
AC6023-12	12	12											X			.87 x 1.41		250	51
AC6023-18	18	18											X			.87 x 1.68		250	51
AC6023-24	24	24											X			.87 x 1.95		250	51
AC6305-6	9	6	3									X				.87 x 1.95		250	60
AC6305-9	12	9	3									X				.87 x 1.95		250	60
AC6305-12	15	12	3									X				.87 x 1.95		250	60
AC6310-3	6	3			3							X				.87 x 1.95		250	60
AC6310-6	9	6			3							X				.87 x 1.95		250	60
SRA-73574	36	36											X			.87 x 2.4		250	55
SRA-73587	28	24			4								X			.87 x 2.4		250	55
AC6355-36	36	36											X			1 x 2.6		250	57
AC6355-36V	32	28	4										X			1 x 2.6		250	57
AC6355-36X	24	20			4								X			1 x 2.6		250	57
AC6355-36C	26	20	4							2			X			1 x 2.6		250	57
AC6355-36K	26	20	4								2		X			1 x 2.6		250	57
AC6355-56	56	56											X			1 x 3.5		250	57
AC6355-56V	52	48	4										X			1 x 3.5		250	57
AC6355-56X	44	40			4								X			1 x 3.5		250	57
AC6355-56C	46	40	4							2			X			1 x 3.5		250	57
AC6355-56K	46	40	4								2		X			1 x 3.5		250	57
AC7356	IP 65 sealed version of AC6355 ** Product Replaced AC7038** Contact factory for details.															1 x 2.97 - 3.87		250	59
AC7036	Up to 80	X	X		X		X			X	X		X	X		3.1 x 3.1 - 6.7		250	64
AC7212		X	X		X					X	X		X	X	X	3.9 x 3.11 - 5.92		250	66
AC7094-130	30		30										X			2.17 x 6.00		250	62
AC7094-136	36		36										X			2.17 x 6.55		250	62
AC7094-142	42		42										X			2.17 x 7.11		250	62
AC7094-148	48		48										X			2.17 x 7.67		250	62

Continued on next page

REVISED 03/17

Commercial Slip Ring Specification Matrix

Slip Ring Capsule (Compact)

Part #	# Rings	Continuous Current (amps)								Coaxial		Standard Operating Voltage (AC)				Size	Bore	Rated Speed	Page #
		2	5	7	10	14	15	30	50	RG178	RG179	120	240	440	600	DIA" x LG"	DIA"	RPM	
80050-957 / 1028300-2	2			2									X			1.248 x 2.54		400	68
80050-958 / 1028300-4	4	2		2									X			1.248 x 2.54		400	68
80050-956	2					2							X			1.248 x 2.54		400	68
80050-955	4	2				2							X			1.248 x 2.54		400	68
80059-950	8					8							X			1.58 x 3.07		600	68

High Speed Slip Ring Capsules

Part #	# Rings	Continuous Current (amps)								Coaxial		Standard Operating Voltage (AC)				Size	Bore	Rated Speed	Page #
		1	2	2.5	5	10	15	30	50	RG178	RG179	120	240	440	600	DIA" x LG"	DIA"	RPM	
EC4294	2	X										X				1.2 x .68		10,000	96
EC3848-6	6	X										X				1.2 x .98		10,000	96
EC4199	8	X										X				1.2 x .92		10,000	96
EC3848-10	10	X										X				1.2 x 1.2		10,000	96
AC3757	36	X										70V				1.625 x 2.53		6,000	92
80042-950	8		X										50V			1.52 x 2.29		20,000	90
80043-950	12		X										50V			1.52 x 2.79		20,000	90
80038-950	8			X									50V			3.56 x 5.28		12,000	98
80039-950	12			X									50V			3.56 x 5.88		12,000	98
80027-950	24			X									50V			3.56 x 8.64		12,000	98
AC6266	4						X						X			4.25 x 1.97	1.5	2,500	94
AC6231	8						X						X			4.25 x 2.75	1.5	2,500	94

Ethernet and High Definition Video Slip Rings

Part #	Continuous Current (amps)			Coaxial			Ethernet		Size	Bore	Rated Speed	Page #
	2	5	10	RG178	RG179	HD-SDI	100BaseT	1000BaseT (or 2 100BaseT)	DIA" x LG"	DIA"	RPM	
SRA-73806	9						1		.44 x 1.16		250	71
SRA-73799	6							1	.44 x 1.16		250	71
SRA-73805	12						1		.61 x 1.79		250	73
SRA-73798	12							1	.61 x 1.79		250	73
SRA-73810	12					1			.61 x 1.79		250	79
AC7203-6							1		.87 x 1.14		250	75
AC7203-12	6						1		.87 x 1.41		250	75
AC7203-12V		2					1		.87 x 1.41		250	75
AC7203-12G								1	.87 x 1.41		250	75
AC7203-18	12						1		.87 x 1.68		250	75
AC7203-18V	6	2					1		.87 x 1.68		250	75
AC7203-18X	2		2				1		.87 x 1.68		250	75
AC7203-18G	6							1	.87 x 1.68		250	75
AC7203-18GV		2						1	.87 x 1.68		250	75
AC7023-24	18						1		.87 x 1.95		250	75
AC7203-24V	12	2					1		.87 x 1.95		250	75
AC7203-24X	8		2				1		.87 x 1.95		250	75
AC7203-24G	12							1	.87 x 1.95		250	75
AC7203-24GV	6	2						1	.87 x 1.95		250	75

Continued on next page

Commercial Slip Ring Specification Matrix

Ethernet and High Definition Video Slip Rings

Part #	Continuous Current (amps)			Coaxial			Ethernet		Size	Bore	Rated Speed	Page #
	2	5	10	RG178	RG179	HD-SDI	100BaseT	1000BaseT (or 2 100BaseT)	DIA" x LG"	DIA"	RPM	
AC7203-24GX	2		2					1	.87 x 1.95		250	75
AC7203-24GG								2	.87 x 1.95		250	75
AC7188	8					1			.87 x 1.68		250	77
AC7188-18V	2	2				1			.87 x 1.68		250	77
AC7188-24	14					1			.87 x 1.95		250	77
AC7188-24V	8	2				1			.87 x 1.95		250	77
SRA-73811	4					2			.87 x 1.79		250	81
AC7217-C	13			2				1	1.0 x 2.6		250	85
AC7217-H	13					1		1	1.0 x 2.6		250	85
AC7217-N	23							1	1.0 x 2.6		250	85
AC7217-G	10							2	1.0 x 2.6		250	85
AC7217-K	13				2			1	1.0 x 2.6		250	85
AC7217-V	15	4						1	1.0 x 2.6		250	85
AC7217-X	15		2					1	1.0 x 2.6		250	85
AC7195-CC	23			4				1	1.0 x 3.5		250	83
AC7195-CG	20			2				2	1.0 x 3.5		250	83
AC7195-CH	23			2		1		1	1.0 x 3.5		250	83
AC7195-CK	23			2	2			1	1.0 x 3.5		250	83
AC7195-CN	33			2				1	1.0 x 3.5		250	83
AC7195-CV	25	4		2				1	1.0 x 3.5		250	83
AC7195-CX	25		2	2				1	1.0 x 3.5		250	83
AC7195-GG	17							3	1.0 x 3.5		250	83
AC7195-GH	20					1		2	1.0 x 3.5		250	83
AC7195-GK	20				2			2	1.0 x 3.5		250	83
AC7195-GN	30							2	1.0 x 3.5		250	83
AC7195-GV	22	4						2	1.0 x 3.5		250	83
AC7195-GX	22		2					2	1.0 x 3.5		250	83
AC7195-HH	23					2		1	1.0 x 3.5		250	83
AC7195-HK	23				2	1		1	1.0 x 3.5		250	83
AC7195-HN	33					1		1	1.0 x 3.5		250	83
AC7195-HV	25	4				1		1	1.0 x 3.5		250	83
AC7195-HX	25		2			1		1	1.0 x 3.5		250	83
AC7195-KK	23				4			1	1.0 x 3.5		250	83
AC7195-KN	33				2			1	1.0 x 3.5		250	83
AC7195-KX	25		2		2			1	1.0 x 3.5		250	83
AC7195-NN	43							1	1.0 x 3.5		250	83
AC7195-NV	35	4						1	1.0 x 3.5		250	83
AC7195-NX	35		2					1	1.0 x 3.5		250	83
AC7195-VV	27	8						1	1.0 x 3.5		250	83
AC7195-VX	27	4	2					1	1.0 x 3.5		250	83
AC7195-XX	27		4					1	1.0 x 3.5		250	83
SRA-73808	12						1		1.375 x 1.97	.5	250	87
SRA-73801	12							1	1.375 x 1.97	.5	250	87
AC6438		X		X	X		X	X	2.1 x 1.6 - 3.2	.5	250	17
AC4598			X	X	X		X	X	3.9 x 2.13 - 4.94	1.5	250	22
AC6275		X	X	X	X		X	X	6.63 x 6.6 - 20.5	2.75	1000	33
AC6098			X	X	X		X	X	8.0 x 4.6 - 14.4	4.00	250	34

Commercial Slip Ring Products







SRA-73683

1/2 inch through-bore miniature slip ring capsule



Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent or continuous rotation while transferring power and / or data. A slip ring is also called a rotary electrical joint, collector, commutator or swivel. A slip ring can improve system performance by simplifying operations and eliminating damage prone wires.

The SRA-73683 provides an economical, readily available solution when a compact through-bore configuration is required. This unit provides a 1/2 inch through-bore for shaft mounting, a compact 1.375 inch outside diameter and a very short overall length for minimal space applications. The SRA-73683 provides 2 amp circuits in 6, 12, 18 and 24 ring configurations.

Features

- 1/2 inch through-bore
- Compact 1.375 inch outside diameter
- Speeds up to 250 rpm continuous
- Continuous rotation of power and / or data signals
- Ethernet model, SRA-73801, available

Benefits

- Transfers power, as well as analog and digital signals
- Compatible with data bus protocols
- Compact packaging

Typical Applications

- Precision rotary equipment
- Semiconductor handling systems
- Robotics
- Camera systems

Slip Rings With Through-Bores

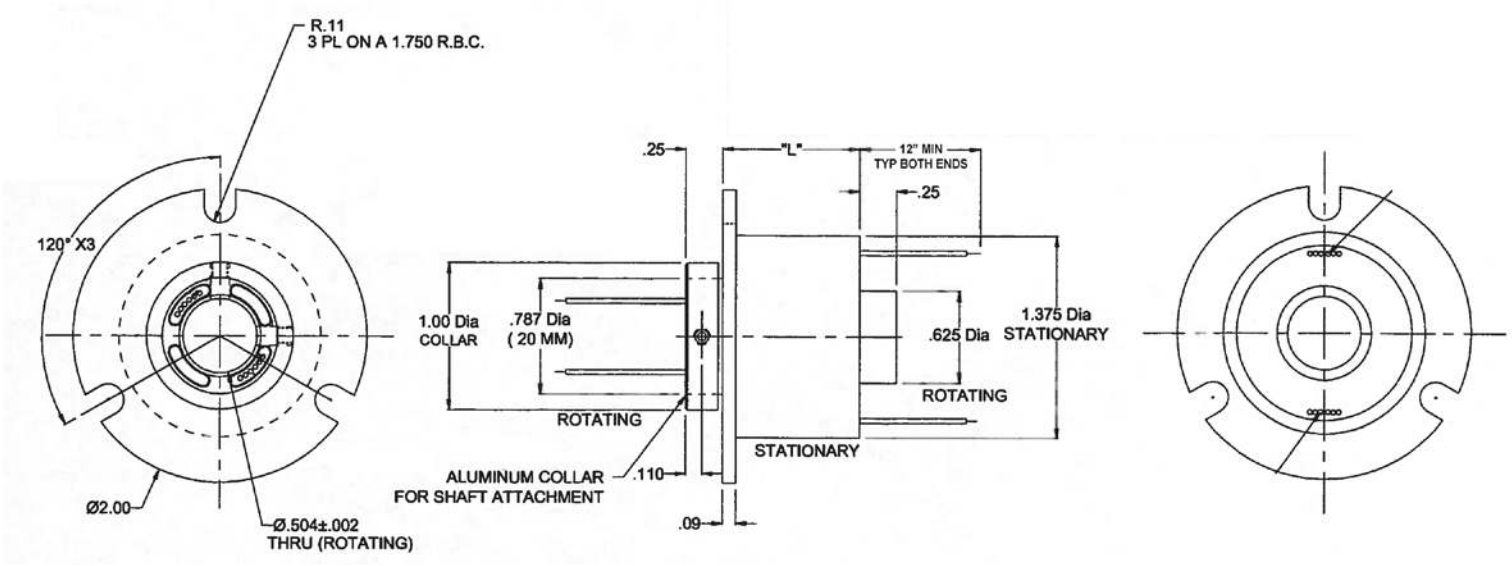
SRA-73683 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12, 18, 24
Lead Length	12, 24, 36 and 48 inches
Lead Size / Type	#26 AWG, Teflon® insulated, stranded
Voltage	210 VAC
Operating Temp.	-40°C to +80°C
Contact Material	Gold
Current Rating	2 A, per ring, max.
Electrical Noise	40 milliohm max.

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Wire Color Code			
Ring #	Color	Ring #	Color
1	BLK	13	WHT-RED
2	BRN	14	WHT-ORN
3	RED	15	WHT-YEL
4	ORN	16	WHT-GRN
5	YEL	17	WHT-BLU
6	GRN	18	WHT-VIO
7	BLU	19	WHT-GRY
8	VIO	20	WHT-BLK-BRN
9	GRY	21	WHT-BLK-RED
10	WHT	22	WHT-BLK-ORN
11	WHT-BLK	23	WHT-BLK-YEL
12	WHT-BRN	24	WHT-BLK-GRN

Part Number	Length "L"	Ring Qty.
SRA-73683-6	.82 inch (20,83 mm)	6
SRA-73683-12	1.12 inch (28,45 mm)	12
SRA-73683-18	1.42 inch (36,07 mm)	18
SRA-73683-24	1.72 inch (43,69 mm)	24

SRA-73683 Dimensions



Dimensions in inches

AC6438

1/2 inch through-bore miniature slip ring capsule

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent or continuous rotation while transferring power and / or data. A slip ring is also called a rotary electrical joint, collector, commutator or swivel. A slip ring can improve system performance by simplifying operations and eliminating damage prone wires.

The AC6438 provides an economical, readily available solution when a compact through-bore configuration is required. This unit provides a 1/2 inch through-bore for routing of hydraulic or pneumatic lines, and a compact 2.1 inch outside diameter and a very short overall length for minimal space applications. The AC6438 provides 5 amp circuits in 6, 12, 18 and 24 ring configurations. Similar in design to our very popular AC4598 and AC6200 series, this design features long life, fiber brush contact technology for ultimate performance in many challenging applications.

Features

- 1/2 inch through-bore
- Compact 2.1 inch outside diameter
- Speeds up to 250 rpm
- Multiple circuit configurations
- Continuous rotation of power and / or data signals
- High-impact thermoplastic construction
- Gold plated rings
- Available with Ethernet

Benefits

- Transfers power, as well as analog and digital signals
- Compatible with data bus protocols
- Fiber brush technology provides long life and maintenance free operation
- Compact packaging



Typical Applications

- Precision rotary equipment
- Semiconductor handling systems
- Industrial machinery
- Robotics

Slip Rings With Through-Bores

AC6438 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12, 18 or 24
Lead Length	12 inch standard
Lead Size / Type	22 AWG
Voltage	240 VAC
Operating Temp.	-40°C to +80°C
Current Rating	5 amps / circuit
Electrical Noise	100 milliohms max.

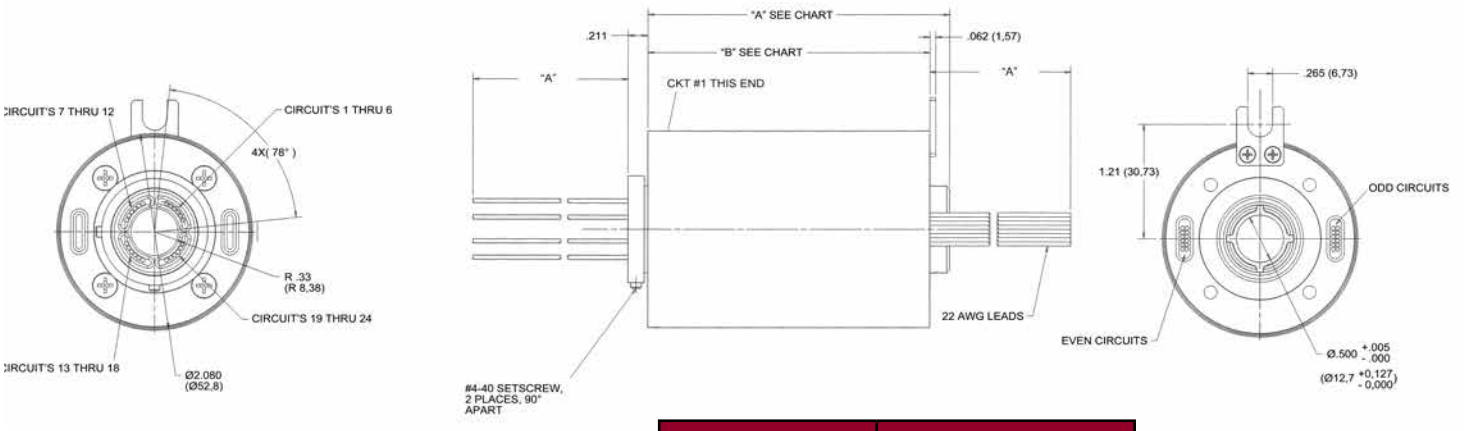
Options
• 24, 36 and 48 inch leads • Alternate lead exits • Available with Ethernet, contact factory

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Wire Color Code					
Ring #	Color	Ring #	Color	Ring #	Color
1	BLK	9	GRY	17	WHT / BLU
2	BRN	10	WHT	18	WHT / VIO
3	RED	11	WHT / BLK	19	WHT / GRY
4	ORN	12	WHT / BRN	20	WHT / BLK / BRN
5	YEL	13	WHT / RED	21	WHT / BLK / RED
6	GRN	14	WHT / ORN	22	WHT / BLK / ORN
7	BLU	15	WHT / YEL	23	WHT / BLK / YEL
8	VIO	16	WHT / GRN	24	WHT / BLK / GRN

Part Number	AC6438-106	AC6438-112	AC6438-118	AC6438-124
Dimension "A"	1.55 inch (39,37 mm)	2.11 inch (53,60 mm)	2.67 inch (67,81 mm)	3.23 inch (82,04 mm)
Dimension "B"	1.33 inch (33,78 mm)	1.89 inch (48,01 mm)	2.44 inch (61,98 mm)	3.00 inch (76,20 mm)

AC6438 Dimensions



Dimensions in inches (millimeters)

Part Number	"A"
AC6438	12 in (304.8 mm)
AC6438-A	24 in (609.6 mm)
AC6438-B	36 in (914.4 mm)
AC6438-C	48 in (1219.2 mm)

AC6349

1 inch through-bore various circuit configurations

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data.

The AC6349 provides an economical, readily available solution when a compact through-bore configuration is required. This unit provides a 1 inch through-bore for routing hydraulic or pneumatic lines and a compact 3.1 inch outside diameter for minimal space applications. The 15 amp circuits are available in 6, 12, 18 and 24 ring configurations in 4 housing lengths. Similar in design to our very popular AC4598, this design features long life, fiber brush contact technology for ultimate performance in many challenging applications. Fiber brushes do not require lubrication and produce virtually no wear debris, for maintenance free operation.

Features

- 1 inch bore
- 6, 12, 18 and 24 circuit models
- Precious metal contacts
- 15 amp rings
- Precision ball bearings for long life
- Speeds up to 250 rpm
- Compact size
- Sealed units available
- Flying leads
- Fully compatible with both analog and TTL control level signals
- Rugged black anodized aluminum construction
- Available with Ethernet

Benefits

- Unique signal handling performance with minimal electrical circuit noise
- Tight packaging to fit in the most demanding space constraints
- Low torque to minimize system torque budget
- Rapid delivery



Typical Applications

- Packaging / wrapping machinery
- Semiconductor handling systems
- Industrial machinery
- Robotics

Slip Rings With Through-Bores

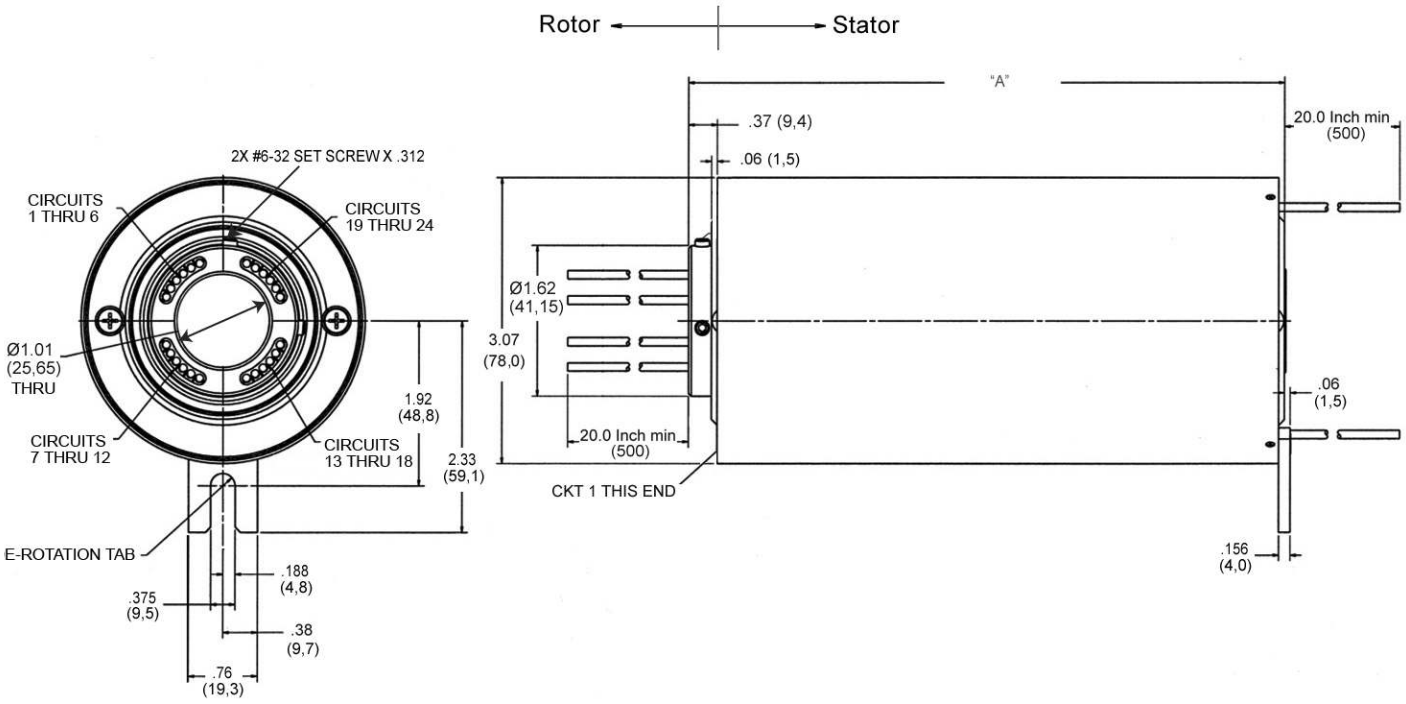
AC6349 Specifications		Options
Operating Speed	250 rpm*	• Steel bearings • Gold - plated rings • Seals • Long leads • Available with Ethernet, contact factory • IP 65 rated slip ring available (P/N AC6875)
Number of Circuits	6, 12, 18, or 24	
Lead Length	20 inch standard	
Lead Size / Type	14 gauge, white with tags	
Voltage	440 VAC	
Operating Temp.	-40°C to +80°C	
Contact Material	Silver	
Current Rating	15 amps / circuits	
Electrical Noise	60 milliohms max.	
Environmental	Splash and dust seal optional	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	Length "A"
AC6349 - 6	2.9 inch (73,7 mm)
AC6349 - 12	4.1 inch (104,1 mm)
AC6349 - 18	5.3 inch (149,7 mm)
AC6349 - 24	6.5 inch (165,1 mm)

Standard units are not sealed.

AC6349 Dimensions



Dimensions in inches (millimeters)

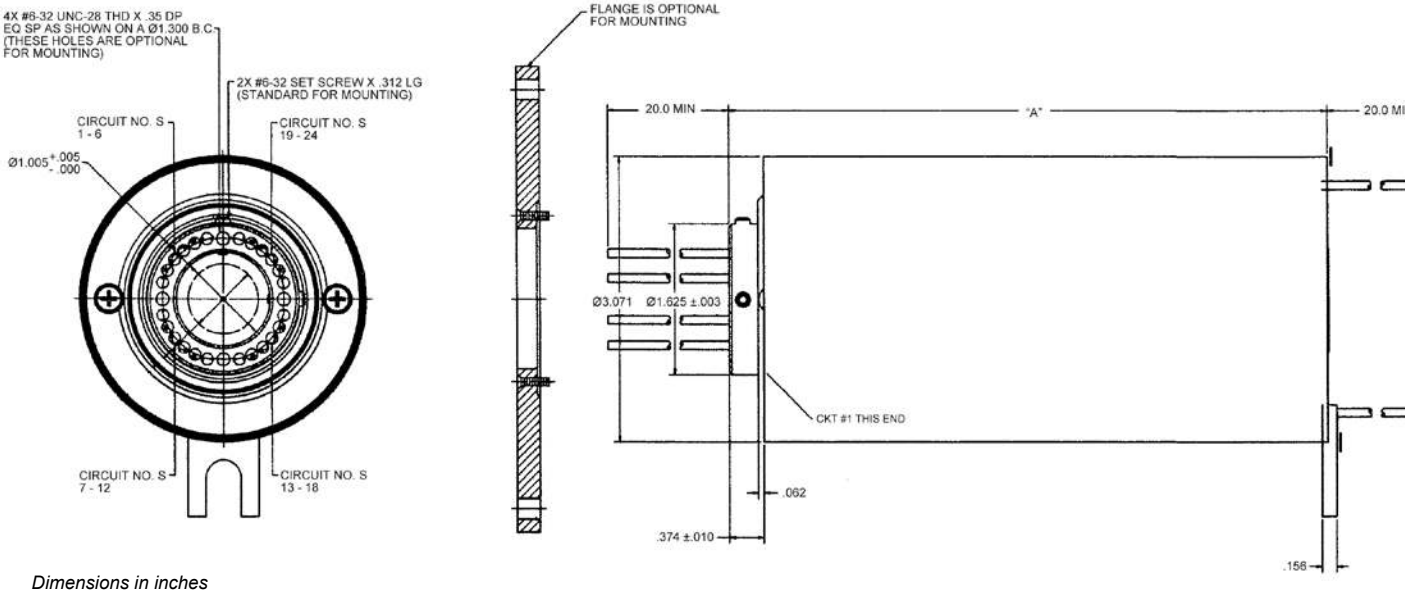
AC6875 Specifications (IP 65 Sealed Version of AC6349)		Options
Operating Speed	250 rpm*	• Steel bearings • Gold - plated rings • Seals • Long leads
Number of Circuits	6, 12, 18, or 24	
Lead Length	20 inch standard	
Lead Size / Type	14 gauge, white with tags	
Voltage	440 VAC	
Operating Temp.	-40°C to +80°C	
Contact Material	Silver	
Current Rating	15 amps / circuits	
Electrical Noise	60 milliohms max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	Length "A"
AC6875-6	2.9 inch (73,7 mm)
AC6875-12	4.1 inch (104,1 mm)
AC6875-18	5.3 inch (149,7 mm)
AC6875-24	6.5 inch (165,1 mm)

Standard units are not sealed.

AC6875 Dimensions



Dimensions in inches

AC4598

10 amp per circuit 1-1/2 inch through-bore

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, collector, swivel, or a rotary joint. A slip ring can improve system performance by simplifying operations and eliminating damage-prone wires dangling from movable joints.

The 1-1/2 inch through-bore provides routing space for hydraulics, pneumatics or for a concentric shaft mount.

The AC4598 uses our unique fiber brush technology which offers several advantages over conventional slip ring contacts, including multiple points of contact per brush bundle, low noise, electrical and low contact wear rates. In addition, fiber brushes do not require lubrication and produce virtually no wear debris.

Features

- 1-1/2 inch through-bore
- Speeds up to 250 rpm
- 6, 12, 18 or 24 ten amp circuits
- 16 gauge, 12 inch lead wire - longer lead lengths are available
- Higher rotational speeds with alternate bearings (optional)
- Various axial and radial lead exits are available
- Splash seals for dust and moisture resistance
- Standard collar mounting - flange mounting optional
- Also available with 12, 24, 36 and 48, 2 amp rings or power and signal combinations. Please refer to AC6200 data sheet
- Available with Ethernet

Benefits

- Transfers analog and digital signals
- Compatible with data bus protocols
- Fiber brush technology provides long life and maintenance-free operation (no lubrication required)
- Continuous 360° rotation of power or data signals



Typical Applications

- Industrial machinery - machining centers, rotary index tables, heavy equipment turrets or cable reels, test equipment, packaging machines, palletizing machines, magnetic clutches, process control equipment, rotary sensors, emergency lighting, robotics
- Exhibit / display equipment
- Medical equipment

AC4598 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12, 18 or 24
Lead Wire	16 gauge, 12 inches (300 mm)
Voltage	600 VAC
Operating Temp.	-40°C to 80°C
Current Rating	10 amp circuits
Noise	100 milliohms max.

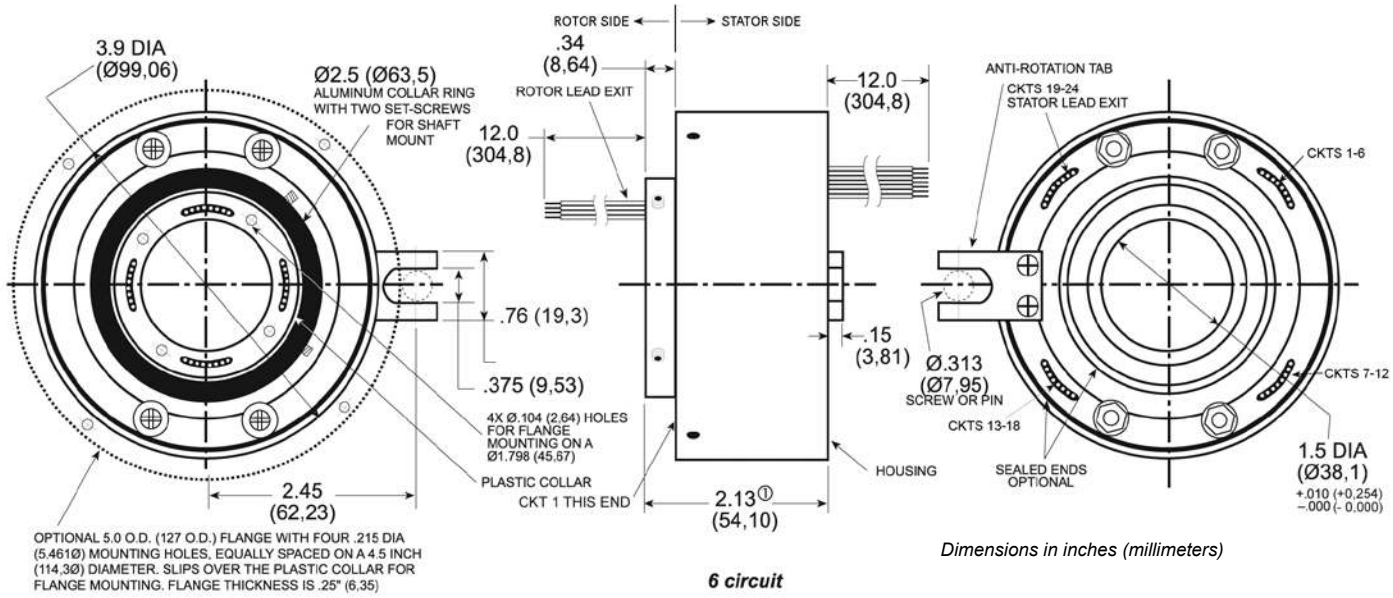
Options

- 5 inch (127 mm) O.D. flange with 4 mounting holes
- Splash seals for dust and moisture resistance
- Various axial and radial lead exits are available
- Longer lead lengths are available
- Higher rotational speeds with alternate bearings
- Higher current and voltage capacity per circuit
- Signal and power circuit combination
- IP 65 rated slip ring available (P/N AC6419)
- Available with Ethernet, contact factory

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

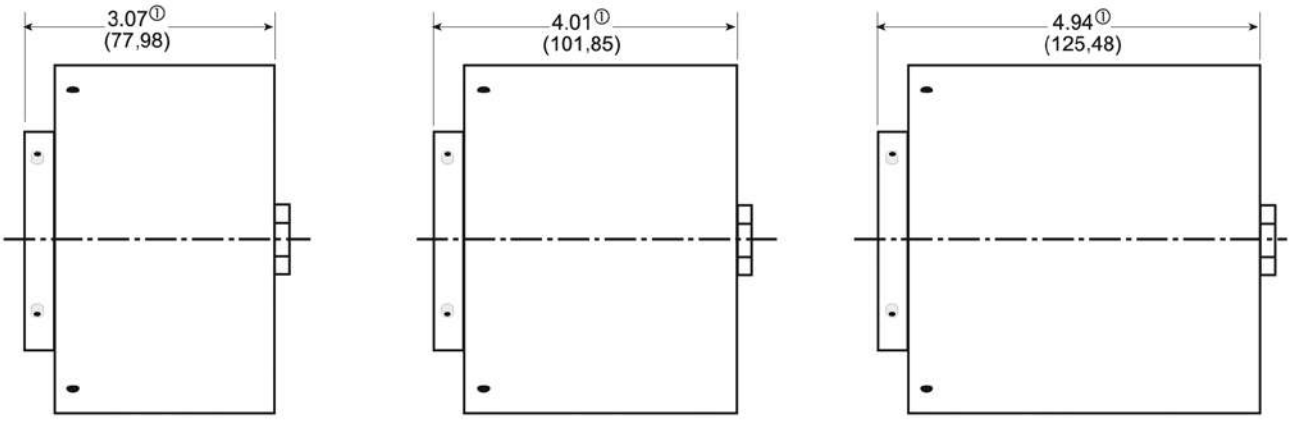
Lead Wire Color Code

Ring #	Color	Ring #	Color	Ring #	Color	Ring #	Color	Ring #	Color	Ring #	Color
1	Blk	5	Yel	9	Gry	13	Wht-Red	17	Wht-Blu	21	Wht-Blk-Red
2	Brn	6	Grn	10	Wht	14	Wht-Orn	18	Wht-Vio	22	Wht-Blk-Orn
3	Red	7	Blu	11	Wht-Blk	15	Wht-Yel	19	Wht-Gry	23	Wht-Blk-Yel
4.	Orn	8	Vio	12	Wht-Brn	16	Wht-Grn	20	Wht-Blk-Brn	24	Wht-Blk-Grn



Dimensions in inches (millimeters)

6 circuit



12 circuit ***18 circuit*** ***24 circuit***

Notes:

1. Drawings not actual size, measurements are in inches (millimeters)
2. Rotor and stator leads exit 4 places, 90° apart, 6 leads per exit relative to circuit count
3. ① = *Flange mounted, add .21 (5,3) for flange, no collar ring*

AC6200

1-1/2 inch through-bore 12, 24, 36 and 48 circuit versions

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, collector, swivel or a rotary joint. A slip ring can improve system performance by simplifying operations and eliminating damage-prone wires dangling from movable joints.

The 1-1/2 inch unobstructed through-bore provides routing space for hydraulics, pneumatics or for a concentric shaft mount.

The AC6200 uses fiber brush technology which offers several advantages over conventional slip ring contacts including multiple points of contact per brush bundle and low contact wear rates. In addition, fiber brushes do not require lubrication and produce virtually no wear debris, for maintenance free, life time operation.

Features

- 1-1/2 inch through-bore
- Speeds up to 250 rpm
- 12, 24, 36 and 48 circuit versions with 2 amp / 220 VAC contacts
- Power and signal (10 and 2 amp) circuits may be combined
- Shaft, brush block and cover are molded of high-impact thermoplastic
- Optional steel bearing and splash seals for harsh environments (special order)
- Collar mounting is standard; flange mounting optional
- 26 gauge color coded, 12” lead wires
- Continuous 360° rotation of power or data signals
- Also available with 6, 12 and 18, 10 amp / 600 VAC rings. Please refer to AC4598 data sheet
- Silver plated rings, silver alloy brushes
- Available with Ethernet

Benefits

- Transfers control and data signals
- Fiber brush technology provides maintenance-free operation (no lubrication required)
- Modular design meets special requirements through off-the-shelf manufacturing techniques
- Compact packaging



Typical Applications

- Industrial machinery – machining centers, rotary index tables, heavy equipment turrets or cable reels, test equipment, packaging and palletizing machines, magnetic clutches, process equipment, rotary sensor, emergency lighting, robotics
- Exhibit / display equipment
- Medical equipment

AC6200 Specifications	
Operating Speed	250 rpm*
Number of Circuits	12, 24, 36, 48
Lead Wire	26 gauge, 12 inches, 12 colors
Voltage	220 VAC
Operating Temp.	-40°C to 80°C
Current Rating	2 amps / circuits
Noise	100 milliohms max.

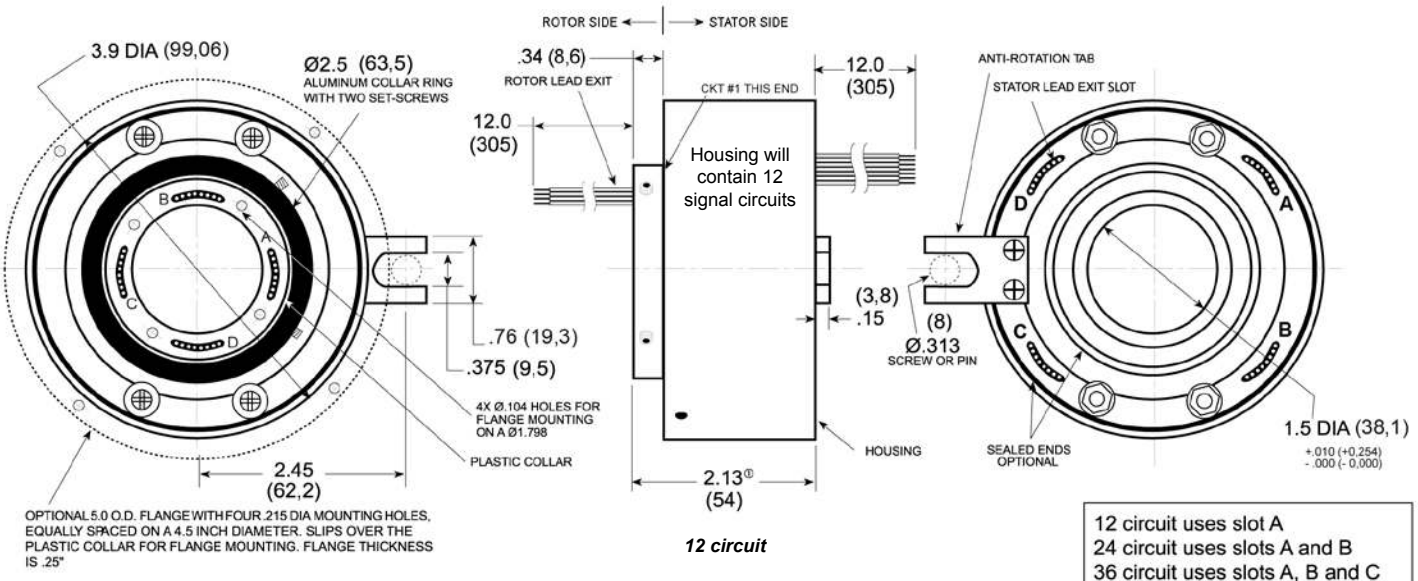
Options

- 5 inch O.D. flange with 4 mounting holes
- Splash seals for dust and moisture resistance
- Various axial and radial lead exits are available
- Signal and power circuit combination for
- 10 A / 600 VAC applications
- Gold plated rings
- IP 65 rated enclosure available (P/N AC6419)
- Available with Ethernet, contact factory

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Lead Wire Color Code

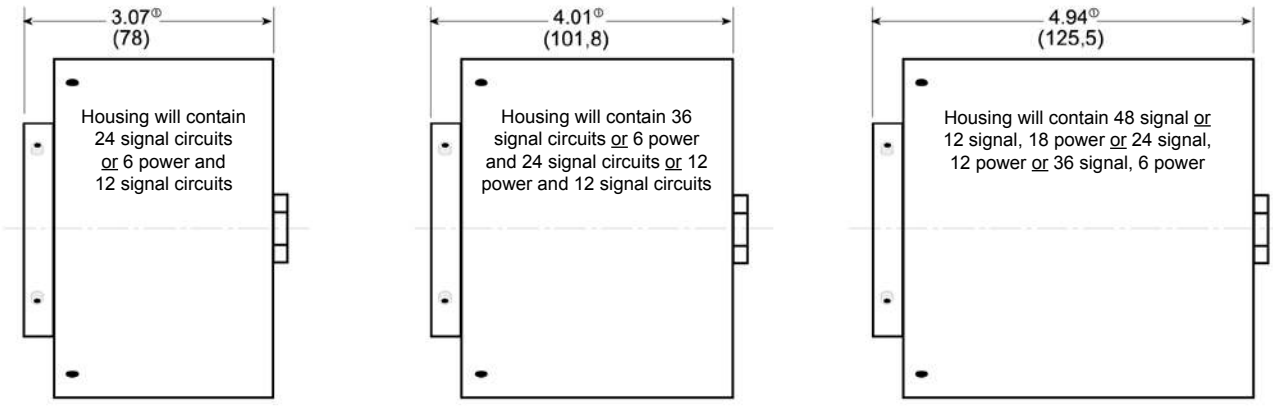
A			B			C			D		
1. Blk	5. Yel	9. Gry	13. Blk	17. Yel	21. Gry	25. Blk	29. Yel	33. Gry	37. Blk	41. Yel	45. Gry
2. Brn	6. Grn	10. Wht	14. Brn	18. Grn	22. Wht	26. Brn	30. Grn	34. Wht	38. Brn	42. Grn	46. Wht
3. Red	7. Blu	11. Wht-Blk	15. Red	19. Blu	23. Wht-Blk	27. Red	31. Blu	35. Wht-Blk	39. Red	43. Blu	47. Wht-Blk
4. Orn	8. Vio	12. Wht-Brn	16. Orn	20. Vio	24. Wht-Brn	28. Orn	32. Vio	36. Wht-Brn	40. Orn	44. Vio	48. Wht-Brn



12 circuit

Dimensions in inches (millimeters)

12 circuit uses slot A
24 circuit uses slots A and B
36 circuit uses slots A, B and C
48 circuit uses slots A, B, C and D



24 circuit *36 circuit* *48 circuit*

Notes:

1. Drawings not actual size, dimensions are in inches (millimeters)
2. Rotor and stator leads exit 4 places, 90° apart, 12 leads per exit relative to circuit count
3. ① = *Flange mounted, add .21 (5,3) for flange*

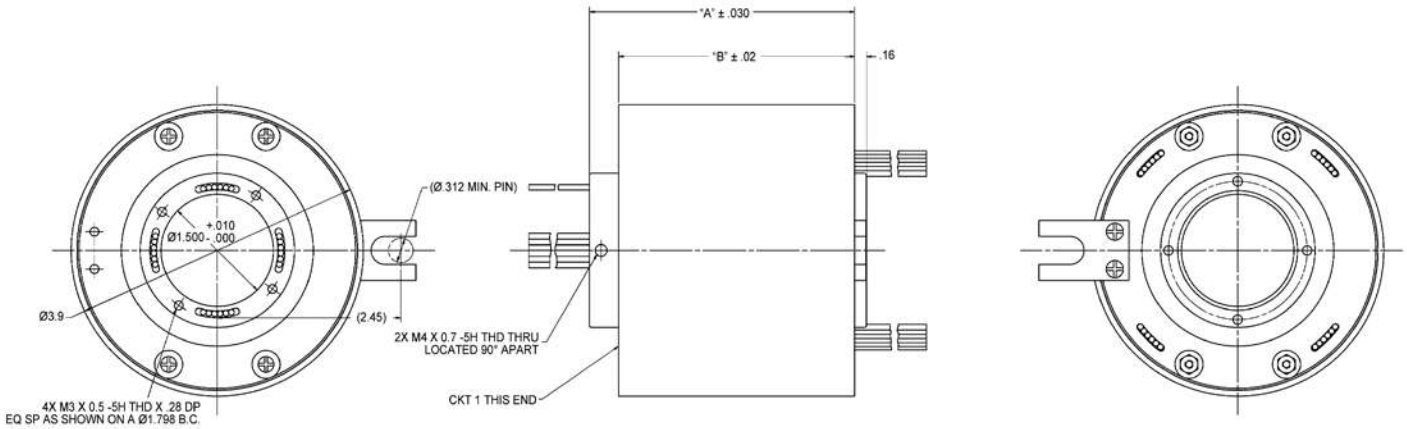
Slip Rings With Through-Bores

AC6419 Specifications (IP 65 Sealed Version of AC4598 and AC6200)		Options
Operating Speed	250 rpm*	• 5 inch (127 mm) O.D. flange with 4 mounting holes • Various axial and radial lead exits are available • Longer lead lengths are available • Higher rotational speeds with alternate bearings • Higher current and voltage capacity per circuit • Signal and power circuit combination
Number of Circuits	Refer to AC4598 and AC6200 data sheets	
Lead Wire	16 gauge power, 26 gauge signal 12 inches (300 mm)	
Voltage	600 VAC (10 amp rings) / 220 VAC (2 amp rings)	
Operating Temp.	-40°C to 80°C	
Current Rating	10 amp circuits	
Noise	100 milliohms max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	"A"	"B"
AC6419-6	2.602 inch (66.090 mm)	2.214 inch (56.235 mm)
AC6419-12	3.538 inch (89.865 mm)	3.150 inch (80.01 mm)
AC6419-18	4.474 inch (113.639 mm)	4.086 inch (103.784 mm)
AC6419-24	5.410 inch (137.414 mm)	5.022 inch (127.558 mm)

AC6419 Dimensions



Refer to AC4598 / AC6200 for lead exits

Dimensions in inches

AC6815

1-1/2 inch through-bore 2 A, 3.5 A, 10 A and high speed data

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, collector, swivel or a rotary joint. A slip ring can improve system performance by simplifying operations and eliminating damage-prone wires dangling from movable joints.

The 1-1/2 inch unobstructed through-bore provides routing space for hydraulics, pneumatics or for a concentric shaft mount.

The AC6815 is designed for error free data communication transmission. Using patented “broadband” slip ring technology, this slip ring is pre-engineered to carry a wide variety of data formats. For example, the AC6815 can handle Ethernet channels of 10, 100 and 1000BaseT. The precious metal contacts are maintenance free and provide long life and are part of the error-free data communication link.

Features

- 1-1/2 inch through-bore
- Speeds up to 250 rpm
- Power and signal (2, 3.5 and 10 amp) circuits may be combined
- Collar mounting is standard; flange mounting with connectorized unit
- 16, 24 and 26 gauge, 24” lead wires
- Continuous 360° rotation of power or data signals
- Gold alloy bifurcated brushes, gold plated rings
- Prewired for high speed data transmission

Benefits

- Transfers control and data signals
- Bifurcated gold alloy brush technology provides maintenance-free operation (no lubrication required)
- Modular design meets special requirements through off-the-shelf manufacturing techniques
- Compact packaging
- Increased circuit density
- Transmit high speed data
  - Ethernet (10 / 100 / 1000BaseT)



Typical Applications

- Industrial machinery – machining centers, rotary index tables, heavy equipment turrets or cable reels, test equipment, packaging and palletizing machines, magnetic clutches, process equipment, rotary sensor, emergency lighting, robotics
- Exhibit / display equipment
- Medical equipment

Slip Rings With Through-Bores

AC6815 Specifications	
Operating Speed	250 rpm*
Number of Circuits	See chart below
Lead Wire	16, 24 and 26 gauge, 24 inches
Current / Voltage	2 A / 60 VAC, 3.5 A / 110 VAC and 10 A / 220 VAC
Operating Temp.	-40°C to +80°C max.
Noise	60 milliohms max.

Options

- Various axial and radial lead exits are available
- Up to 48 inch flying leads from rotor and / or stator
- Signal and power circuit combination for 2, 3.5 and 10 amp applications

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

AC6815 Part Numbering System

AC6815 - □□□□□□□□□□ - □□ 50 - □□□ - □□

#1 #2 #3 #4 #5 #6 #7 #8 #9 #10

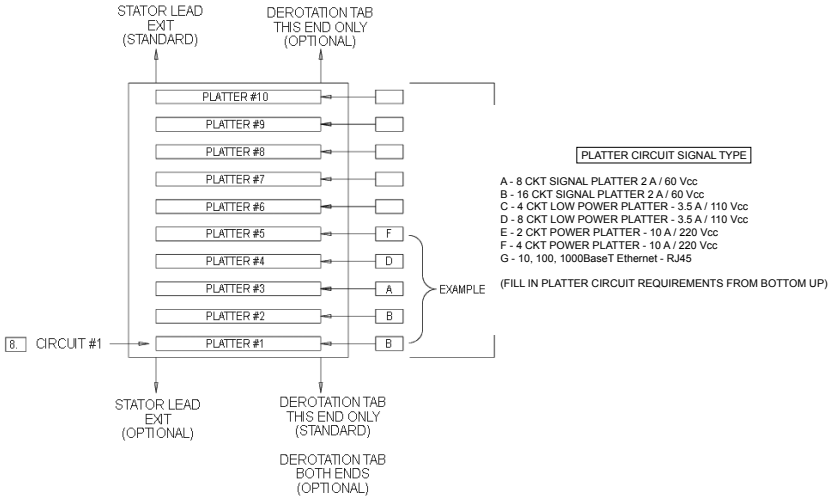
PLATTER CIRCUIT SIGNAL TYPE
(From chart below)

STATOR LEAD EXITING
S - Standard
O - Optional

DE-ROTATION TAB
S - Standard
O - Optional
B- Both

LEAD LENGTH (Inches)
024 = 24.0 (Standard)

CUSTOM MODIFICATION
(00-Standard)



PLATTER CIRCUIT SIGNAL TYPE

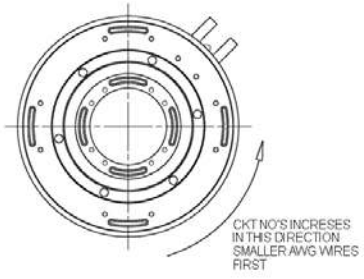
A - 8 CKT SIGNAL PLATTER 2 A / 60 Vcc
B - 16 CKT SIGNAL PLATTER 2 A / 60 Vcc
C - 4 CKT LOW POWER PLATTER - 3.5 A / 110 Vcc
D - 8 CKT LOW POWER PLATTER - 3.5 A / 110 Vcc
E - 2 CKT POWER PLATTER - 10 A / 220 Vcc
F - 4 CKT POWER PLATTER - 10 A / 220 Vcc
G - 10, 100, 1000BaseT Ethernet - RJ45

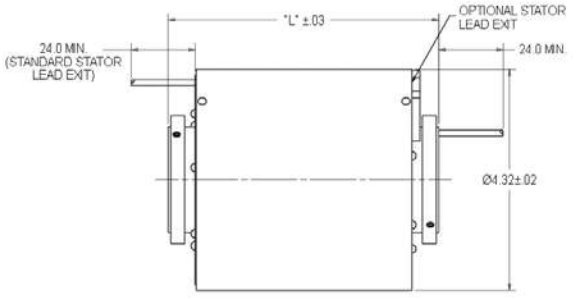
(FILL IN PLATTER CIRCUIT REQUIREMENTS FROM BOTTOM UP)

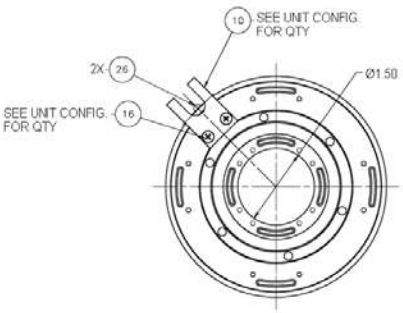
# of Platters	Flying Leads "L"
1	3.01
2	3.34
3	3.66
4	3.99
5	4.32
6	4.64
7	4.97
8	5.29
9	5.62
10	5.95

Note: Platters 1 thru 8 are standard, 9 and 10 are options.

AC6815 Dimensions







Dimensions in inches

AC6428

1-3/8 inch through-bore in 60, 72, 84 and 96, 2 amp circuit versions

AC6429

1-3/8 inch through-bore in 48, 2 amp circuits and 6 or 12, 10 amp circuits

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data. A slip ring is also called a rotary electrical joint, collector, commutator, or swivel. A slip ring can improve system performance by simplifying operations and eliminating damage prone wires.

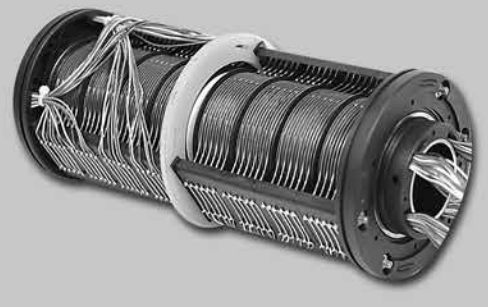
The AC6428 and AC6429 provide an economical, readily available solution when a compact, through bore configuration is required. This unit provides a 1-3/8 inch through bore for routing of hydraulic or pneumatic lines, and a compact 3.9 inch outside diameter for minimal space applications. The AC6428 provides 2 amp circuits in 60, 72, 84 and 96 ring configurations. The AC6429 provides 48, 2 amp rings coupled with either 6 or 12, 10 amp circuits. Similar in design to our very popular AC4598 and AC6200 series, this design features long life, fiber brush contact technology for ultimate performance in many challenging applications.

Features

- 1-3/8 inch through-bore
- Speeds up to 250 rpm
- Multiple circuit configurations
- Continuous rotation of power and / or data signals
- High-impact thermoplastic construction
- Sealed to exclude dust and light fluid splash
- Available with Ethernet

Benefits

- Transfers power, as well as analog and digital signals
- Compatible with data bus protocols
- Fiber brush technology provides long life and maintenance free operation
- Compact packaging



Typical Applications

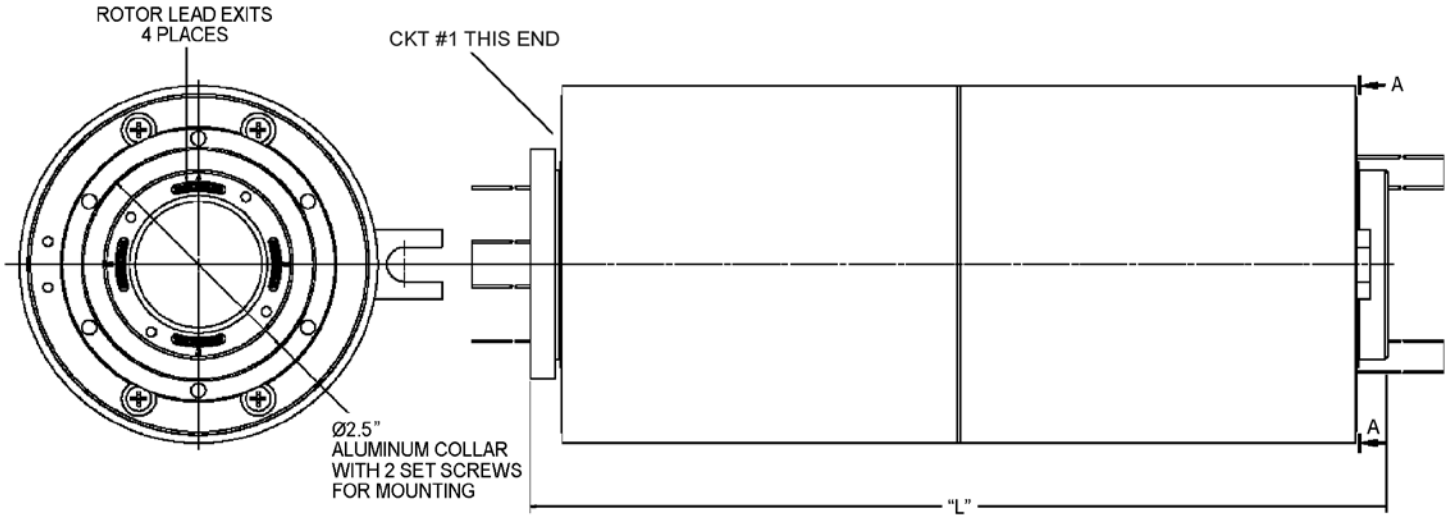
- Precision rotary equipment
- Semiconductor handling systems
- Industrial machinery
- Robotics

Slip Rings With Through-Bores

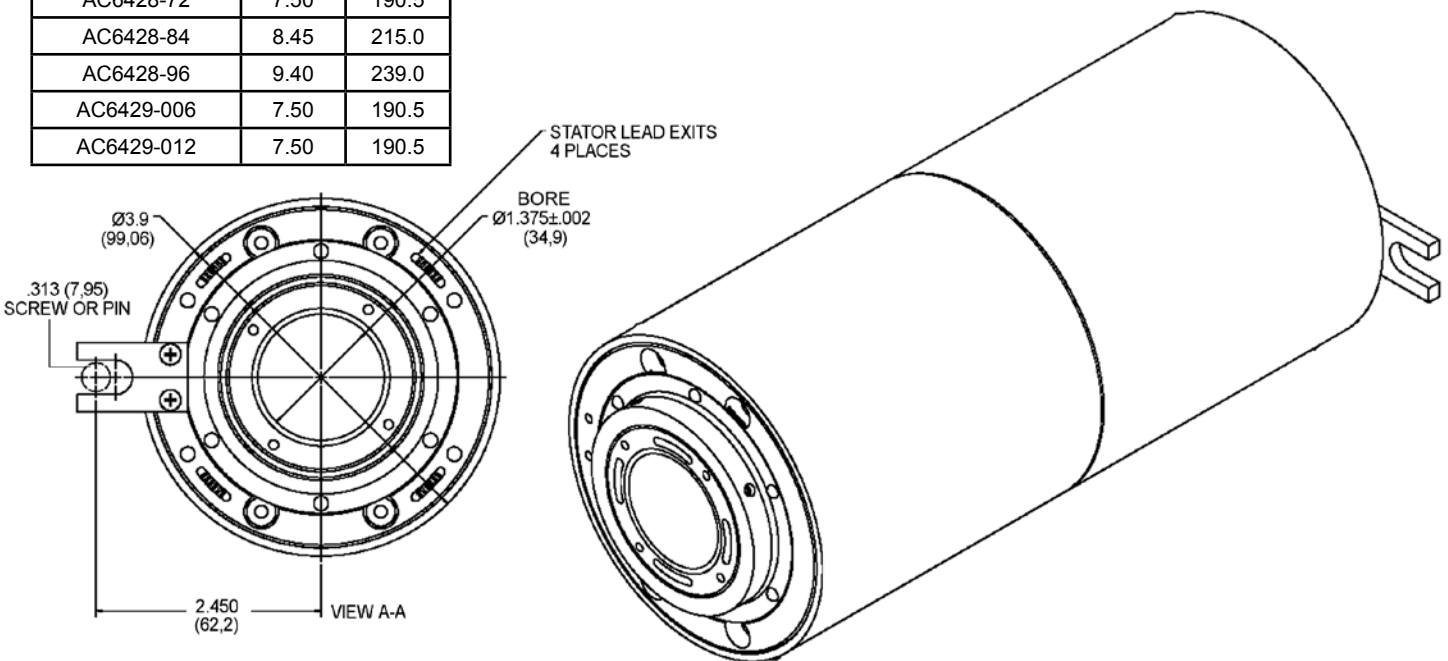
Specifications	AC6428	AC6429
Operating Speed	250 rpm*	250 rpm*
Number of Circuits	60, 72, 84, 96	48 @ 2 amp PLUS 6 or 12 @ 10 amp
Lead Lengths	40 inches (1000 mm)	40 inches (1000 mm)
Voltage	220 VAC	220 VAC, 2 amp; 600 VAC 10 amp
Current Ratings	2 amps / circuits	2 amp and 10 amp / circuits
Lead Size / Type	26 AWG	26 AWG, 2 amp circuits 16 AWG, 10 amp circuits
Operating Temp.	-40°C to +80°C max.	-40°C to +80°C max.
Noise	100 milliohms max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Optional Gold Plated Rings Available



Part Number	"L"	
	in.	mm.
AC6428-60	6.60	167.7
AC6428-72	7.50	190.5
AC6428-84	8.45	215.0
AC6428-96	9.40	239.0
AC6429-006	7.50	190.5
AC6429-012	7.50	190.5



Dimensions in inches (millimeters)

AC6275

2-3/4 inch through-bore

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, collector, swivel or a commutator. A slip ring can improve system performance by simplifying operations and eliminating damage-prone wires dangling from movable joints.

The 2-3/4 inch unobstructed through-bore provides routing space for hydraulics, pneumatics or for a concentric shaft mount.

The AC6275 uses our fiber brush technology which offers several advantages over conventional slip ring contacts including multiple points of contact per brush bundle, low contact force per fiber and low contact wear rates. In addition, fiber brushes do not require lubrication and produce virtually no wear debris. The AC6275 features field serviceable brush blocks.

Features

- 2-3/4 inch through-bore
- Compact 6.63 inch outside diameter
- Modular design - a single module can have: one 50 amp ring; two 30 amp rings; one, two or three 10 amp rings or six 5 amp signal rings
- Up to 24-50 amp circuits, 48-30 amp circuits, 72-10 amp rings or 144-5 amp rings in a 24 module length, or combinations of all four in a single housing
- Speeds up to 1,000 rpm
- Steel bearings and machined shaft and housing for harsh environments
- Collar mounting is standard; flange mounting is optional
- Various lead exits are available
- Silver plated rings are standard. Gold plated, optional.
- 20, 16, 10 and 8 gauge lead wire
- Continuous 360° rotation of power or data signals
- Splash seals for dust and moisture resistance
- Available as slip ring / brush block separates
- Available with Ethernet

Benefits

- Transfers control and data signals
- Fiber brush technology provides maintenance-free operation (no lubrication required)
- Modular design meets special requirements through off-the-shelf manufacturing techniques
- Customized configurations for your application



Typical Applications

- Industrial machinery – machining centers, rotary index tables, heavy equipment turrets or cable reels, test equipment, packaging and palletizing machines, magnetic clutches, process equipment, rotary sensors, emergency lighting, robotics
- Exhibit / display equipment
- Medical equipment

Slip Rings With Through-Bores

AC6275 Specifications	
Operating Speed	1,000 rpm*
Number of Circuits	Various configurations
Lead Lengths	12 inch (304 mm) min. from point of exit
Lead Size	Signal circuits: #20 AWG, 5 amps #16 AWG, 10 amps Power circuits: #10 AWG, 30 amps #8 AWG, 50 amps
Lead (Colors)	All white with tags
Voltage	250 VAC for 5 A 600 VAC for 10 A, 30 A and 50 A
Operating Temp.	-40°C to +80°C
Contact Material	Precious metal
Current Rating	5, 10, 30 and 50 amps
Noise	100 milliohms, max.

Options

- Longer lead lengths available
- Power and signal combinations
- Rotor and stator lead exits
- Gold plated rings
- Seamed housing standard, solid housing optional
- IP65 sealing (P/N AC6793)

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	# of Circuits	Capsule Length (L)	# of Modules
AC6275–6	6 power ckts max. or 36 signal ckts max.	6.6 inch	6
AC6275–12	12 power ckts max. or 72 signal ckts max.	11.2 inch	12
AC6275–18	18 power ckts max. or 108 signal ckts max.	15.7 inch	18
AC6275–24	24 power ckts max. or 144 signal ckts max.	20.5 inch	24

The AC6275 commercial slip ring provides configuration flexibility to meet your application needs. This product can be configured as required, with 5 amp signal, 10 amp rings, 30 amp rings and 50 amp rings.

Four set lengths are available, based on the number of modules that are required. These lengths are provided in the capsule length chart above. Each module has either 1-50 amp ring or 2-30 amp rings. For 10 amp rings, there are 1 to 3 rings per module. For 5 amp rings, there are 6 per module. Blank spacer modules are available for greater separation of power and signal circuits.

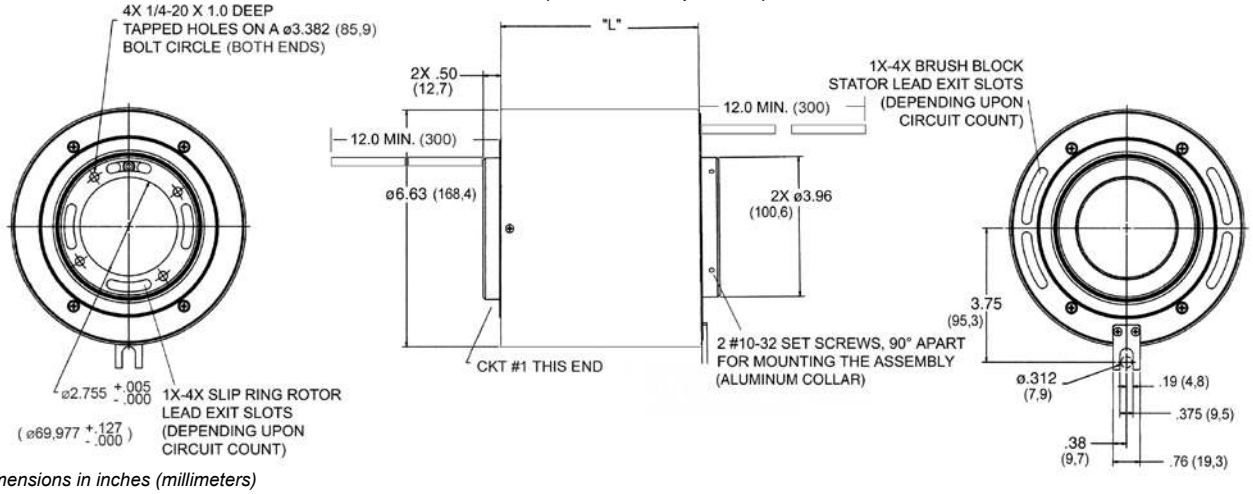
1) Define the number of signal / 5 amp rings and round up to the closest multiple of 6. Divide by 6 for number of 6 ring modules.
2) Define the number of 10 amp rings and round up to the closest multiple of 3 (e.g. 9 divided by 3 equals 3, 3 ring modules).
3) Define the number of 30 amp rings and round up to the closest multiple of 2. Divide by 2 for the number of 30 amp modules.
4) Total the number of signal / 5, 10 amp, 30 amp and 50 amp modules to define the total number of modules required.
5) If your total does not equal the 6, 12, 18 or 24 contained in the 4 lengths above, we will use spacers to fill out the unit to the nearest multiple of 6.

Example: 5, 10 amp rings (2 X 3 = 6), 6 / 3 = 2 modules

(3 each) 30 amp rings = 2 modules

+4 modules

⇒ use 6 (closest multiple of 6)



Dimensions in inches (millimeters)

AC6793 Specifications (IP 65 Sealed Version of AC6275)		Options
Operating Speed	1,000 rpm*	• Longer lead lengths available • Power and signal combinations • Rotor and stator lead exits • Gold plated rings
Number of Circuits	Various configurations	
Lead Lengths	12 inch (304 mm) min. from point of exit	
Lead Size	Signal circuits: #20 AWG, 5 amps #16 AWG, 10 amps Power circuits: #10 AWG, 30 amps #8 AWG, 50 amps	
Lead (Colors)	All white with tags	
Voltage	250 VAC for 5A 600 VAC for 10A, 30A and 50A	
Operating Temp.	-40°C to +80°C	
Contact Material	Precious metal	
Current Rating	5, 10, 30 and 50 amps	
Noise	100 milliohms, max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	# of Circuits	Capsule Length (L)	# of Modules
AC6793–6	6 power ckts max. or 36 signal ckts max.	6.6 inch	6
AC6793–12	12 power ckts max. or 72 signal ckts max.	11.2 inch	12
AC6793–18	18 power ckts max. or 108 signal ckts max.	15.7 inch	18
AC6793–24	24 power ckts max. or 144 signal ckts max.	20.5 inch	24

The AC6275 commercial slip ring provides configuration flexibility to meet your application needs. This product can be configured as required, with 5 amp signal, 10 amp rings, 30 amp rings and 50 amp rings.

Four set lengths are available, based on the number of modules that are required. These lengths are provided in the capsule length chart above. Each module has either 1-50 amp ring or 2-30 amp rings. For 10 amp rings, there are 1 to 3 rings per module. For 5 amp rings, there are 6 per module. Blank spacer modules are available for greater separation of power and signal circuits.

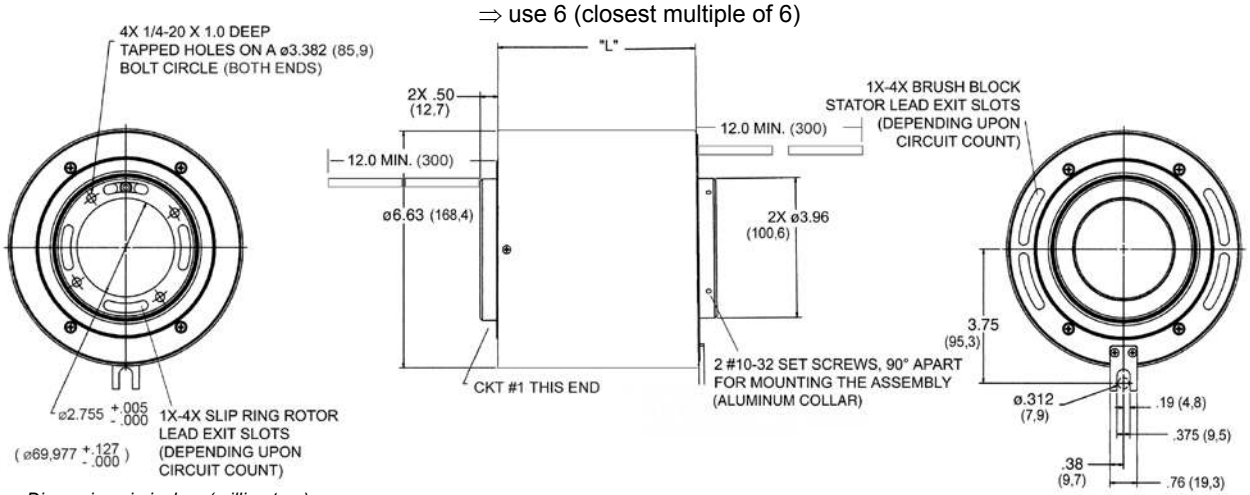
1) Define the number of signal / 5 amp rings and round up to the closest multiple of 6. Divide by 6 for number of 6 ring modules.
2) Define the number of 10 amp rings and round up to the closest multiple of 3 (e.g. 9 divided by 3 equals 3, 3 ring modules).
3) Define the number of 30 amp rings and round up to the closest multiple of 2. Divide by 2 for the number of 30 amp modules.
4) Total the number of signal / 5, 10 amp, 30 amp and 50 amp modules to define the total number of modules required.
5) If your total does not equal the 6, 12, 18 or 24 contained in the 4 lengths above, we will use spacers to fill out the unit to the nearest multiple of 6.

Example: 5, 10 amp rings (2 X 3 = 6), 6 / 3 = 2 modules

(3 each) 30 amp rings = 2 modules

+4 modules

⇒ use 6 (closest multiple of 6)



Dimensions in inches (millimeters)

REVISED 03/15

AC6098
4 inch through-bore

Description
A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or a rotary joint.

The AC6098 is a commercial slip ring capsule that features a 4 inch through-bore and a compact 8.13 inch outside diameter. The through-bore provides routing space for hydraulics, pneumatics, or for a concentric shaft mount.

This slip ring is available in four lengths, from 4.6 to 14.5 inches (depending on the number of circuits required). It can be manufactured with 1 to 72 signal rings or 1 to 24 power rings. This “stacked module” approach allows us to quickly assemble the exact number and type of circuits that our customers require. Unlike most competitive units, the AC6098 transfers low level control and data signals. In addition, signal / data circuits can be combined with power circuits all in the same assembly. The slip ring can run up to 250 rpm.

The AC6098 uses our fiber brush technology which offers several advantages over conventional slip ring contacts including multiple points of contact per brush bundle, low contact force per fiber and low contact wear rates. In addition, fiber brushes do not require lubrication and produce virtually no wear debris.

Features
- 4 inch through-bore
- 1 to 72 signal rings (signal up to 10 amps)
- 1 to 24 power rings (30 amp or 50 amp or some combination)
- Can combine signal and power in same slip ring
- Handles controller signals
- Speeds up to 250 rpm
- Silver plated rings; silver alloy fiber brushes
- Sealed against dust and splash
- Brush assemblies are field serviceable (if required)
- Available with Ethernet

Benefits
- Compact design
- Design flexibility to meet your requirements
- Transfers control and data signals
- Provides the exact number of circuits required
- Fiber brush technology provides maintenance-free operation (no cleaning or lubrication required)



Typical Applications
- Industrial machinery - machining centers, rotary index tables, heavy equipment turrets or cable reels, test equipment, packaging and palletizing machines, robotics, process equipment and rotary sensors
- Amusement rides
- Exhibit / display equipment
- Medical equipment

AC6098 Specifications		Options
Operating Speed	250 rpm*	• Longer lead lengths available • Power and signal combinations • Gold plated rings • Seamed housing optional, solid housing standard • Available with Ethernet, contact factory
Number of Circuits	Various configurations	
Lead Lengths	12 inch (304 mm) min. from point of exit	
Lead Size	Signal circuits: #16 AWG, 10 amps Power circuits: #10 AWG, 30 amps #8 AWG, 50 amps	
Leads	All white with tags	
Voltage	600 VAC	
Operating Temp.	-40°C to +80°C	
Contact Material	Precious metal	
Current Rating	10, 30 and 50 amps	
Noise	100 milliohms, max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	# of Circuits	Capsule Length	# of Modules
AC6098–6	6 power ckts max. or 18 signal ckts max.	4.43 inch (112,5 millimeters)	1 to 6
AC6098–12	12 power ckts max. or 36 signal ckts max.	7.78 inch (197,5)	7 to 12
AC6098–18	18 power ckts max. or 54 signal ckts max.	11.12 inch (282,6)	13 to 18
AC6098–24	24 power ckts max. or 72 signal ckts max.	14.47 inch (368,3)	19 to 24

The AC6098 commercial slip ring provides configuration flexibility to meet your application needs. This product can be configured as required, with signal / 10 amp rings, 30 amp rings and 50 amp rings.

Four set lengths are available, based on the number of modules that are required. These lengths are provided in the capsule length chart above. Blank spacer modules are available for greater separation of power and signal circuits. Each 30 amp and 50 amp ring is one module. For signal / 10 amp rings, there are 1 to 3 rings per module. To determine the length of your capsule:

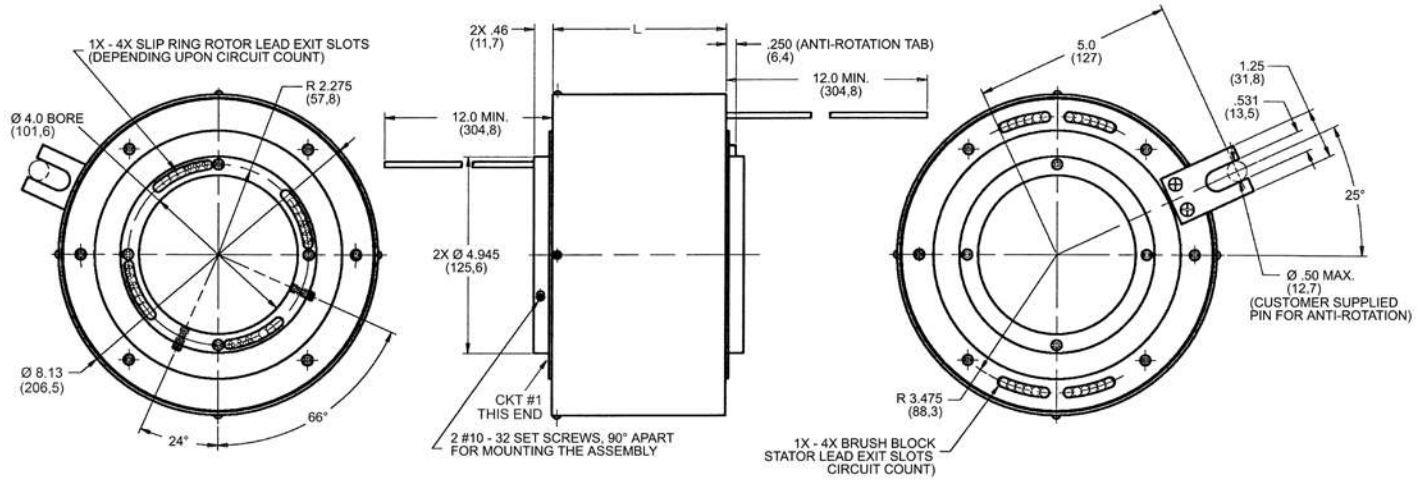
1) Define the number of signal / 10 amp rings, and round up to the closest multiple of 3 (i.e. 7 signal rings rounds up to 9 rings).
2) Divide this number by 3 to determine the number of signal / 10 amp modules.
3) Total the number of signal / 10 amp, 30 amp and 50 amp modules to define the total number of modules required.
4) If your total does not equal the 6, 12 18 or 24 contained in the 4 lengths above, we will use spacers to fill out the unit to the nearest multiple of 6.

Example: 5 signal rings (2 X 3 = 6), 6 / 3 = 2 signal modules

(3 each) 30 amp rings = 3 modules

+5 modules

⇒ use 6 (closest multiple of 6)



Dimensions in inches (millimeters)

Endura-Trac™

Standard W series

Description

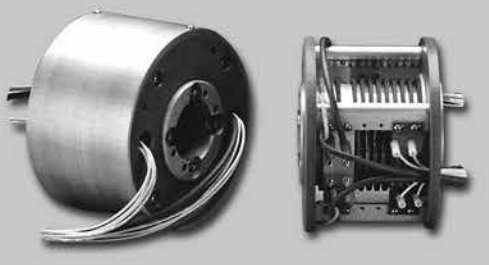
The Endura-Trac™ series of slip ring assemblies were developed for a wide variety of applications and environments. The flexible design and through-bore capability of up to 3 inches, along with many other options make it ideal for a designer to incorporate into new and retrofit applications. Modular construction allows a range of signal and power combinations with power circuits up to 30 amps and signal circuits up to 5 amps. These slip ring assemblies are a quick turn solution for your application. Off-the-shelf components allow for a delivery which meets your needs.

Features

- Unobstructed bore sizes from 1-1/2 inches to 3 inches
- Up to 24 signal circuits, up to 12 power circuits
- Continuous bidirectional rotation up to 60 rpm
- All metal dust cover
- Flying lead wire bundle, 24 inch lead length
- #20 AWG signal lead wire, #12 AWG power lead wire
- Shaft, rotor, or both can rotate
- Leadwires can exit from same or opposite ends of the rotor and stator

Benefits

- Ease of installation
- Compatible with data bus protocols
- Transfers power, as well as analog and digital signals
- Replaceable brush blocks
- 27 different combinations of signals and power circuits



Typical Applications

- Packaging machines
- Index tables
- Paper and film converting
- Rotary machines
- Machine tools
- Automation equipment
- Medical equipment
- Surveillence equipment
- Inspection equipment

Standard W Series Specifications		Options
Operating Speed	60 RPM	• Open frame • Drive adaptor for stator de-rotation • Longer lead lengths • Various power and signal configurations available
Power Circuits	Up to 12 power circuits: 30 A / 600 volts	
Signal Circuits	Up to 24 signal circuits: 5 A / 250 volts	
Terminals	Power circuits - 12 AWG flying leads Signal circuits - 20 AWG flying leads	
Temperature Range	-20˚C to +80˚C	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Bore Size	ID Actual	OD	S	R
1.5 inch (38,1 mm)	1.52 inch (38,61)	5 inch (127,00)	4.033 inch (102,44)	1.896 inch (48,16)
3.0 inch (76,2)	3.02 inch (76,71)	6.50 inch (165,10)	5.488 inch (139,40)	3.396 inch (86,26)

To determine length of overall unit, use the following formulas or contact us for assistance.

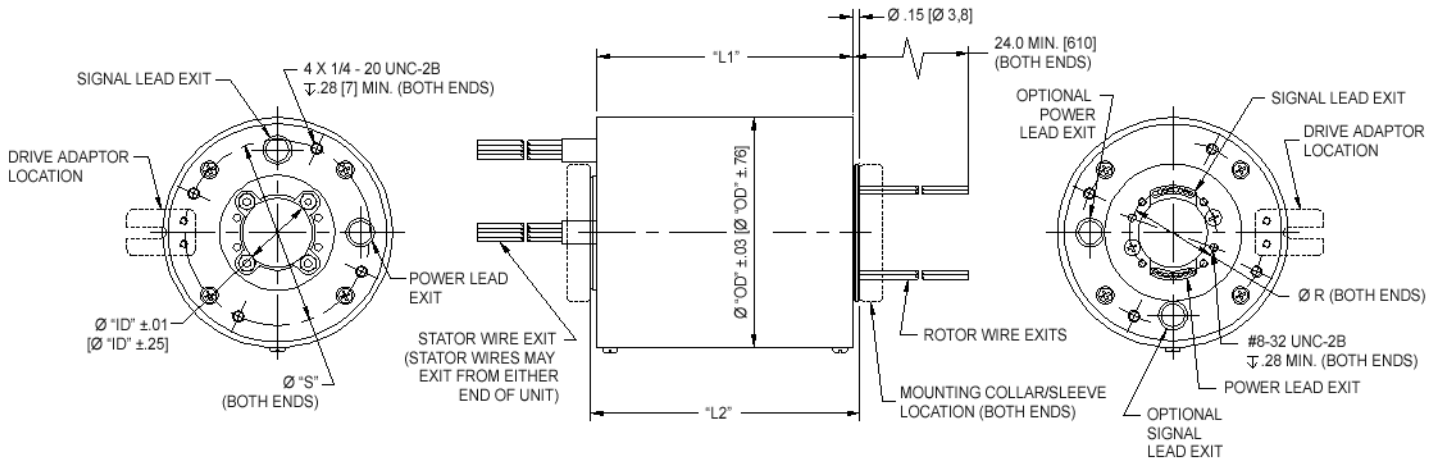
xx = Total number of signal rings
yy = Total number of power rings

L1 = .2(xx) + .4(yy) + .80
L2 = .2(xx) = .4(yy) + 1.09

Number of signal rings (multiples of 4)

Number of power rings (multiples of 2)	0	4	8	12	16	20	24
0		-	-	-	-	-	-
2	-	-	-	-	-	-	
4	-	-	-	-	-		
6	-	-	-	-			
8	-	-	-				
10	-	-					
12	-						

Standard W Series Dimensions



Dimensions in inches [millimeters]

Endura-Trac™

Fiber W series

Description

The Endura-Trac™ series of slip ring assemblies were developed for a wide variety of applications and environments. The flexible design and through-bore capability of up to 9 inches, along with many other options make it ideal for a designer to incorporate into new and retrofit applications. Modular construction allows a range of signal and power combinations with power circuits up to 30 amps and signal circuits. With the release of the Fiber W Series the traditional composite brushes have been replaced with fiber brushes, eliminating the need for debris maintenance and brush replacement for the life of the slip ring.

Features

- Bore sizes from 1.5 inch to 9.0 inch
- Up to 48 signal circuits or low power (rated at 250 V / 5 A each)
- Up to 28 power circuits (rated at 600 V / 30 A each)
- Continuous bidirectional rotation up to 250 rpm on all sizes
- Flying lead wire bundle, 24 inch lead length standard
- #20 AWG signal lead wire, #12 AWG power lead wire
- All metal exterior cover
- Shaft and flange mounting
- Stator, rotor, or both can rotate

Benefits

- Ease of use
- Debris free operation
- Maintenance free life
- Extended life versus traditional composite brushes
- Compatible with data bus protocols, contact factory for details
- Transfers power, as well as analog and digital signals
- Hundreds of different combinations of signals and power circuits
- Integration of cable assemblies and connectors



Typical Applications

- Packaging machines
- Index tables
- Paper and film converting
- Rotary machines
- Machine tools
- Automation equipment
- Medical equipment
- Surveillance equipment
- Inspection equipment

Fiber W Series Specifications		Options
Rated Speed	1.5 and 3.0 inch bore: 250 rpm 4.0, 6.0 and 9.0 inch bore: 250 rpm	• Drive adaptor for stator de-rotation • Longer lead lengths • Sealed version (NEMA 12) • Various power and signal configurations available • Mounting collar for shaft mount • Higher circuit counts available, contact factory • Higher RPMs possible on some units
Power Rings	30 A / 600 volts	
Signal Rings	5 A / 250 volts	
Lead Wire	Power circuits - 12 AWG flying leads Signal circuits - 20 AWG flying leads	
Temperature Range	-40°C to +80°C	

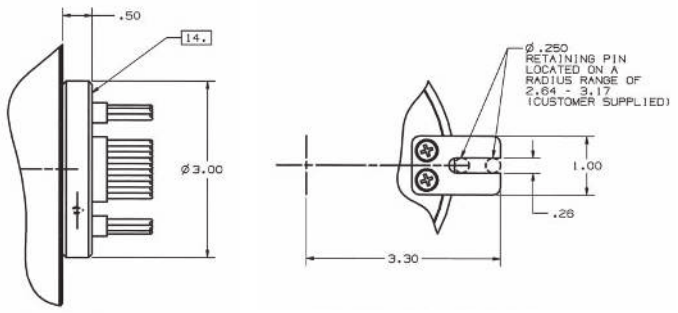
**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Bore Size	ID Actual	OD	Max RPM	"L1"	S	R
1.5 inch (38,1 mm)	1.52 (38,61)	4.97 (126,24)	250	Unsealed - .2 (XX) + .4 (YY) + 1.63 Sealed - .2 (XX) + .4 (YY) + 2.41	4.033 (102,44)	1.896 (48,16)
3.0 (76,2)	3.02 (76,71)	6.47 (164,34)	250	Unsealed - .2 (XX) + .4 (YY) + 1.52 Sealed - .2 (XX) + .4 (YY) + 1.89	5.488 (139,40)	3.396 (86,26)
4.0 (101,6)	4.02 (102,11)	7.50 (190,50)	250	Unsealed - .2 (XX) + .4 (YY) + 1.38 Sealed - .2 (XX) + .4 (YY) + 2.18	6.500 (165,10)	4.396 (111,66)
6.0 (152,40)	6.02 (152,91)	9.51 (241,30)	250	Unsealed - .2 (XX) + .4 (YY) + 1.39 Sealed - .2 (XX) + .4 (YY) + 2.18	8.332 (211,63)	6.646 (168,81)
9.0 (228,60)	9.02 (229,11)	12.50 (317,50)	250	Unsealed - .2 (XX) + .4 (YY) + 1.63 Sealed - .2 (XX) + .4 (YY) + 2.37	11.500 (292,10)	9.585 (243,46)

To determine length of overall unit, use the "L1" formulas or contact us for assistance.

xx = Total number of signal rings, available in multiples of 4
yy = Total number of power rings, available in multiples of 2

Additional configurations available, contact factory for details.

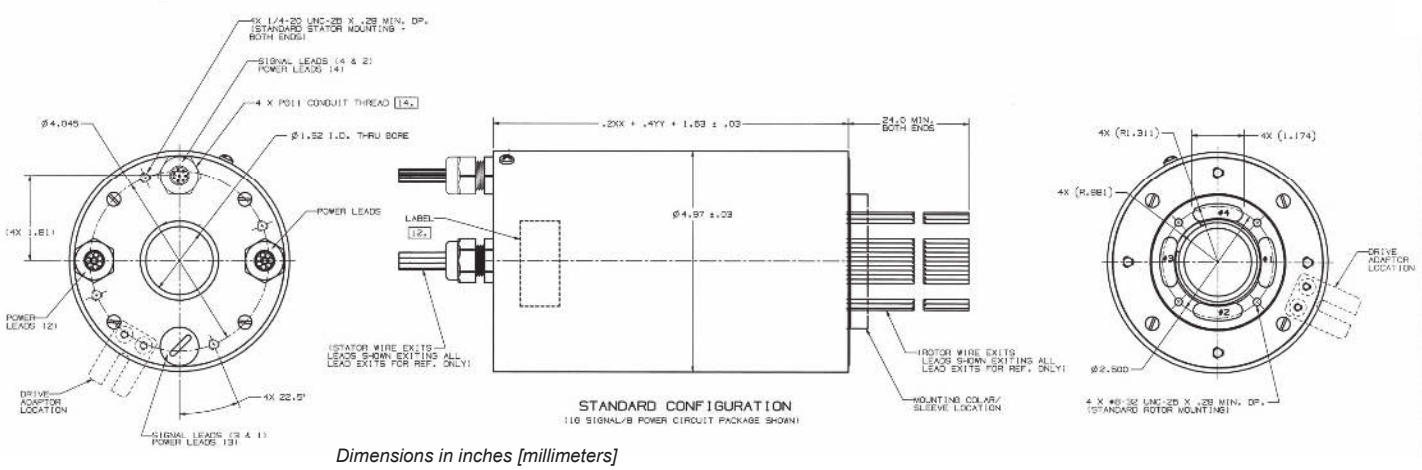


Number of signal rings (multiples of 4)

Number of power rings (multiples of 2)	0	4	8	12	16	20	24	28	32	36	40
0		-	-	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-	-	-	
4	-	-	-	-	-	-	-	-	-		
6	-	-	-	-	-	-	-	-			
8	-	-	-	-	-	-	-				
10	-	-	-	-	-	-					
12	-	-	-	-	-						
14	-	-	-	-							
16	-	-	-								
18	-	-									
20	-										

Plus W Series Dimensions

Example shown is of the W15 (1.5 inch bore). Contact factory for all other sizes.



Dimensions in inches [millimeters]

Endura-Trac™ Accessories

Our pre-engineered slip rings that feature a flexible design, minimized lead times and maximum reliability



Mounting Guidelines

There are several mounting options available on Endura-Trac™ products. One of the most important rules to remember when designing the installation of a slip ring is to avoid hard mounting both the rotating and stationary sections. This can transfer concentricity and axial run-out into the slip ring assembly and can adversely affect slip ring life.

Hard Mounting (Fixed Mounting): Any concentricity or axial run-out in the rotating-mechanical system is transferred to the slip ring assembly.

Soft Mounting (Floating Mount): Any concentricity or axial run-out in the rotating-mechanical system is not transferred to the slip ring assembly.

Ideally, the inner portion of the slip ring (ID) should be mounted by attaching a flange directly to it with screws or by using a Mounting Collar Kit that attaches to the slip ring rotor section and connects to the shaft with set-screws. The outer portion of the slip ring (OD) is soft mounted using a Drive Adapter Kit. If the OD is hard mounted in a housing or with a flange, the ID may be soft mounted using a flexible coupling. Hard mounting both the rotor and stator is not recommended.

Mounting Accessories

The Mounting Collar Kit attaches to either end of the slip ring rotor and facilitates mounting to a shaft by means of 2 or 4 set-screws. Location of set screws vary by model, contact factory for details. All mounting collars add 0.50 inch to the overall unit length.

Drive Adapter Kits are the perfect solution for soft mounting the stator section of the slip ring. This simple pin-in-slot arrangement prevents system concentricity or axial run-out problems from being transferred into the slip ring.

Mounting Accessories		
Bore Size (Inch)	**Mounting Collar Kit Part Number**	**Drive Adapter Kit Part Number**
1.5	W1500090	W1500087
3.0	W3000069	W1500087
4.0	W4000035	W1500087
6.0	W6000021	W1500087
9.0	W9000019	W1500087

Split Slip Rings

Description

For some applications, particularly machinery and equipment upgrades, it is impossible to access either end of the rotating shaft to allow the addition of a conventional slip ring. For these applications, we have a special slip ring solution which includes a split slip ring and a conventional brush block. The slip ring is essentially supplied as two semi-circular parts, which are then clamped around the shaft with a tightening system to rigidly fix the two halves together. Since the two semi-circulars sections are finish machined and gold plated at the factory in the assembled condition, the effects of the gap on the overall operation of the slip ring are minimized. Electrical connections can either be standard or custom.

Features

- Separate split ring and brush block
- Minimal disturbance electrically at the split of the slip ring

Benefits

- Enables existing rotating shaft to be retrofitted with a slip ring



Typical Applications

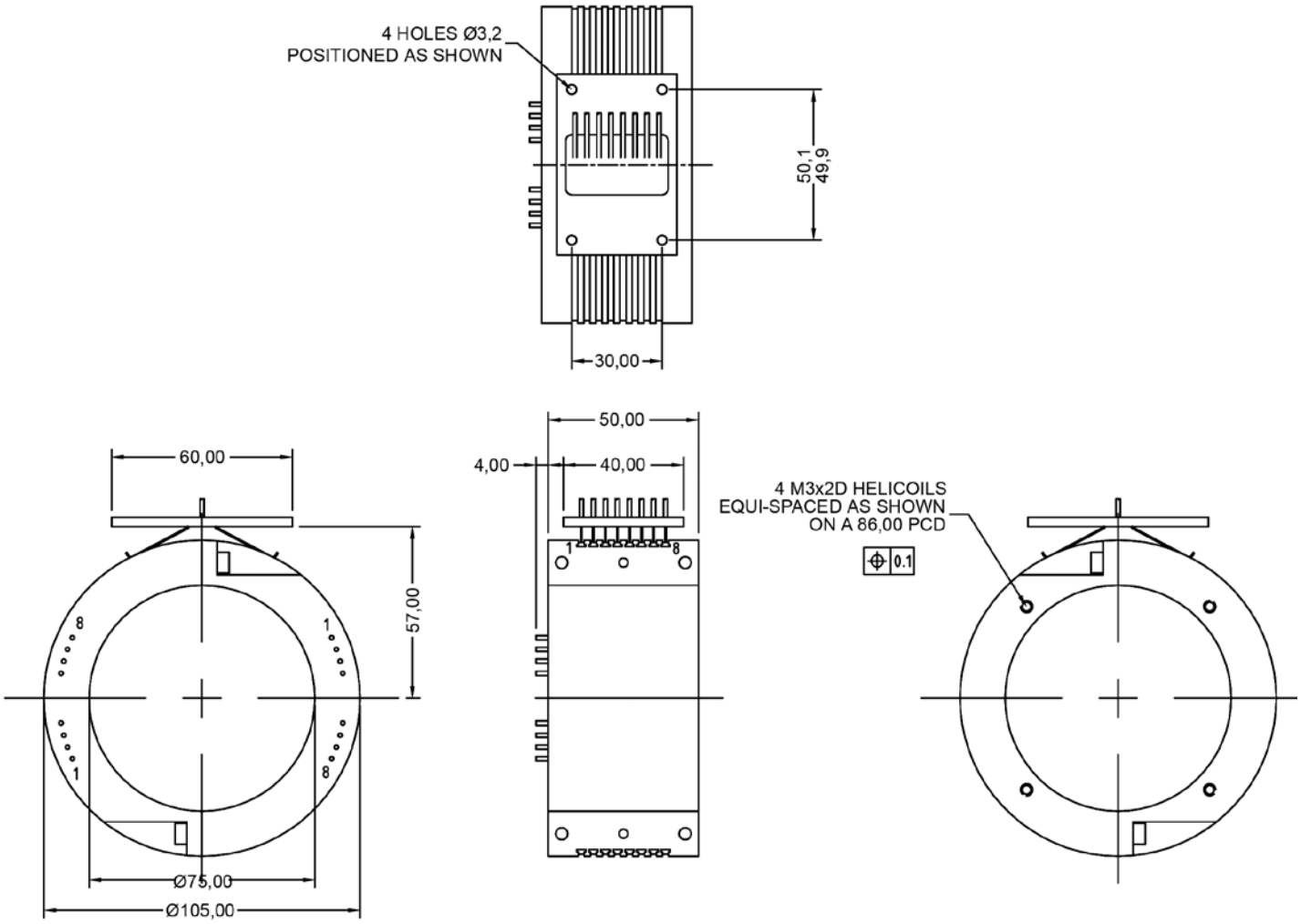
- Updates of large complex machinery

Split Slip Rings

As these are special applications, we show a selection of units delivered in the past. Please contact us with your exact requirements.

Part No.	Internal Diameter	External Diameter	Length	No. of Rings	Current Capability
56814-951	75 mm	105 mm	50 mm	8	2 A
56871-951	152 mm	182 mm	20 mm	4	2 A
57165-950	42 mm	61 mm	31 mm	5	2 A
57622-950	178 mm	221 mm	40 mm	8	2 A

Split Slip Ring Dimensions



Dimensions in millimeters

SRA-73540

Compact slip ring capsule

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

This slip ring which we call our “mini”, is our newest design and smallest physical package. It can incorporate up to 12 circuits, each rated at 2 amps. This unit is ideal for use where mounting space is limited and critical, without sacrificing current handling capability.

Features

- 6 and 12 circuit models
- 2 amp, 120 VAC circuits
- Precision assembly to provide exceptional rotational life
- Speeds up to 250 rpm
- Compact size .44 inch diameter, .64 inch long
- Gold-on-gold contacts
- Mounting flange on housing
- Flexible, color-coded, silver-plated, stranded copper lead wire
- Superior handling of low level control signals

Benefits

- Extremely compact
- Low torque
- Quick shipment
- High bandwidth transfer capability



Typical Applications

- CCTV pan / tilt camera mounts
- Medical equipment
- Robot end effectors
- Miniature cable reels
- Laboratory equipment

Slip Ring Capsules (Compact)

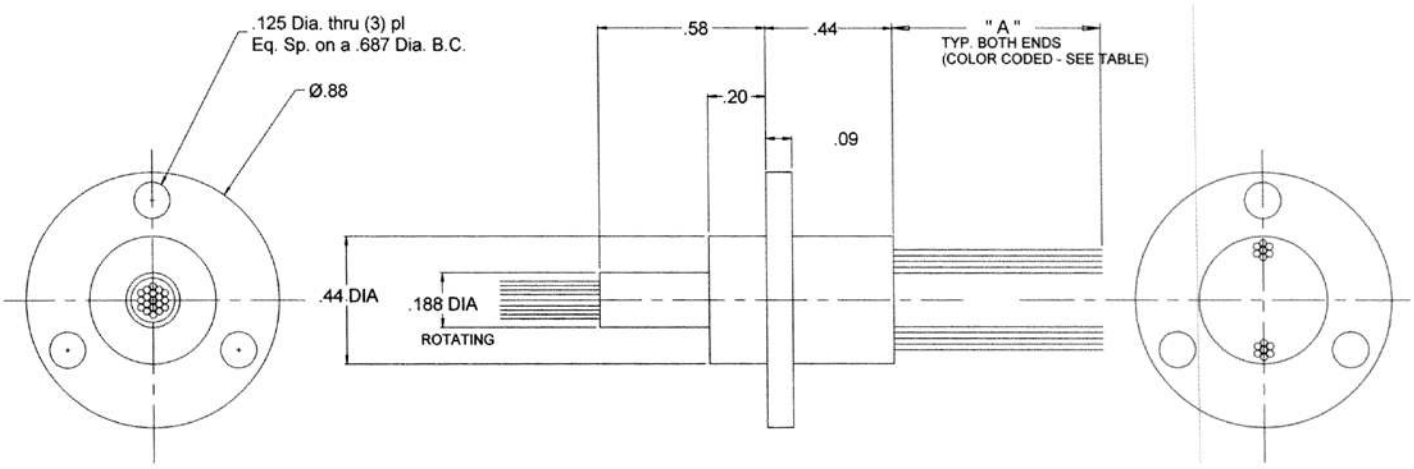
SRA-73540 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12
Lead Lengths	12, 24, 36 and 48 inches
Lead Size / Type	#28 AWG, Teflon® insulated, stranded cond.
Voltage	120 VAC
Max. Ambient Temp.	-40°C to +80°C
Contact Material	Gold
Current Rating	2 A per ring, maximum
Noise	60 milliohms max.

Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.

Lead Wire Color Code	
Ring #	**Color Code**
1	BLK
2	BRN
3	RED
4	ORN
5	YEL
6	GRN
7	BLU
8	VIO
9	GRY
10	WHT
11	WHT-BLK
12	WHT-BRN

Part Number	"A" Dimension	Ring Qty.
SRA-73540-6	12 inch (304.8 mm)	6
SRA-73540-6A	24 inch (609.6 mm)	6
SRA-73540-6B	36 inch (914.4 mm)	6
SRA-73540-6C	48 inch (1219.2 mm)	6
SRA-73540	12 inch (304.8 mm)	12
SRA-73540-A	24 inch (609.6 mm)	12
SRA-73540-B	36 inch (914.4 mm)	12
SRA-73540-C	48 inch (1219.2 mm)	12

SRA-73540 Dimensions



Dimensions in inches

SRA-73625

Compact slip ring capsule

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

The SRA-73625 miniature capsule provides up to 18, 2 amp rated contacts in a small, .44 inch diameter design. Color-coded lead wires are provided on both the rotor and stator to allow simplified electrical connections. Similar in design to our SRA-73540, the SRA-73625 allows tremendous flexibility in dealing with system size restrictions.

Features

- 18 circuit
- 2 amp, 120 VAC circuits
- Precision assembly to provide exceptional rotational life
- Speeds up to 250 rpm
- Compact size .44 inch diameter
- Gold-on-gold contacts
- Mounting flange on housing
- Flexible, color-coded, silver-plated, stranded copper lead wire
- Superior handling of low level control signals
- GigE model, SRA-73799, available

Benefits

- Extremely compact
- Low torque
- Quick shipment
- High bandwidth transfer capability



Typical Applications

- CCTV pan / tilt camera mounts
- Medical equipment
- Robot end effectors
- Miniature cable reels
- Laboratory equipmentp

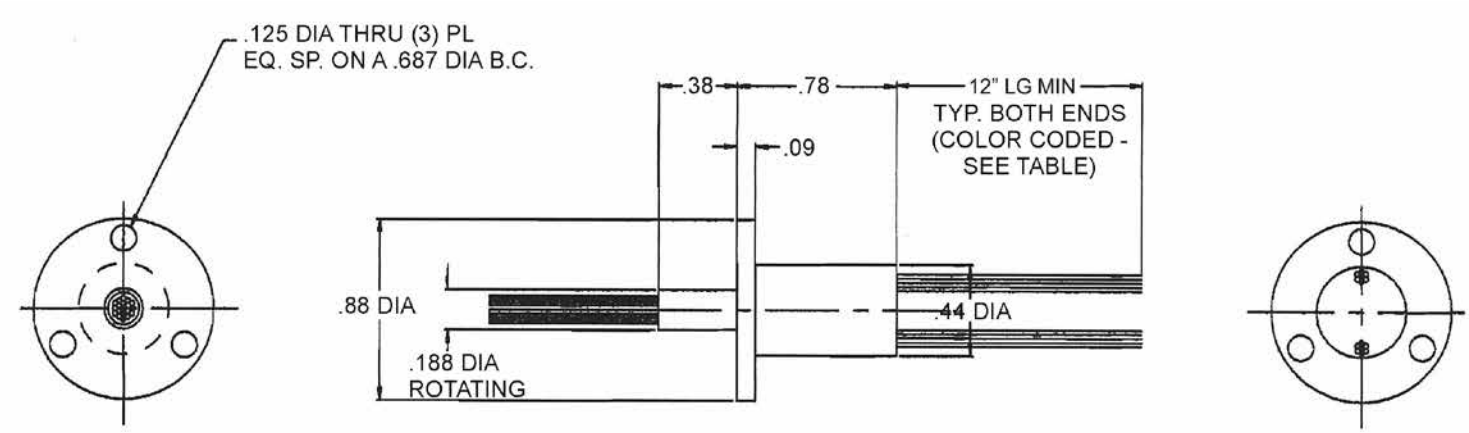
Slip Ring Capsules (Compact)

SRA-73625 Specifications	
Operating Speed	250 rpm*
Number of Circuits	18
Lead Lengths	12, 24, 36 and 48 inches
Lead Size / Type	#28 AWG, Teflon® insulated, stranded cond.
Voltage	120 VAC
Max. Ambient Temp.	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amps per circuit
Noise	60 milliohms max.

Lead Wire Color Code			
Ring #	**Color Code**	**Ring #**	**Color Code**
1	BLK	10	WHT
2	BRN	11	WHT-BLK
3	RED	12	WHT-BRN
4	ORN	13	WHT-RED
5	YEL	14	WHT-ORN
6	GRN	15	WHT-YEL
7	BLU	16	WHT-GRN
8	VIO	17	WHT-BLU
9	GRY	18	WHT-VIO

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

SRA-73625 Dimensions



Dimensions in inches

AC6373

Compact slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

The AC6373 miniature capsule provides up to 12, 2 amp rated contacts in a small, 1/2 inch diameter design. Color-coded lead wires are provided on both the rotor and stator to allow simplified electrical connections. Similar in design to our very popular AC6023 family, the AC6373 allows tremendous flexibility in dealing with system size restrictions. It is available in 6 and 12 circuit configurations.

Features

- 6 and 12 circuit models
- 2 amp, 120 VAC circuits
- Precision assembly to provide exceptional rotational life
- Speeds up to 100 rpm
- Compact size 1/2 inch diameter, .58 inch or .83 inch long
- Gold
- Mounting flange on housing
- Flexible, color-coded, silver-plated, stranded copper lead wire
- Superior handling of low level control signals

Benefits

- Extremely compact
- Low torque
- Quick shipment
- High bandwidth transfer capability

Typical Applications

- CCTV pan / tilt camera mounts
- Medical equipment
- Robot end effectors
- Miniature cable reels
- Laboratory equipment

Slip Ring Capsules (Compact)

AC6373 Specifications	
Operating Speed	100 rpm*
Number of Circuits	6 or 12
Lead Lengths	12, 24, 36 and 48 inches
Lead Size / Type	28 (7 / 36) silver plated copper Type ET Teflon® insulated
Voltage	120 VAC
Max. Ambient Temp.	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amps / circuit
Noise	60 milliohms max.

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

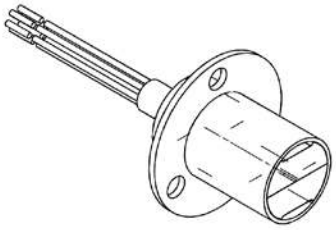
Teflon® is a registered trademark of E.I. du Pont de Nemours and Co.

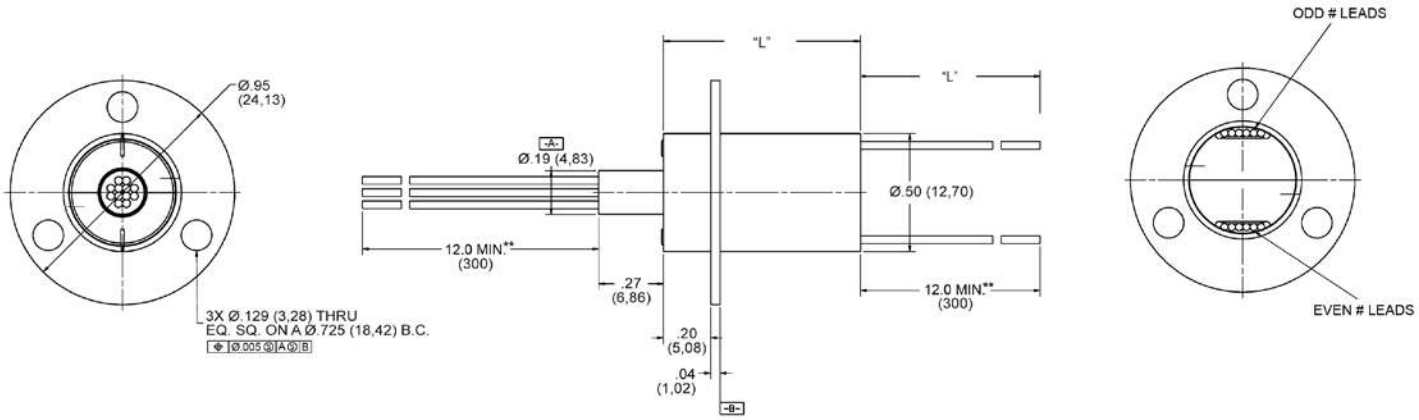
Also available without flange, P/N AC6456

AC6373 Lead Wire Color Codes			
Ring #	**Color Code**	**Ring #**	**Color Code**
#1	BLK	#7	BLU
#2	BRN	#8	VIO
#3	RED	#9	GRY
#4	ORN	#10	WHT
#5	YEL	#11	WHT-BLK
#6	GRN	#12	WHT-BRN

Part Number	Length "L"
AC6373 - 6	.58 inch (14,7 mm)
AC6373 - 12	.83 inch (21,1 mm)

AC6373 Dimensions





Dimensions in inches (millimeters)

Part Number	"L"
AC6373	12 in (304.8 mm)
AC6373-A	24 in (609.6 mm)
AC6373-B	36 in (914.4 mm)
AC6373-C	48 in (1219.2 mm)

SRA-73526 / SRA-73528 / SRA-73599

Compact in various circuit configurations

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

Features

- 6, 12, 18 and 24 circuit models
- 2 amp / 240 VAC circuits
- Precision ball bearings meet or exceed life requirements for most commercial applications
- Speeds up to 250 rpm
- Compact size: .87 inch to 1.44 inch lengths (depending upon number of circuits)
- Gold-on-gold contacts
- Compatible with data bus protocols
- Flexible, color-coded, silver-plated, Teflon® insulated lead wires
- Transfers analog and digital signals

Benefits

- Smooth running
- Low torque
- Compact
- Quick shipment



Typical Applications

- CCTV pan / tilt camera mounts
- Electrical test equipment
- Manufacturing and process control equipment
  - Indexing tables
  - Robotics (end-effectors, arms, vision systems, sensors)
- Exhibit / display equipment
- Medical equipment

Slip Ring Capsules (Compact)

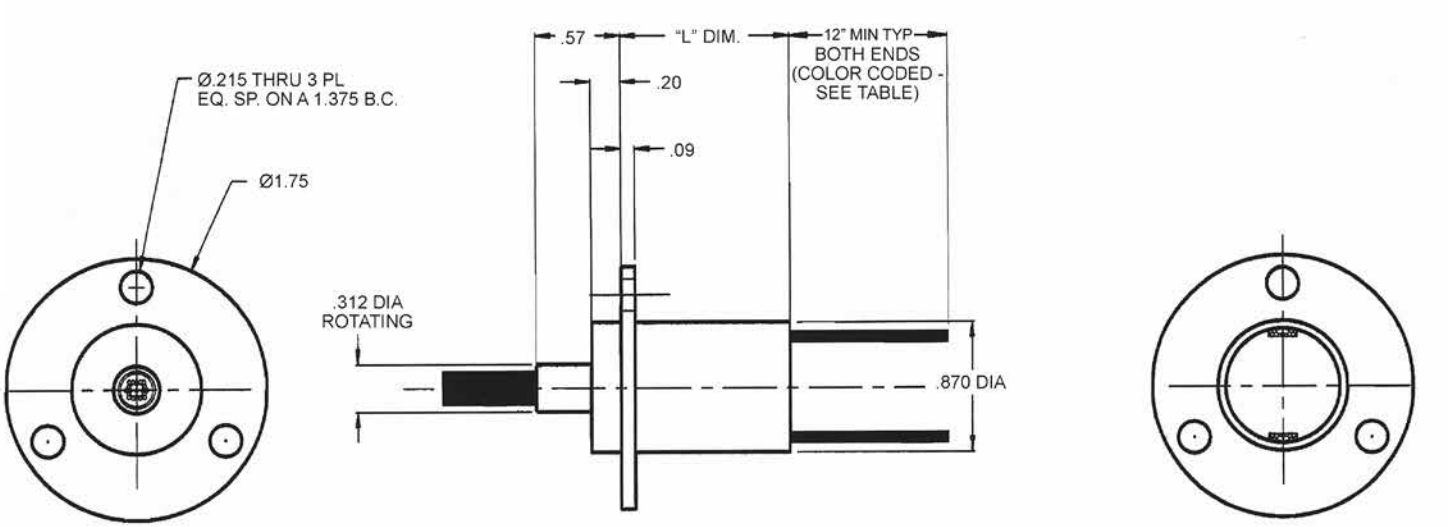
SRA-73526 / SRA-73528 / SRA-73599 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12, 18, or 24
Lead Lengths	12, 24, 36 and 48 inches
Lead Size / Type	#26 AWG Teflon® insulated, stranded cond.
Voltage	240 VAC
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amps / circuit
Electrical Noise	60 milliohms max.

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Lead Wire Color Code					
Ring#	**Color Code**	**Ring#**	**Color Code**	**Ring#**	**Color Code**
1	BLK	9	GRY	17	WHT-BLU
2	BRN	10	WHT	18	WHT-VIO
3	RED	11	WHT-BLK	19	WHT-GRY
4	ORN	12	WHT-BRN	20	WHT-BLK-BRN
5	YEL	13	WHT-RED	21	WHT-BLK-RED
6	GRN	14	WHT-ORN	22	WHT-BLK-ORN
7	BLU	15	WHT-YEL	23	WHT-BLK-YEL
8	VIO	16	WHT-GRN	24	WHT-BLK-GRN

Part Number	Length "L"	# of Circuits
SRA-73526-6	.57	6
SRA-73528	.76	12
SRA-73526-18	1.11	18
SRA-73599	1.24	24

SRA-73526 / SRA-73528 / SRA-73599 Dimensions



Dimensions in inches

AC6023

Compact in various circuit configurations

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

The AC6023 slip ring capsule is a standard, off-the-shelf unit that uses gold contacts at the rotary interface. Color-coded lead wires are used on both the stator and rotor for simplified electrical connections. It is available in 6, 12, 18 and 24 circuit models.

Aside from the standard configurations, we have a wide variety of special designs, which have been customized to meet the particular needs of an individual application.

Features

- 6, 12, 18 and 24 circuit models
- 2 amp / 240 VAC circuits
- Precision ball bearings meet or exceed life requirements for most commercial applications
- Speeds up to 250 rpm
- Compact size: 0.57 inch to 1.38 inch lengths (depending upon number of circuits)
- Gold
- 12 inch, 24 inch, 36 inch, 48 inch standard lead lengths
- Compatible with data bus protocols
- Sealed units are also available (dust and light splash only)
- Flexible, color-coded, silver-plated, Teflon® insulated lead wires
- Transfers analog and digital signals
- Also available with 5 and 10 amp power rings combined with 2 amp rings. Please refer to AC6305 / AC6310 data sheet.

Benefits

- Smooth running
- Low torque
- Compact
- Quick shipment



Typical Applications

- CCTV pan / tilt camera mounts
- Electrical test equipment
- Manufacturing and process control equipment
  - Indexing tables
  - Robotics (end-effectors, arms, vision systems, sensors)
- Exhibit / display equipment
- Medical equipment

Slip Ring Capsules (Compact)

AC6023 Specifications	
Operating Speed	250 rpm*
Number of Circuits	6, 12, 18, or 24
Lead Lengths	12, 24, 36, and 48 inches
Lead Size / Type	28 (7 / 36) silver plated copper, type ET Teflon®
Voltage	240 VAC
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amps / ckt
Electrical Noise	60 milliohms max.

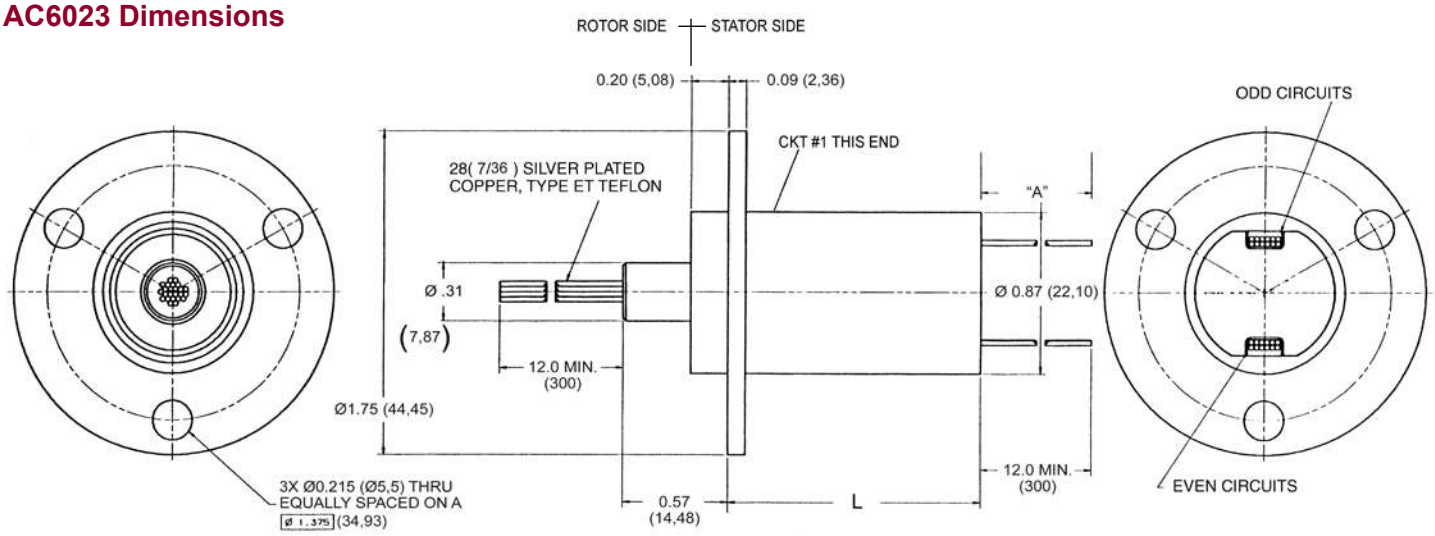
Options
• Splash seals for dust and moisture resistance • No flange • Aluminum housing

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Lead Wire Color Codes					
Ring#	Color Code	Ring#	Color Code	Ring#	Color Code
1	BLK	9	GRY	17	WHT-BLU
2	BRN	10	WHT	18	WHT-VIO
3	RED	11	WHT-BLK	19	WHT-GRY
4	ORN	12	WHT-BRN	20	WHT-BLK-BRN
5	YEL	13	WHT-RED	21	WHT-BLK-RED
6	GRN	14	WHT-ORN	22	WHT-BLK-ORN
7	BLU	15	WHT-YEL	23	WHT-BLK-YEL
8	VIO	16	WHT-GRN	24	WHT-BLK-GRN

Capsule Length = L		
Part Number	Capsule Length (L)	# Of Circuits
AC6023–6	0.57 inch (14,5 mm)	6
AC6023–12	0.84 inch (21,3 mm)	12
AC6023–18	1.11 inch (28,2 mm)	18
AC6023–24	1.38 inch (35,1mm)	24

AC6023 Dimensions



Dimensions in inches (millimeters)

Part Number	"A"
AC6023	12 in (304.8 mm)
AC6023-A	24 in (609.6 mm)
AC6023-B	36 in (914.4 mm)
AC6023-C	48 in (1219.2 mm)

SRA-73762

Compact in various circuit configurations

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

Features

- 12, 18 and 24 circuit models
- 2 amp / 240 VAC circuits
- Precision ball bearings meet or exceed life requirements for most commercial applications
- Speeds up to 250 rpm
- Compact size: .61 inch diameter and 1.56 inch length
- Gold-on-gold contacts
- Compatible with data bus protocols
- Flexible, color-coded, silver-plated, Teflon® insulated lead wires
- Transfers analog and digital signals

Benefits

- Smooth running
- Low torque
- Compact
- Quick shipment



Typical Applications

- CCTV pan / tilt camera mounts
- Electrical test equipment
- Manufacturing and process control equipment
  - Indexing tables
  - Robotics (end-effectors, arms, vision systems, sensors)
- Exhibit / display equipment
- Medical equipment

Slip Ring Capsules (Compact)

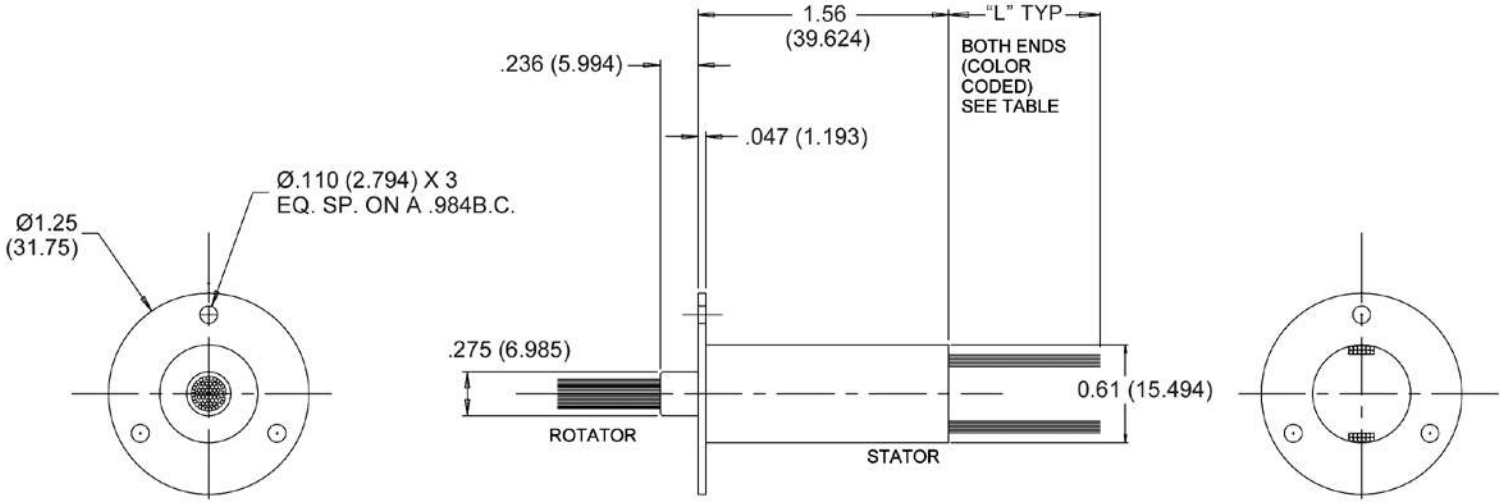
SRA-73762 Specifications	
Operating Speed	250 rpm*
Number of Circuits	12, 18 and 24
Lead Lengths	12, 24, 36 and 48 inches
Lead Size / Type	#28 AWG Teflon® insulated, stranded cond.
Voltage	240 VAC
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amps, per circuit
Electrical Noise	60 milliohms max.

Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.

SRA-73762 Lead Wire Color Codes				
Ring #	**Color Code**	**Ring #**	**Color Code**	
1	BLK	13	WHT-RED	
2	BRN	14	WHT-ORN	
3	RED	15	WHT-YEL	
4	ORN	16	WHT-GRN	
5	YEL	17	WHT-BLU	
6	GRN	18	WHT-VIO	
7	BLU	19	BLK	TAGGED LEADS 19 - 24
8	VIO	20	BRN	
9	GRY	21	RED	
10	WHT	22	ORN	
11	WHT-BLK	23	YEL	
12	WHT-BRN	24	GRN	

Part Number	"L"
SRA-73762	12 in (304.8 mm)
SRA-73762-A	24 in (609.6 mm)
SRA-73762-B	36 in (914.4 mm)
SRA-73762-C	48 in (1219.2 mm)

SRA-73762 Dimensions



Dimensions in inches (mm)

SRA-73574 / SRA-73587

Compact in various circuit configurations

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data.

The SRA-73574 / SRA-73587 provides an economical, readily available solution when a compact, high circuit count configuration is required. Our standard units, offer 36, 2 amp, 4, 10 amp and 24, 2 amp signal rings, respectively. These units can be modified to provide various combinations of power, signal and coax circuits. Similar in design to our very popular AC6023, this design features gold-on-gold contact technology for ultimate performance in many challenging applications.

Features

- 2 amp and 10 amp circuit combinations standard
- Precision ball bearing for long life
- Speeds up to 250 rpm
- Compact size
- Transfers analog and digital signals
- Compatible with data bus protocols

Benefits

- Unique signal handling performance with minimal electrical circuit noise
- Tight packaging to fit in the most demanding space constraints
- Low torque to minimize system torque budget
- Rapid delivery



Typical Applications

- Pan / tilt camera mounts
- Rotary index tables
- Rate tables
- Lighting
- Robotics

Slip Ring Capsules (Compact)

Specifications	SRA-73574	SRA-73587
Operating Speed	250 rpm*	250 rpm*
Circuit Configurations	36 circuits @ 2 A., #26 AWG Teflon® insulated, stranded cond.	4 power 10 A continuous, #18 AWG Teflon® insulated, stranded cond. 24 signal, 2 A, #26 AWG Teflon insulated, stranded cond.
Voltage	240 VAC	240 VAC
Temperature Range	-40°C to +80°C	-40°C to +80°C
Contact Material	Gold	Gold
Electrical Noise	60 milliohms max.	60 milliohms max.

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

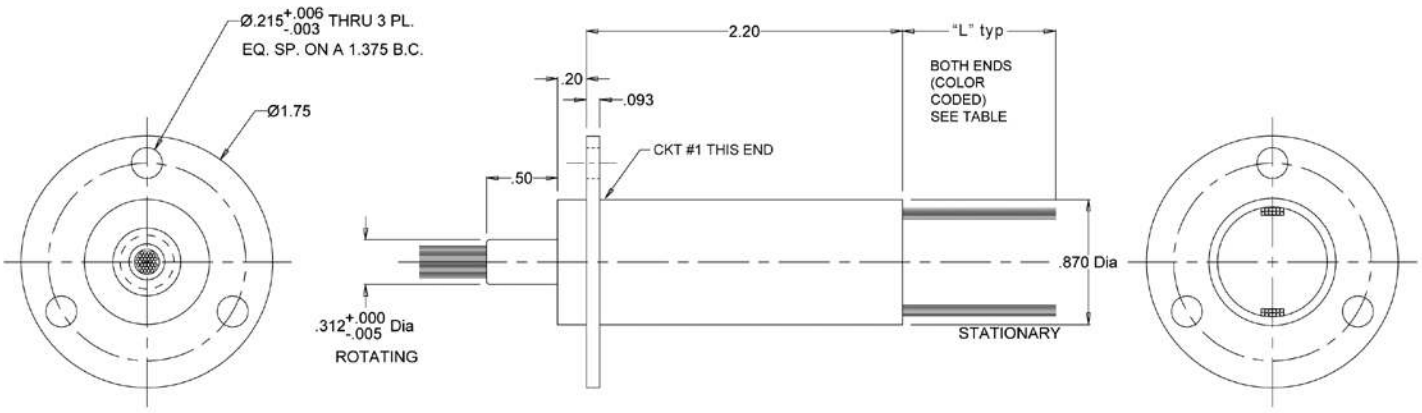
SRA-73574 Lead Wire Color Codes

Ring #	Color Code	Ring #	Color Code	Ring #	Color Code	Ring #	Color Code
1	BLK	10	WHT	19	WHT-GRY	28	WHT-BRN-RED
2	BRN	11	WHT-BLK	20	WHT-BLK-BRN	29	WHT-BRN-ORN
3	RED	12	WHT-BRN	21	WHT-BLK-RED	30	WHT-BRN-YEL
4	ORN	13	WHT-RED	22	WHT-BLK-ORN	31	WHT-BRN-GRN
5	YEL	14	WHT-ORN	23	WHT-BLK-YEL	32	WHT-BRN-BLU
6	GRN	15	WHT-YEL	24	WHT-BLK-GRN	33	WHT-BRN-VIO
7	BLU	16	WHT-GRN	25	WHT-BLK-BLU	34	WHT-BRN-GRY
8	VIO	17	WHT-BLU	26	WHT-BLK-VIO	35	WHT-RED-ORN
9	GRY	18	WHT-VIO	27	WHT-BLK-GRY	36	WHT-RED-YEL

SRA-73587 Lead Wire Color Codes

Ring #	Color Code
1 - 24	SAME AS SHOWN ON SRA-73574
25	WHT (18 AWG)
26	BRN (18 AWG)
27	RED (18 AWG)
28	ORN (18 AWG)

SRA-73574 / SRA-73587 Dimensions



Dimensions in inches

Part Number	"L"
SRA-73574 / SRA-73587	12 in (304.8 mm)
SRA-73574-A / SRA-73587-A	24 in (609.6 mm)
SRA-73574-B / SRA-73587-B	36 in (914.4 mm)
SRA-73574-C / SRA-73587-C	48 in (1219.2 mm)

AC6355

Compact in various circuit configurations

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data.

The AC6355 provides an economical, readily available solution when a compact, high circuit count configuration is required. Our standard units, AC6355-36 and AC6355-56 offer 36, 2 amp and 56, 2 amp signal rings, respectively. These units can be modified to provide various combinations of power, signal and coax circuits. Similar in design to our very popular AC6023, this design features gold-on-gold contact technology for ultimate performance in many challenging applications.

Features

- Standard 36 and 56 circuit models with 2 amp circuits
- 2 amp, 5 amp, 10 amp circuit combinations standard; 50 or 75 ohm coax circuit combinations are optional
- Precision ball bearing for long life
- Speeds up to 250 rpm
- Compact size
- Sealed units available (dust and light splash only)
- Metal housing available
- Transfers analog and digital signals
- Compatible with data bus protocols

Benefits

- Unique signal handling performance with minimal electrical circuit noise
- Tight packaging to fit in the most demanding space constraints
- Low torque to minimize system torque budget
- Rapid delivery



Typical Applications

- Pan / tilt camera mounts
- Rotary index tables
- Rate tables
- Lighting
- Robotics

Slip Ring Capsules (Compact)

AC6355 Specifications		
Operating Speed	250 rpm*	
Circuit Configurations	36 ring	56 ring
	36 @ 2 amp	56 @ 2 amp
	4 @ 5 amp; 28 @ 2 amp	4 @ 5 amp; 48 @ 2 amp
	4 @ 10 amp; 20 @ 2 amp	4 @ 10 amp; 40 @ 2 amp
Lead Length	24 inch (600 mm)	
Lead Size / Type	2 amp, 26 AWG 5 amp, 20 AWG 10 amp, 16 AWG	
Housing	Plastic	
Voltage	240 VAC	
Operating Temp.	-40°C to +80°C	
Contact Material	Gold	
Electrical Noise	60 milliohms max.	

Options

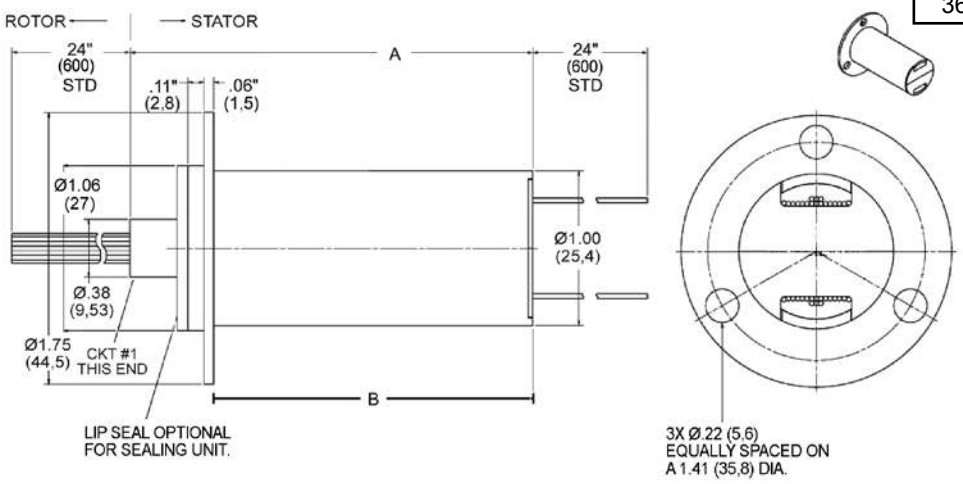
- 48 inch (1200 mm) lead length
- Aluminum housing, black anodized
- 50 ohm coax, RG178
- 75 ohm coax, RG179
- Splash seals for dust and moisture resistance
- Non-flanged housing available
- IP 65 rated slip ring available (P/N AC7356)

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

AC6355 Lead Wire Color Codes											
Ring #	Color Code	Ring #	Color Code	Ring #	Color Code	Ring #	Color Code	Ring #	Color Code	Ring #	Color Code
1	BLK	11	WHT-BLK	21	RED	31	WHT-RED	41	YEL	51	WHT-YEL
2	BRN	12	WHT-BRN	22	ORN	32	WHT-ORN	42	GRN	52	WHT-GRN
3	RED	13	WHT-RED	23	YEL	33	WHT-YEL	43	BLU	53	WHT-BLU
4	ORN	14	WHT-ORN	24	GRN	34	WHT-GRN	44	VIO	54	WHT-VIO
5	YEL	15	WHT-YEL	25	BLU	35	WHT-BLU	45	GRY	55	BLK
6	GRN	16	WHT-GRN	26	VIO	36	WHT-VIO	46	WHT	56	BRN
7	BLU	17	WHT-BLU	27	GRY	37	BLK	47	WHT-BLK		
8	VIO	18	WHT-VIO	28	WHT	38	BRN	48	WHT-BRN		
9	GRY	19	BLK	29	WHT-BLK	39	RED	49	WHT-RED		
10	WHT	20	BRN	30	WHT-BRN	40	ORN	50	WHT-ORN		

2 amp leads will be color coded and number tagged
5 amp rings will have 20 AWG black lead wire, tagged
10 amp rings will have 16 AWG black lead wire, tagged

AC6355	A	B
56 Ring	3.50 in (88,9 mm)	2.96 (75,3)
36 Ring	2.60 (66,04)	2.06 (52,4)



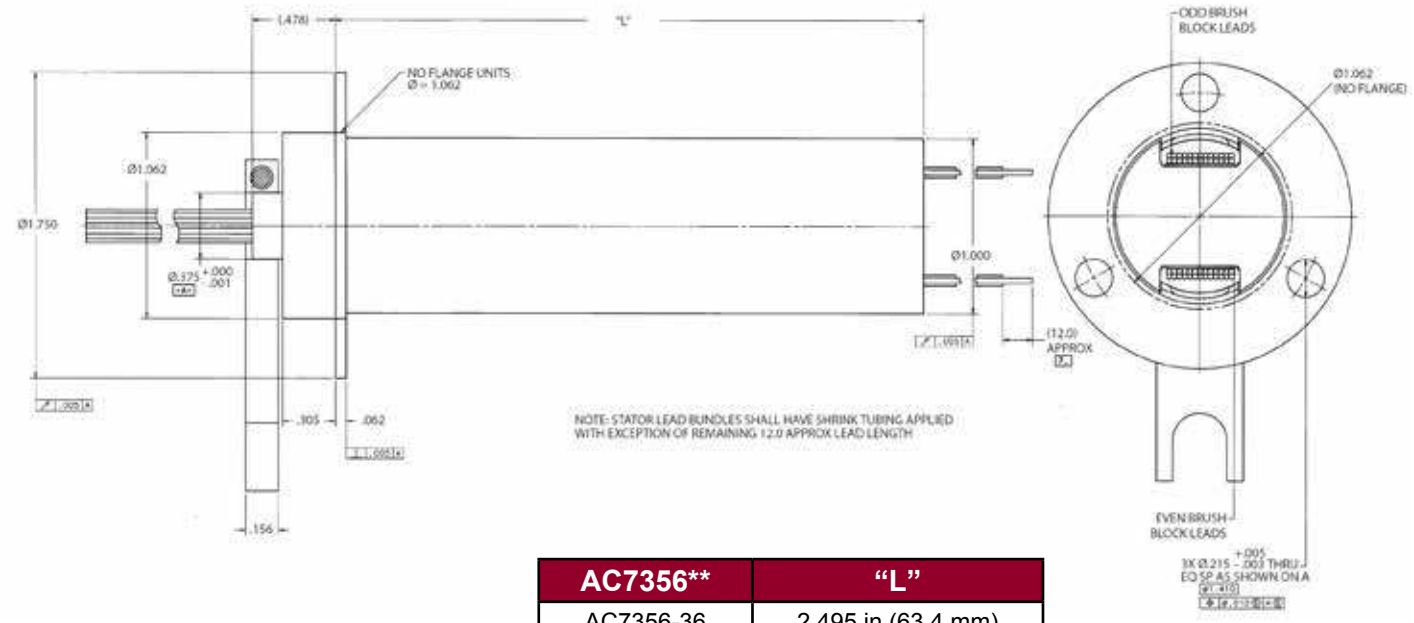
Dimensions in inches (millimeters)

AC7356** Specifications (IP 65 Sealed Version of AC6355)			Options
Operating Speed	250 rpm*		• 48 inch (1200 mm) length leads • 50 ohm coax, RG178 • 75 ohm coax, RG179
Circuit Configurations	36 ring	56 ring	
	36 @ 2 amp	56 @ 2 amp	
	4 @ 5 amp; 28 @ 2 amp	4 @ 5 amp; 48 @ 2 amp	
	4 @ 10 amp; 20 @ 2 amp	4 @ 10 amp; 40 @ 2 amp	
Lead Length	24 inch (600 mm)		
Lead Size / Type	2 amp, 26 AWG 5 amp, 20 AWG 10 amp, 16 AWG		
Housing	Aluminum housing, black anodized		
Voltage	240 VAC		
Operating Temp.	-40°C to +80°C		
Contact Material	Gold		
Electrical Noise	60 milliohms max.		
Environmental	IP 65 sealed		

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

****Product Replaced AC7038. Contact factory for details.**

AC7356** Dimensions



AC7356**	"L"
AC7356-36	2.495 in (63.4 mm)
AC7356-56	3.395 in (86.2 mm)

Dimensions in inches

AC6305
AC6310

Compact in various circuit configurations

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or an electrical rotary joint.

The AC6305 provides three, 5 amp circuits combined with 6, 9, or 12 signal (2 amp max) circuits. The AC6310 provides three, 10 amp circuits and 3 or 6 signal circuits. This compact power and signal handling design provides unique capability for many challenging applications.

Features

- 6, 9, 12 and 15 circuit models
- 5 amp / 2 amp and 10 amp / 2 amp circuit combinations
- Precision ball bearings meet or exceed life requirements for most commercial applications
- Speeds up to 250 rpm
- Compact size: 1.38 inch long
- Gold
- 12, 24, 36, 48 inch standard lead lengths (longer lead lengths are available)
- Sealed units are also available (dust and light splash only)
- Flexible silver-plated copper, color-coded, Teflon® insulated lead wires
- Compatible with data bus protocols
- Also available with 6, 12, 18, and 24, 2 amp rings. Please refer to AC6023 data sheet.

Benefits

- Smooth running
- Low torque
- Compact
- Very low noise (electrical)
- Quick shipment



Typical Applications

- CCTV pan / tilt camera mounts
- Electrical test equipment
- Manufacturing and process control equipment
  - Indexing tables
  - Robotics (end-effectors, arms, vision systems, sensors)
- Exhibit / display equipment
- Medical equipment

Specifications	AC6305	AC6310	Options
Operating Speed	250 rpm*	250 rpm*	• Splash seals for dust and moisture resistance • Metal housings with and without flanges
Number of Circuits	3 @ 5 amps and 6, 9, or 12 @ 2 amps	3 @ 10 amps and 3 or 6 @ 2 amps	
Lead Lengths	12, 24, 36 and 48 inches	12, 24, 36 and 48 inches	
Lead Size / Type	2 amp, 26 gauge silver plated copper, Teflon® 5 amp, 20 gauge silver plated copper, Teflon®	2 amp, 26 gauge silver plated copper, Teflon® 10 amp,16 gauge tin plated copper, Teflon®	
Voltage	240 VAC	240 VAC	
Max Ambient Temp.	-40°C to +80°C	-40°C to +80°C	
Contact Material	Gold	Gold	
Current Rating	5 amps and 2 amps / circuit	10 amps and 2 amps / circuit	
Noise	60 milliohms max.	60 milliohms max.	

Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.

AC6305 Lead Wire Color Codes

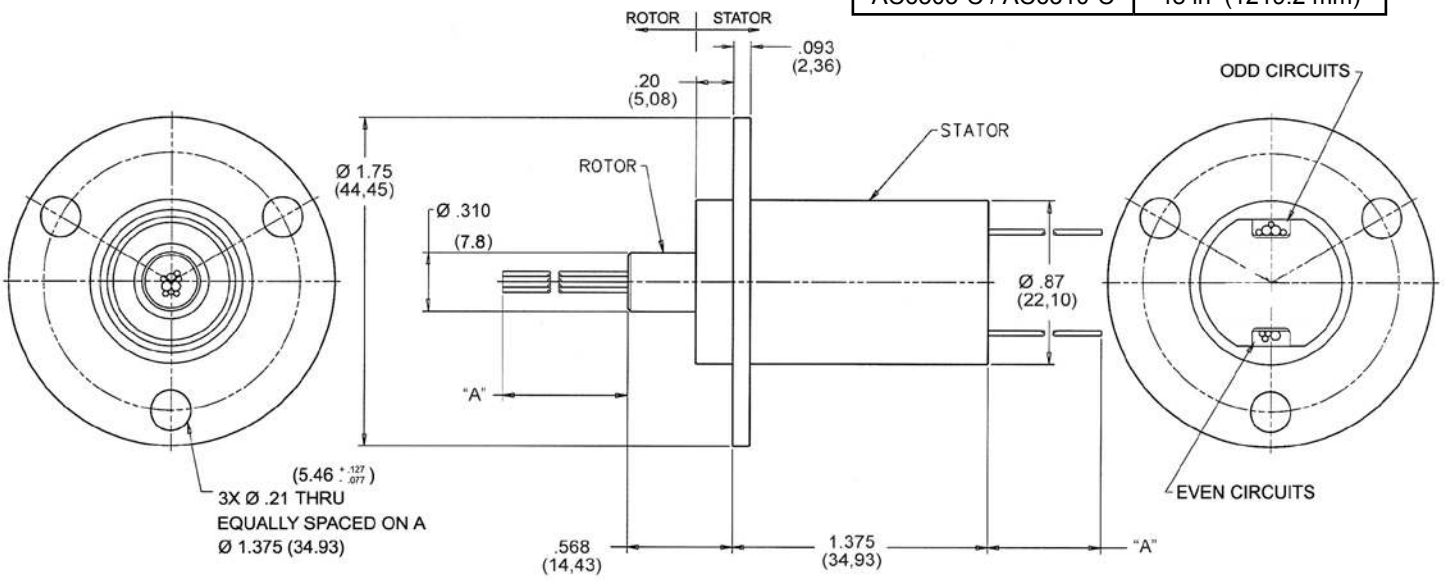
	Ring #	Color Code	Ring #	Color Code
20 AWG TAGGED LEADS	1	BLK	9	GRN
	2	BLK	10	BLU
	3	BLK	11	VIO
	4	BLK	12	GRY
	5	BRN	13	WHT
	6	RED	14	WHT-BLK
	7	ORN	15	WHT-BRN
	8	YEL		

AC6310 Lead Wire Color Codes

	Ring #	Color Code	Ring #	Color Code
16 AWG TAGGED LEADS	1	BLK	9	GRN
	2	BLK		
	3	BLK		
	4	BLK		
	5	BRN		
	6	RED		
	7	ORN		
	8	YEL		

AC6305 / AC6310 Dimensions

Part Number	"A"
AC6305 / AC6310	12 in (304.8 mm)
AC6305-A / AC6310-A	24 in (609.6 mm)
AC6305-B / AC6310-B	36 in (914.4 mm)
AC6305-C / AC6310-C	48 in (1219.2 mm)



Dimensions in inches (millimeters)

AC7094

Fiber brush slip ring capsule

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent or continuous rotation while transferring power and / or data. A slip ring is also called a rotary electrical joint, collector, commutator or swivel. A slip ring can improve system performance by simplifying operations and eliminating damage prone wires.

The AC7094 provides a compact 2.1 inch outside diameter. The AC7094 provides 5 amp circuits in 30, 36, 42 and 48 ring configurations. Similar in design to our very popular AC4598 and AC6200 series, this design features long life, fiber brush contact technology for ultimate performance in many challenging applications.

Features

- Compact 2.1 inch outside diameter
- Speeds up to 250 rpm
- Multiple circuit configurations
- Continuous rotation of power and / or data signals
- High-impact thermoplastic construction
- Gold plated rings
- Available with Ethernet

Benefits

- Transfers power, as well as analog and digital signals
- Compatible with data bus protocols
- Fiber brush technology provides long life and maintenance free operation
- Compact packaging



Typical Applications

- Precision rotary equipment
- Semiconductor handling systems
- Industrial machinery
- Robotics

AC7094 Specifications	
Operating Speed	250 rpm*
Number of Circuits	30, 36, 42 or 48
Lead Length	12 inch standard
Lead Size / Type	22 AWG
Voltage	240 VAC
Operating Temp.	-40°C to +80°C
Current Rating	5 amps / circuit
Electrical Noise	100 milliohms max.

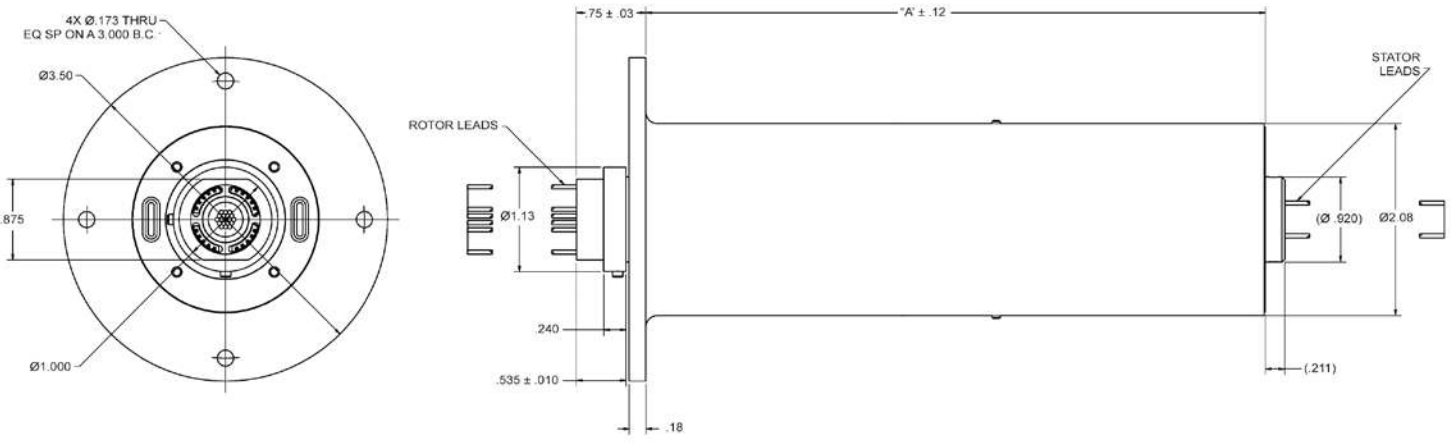
Options
• 24, 36 and 48 inch leads • Longer leads available • Available with Ethernet, contact factory

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Wire Color Code									
Ring #	Color	Ring #	Color	Ring #	Color	Ring #	Color	Ring #	Color
1	BLK	11	WHT / BLK	21	WHT / BLK / RED	31	BLU	41	WHT / BLU
2	BRN	12	WHT / BRN	22	WHT / BLK / ORN	32	VIO	42	WHT / VIO
3	RED	13	WHT / RED	23	WHT / BLK / YEL	33	GRY	43	WHT / GRY
4	ORN	14	WHT / ORN	24	WHT / BLK / GRN	34	WHT	44	WHT / BLK / BRN
5	YEL	15	WHT / YEL	25	BLK	35	WHT / BLK	45	WHT / BLK / RED
6	GRN	16	WHT / GRN	26	BRN	36	WHT / BRN	46	WHT / BLK / ORN
7	BLU	17	WHT / BLU	27	RED	37	WHT / RED	47	WHT / BLK / YEL
8	VIO	18	WHT / VIO	28	ORN	38	WHT / ORN	48	WHT / BLK / GRN
9	GRY	19	WHT / GRY	29	YEL	39	WHT / YEL		
10	WHT	20	WHT / BLK / BRN	30	GRN	40	WHT / GRN		

Part Number	Dimension “A”
AC7094-130	5.016 inch (127,4 mm)
AC7094-136	5.574 (141,6)
AC7094-142	6.132 (155,8)
AC7094-148	6.690 (169,9)

AC7094 Dimensions



Dimensions in inches

AC7036

Integrated AC6349 and AC6355 / AC7195 slip ring capsules for high circuit density

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data.

The AC7036 integrates two of our popular slip ring capsules, the AC6349 and AC6355, creating one compact assembly. Connecting hardware is used to combine these units by inserting the AC6355 / AC7195 in the bore of the AC6349. This combination provides a wide range of circuit capabilities up to 24 circuits rated at 15 amps and 36 or 56 circuits rated at 2 amps, in a compact 6.5 inch length and 3.1 inch diameter. The outer capsule features 6, 12, 18, or 24 circuits rated at 15 amps, while the inner capsule can be configured with 2 amp, 5 amp, 10 amp, or coax circuits.

Features

- Multiple circuit combinations
- High circuit density
- Precious metal contacts
- Speeds to 150 rpm
- Flying leads
- Rugged black anodized aluminum construction
- Available with Ethernet

Benefits

- Isolations between power (outer) and signal (inner)
- Tight packaging to fit the most demanding applications
- Low torque
- Built from readily available components for rapid delivery
- Rotor flange for ease of mounting



Typical Applications

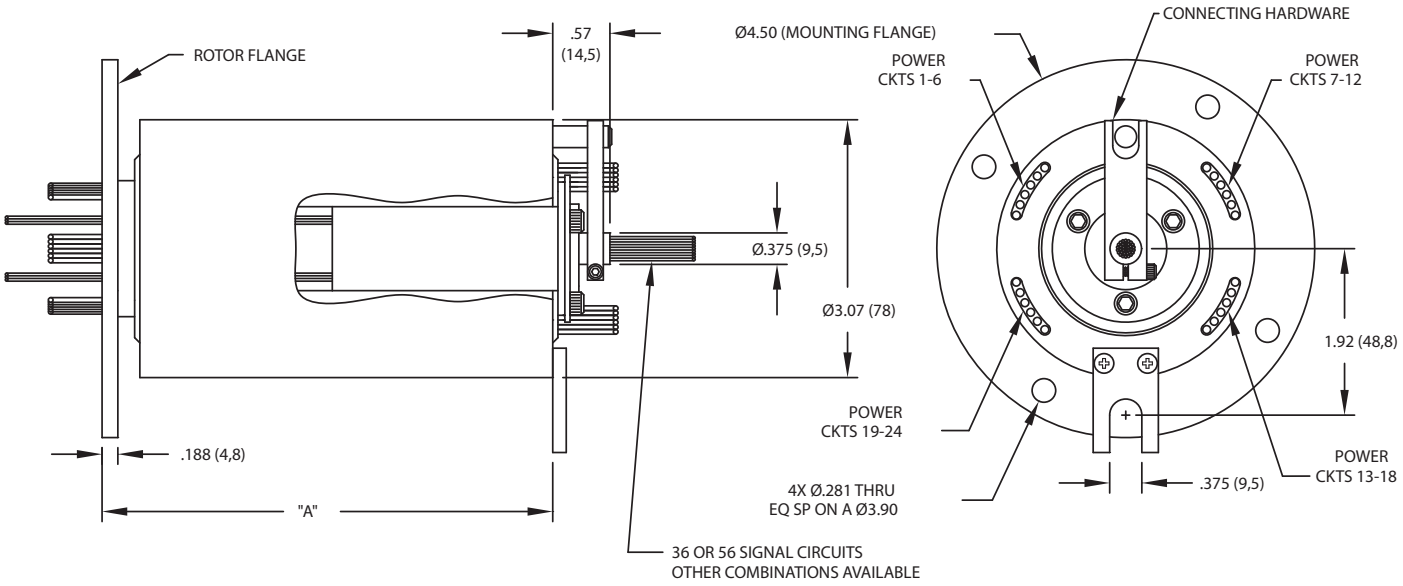
- Gimble systems
- Packaging equipment
- Rotary tables
- Motion control systems
- Robotics

AC7036 Specifications		Options
Operating Speed	150 rpm*	• Seals • Harnessing • Available with Ethernet, contact factory
Number of Circuits	Variable, refer to AC6349 and AC6355 / AC7195 data sheets	
Lead Length	20 inch minimum	
Lead Size	14 AWG outer capsule, refer to AC6355 data sheet for inner	
Voltage	440 VAC outer capsule, 240 VAC inner capsule	
Operating Temp.	-40°C to +80°C	
Contact Material	Precious metal	
Current Rating	15 amps outer capsule (AC6349) 2, 5, 10 amp inner capsule (AC6355)	
Electrical Noise	60 milliohms max.	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Part Number	Length "A"
AC7036-6	3.06 in (77,7 mm)
AC7036 - 12	4.24 in (107,7 mm)
AC7036 - 18	5.43 in (137,9 mm)
AC7036 - 24	6.62 in (168,1 mm)

AC7036 Dimensions



Dimensions in inches (millimeters)

AC7212
Integrated slip ring capsule



Typical Applications

- Gimbal systems
- Industrial machinery
- Rotary position tables
- Robotics

Description
A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and data from a stationary to a rotating structure.

The AC7212 is a highly configurable product that integrates together our AC4598 or AC6200 series products by coupling any one of the following products in the center bore:

- AC6355
- AC6023
- AC7195
- AC7203
- AC7217
- AC7188

These combinations provide a wide range of circuit capabilities that can be determined from the respective product data sheets. A flange and de-rotation tab is attached to the outer AC4598 / AC6200 capsule for convenient mounting of the assembly.

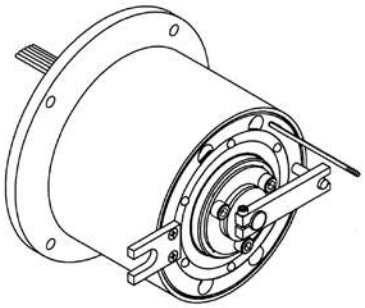
Features
- Multiple circuit combinations
- Precious metal contacts
- Speeds to 150 RPM
- Sealing to dust and light fluid splash available
- Flange for easy installation

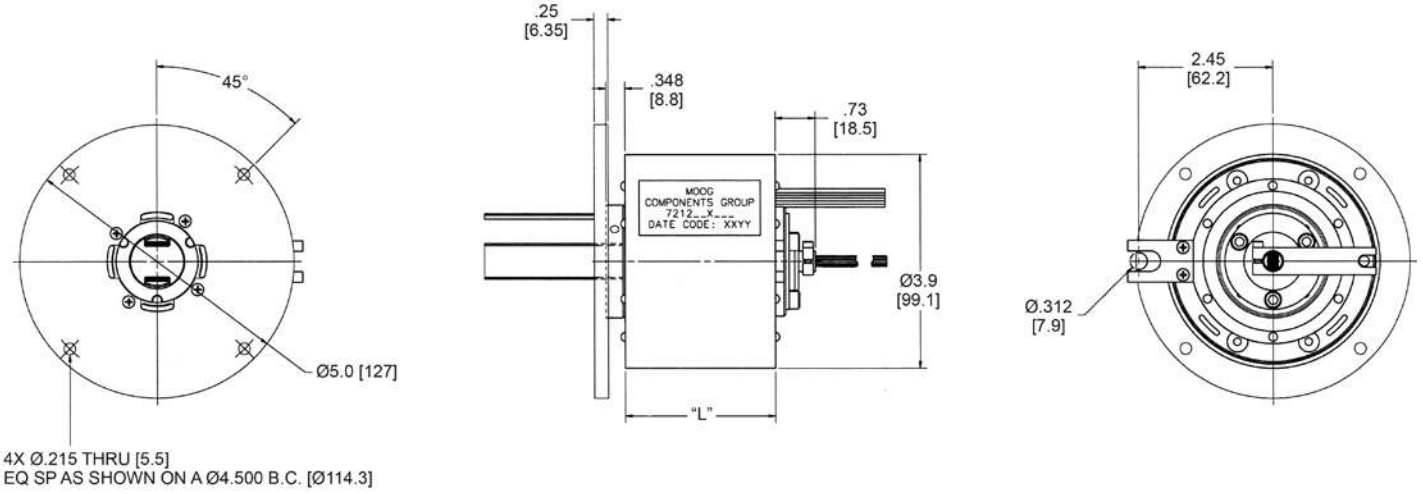
Benefits
- Isolation between power and signal circuits
- Compact package with high circuit density
- Assembled from existing components providing many possible configurations

AC7212 Specifications		Options
Operating Speed	150 rpm* continuous	• Splash seals for dust and light fluid splash • Variable lead lengths, see individual sheets for options
Circuit Options	Refer to AC4598 or AC6200 data sheets for outer capsule options and AC6355, AC6023, AC7195, AC7203, AC7188 data sheets for inner capsule options	
Voltage	Refer to individual product data sheets	
Temperature Range	-40°C to +80°C	
Contact Material	Precious metal	
Current Rating	Signal to 10 amps	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

AC7212 Dimensions





Dimensions in inches [mm]

To determine “L” dimension refer to AC4598 / AC6200 data sheet for length of the selected outer slip ring configuration

P Series

Compact slip rings

Description

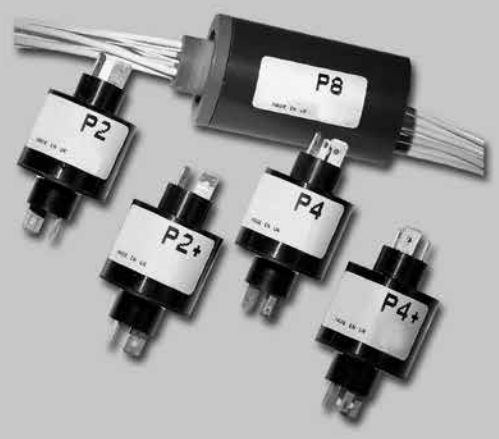
The P series slip rings are compact, cost effective mercury free slip rings designed for industrial manufacturing. The P2 has two rings, each able to carry 7 amps. The P4 has two rings rated at 7 amps and two at 2 amps. All are fully ball raced and suitable for mounting in any orientation. The P2+ and P4+ are capable of conducting 14 amps through the power circuits and in the case of the P4+, 2 amps through the 2 signal circuits. These units are ideal for applications where currents are increased due to lower distribution voltage. They are well suited for use in the food and packaging industries. The P8 Lite is capable of carrying 14 amps on each of the 8 rings. All P Series units feature gold slip rings and gold alloy brushes. Standard spade terminals or flying leads allow rapid installation.

Features

- Mercury free
- Reliable rotational connections for power, signal and data transmission
- Speeds to 600 rpm
- Fast on spade terminals or flying leads

Benefits

- Compact and robust design
- Designed for low cost
- Gold contacts
- Mount in any orientation



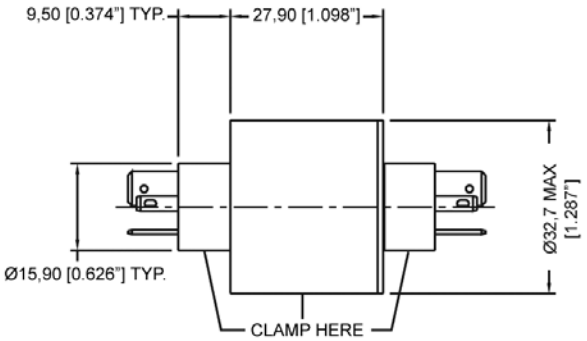
Typical Applications

- Machine tools
- Heated rollers
- Food manufacturing
- Chemical processing
- Packaging

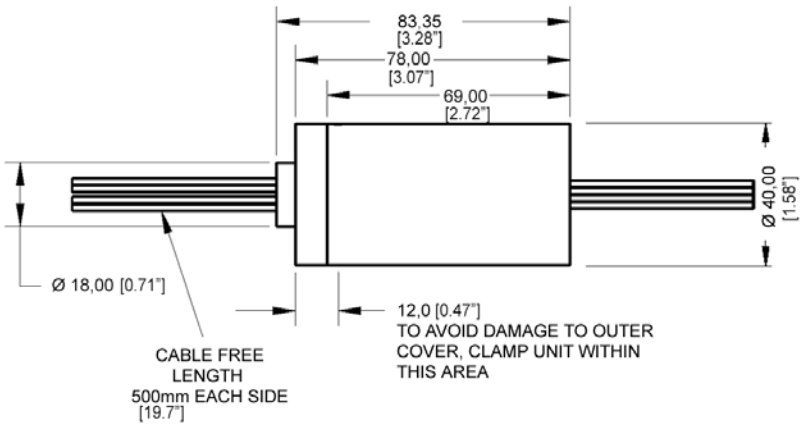
P Series Specifications					
	P2	**P4**	**P2+**	**P4+**	**P8 Lite**
Part Number	80050-957 / 1028300-2	80050-958 / 1028300-4	80050-956	80050-955	80059-950
Maximum Speed	400 rpm	400 rpm	400 rpm	400 rpm	600 rpm
Power Circuits	2 @ 7 amps	2 @ 7 amps	2 @ 14 amps	2 @ 14 amps	8 @ 14 amps
Signal Circuits	-	2 @ 2 amps	-	2 @ 2 amps	-
Terminals Power	0.8 x 6.35	0.8 x 6.35 0.8 x 2.80	0.8 x 6.35	0.8 x 6.35 0.8 x 2.80	ETFE Flying Leads Power 16 AWG [PARA]
Mounting	As Shown On Drawing				
Maximum Voltage	240 VAC	240 VAC	240 VAC	240 VAC	240 VAC
Temperature Range	-20°C to +90°C	-20°C to +90°C	-20°C to +90°C	-20°C to +90°C	-20°C to +80°C
Sealing	-	-	-	-	IP22

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

P Series Dimensions



P2, P2+, P4, P4+ Series



P8 Lite Series

Dimensions in millimeters [inches]

Ethernet and High Definition Slip Rings

High performance slip ring solutions for reliable Ethernet transmission

Description

Ethernet, developed in 1976, has become the primary LAN technology and serves as the basis for the IEEE 802.3 standard. Ethernet provides significant advantage as a robust, inexpensive and widely supported format leading to its implementation in a wide variety of data communication networks.

Moog's Ethernet slip ring solutions have been developed to provide reliable products to allow transfer of the Ethernet protocol through a rotating interface. The innovative designs meet the challenge of matching impedance, controlling crosstalk and managing losses. Wide range of product solutions are offered with combinations of data and power in multiple mechanical configurations to meet your application needs.

Advantages

- Configured for Ethernet transmission
- RJ45 connector for direct plug-and-play
- High performance contact technology
- Available with multiple Ethernet, power and signal combinations

Selecting A Slip Ring

There are three important parameters that must be considered when incorporating a slip ring in an Ethernet communication line:

1. Insertion loss
2. Return loss
3. Crosstalk

These parameters establish the signal to noise ratio of the transmission line and ultimately the capability of the slip ring to handle critical data communication. Equally important is the durability of the contacts to maintain integrity over time for long term performance to specification. As the world's leading manufacturer of slip rings, Moog slip rings are uniquely suited for critical Ethernet applications. Founded over 50 years ago, the company has developed products for critical applications in military, space, medical and industrial environments. Our industrial slip ring products are based on our years of material and design experience and provide unrivaled contact technologies. To respond to market demand for engineered Ethernet solutions, Moog has developed an extensive line of Ethernet products based on our popular capsule and through-bore products.

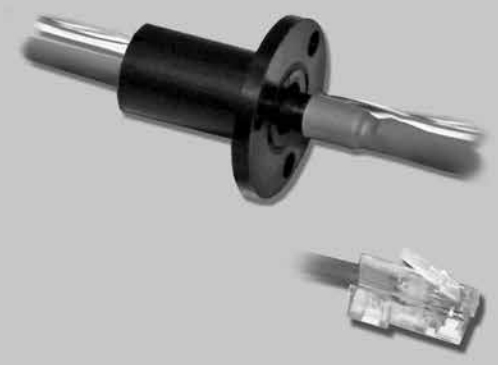


Typical Applications

- 10 / 100 / 1000BaseT transmission
- Motion control
- Video over Ethernet
- CCTV IP-surveillance

SRA-73799 / SRA-73806

Ethernet slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and data from a stationary to a rotating structure.

The SRA-73799 and SRA-73806, derivative of our very popular SRA-73625, provides 100BaseT or 1000BaseT Ethernet communication in combination with 2 amp, signal / power connections. The Ethernet cable is supplied terminated with a RJ45 jack, ready to connect.

The SRA-73799 and SRA-73806 utilizes gold-on-gold contact technology with very low electrical noise for unparalleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Fully compliant with IEEE 802.3 formats
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Speeds up to 250 RPM continuous
- 12, 24, 36 and 48 inch lead lengths
- Supplied with 100BaseT or 1000BaseT Ethernet and 2 amp circuits

Benefits

- Compact
- Plug-and-play Ethernet connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- CCTV IP-surveillance

Ethernet and High Definition Slip Ring Capsules

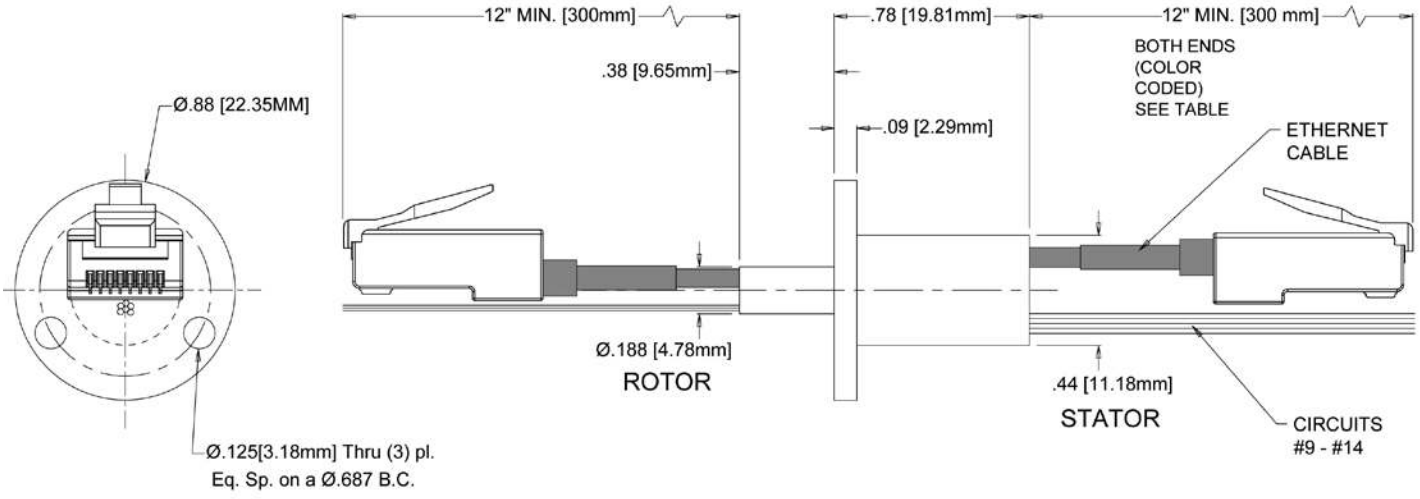
SRA-73799 / SRA-73806 Specifications		Options
Operating Speed	250 rpm* continuous	• Lead lengths of 12, 24, 36 and 48 inches
Ethernet Connections	10 / 100BaseT and 1000BaseT	
Circuit Options	Ethernet plus, 2 amp contacts	
Voltage	240 VAC on power circuits	
Temperature Range	-40°C to +80°C	
Contact Material	Gold-on-gold	
Current Rating	2 amps	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

SRA-73799 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	1000BaseT Ethernet Cable	9	BLK
2		10	BRN
3		11	RED
4		12	ORN
5		13	YEL
6		14	GRN
7			
8			

SRA-73806 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	100BaseT Ethernet Cable	9	YEL
2		10	GRN
3		11	BLU
4		12	VIO
5	BLK	13	GRY
6	BRN		
7	RED		
8	ORN		

SRA-73799 / SRA-73806 Dimensions



Dimensions in inches (mm)

SRA-73798 / SRA-73805

Ethernet slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and data from a stationary to a rotating structure.

The SRA-73798 and SRA-73805 provide 100BaseT or 1000BaseT Ethernet communication in combination with 2 amp, signal / power connections. The Ethernet cable is supplied terminated with a RJ45 jack, ready to connect.

The SRA-73798 and SRA-73805 utilize gold-on-gold contact technology with very low electrical noise for unparalleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Fully compliant with IEEE 802.3 formats
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Speeds up to 250 RPM continuous
- 12, 24, 36 and 48 inch lead lengths
- Supplied with 100BaseT or 1000BaseT Ethernet and 2 amp circuits

Benefits

- Compact
- Plug-and-play Ethernet connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- CCTV IP-surveillance

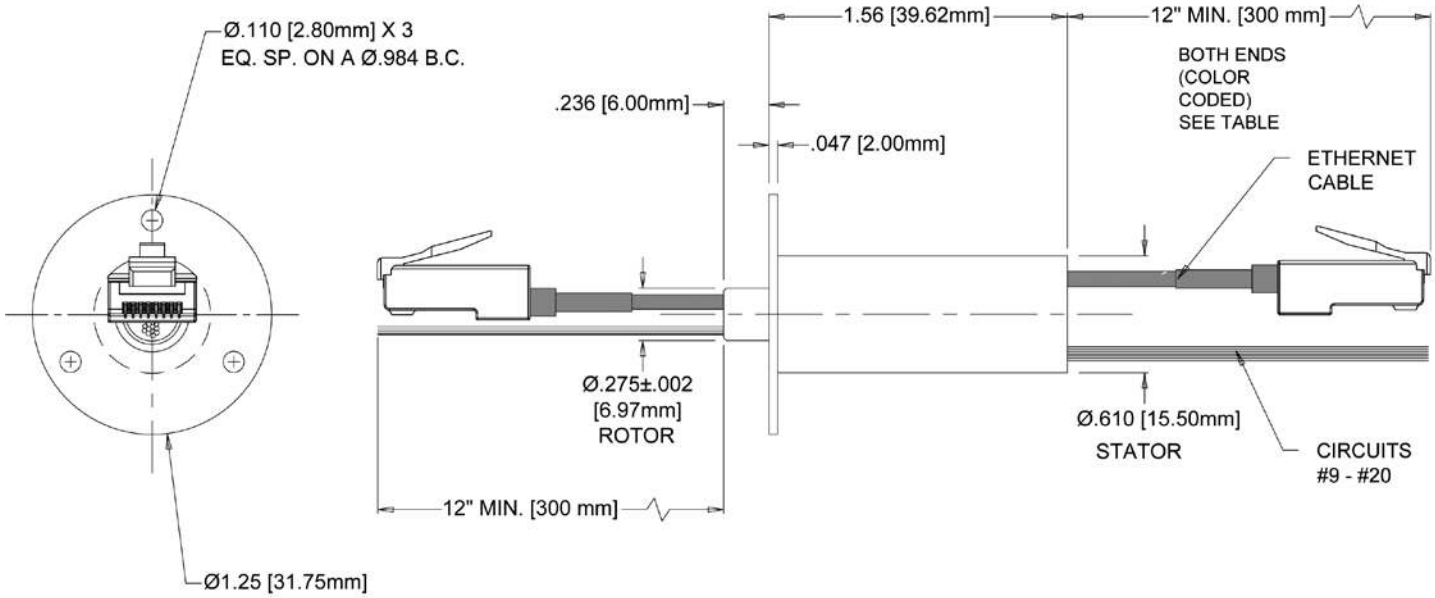
SRA-73798 / SRA-73805 Specifications		Options
Operating Speed	250 rpm* continuous	• Standard 12 inch lead lengths, optional 24, 36 and 48 inch available
Ethernet Connections	10 / 100BaseT and 1000BaseT	
Circuit Options	Ethernet plus, 2 amp contacts	
Voltage	210 VAC on power circuits	
Temperature Range	-40°C to +80°C	
Contact Material	Gold-on-gold	
Current Rating	2 amps	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

SRA-73798 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	1000BaseT Ethernet Cable	11	RED
2		12	ORN
3		13	YEL
4		14	GRN
5		15	BLU
6		16	VIO
7		17	GRY
8		18	WHT
9	BLK	19	WHT-BLK
10	BRN	20	WHT-BRN

SRA-73805 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	100BaseT Ethernet Cable	11	BLU
2		12	VIO
3		13	GRY
4		14	WHT
5	BLK	15	WHT-BLK
6	BRN	16	WHT-BRN
7	RED		
8	ORN		
9	YEL		
10	GRN		

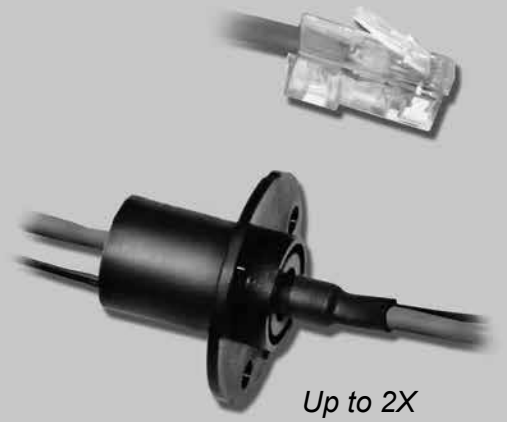
SRA-73798 / SRA-73805 Dimensions



Dimensions in inches (mm)

AC7203

Ethernet slip ring capsule



Up to 2X

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and data from a stationary to a rotating structure.

The AC7203, a derivative of our very popular AC6023 series, provides Ethernet communication in combination with 2 amp, 5 amp and 10 amp power connections. Options are available for both 10 / 100BaseT and 1000BaseT (Gigabit Ethernet). The Ethernet cable is supplied terminated with a RJ45 jack, ready to connect.

The AC7203 utilizes gold-on-gold contact technology with very low electrical noise for unparalleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Fully compliant with IEEE 802.3 formats
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Speeds up to 250 RPM continuous
- 12, 24, 36 and 48 inch lead lengths
- Available with various combinations of Ethernet, 2 amp, 5 amp and 10 amp connections
- Sealing to dust and light fluid splash available

Benefits

- Compact
- Plug-and-play Ethernet connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- CCTV IP-surveillance

Ethernet and High Definition Slip Ring Capsules

AC7203 Specifications	
Operating Speed	250 rpm* continuous
Ethernet Connections	10 / 100BaseT and 1000BaseT
Circuit Options	Ethernet plus, 2 amp, 5 amp and 10 amp
Voltage	240 VAC on power circuits
Temperature Range	-40°C to +80°C
Contact Material	Gold-on-gold
Current Rating	2 to 10 amps

Options

- Splash seals for dust and light fluid splash
- Standard 12 inch lead lengths, optional 24, 36 and 48 inch available
- No flange
- Metal housing

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

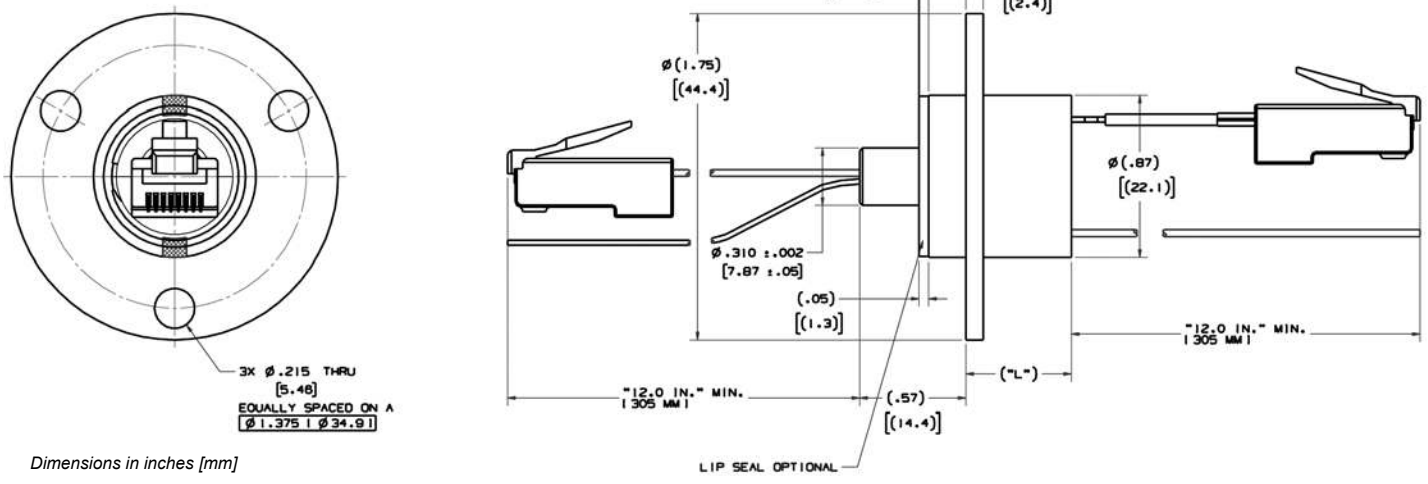
Circuit Table

Part #	Continuous Current (amps)			Ethernet	
	2	5	10	100BaseT	1000BaseT (or 2 100BaseT)
AC7203-6				1	
AC7203-12	6			1	
AC7203-12V		2		1	
AC7203-12G					1
AC7203-18	12			1	
AC7203-18V	6	2		1	
AC7203-18X	2		2	1	
AC7203-18G	6				1
AC7203-18GV		2			1
AC7203-24	18			1	
AC7203-24V	12	2		1	
AC7203-24X	8		2	1	
AC7203-24G	12				1
AC7203-24GV	6	2			1
AC7203-24GX	2		2		1
AC7203-24GG					2

Part Number	Length "L"
AC7203-6	.57 inch (14.5 mm)
AC7203-12	.84 inch (21.3 mm)
AC7203-18	1.11 inch (28.2 mm)
AC7203-24	1.38 inch (35.1 mm)

NOTE: Contact factory for details on wire colors

AC7203 Dimensions



Dimensions in inches [mm]

AC7188

High Definition (HD) video slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring video, power and data from a stationary to a rotating structure.

The AC7188, a derivative of our very popular AC6023 series, provides HD-SDI video communication in combination with 2 amp and 5 amp power or data connections. RG179 coax cable is provided for video transfer. The coax cable is supplied terminated with a BNC connector, ready to install.

The AC7188 utilizes gold-on-gold contact technology with very low electrical noise for un-paralleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Compatible with:
  - SMPTE 259 M (SD-SDI)
  - SMPTE 292 M (HD-SDI)
- Speeds up to 250 RPM
- 12, 24, 36 and 48 inch lead lengths
- Available with various combinations of coax, 2 amp and 5 amp connections
- Sealing to dust and light fluid splash available

Benefits

- Compact
- Plug-and-play coax connection

Typical Applications

- Security cameras
- Rotating video displays
- Camera jibs
- Pan / tilt video camera heads

Ethernet and High Definition Slip Ring Capsules

AC7188 Specifications	
Operating Speed	250 rpm*
Video Connections	HD-SDI
Circuit Options	Video, 2 amp and 5 amp
Voltage	210 VDC / 240 VAC on standard circuits
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 amp (28 AWG) and 5 amp (20 AWG)

Options

- Seals for dust and light fluid splash
- Lead lengths of 12, 24, 36 and 48 inches
- Flange / no flange
- Metal housing

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Circuit Table

Part #	Continuous Current (amps)		HD-SDI
	2	5	RG179
AC7188-18	8		1
AC7188-18V	2	2	1
AC7188-24	14		1
AC7188-24V	8	2	1

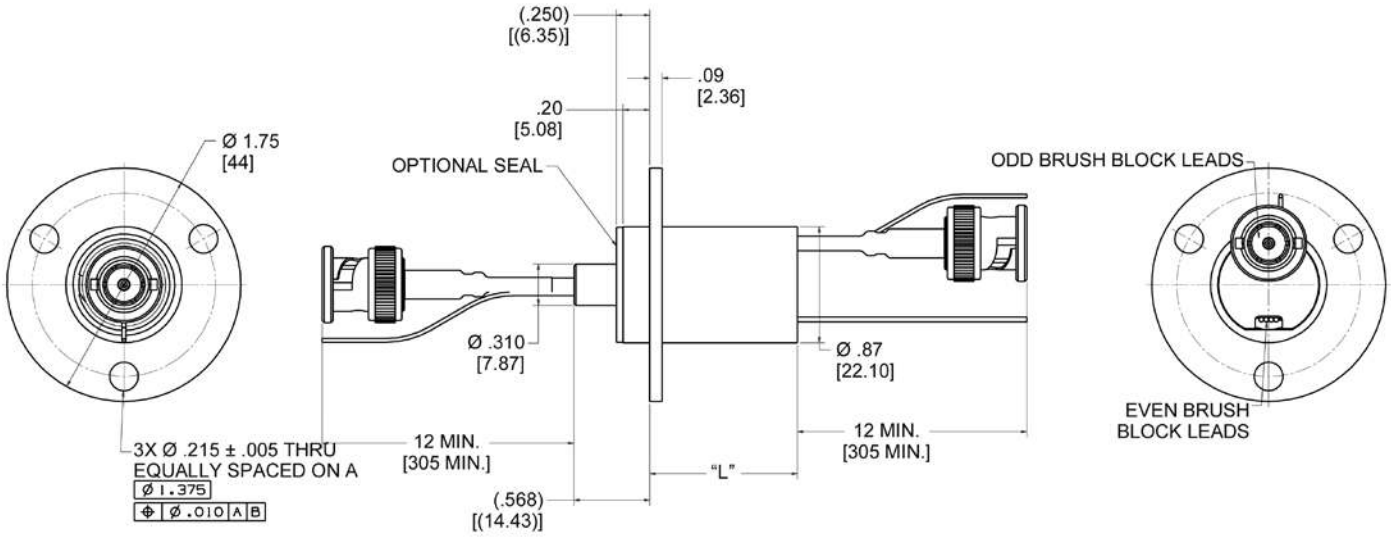
Part Number	Length "L"
AC7188-18 / 18V	1.105 inch (28.1 mm)
AC7188-24 / 24V	1.375 inch (34.9 mm)

Part Number	Lead Length
AC7188	12 in (304.8 mm)
AC7188-A	24 in (609.6 mm)
AC7188-B	36 in (914.4 mm)
AC7188-C	48 in (1219.2 mm)

Lead Wire

AC7188-18		AC7188-18V		AC7188-24		AC7188-24V	
Ring #	Color / AWG	Ring #	Color / AWG	Ring #	Color / AWG	Ring #	Color / AWG
1	BLK / 28	1	BLK / 20 AWG	1	BLK / 28	1	BLK / 20
2	BRN / 28	2	ORN / 28 AWG	2	BRN / 28	2	BLK / 20
3	RED / 28 AWG	3	COAX	3	RED / 28	3	BLU / 28
4	ORN / 28 AWG	4	YEL / 28 AWG	4	ORN / 28	4	VIO / 28
5	COAX	5	BLK / 20 AWG	5	YEL / 28	5	COAX
6	YEL / 28 AWG			6	GRN / 28	6	GRY / 28
7	GRN / 28 AWG			7	BLU / 28	7	WHT / 28
8	BLU / 28 AWG			8	VIO / 28	8	WHT / BLK / 28
9	VIO / 28 AWG			9	COAX	9	WHT / BRN / 28
				10	GRY / 28	10	WHT / RED / 28
				11	WHT / 28	11	WHT / ORN / 28
				12	WHT / BLK / 28		
				13	WHT / BRN / 28		
				14	WHT / RED / 28		
				15	WHT / ORN / 28		

AC7188 Dimensions



Dimensions in inches [mm]

SRA-73810

High Definition (HD) video slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring video, power and data from a stationary to a rotating structure.

The SRA-73810, provides HD-SDI communication in combination with 12, 2 amp connections. RG179 coax cable is provided for video transfer. The coax cable is supplied terminated with BNC connectors, ready to install.

The SRA-73810 utilizes gold-on-gold contact technology with very low electrical noise for un-paralleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Compatible with:
  - SMPTE 259 M (SD-SDI)
  - SMPTE 292 M (HD-SDI)
- Speeds up to 250 RPM
- 12, 24, 36 and 48 inch lead lengths
- Available with one coax, and 12, 2 amp connections

Benefits

- Compact
- Plug-and-play coax connection

Typical Applications

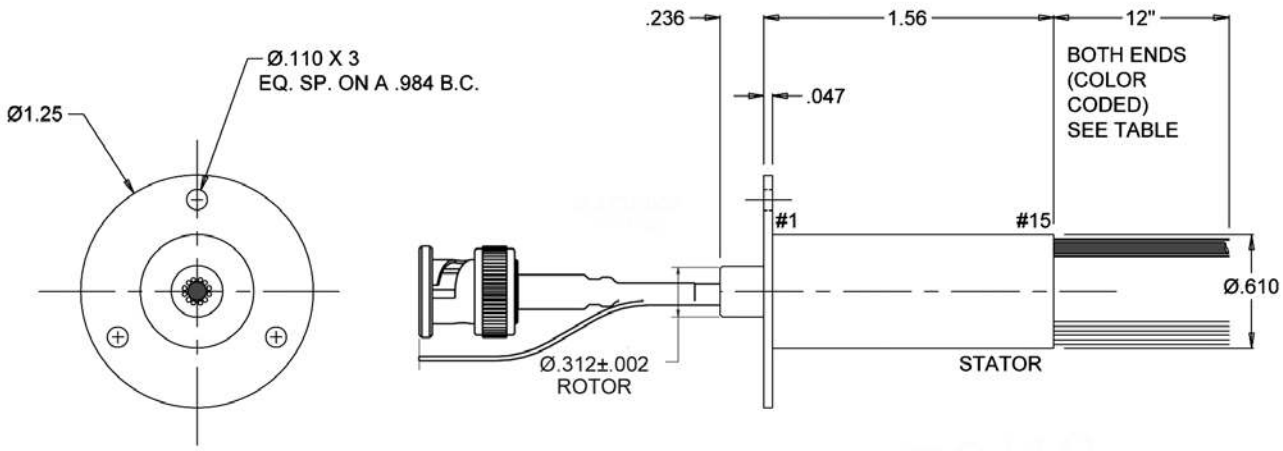
- Security cameras
- Rotating video displays
- Camera jibs
- Pan / tilt video camera heads

SRA-73810 Specifications		Options
Operating Speed	250 rpm*	• Lead lengths of 12, 24, 36 and 48 inches • Flange / no flange
Video Connections	HD-SDI / SD-SDI	
Circuit Options	Video, 12, 2 amp	
Voltage	210 VDC / 240 VAC on standard circuits	
Temperature Range	-40°C to +80°C	
Contact Material	Gold	
Current Rating	2 amp (28 AWG)	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Lead Wire Color Code			
Ring #	**Color Code**	**Ring #**	**Color Code**
1	BLK	9	GRY
2	BRN	10	WHT
3	RED	11	WHT-BLK
4	ORN	12	WHT-BRN
5	YEL	13	SHIELD
6	GRN	14	COAX
7	BLU	15	SHIELD
8	VIO		

SRA-73810 Dimensions



Dimensions in inches

SRA-73811

High Definition (HD) dual channel video slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring video, power and data from a stationary to a rotating structure.

The SRA-73811, provides dual HD-SDI communication in combination with 4, 2 amp connections. RG179 coax cable is provided for video transfer. The coax cable is supplied terminated with BNC connectors, ready to install.

The SRA-73811 utilizes gold-on-gold contact technology with very low electrical noise for un-paralleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Compatible with:
  - SMPTE 259 M (SD-SDI)
  - SMPTE 292 M (HD-SDI)
- Speeds up to 250 RPM
- 12, 24, 36 and 48 inch lead lengths
- Available with two coax, and 4, 2 amp connections

Benefits

- Compact
- Plug-and-play coax connection

Typical Applications

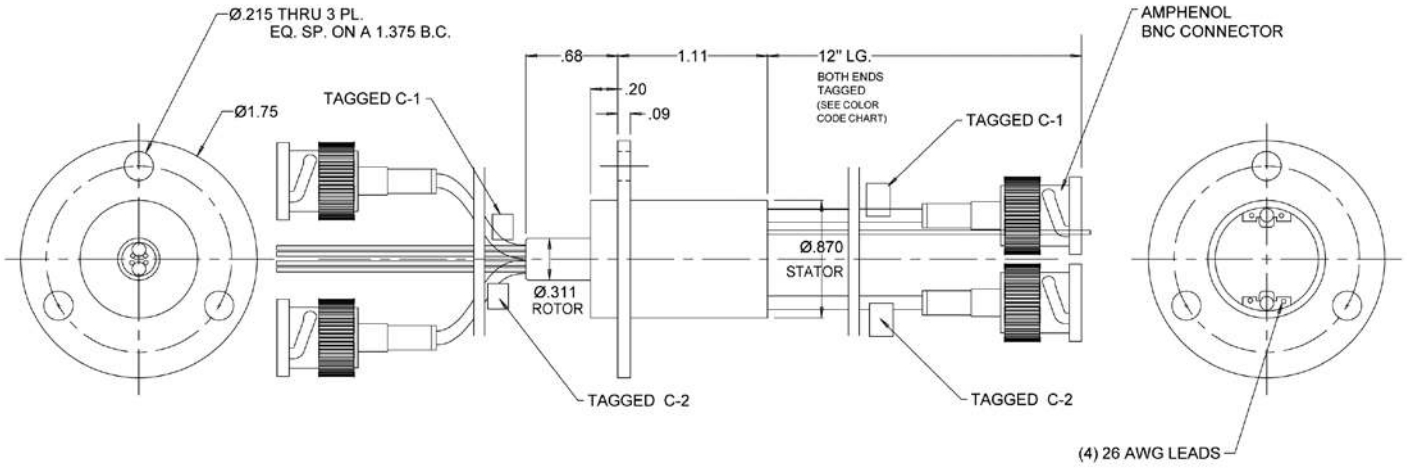
- Security cameras
- Rotating video displays
- Camera jibs
- Pan / tilt video camera heads

SRA-73811 Specifications		Options
Operating Speed	250 rpm*	• Lead lengths of 12, 24, 36 and 48 inches • Flange / no flange
Video Connections	HD-SDI / SD-SDI	
Circuit Options	2 Video, 4, 2 amp	
Voltage	210 VDC / 240 VAC on standard circuits	
Temperature Range	-40°C to +80°C	
Contact Material	Gold	
Current Rating	2 amp (26 AWG)	

Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.

Lead Wire Color Code			
Ring #	**Color Code**	**Tag #**	**Circuit #**
1	SHIELD	C - 1	1
2	COAX		
3	SHIELD		
4	BLK	-	2
5	BRN	-	3
6	RED	-	4
7	ORN	-	5
8	SHIELD	C - 2	6
9	COAX		
10	SHIELD		

SRA-73811 Dimensions



Dimensions in inches

AC7195

Ethernet and High Definition (HD) video slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring video, power and data from a stationary to a rotating structure.

The AC7195, a derivative of our very popular AC6355 series, provides Ethernet and HD-SDI video communication in combination with 2 amp, 5 amp and 10 amp power or data connections and analog coax connections. The Ethernet cable is supplied terminated with a RJ45 connector, and the HD-SDI cable is terminated with a BNC connector, ready to install.

The AC7195 utilizes gold-on-gold contact technology with very low electrical noise for un-paralleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Compliant with IEEE 802.3 formats
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Compatible with HD-SDI
- Speeds up to 250 RPM
- 24 and 48 inch lead lengths
- Multiple circuit configurations available
- Sealing to dust and light fluid splash available

Benefits

- Compact
- Plug-and-play Ethernet and HD-SDI video connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- High definition video security
- Pan / tilt systems
- Rotating high definition video displays

Ethernet and High Definition Slip Ring Capsules

AC7195 Specifications	
Operating Speed	250 rpm*
Ethernet Connections	10 / 100BaseT and 1000BaseT
video Connections	HD-SDI, 50 / 75 ohm coax
Circuit Options	Ethernet plus coax, 2 amp, 5 amp and 10 amp
Voltage	240 VAC on power circuits
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 to 10 amps

Options

- Splash seals for dust and light fluid splash
- Standard 24 inch lead lengths, optional 48 inch available
- No flange
- Metal housing
- IP 65 rated slip ring available (see P/N AC7356 for dimensions)

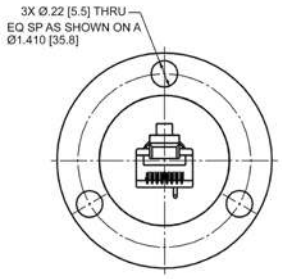
**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

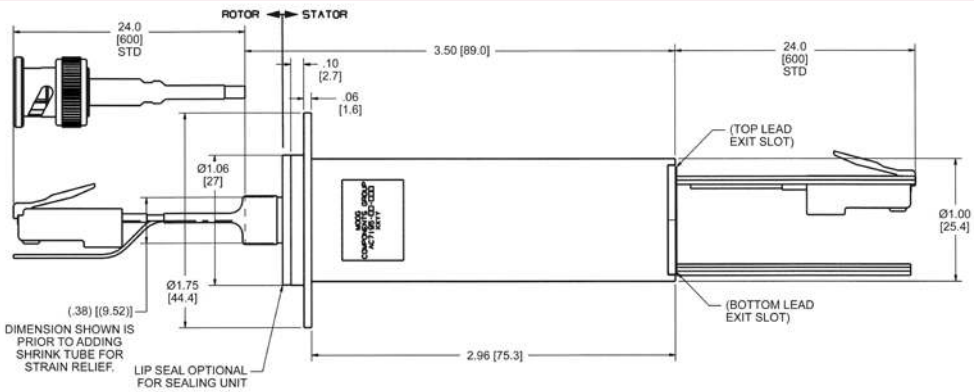
Circuit Table

Part #	Continuous Current (amps)			Coaxial			Ethernet
	2	5	10	RG178	RG179	HD-SDI	1000BaseT (or 2 100BaseT)
AC7195-CC	23			4			1
AC7195-CG	20			2			2
AC7195-CH	23			2		1	1
AC7195-CK	23			2	2		1
AC7195-CN	33			2			1
AC7195-CV	25	4		2			1
AC7195-CX	25		2	2			1
AC7195-GG	17						3
AC7195-GH	20					1	2
AC7195-GK	20				2		2
AC7195-GN	30						2
AC7195-GV	22	4					2
AC7195-GX	22		2				2
AC7195-HH	23					2	1
AC7195-HK	23				2	1	1
AC7195-HN	33					1	1
AC7195-HV	25	4				1	1
AC7195-HX	25		2			1	1
AC7195-KK	23				4		1
AC7195-KN	33				2		1
AC7195-KV	25	4			2		1
AC7195-KX	25		2		2		1
AC7195-NN	43						1
AC7195-NV	35	4					1
AC7195-NX	35		2				1
AC7195-VV	27	8					1
AC7195-VX	27	4	2				1
AC7195-XX	27		4				1

NOTE: Contact factory for details on wire colors

AC7195 Dimensions





Dimensions in inches [mm]

AC7217

Ethernet and High Definition (HD) video slip ring capsule



Up to 3X

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring video, power and data from a stationary to a rotating structure.

The AC7217, a derivative of our very popular AC6355 series, provides Ethernet and HD-SDI video communication in combination with 2 amp, 5 amp and 10 amp power or data connections and analog coax connections. The Ethernet cable is supplied terminated with a RJ45 connector, and the HD-SDI cable is terminated with a BNC connector, ready to install.

The AC7217 utilizes gold-on-gold contact technology with very low electrical noise for unparalleled performance and provides functional life that exceeds any competitive slip ring.

Features

- Compliant with IEEE 802.3 formats:
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Compatible with HD-SDI
- Speeds up to 250 RPM
- 24 and 48 inch lead lengths
- Multiple circuit configurations available
- Sealing to dust and light fluid splash available

Benefits

- Compact
- Plug-and-play Ethernet and HD-SDI video connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- High definition video security
- Pan / tilt systems
- Rotating high definition video displays

Ethernet and High Definition Slip Ring Capsules

AC7217 Specifications	
Operating Speed	250 rpm*
Ethernet Connections	10 / 100BaseT and 1000BaseT
Video Connections	HD-SDI, 50 / 75 ohm coax
Circuit Options	Ethernet plus, coax, 2 amp, 5 amp and 10 amp
Voltage	240 VAC on power circuits
Temperature Range	-40°C to +80°C
Contact Material	Gold
Current Rating	2 to 10 amps

Options

- Seals for dust and light fluid splash
- Standard 24 inch leads, optional 48 inch
- No flange
- Metal housing
- IP 65 rated slip ring available (see P/N AC7356 for dimensions)

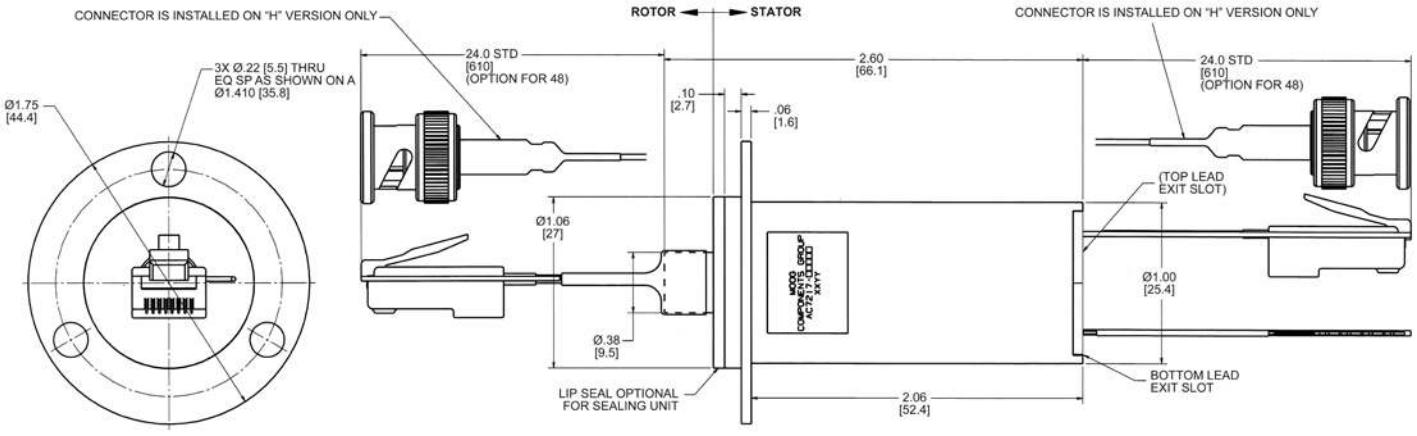
**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Circuit Table

Part #	Continuous Current (amps)			Coaxial			Ethernet
	2	5	10	RG178	RG179	HD-SDI	1000BaseT (or 2 100BaseT)
AC7217-C	13			2			1
AC7217-H	13					1	1
AC7217-N	23						1
AC7217-G	10						2
AC7217-K	13				2		1
AC7217-V	15	4					1
AC7217-X	15		2				1

NOTE: Contact factory for details on wire colors

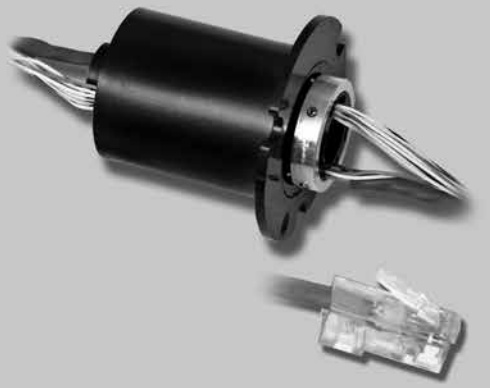
AC7217 Dimensions



Dimensions in inches [mm]

SRA-73801 / SRA-73808

Ethernet slip ring capsule



Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and data from a stationary to a rotating structure.

The SRA-73801 and SRA-73808, derivatives of our very popular SRA-73683, provides Ethernet communication in combination with 2 amp, signal / power connections. The Ethernet cable is supplied terminated with a RJ45 jack, ready to connect.

The SRA-73801 and SRA-73808 utilize gold-on-gold contact technology with very low electrical noise for unparalleled performance and provides functional life that exceeds any competitive slip ring. This unit provides a 1/2 inch through-bore for shaft mounting and a compact 1-3/8 inch outside diameter for minimal space applications.

Features

- Fully compliant with IEEE 802.3 formats
  - 10BaseT
  - 100BaseTx
  - 100BaseT2
  - 1000BaseT
- Speeds up to 120 RPM continuous
- 12, 24, 36 and 48 inch lead lengths
- Supplied with 1000BaseT Ethernet and 12, 2-amp circuits

Benefits

- Compact
- Plug-and-play Ethernet connection

Typical Applications

- Video over Ethernet
- Motor control
- POE (Power-Over-Ethernet)
- CCTV IP-surveillance

Ethernet and High Definition Slip Ring Capsules

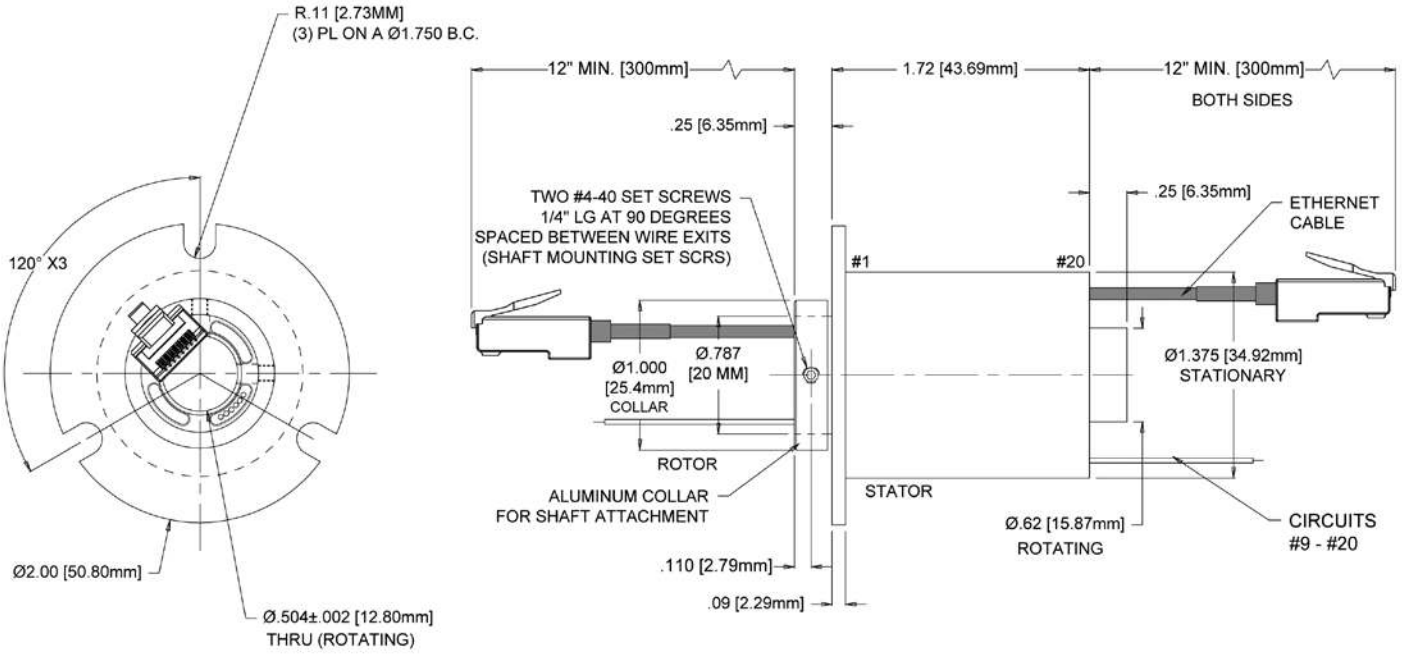
SRA-73801 / SRA-73808 Specifications		Options
Operating Speed	250 rpm* continuous	• Lead lengths of 12, 24, 36 and 48 inches
Ethernet Connections	10 / 100BaseT and 1000BaseT	
Circuit Options	Ethernet plus, 2 amp contacts	
Voltage	210 VDC on power circuits	
Temperature Range	-40°C to +80°C	
Contact Material	Gold	
Current Rating	2 amps	

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

SRA-73801 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	1000BaseT Ethernet Cable	11	RED
2		12	ORG
3		13	YEL
4		14	GRN
5		15	BLU
6		16	VIO
7		17	GRY
8		18	WHT
9	BLK	19	WHT-BLK
10	BRN	20	WHT-BRN

SRA-73808 Lead Wire Color			
Ring #	Color Code	Ring #	Color Code
1	100BaseT Ethernet Cable	11	BLU
2		12	VIO
3		13	GRY
4		14	WHT
5	BLK	15	WHT-BLK
6	BRN	16	WHT-BRN
7	RED		
8	ORN		
9	YEL		
10	GRN		

SRA-73801 / SRA-73808 Dimensions



Dimensions in inches [mm]

Ethernet Through-bore Slip Ring Capsule Options

Moog also offers Ethernet capability in the following through-bore slip ring capsules:

AC6438
1/2 inch through-bore miniature slip ring capsule

AC6349
1 inch through-bore various circuit configurations

AC4598
10 amp per circuit 1-1/2 inch through-bore

AC6200
1-1/2 inch through-bore 12, 24, 36 and 48 circuit versions

AC6428
1-3/8 inch through-bore in 60, 72, 84 and 96, 2 amp circuit versions

AC6429
1-3/8 inch through-bore in 48, 2 amp circuits and 6 or 12, 10 amp circuits

AC6275
2-3/4 inch through-bore

Please refer to the data sheets for additional information and contact factory for details.

PH Series

Description

Suitable for industrial applications such as general purpose instrumentation and testing, the PH series rugged design makes it an optimum choice for adverse operating conditions. Continuous silver connection ensuring minimal thermal error making this design compatible with thermocouple and strain gauge instrumentation.

Quick and easy to install, these units are available with either 8 or 12 circuits. Both options operate at speeds up to 20,000 rotations per minute.

Features

- Optimum for adverse operating conditions
- Continuous silver connection ensuring minimal thermal error
- Compatible with the thermocouple and strain gauge instrumentation
- Quick and easy to install
- Available with either 8 or 12 circuits
- Speeds up to 20,000 rotations per minute

Benefits

- Compact size
- Low drive torque requirement



Typical Applications

- Test apparatus for thermocouples and strain gages
- General purpose instrumentation and testing

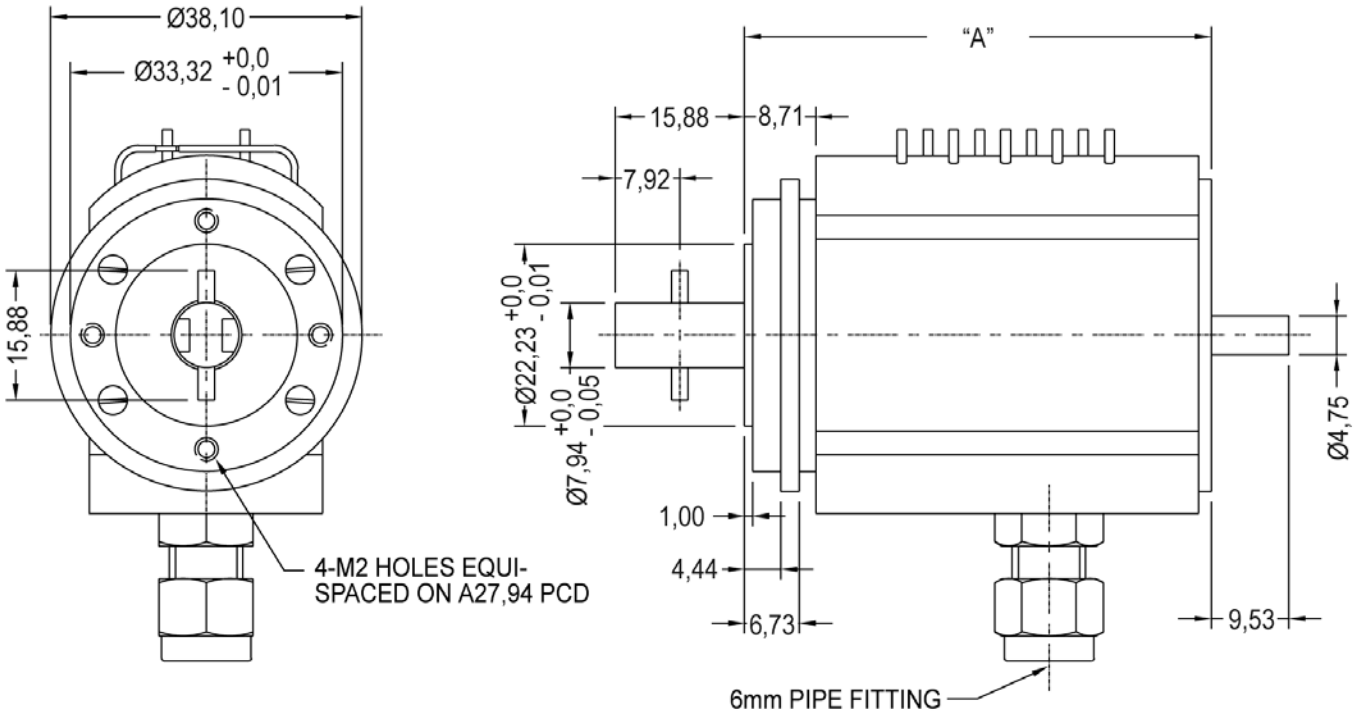
PH Series Specifications	
Terminals	Silver
Mounting	Flange mounting - 4 holes M2
Maximum Voltage	50 volts
Temperature Range	-20ºC to +90ºC
Maximum Current	2 amps
Cooling Air Pressure	1.4kg / cm2

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Note: *Operation at maximum rotational speed requires cooling air to be supplied through the inlet and outlet ports provided.*

Series	Part Number	Number of Circuits	Length (A)	Max. Speed RPM
PH 08	80042-950	8	57,15 mm	20.000
PH 12	80043-950	12	69,85 mm	20.000

PH Series Dimensions



Dimensions in millimeters

AC3757

Miniature slip ring assembly

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transferring power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, commutator, collector, swivel or a rotary joint.

The AC3757 high speed slip ring provides 36 circuits and operational speeds up to 6,000 rpm. Our fiber brush technology minimizes contact wear and resultant debris while it extends operational life.

Features

- 36 circuits
- High speed performance with customer's cooling systems:
  - 4,000 rpm without cooling
  - 6,000 rpm with gas cooling (nitrogen)
- Thermocoupled leads are available
- Low noise. The low contact force of the fiber brush design reduces resistance (noise) while providing superior power and data transfer capability.
- Cooling tubes

Benefits

- Fiber brush technology. The sliding electrical contacts used in the AC3757 slip ring features our fiber brush technology to provide these benefits:
  - Low contact force per fiber
  - Low contact wear rates
  - Contact surfaces that do not require lubrication
  - Ability to perform in vacuum and varied ambient conditions
- Improved system performance. Slip rings can improve mechanical performance, simplify system operation and eliminate damage-prone wires dangling from movable joints.



Typical Applications

This slip ring provides high speed performance and is successfully serving in applications such as:

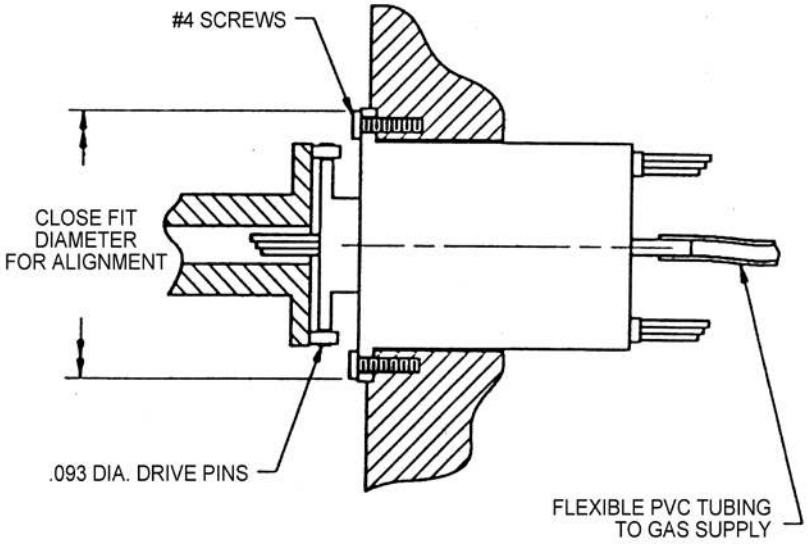
- Centrifuges
- Tire testing
- Gasoline or diesel engine testing

AC3757 Specifications	
Ring O.D.	0.270 inch
Ring Pitch	0.032 inch
Flange Diameter	1.600 inch
Bore	None
Volts (Peak to Peak)	70
Circuits **Leads** 1–26 30 (19 / 42) AWG silver plated standard copper conductor 27–36 Solid chromel and alumel leads	
All leads are color coded extruded teflon insulation.	
Chromel / alumel thermocouple pairs are attached to each bearing and to brushes #1 and #12 to monitor temperature.	

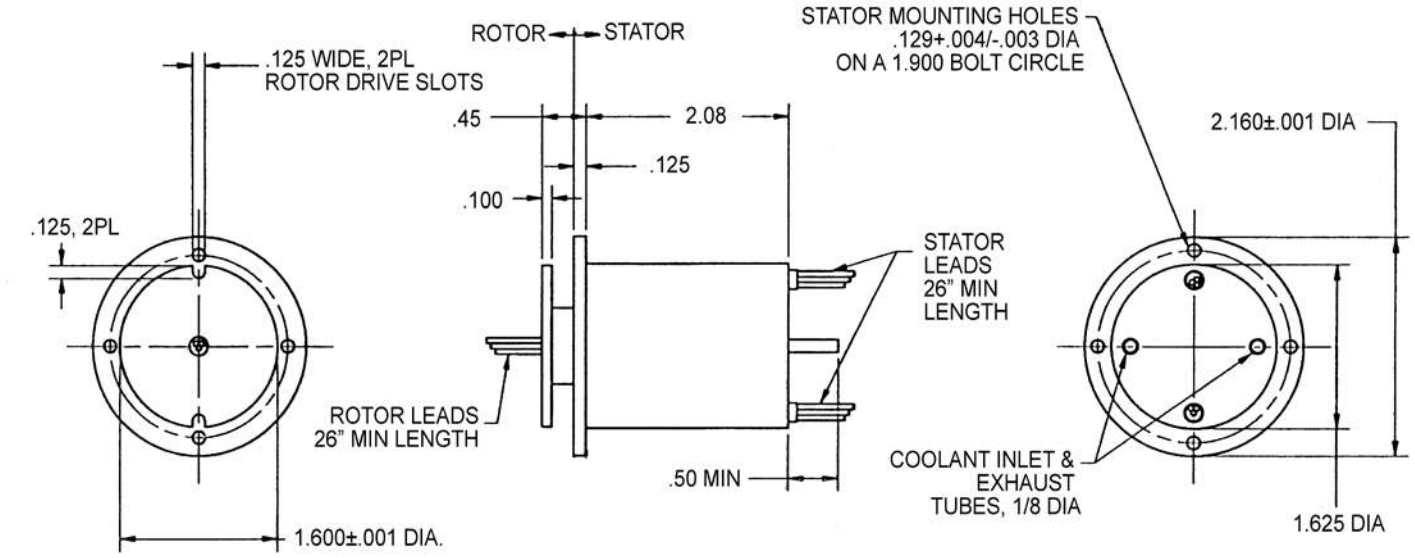
Lead Wire Color Codes							
Ring #	Color Code	Ring #	Color Code	Ring #	Color Code	Ring #	Color Code
1	BLK	10	WHT	19	WHT-GRY	28	ORN (ALUMEL)
2	BRN	11	WHT-BLK	20	WHT-BLK-BRN	29	BLK (CHROMEL)
3	RED	12	WHT-BRN	21	WHT-BLK-RED	30	BRN (ALUMEL)
4	ORN	13	WHT-RED	22	WHT-BLK-ORN	31	RED (CHROMEL)
5	YEL	14	WHT-ORN	23	WHT-BLK-YEL	32	ORN (ALUMEL)
6	GRN	15	WHT-YEL	24	WHT-BLK-GRN	33	BLK (CHROMEL)
7	BLU	16	WHT-GRN	25	WHT-BLK-BLU	34	BRN (ALUMEL)
8	VIO	17	WHT-BLU	26	WHT-BLK-VIO	35	RED (CHROMEL)
9	GRY	18	WHT-VIO	27	RED (CHROMEL)	36	ORN (ALUMEL)

Note: Other combinations of standard conductors and thermocouple leads are available.

Recommended Mounting Arrangement



AC3757 Dimensions



Dimensions in inches

AC6231 / AC6266

High speed through-bore capsule

Description

A slip ring capsule can be used in any electromechanical system that requires unrestrained, intermittent, or continuous rotation while transferring power and / or data. A slip ring is also called a rotary electrical joint, collector, commutator, or swivel. A slip ring can improve system performance by simplifying operations and eliminating damage prone wires.

The AC6231 provides a high performance solution when a through-bore configuration with high-speed operation is required. This unit provides a 1-1/2 inch through-bore for shaft mounting and a compact 4.25 inch outside diameter and very short overall length for minimal space applications. The AC6231 provides eight 15 amp circuits and the AC6266 provides four 15 amp circuits. Similar in design to our very popular AC4598 and AC6200 series, this design features long life, fiber brush contact technology for ultimate performance in many challenging applications. Brush blocks are easily replaceable for extended life.

Features

- 1-1/2 inch through-bore
- Compact 4.25 inch outside diameter
- Speeds up to 2500 rpm
- Transfers power, as well as analog and digital signals
- Rugged black anodized aluminum construction

Benefits

- Compatible with data bus protocols
- Fiber brush technology provides long life and operation
- Compact packaging
- Ease of installation



(outer cover removed for view)

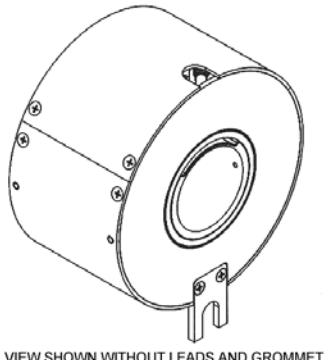
Typical Applications

- Precision rotary equipment
- High speed testing
- Semiconductor handling systems
- Industrial machinery
- Robotics

Specifications	
Operating Speed	2500 rpm* continuous
Number of Circuits	8 (AC6231), 4 (AC6266)
Lead Lengths	20 inch min.
Lead Size / Type	14 AWG
Voltage	220 VAC
Operating Temp.	-40°C to +80°C
Current Rating	15 amps / circuit
Noise	60 milliohms max.

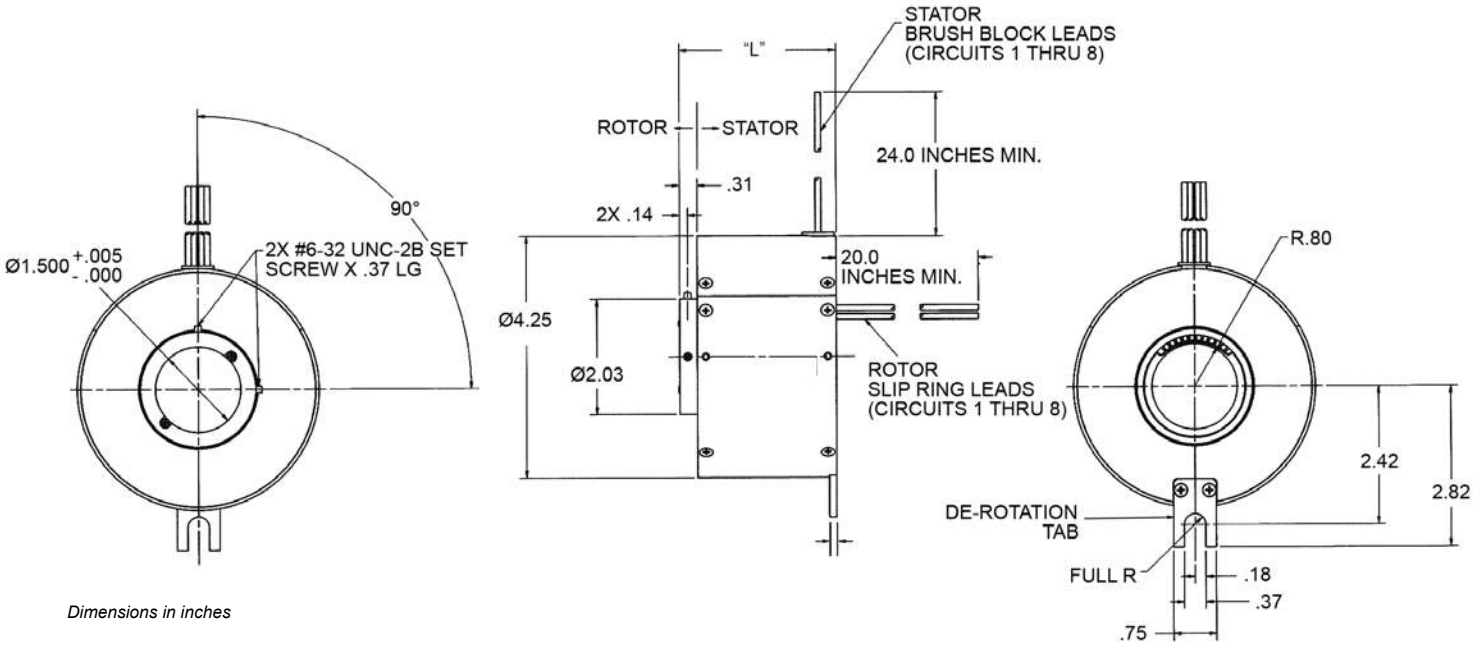
Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.

AC6231 / AC6266 Dimensions



VIEW SHOWN WITHOUT LEADS AND GROMMET

Part Number	Length "L"
AC6231	2.75 inches (69.85 mm)
AC6266	1.97 inches (50.038 mm)



Dimensions in inches

EC3848

High speed

Description

A slip ring can be used in any electromechanical system that requires unrestrained, continuous rotation while transmitting power and / or data from a stationary to a rotating structure. A slip ring is also called a rotary electrical interface, collector, swivel or rotary joint. A slip ring can improve system performance by simplifying operations and eliminating damage-prone wires dangling from moving joints.

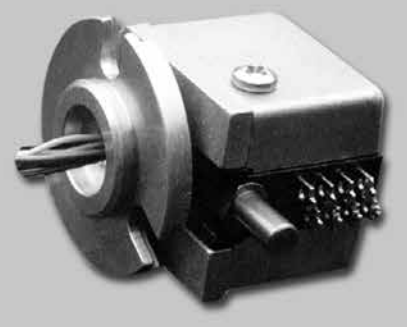
The EC3848 features precious metal brushes and rings. Flying lead wires on the rotating side and solder terminals on the stator side complete the electrical connections. Precision ball bearings and the patented fiber brush design allow operation up to 10,000 rpm without the need for cooling equipment. Fiber brush technology offers several advantages over conventional slip ring contacts including multiple points of contact per brush bundle, low contact force per fiber and low contact wear rates. In addition, fiber brushes do not require lubrication and produce virtually no wear debris.

Features

- Speeds up to 10,000 rpm without cooling
- 2, 6, 8 and 10 circuit models
- Precision ball bearings
- 1 amp / 100 VDC circuits
- Precious metal contacts

Benefits

- Transfers control and data signals
- Fiber brush technology provides maintenance-free operation (no lubrication required)
- Standard design meets high speed requirements at a fraction of the cost of a custom assembly

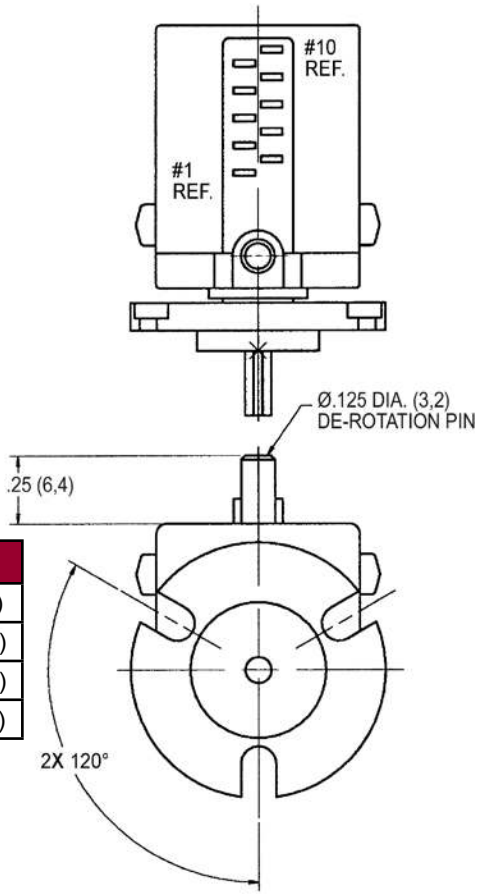


Typical Applications

- Centrifuges
- Various high speed instrumentation applications such as tire testing

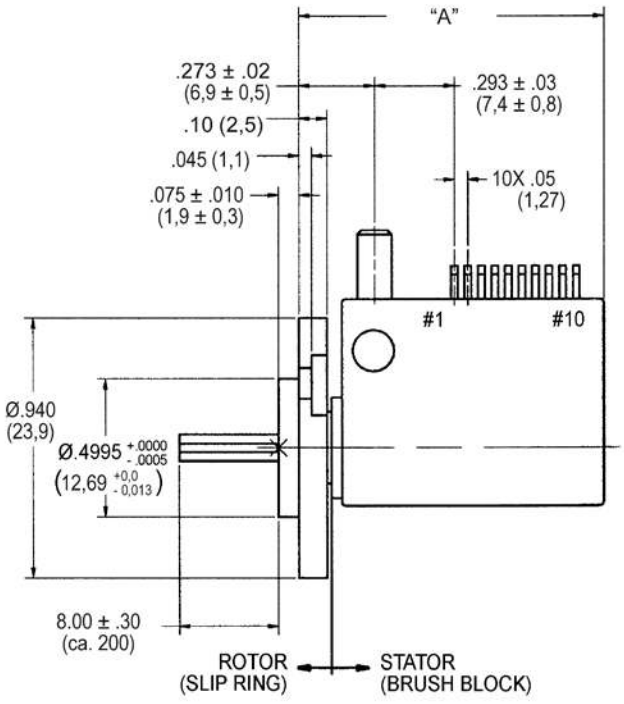
Specifications	
Operating Speed	0 - 10,000 rpm*
Number of Rings	Up to 10 (2, 6, 8 and 10)
Electrical Connections	30 (19 / 42) AWG leads on rotor Solder terminals on stator
Voltage	Low millivolt range to 100 VDC
Maximum Ambient Temperature	50°C (120°F) over 1,000 rpm 80°C (175°F) up to 1,000 rpm
Contact Material	Precious metal
Current Rating	1.0 amps maximum per ring
Electrical Noise	20 mΩ at 5 rpm 6 VDC, 50 mA current
Cooling	Not required

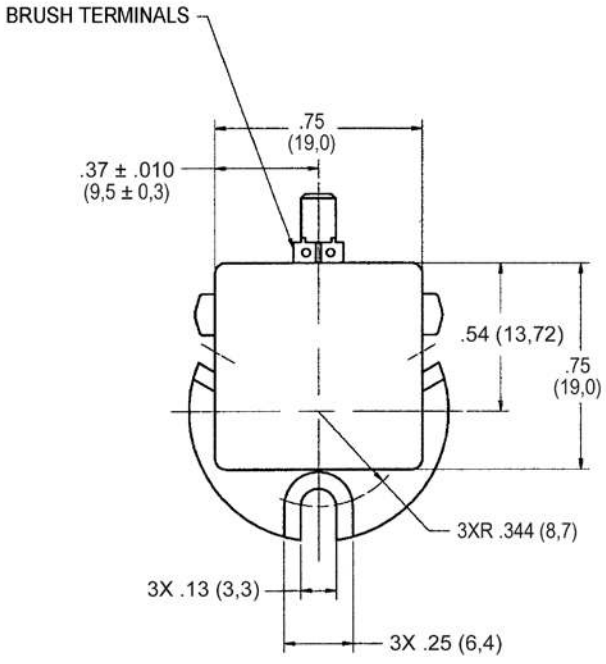
** Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*



Lead Wire Color Code			
Ring #	Color	Ring #	Color
1	BLK	6	GRN
2	BRN	7	BLU
3	RED	8	VIO
4	ORN	9	GRY
5	YEL	10	WHT

Part #	Circuits	Length "A"
EC4294	2	0.60 inch (15,2 mm)
EC3848-6	6	0.91 inch (23,2 mm)
EC4199	8	0.84 inch (21,3 mm)
EC3848-10	10	1.11 inch (28,3 mm)





Dimensions in inches (millimeters)

EC3848-10 outline shown (other models available upon request)

PM Series

Description

Suitable for a wide variety of industrial applications, the PM series is designed to transmit power and data signals at high speeds. Compatible with thermocouple and strain gauge instrumentation, the PM series is designed to maintain reliable performance under adverse operating conditions. Continuous silver connections ensure minimal thermal error. Quick and easy to install and available with 8, 12 and 24 circuits.

Features

- Suitable for a wide variety of industrial applications
- Transmits power and data signals at high speeds
- Compatible with thermocouple and strain gauge instrumentation
- Reliable performance under adverse operating conditions
- Continuous silver connections ensure minimal thermal error
- Quick and easy to install
- Available with 8, 12 and 24 circuits

Benefits

- High rotational speed
- Low torque required to drive this unit



Typical Applications

- Instrumentation and testing

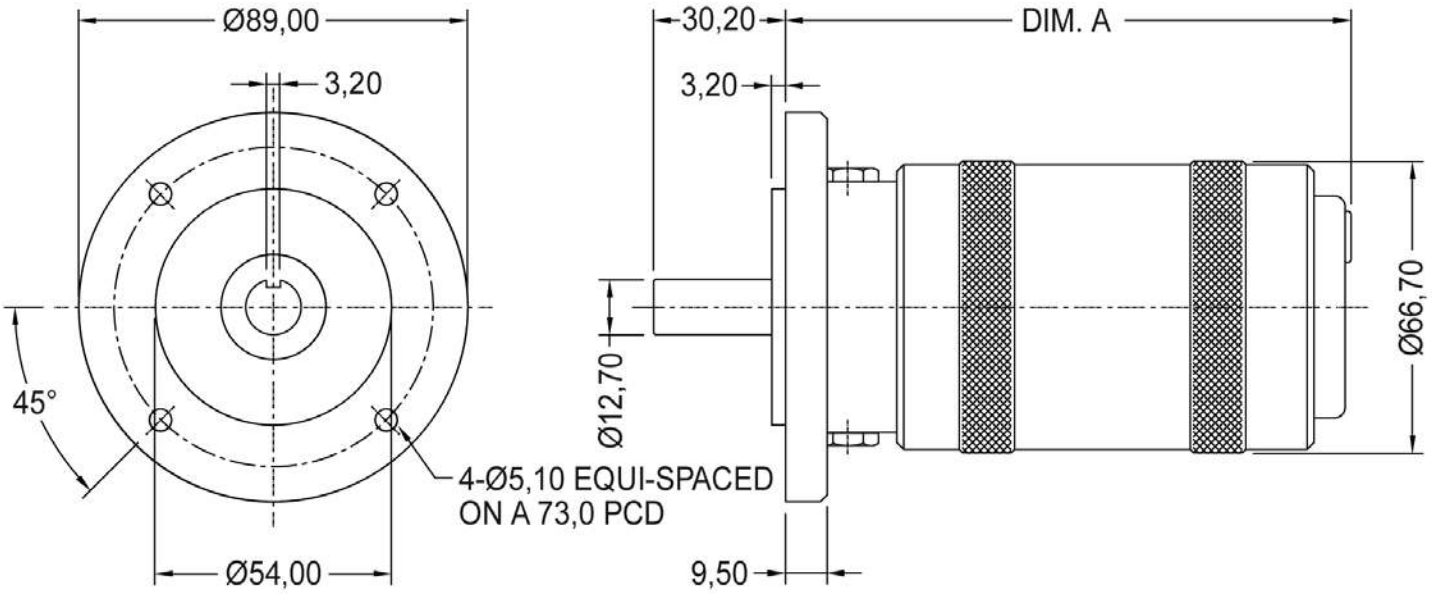
PM Series Specifications	
Terminals	Silver
Mounting	Flange mounted 4 holes ø5,1 mm equi-spaced on a 73,0 mm P.C.D.
Cooling Air Pressure	1.4kg / cm2
Brush Lifting Air Pressure	4.2 kg / cm2
Maximum Voltage	50 volts
Temperature Range	-20ºC to +90ºC
Maximum Current	2.5 amps

**Please note that the operational life of the unit is dependent upon rotational speed, environment and temperature.*

Note: Operation at maximum rotational speed requires cooling air to be supplied through the inlet and outlet ports provided.

Series	Part Number	Number of Ways	Length Diameter	Weight gm	Starting Torque g-cm	Maximum Speed RPM
PM-08	80038-950	8	132 mm	1000	290	12,000
PM-12	80039-950	12	147 mm	1140	406	12,000
PM-24	80027-950	24	216 mm	1820	812	12,000

PM Series Dimensions



Dimensions in millimeters

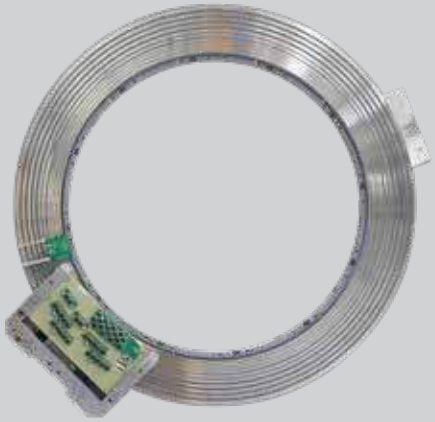
Large Diameter Slip Ring

Description

Large bore slip rings represent the union of manufacturing processes and technologies that enable Moog to offer large, high volume slip rings with advanced features that are cost effective. The manufacturing processes allow the slip ring to be built in an assembly line fashion that significantly reduces delivery time and price.

Features

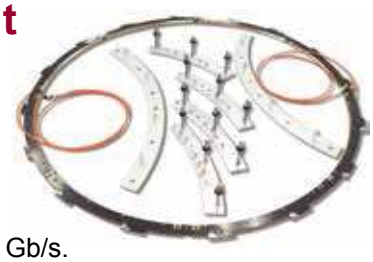
- Platter or drum configuration
- Diameters exceeding 70 inches (1.7 m)
- Rotational speeds to 300 rpm
- Power rings rated up to 1000 V
- Power rings rated up to 300 amp
- Quiet mechanical system operation
- Low maintenance requirements
- Multiple brush tip options with minimal debris
- Capability of adding integral encoder, multiplexer, fiber optic rotary joint and non-contacting data link
- Multiplexing: multiple bidirectional signals to minimize ring count
- Encoder: capable of >15,000 counts



Typical Applications

- Medical CT scanners
- Luggage scanners
- Amusement rides
- Cranes
- Offshore mooring
- Non-destructive test equipment
- Industrial 3D imaging equipment

Fiber Optic Rotary Joint (FORJ)



Description

Large bore optical rotary joints for high speed optical communications with aggregate data rates exceeding 40 Gb/s. This patented technology also has the capability to transfer multiple data signals per optical channel.

Features

- Integrated directly into slip ring or can stand alone
- Inherent EMI immunity
- Multiple electronics options (single channel, multi-channel, FPGA)
- Significant system health diagnostics
- Bidirectional channel support

Non-Contacting Data Link (NCDL)



Description

Large bore non-contacting data link for high speed data communications with aggregate data rates exceeding 5 Gb/s.

Features

- Integrate directly into slip ring or can stand alone
- Bidirectional channel support
- Requires less footprint than FORJ option
- Modules packaged within footprint of slip ring

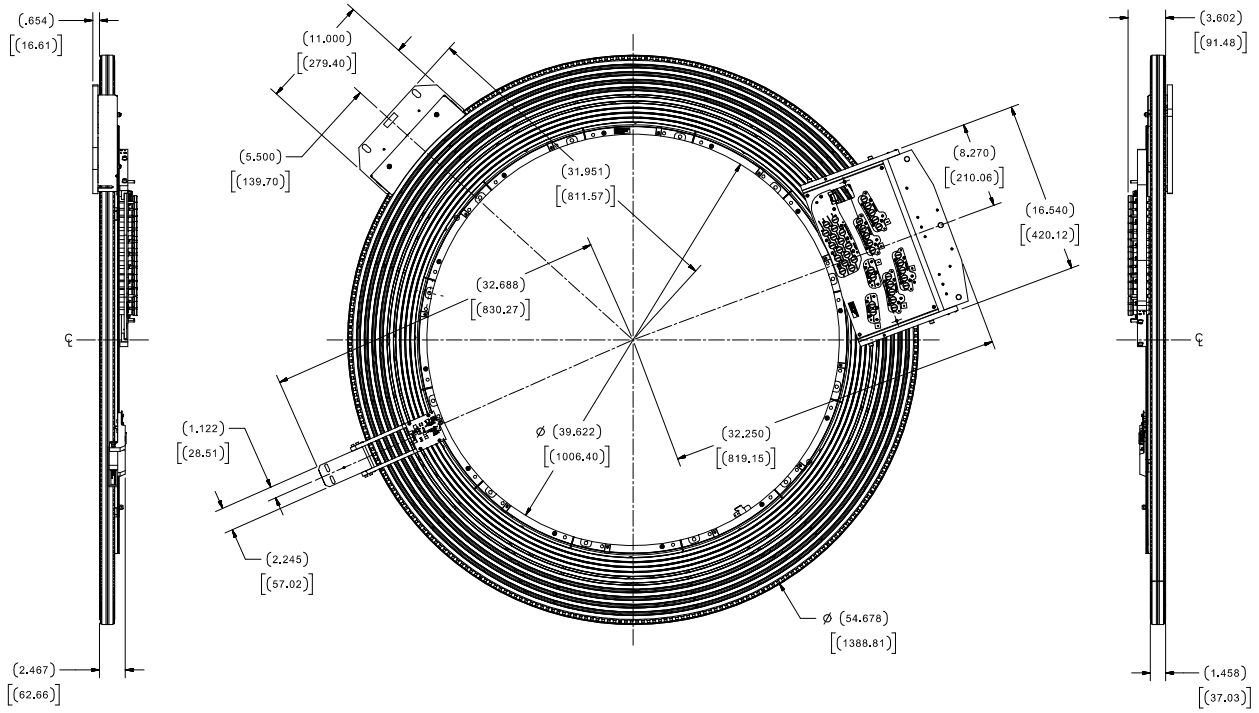
Specifications												
Part Number	Type	ID*	OD*	High Power Qty	Mid Power Qty	Signal Qty	High Power Voltage	High Power Current (cont.)	Speed	Integrated Encoder	Integrated Data Link	Data Link Options
CT6455	Drum	31.952	35.044	4	2	8	480 VAC	100 A	120 rpm	No	No	
CT6764	Drum	37.400	39.984	4	2	0	480 VAC	100 A	120 rpm	No	No	
CT7013	Platter	38.590	56.194	4	2	4	400 VAC	100 A	180 rpm	No	No	
CT7311	Platter	39.622	54.818	4	2	4	380 VAC	100 A	180 rpm	Yes	NCDL	- Single Ch 5 Gbps R->S
CT7093	Platter	42.520	54.100	3	2	4	500 VAC	100 A	180 rpm	No	FORJ	- Single Ch 2.5 Gbps* R->S - 4 Ch 2.5 Gbps* R->S
CT7138	Platter	42.047	54.094	5	0	4	400 VAC	100 A	120 rpm	No	FORJ	
CT6970	Platter	44.291	59.916	3	2	6	600 VAC	100 A	180 rpm	Yes	FORJ	- Single Ch 2.5 Gbps* R->S - 4 Ch 2.5 Gbps* R->S - 4 Ch R->S with 1.25 Gbps* S->R path - Bidirectional Gigabit Ethernet (1000Base - SX)
CT6536	FORJ ONLY	39.624	43.040						300 rpm	No		

* OD, ID dimension does not include brush block, fiber optic hardware, or non-contacting data link mounting dimension

- All designs are RoHS compliant
- Design to customer specifications

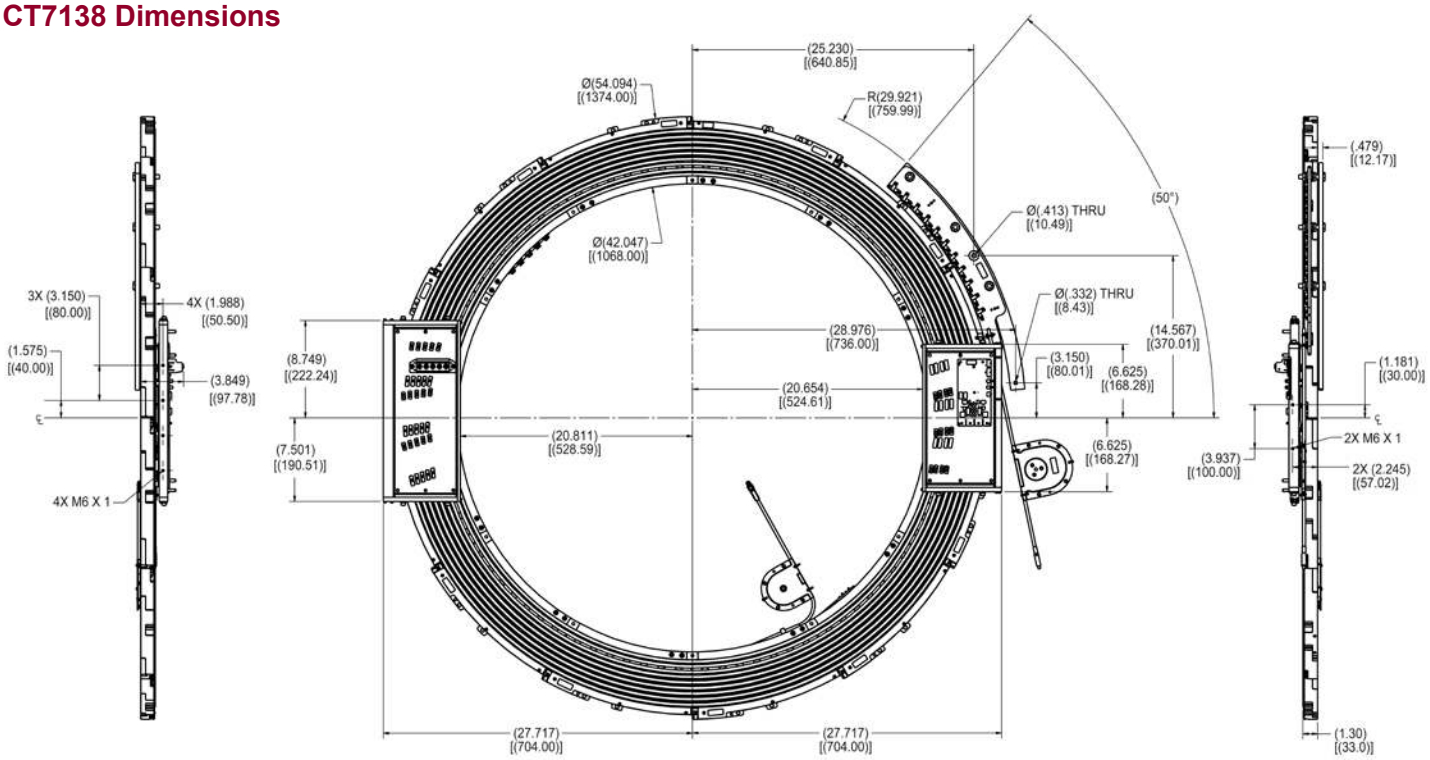
Note: Slip ring designs within these general specifications may be for either military or commercial applications. Slip rings specifically designed for military applications may require licensing for export. Contact factory for export classification.

CT7311 Dimensions



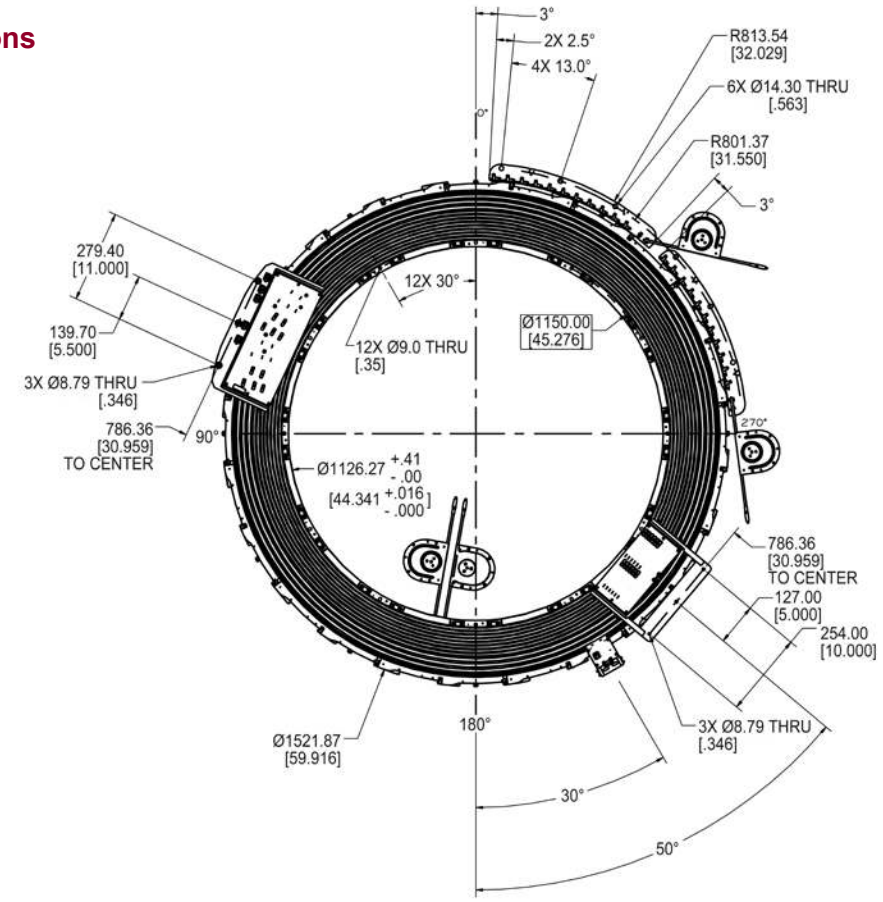
Dimensions in inches [milimeters]

CT7138 Dimensions



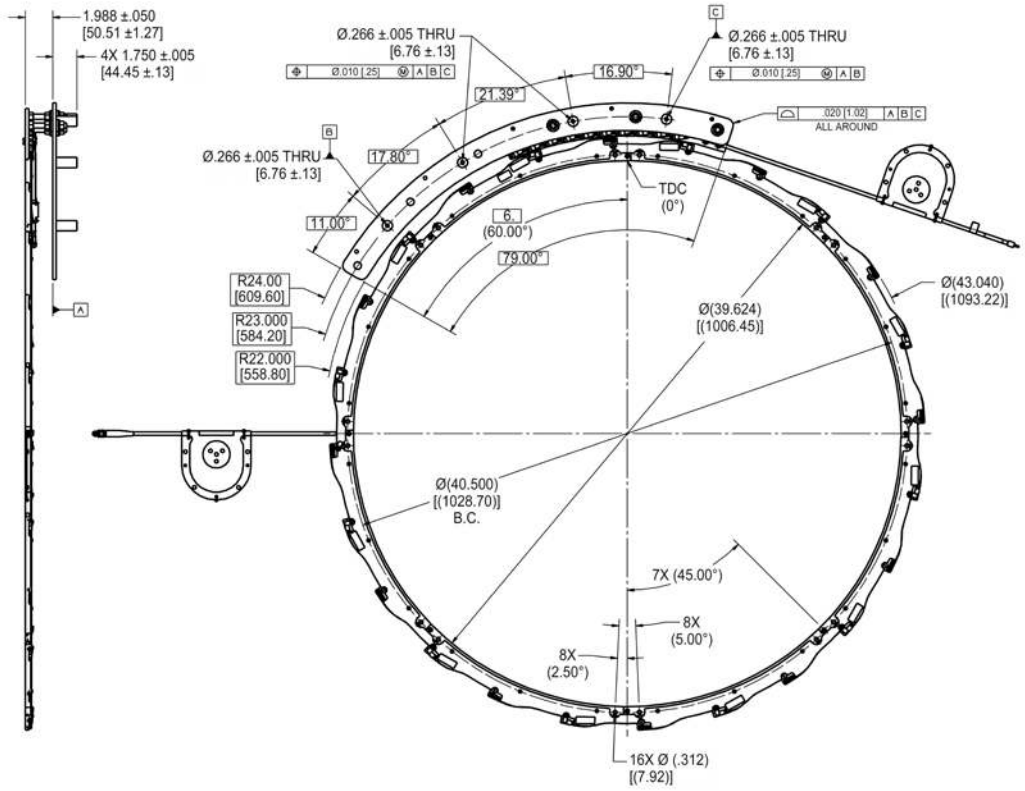
Dimensions in inches [milimeters]

CT6970 Dimensions



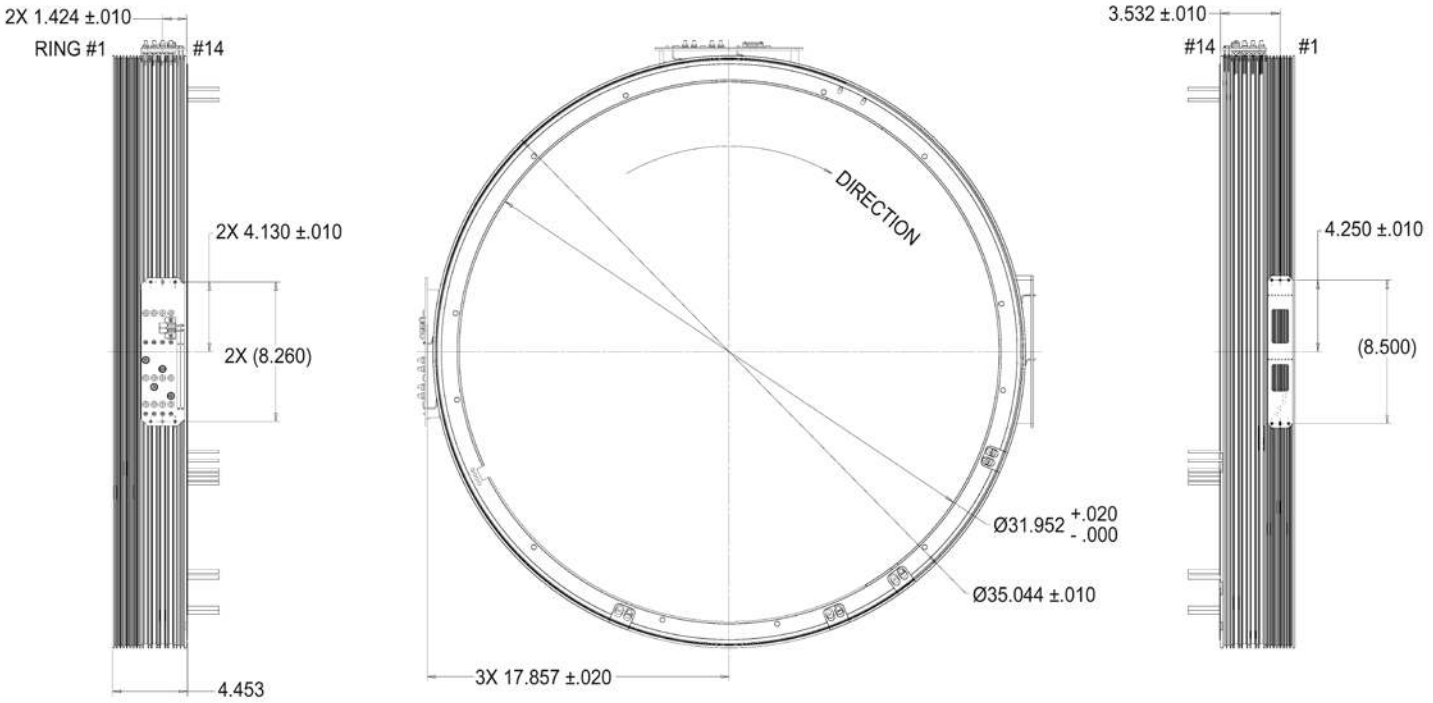
Dimensions in millimeters [inches]

CT6536 Dimensions



Dimensions in inches [millimeters]

CT6455 Dimensions



Dimensions in inches

Fiber Optic Rotary Joints

Description

Fiber Optic Rotary Joints (FORJs) are to optical signals what electrical slip rings are to electrical signals, a means to pass signals across rotating interfaces, particularly when transmitting large amounts of data. FORJs maintain the intrinsic advantages of fiber end to end. Moog has been producing fiber optic rotary joints for over 20 years.

Single or Multi-channel

FORJs are available in single and multi-channel options. The most cost and size efficient options are the single and dual channel designs. If more than two fibers are present in a system, multiplexing solutions are available to combine multiple channels onto one or two fibers to allow the use of a one or two channel FORJ.

In cases where more than two fibers are required, Moog has three designs; FO190, FO242 and FO291 where single channels are stacked to achieve the desired number of channels. The FO300 uses a common de-rotating optical element for all fiber channels.

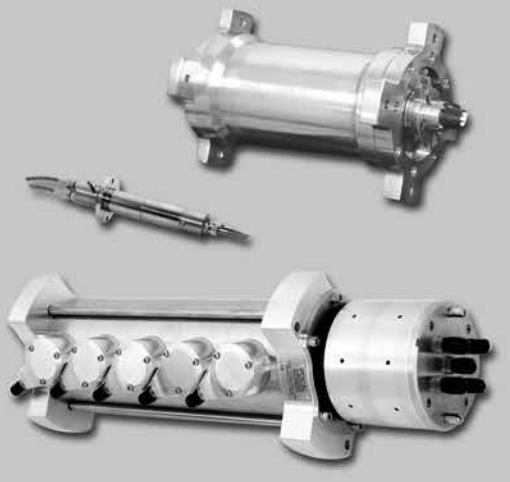
Singlemode or Multimode

Singlemode fibers allow the propagation of a singlemode of optical energy due to their small core size and small numerical aperture and for this reason they exhibit very high bandwidths. Most singlemode fiber systems operate at 1300 nm and 1550 nm wavelengths because of lower fiber attenuation at these wavelengths. Because of these smaller core sizes and numerical aperture, singlemode FORJs must be designed with very precise mechanical alignments.

Multimode fibers have large cores and large numerical apertures allowing the propagation of multiple modes of optical energy. These features allow larger amounts of light to be transmitted from sources such as LEDs and VCSELs, but result in higher attenuation and dispersion. Because of these attenuation and dispersion features, multimode fiber systems are typically used for shorter datacom links. Most multimode systems operate at 850 nm and 1300 nm.

Features

- Ruggedized for harsh environments
- Compact sizes
- Variety of configuration options
- Custom designs available



Typical Applications

- Robotics
- Vehicle turrets
- Radar antennas
- Medical systems
- Security systems
- Sensor platforms
- Material handling systems
- Remotely operated vehicles
- Fiber optic cable reels
- Video surveillance systems
- Marine propulsion systems
- Wind energy turbines

Fiber Optic Rotary Joints (FORJ)

FORJ Performance Data

Product	Performance							Physical					
	Fiber Type		Channels	Insertion Loss - Maximum dB MM = 5.5 dB		Maximum Rotational Speed	Operating Temperature	Size Inches (mm)			Standard Interface		
-	SM	MM	-	SM	MM	RPM	-	Minimum Length	Flange Diameter	Drum Diameter	Pigtail / Adaptor	Connector Type	Pigtail Length
FO228	N	Y	1	NA	4.0	100	-40 to +75°C	1.75 (44.45)	1.50 (38.10)	0.73 (18.54)	Adaptor	FC or ST	NA
FO197	N	Y	1	NA	3	1000	-40 to +60°C	2.38 (60.45)	1.50 (38.10)	0.62 (15.74)	Pigtail or Adaptor	FC, ST for Adaptors; As Required on Pigtails	As Required
FO206	Y	Y	1	3.5	NA	1000	-40 to +60°C	2.36 (59.94)	1.50 (38.10)	0.77 (19.55)	Pigtail or Adaptor	FC / PC Standard Alternates Available	As Required
FO285 *	Y	Y	1	3.5	NA	500 +	-55 to +75°C	1.02 (25.90)	0.75 (19.05)	0.037 (.93)	Pigtail	As Required	As Required
FO286 *	N	Y	1	NA	2.5	500 +	-55 to +75°C	0.75 (19.05)	0.75 (19.05)	0.037 (.93)	Pigtail	As Required	As Required
FO310	Y	Y	1	1.5	1.5	100	-40 to +85°C	3.41 (86.6)	1.5 (38.1)	0.63 (15.9)	Pigtail	As Required	As Required
FO300A **	Y	Y	2 to 17	< 4.0 dB	< 4.0 dB	100	-40 to +60°C	4.22 (107.18)	1.8 (45.72)	2.35 (59.69)	Pigtail	As Required	As Required
FO300B **	Y	Y	2 to 31	< 4.5 dB	< 5.0 dB	100	-40 to +60°C	5.76 (146.2)	2.1 (53.34)	2.72 (69.1)	Pigtail	As Required	As Required
FO300C **	Y	N	2 to 52	< 5.0 dB	NA	100	-40 to +60°C	6.79 (172.5)	3.1 (78.74)	3.72 (94.5)	Pigtail	As Required	As Required
FO215 *	N	Y	2	NA	5.5	500 +	-40 to +60°C	P: 3.30 (83.82)	P: 1.50 (38.10)	P: 0.75 (19.05)	Pigtail or Adaptor	ST, FC, SC, LC	As Required
FO257	Plastic		2	8 ***		500 +	-40 to +60°C	3.47 (88.13)	1.85 (46.99)	1.24 (31.49)	Pigtail	ST or SMA	As Required
FO292 *	N	Y	2	NA	5.5	500 +	-40 to +60°C	2.25 (57.15)	1.25 (31.75)	0.50 (12.7)	Pigtail	ST, FC, SC, LC	As Required
FO242 *	Y	N	2 to 5	5.5	NA	100 +	-40 to +60°C	See Data Sheet	5.02 (127.50)	5.00 (127.00)	Adaptor	FC / PC Standard; ST Optional	NA
FO291 ***	Y	Y	2 to 9	6	5.5	100 +	-40 to +60°C	See Data Sheet	See Data Sheet	See Data Sheet	Adaptor	FC / PC Standard; ST Optional	NA
FO190 *	N	Y	2 to 21**	NA	5.5	100	-40 to +60°C	See Data Sheet	5.02 (127.50)	5.00 (127.0)	Adaptor	FC / PC, ST	NA
Hybrid Units													
H18	Y	Y	1 Optic 18 Elec.	3.5	2.5	500	-20 to +60°C	3.4 (86.36) MM, 3.64 (92.45) SM	1.75 (44.45)	0.87 (22.0)	Pigtail	As Required	As Required
H24	Y	Y	1 Optic 24 Elec.	3.5	2.5	500	-20 to +60°C	3.7 (93.98) MM, 3.94 (100.07) SM	1.75 (44.45)	0.87 (22.0)	Pigtail	As Required	As Required

* The FO242 and FO190 can be combined to offer a hybrid multimode and singlemode solution
SM = Singlemode MM = Multimode
** More passes are available with a custom design
*** 1 MM pass can be accommodated on the FO291

* Right angle options available
** Consult factory for number of passes available for SM and MM combination applications
*** Pigtail length effect with plastic fiber

Note: Optical values for all listed multimode FORJs are based on use with LED sources.

Shock and Vibration

Moog Component Group FORJs support high shock and vibration environments, long life requirements of more than 200,000 hours and long data links over 100 km of fiber. Units are available that are tested to MIL-STD-167-1, MIL-STD-202, MIL-STD-204 for vibration and MIL-STD-810D / E and MIL-STD-901D for shock.

Options

- Supply and installation of customer specific connectors and fibers
- Customization of mounting configurations, housing materials and drive couplers
- Fluid filling and pressure compensation for underwater use

FO228

Fiber optic rotary joint

Description

The FO228, a single-pass multimode fiber optic rotary joint (FORJ), is passive and bidirectional, and maintain the benefits of fiber optics (such as high bandwidth and EMI immunity) in systems with a rotational interface.

This cost efficient FORJ model is designed for applications having moderate demands for optical performance and life. Due to its lensless design, it can operate at any wavelength supported by the fiber used in the assembly.

The FORJ can be combined with our electrical and fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer.

Features

- Provides rotary coupling for a multimode fiber link
- Passive bidirectional device
- Low cost
- Can be combined with our electrical slips and fluid unions
- Alternative drive coupling and mounting arrangements are available (consult factory for specification details)
- Connectorized interfaces, for easy fiber cable replacement
- Can be integrated into existing slip ring designs
- Aluminum or anodized aluminum housing
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810D functional shock (40 g)



Typical Applications

- Cable reelers used in EOD robots
- Material handling systems
- Security cameras

Fiber Optic Rotary Joints (FORJ)

FO228 Specifications		
Fiber Size (Microns)	50/125 or 62.5/125 (consult factory for other sizes)	
Insertion Loss	Typical < 2.5 dB	Maximum < 4.0 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.0 dB
Wavelength	Broadband (fiber dependant)	
Rotational Speeds	To 100 rpm. Higher rotational speeds should be discussed with the factory	
Temperature	-40 to +75 deg C. Consult factory for extended range	
Life	500,000 revolutions	
Exterior Surfaces	Aluminum or anodized aluminum	
Vibration	Tested to MIL-STD-167-1 (ships)	
Shock	Tested to MIL-STD-810D	
Terminations	Standard with ST or FC connector receptacles. Can be pigtailed with cable and connectors to meet customer's requirements.	
Pigtail Length	As required	

Hybrid Units

Can be combined with electrical and fluid slip rings

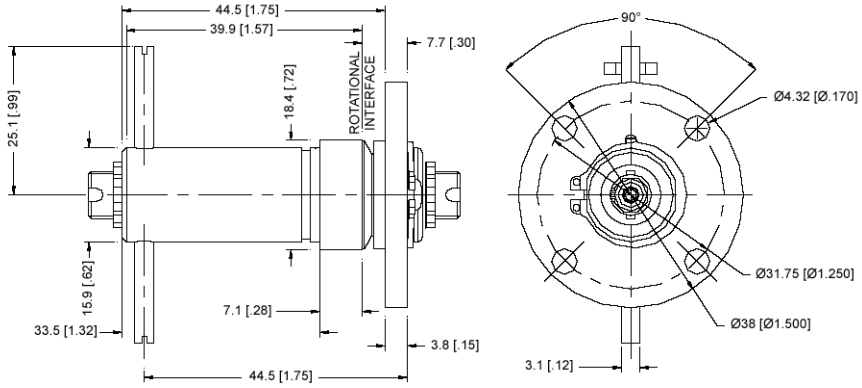
Mounting Options

Available with or without mounting flange (consult factory for details)

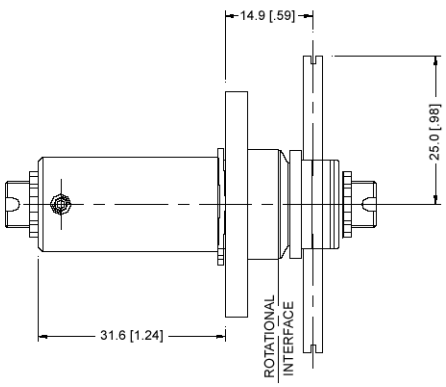
Terminations

Built-in FC or ST connector receptacles

FO228 Dimensions



Shaft Mounting Arrangement



Body Mounting Arrangement

Dimensions in inches [millimeters]

FO197

Fiber optic rotary joint

Description

The FO197 is a single-pass, multimode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of any type of optical signal across rotational interfaces.

The FO197 fiber optic rotary joint can be combined with our electrical and / or fluid slip rings, providing a single, compact package for optical signals, electrical power and fluid transfer.

The FORJ can be assembled with pigtail lengths tailored to the customer's application or installed with connector bushings (ST or FC). Housing, mounting flange and drive features can also be customized to meet the customer's requirements.

Features

- Provides rotary coupling for a multimode fiber link
- Passive bidirectional device
- Can be combined with our electrical slips and fluid unions
- Alternative drive coupling and mounting arrangements are available (consult factory for specification details)
- Connectorized interfaces, for easy fiber cable replacement
- Can be integrated into existing slip ring designs
- Stainless steel, aluminum or anodized aluminum housing
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810D functional shock (40 g)



Typical Applications

- Remote I/O in industrial machinery
- Video surveillance systems
- Material handling systems
- Sensor platforms
- Indexing tables
- Cable reels
- Robotics
- Turrets

FO197 Specifications		
Fiber Size (Microns)	50 / 125, 62.5 / 125, 100 / 140 or 200 / 230	
Insertion Loss	Typical < 1.5 dB	Maximum < 3.0 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.0 dB
Back Reflection	Typical 22 dB	18 dB Minimum
Wavelengths	850, 1300 or 1550 nm. Consult factory for multi-wavelength applications.	
Rotational Speeds	To 1000 rpm. Higher rotational speeds should be discussed with the factory.	
Temperature	-40 to +60 deg C (dry version). Consult factory for extended range.	
Dispersion	< 10 picoseconds (calculated)	
Exterior Surfaces	Stainless steel, aluminum or anodized aluminum	
Vibration	Tested to MIL-STD-167-1 (ships)	
Shock	Tested to MIL-STD-810D	
Terminations	ST or FC connector receptacles or pigtailed with cable and connectors to meet customer's requirements	
Pressure	Up to 10000 psi (69,000 kPa) for fluid filled version*	
Pigtail Length	As required	

**Fluid filled version is slightly larger than shown below.*

Hybrid Units

Can be combined with electrical and fluid slip rings.

Mounting

See diagrams for details. Customized mounting flanges also available.

Pressure

Optional fuid-filled version for pressure compensation (in a slightly lager housing than shown).

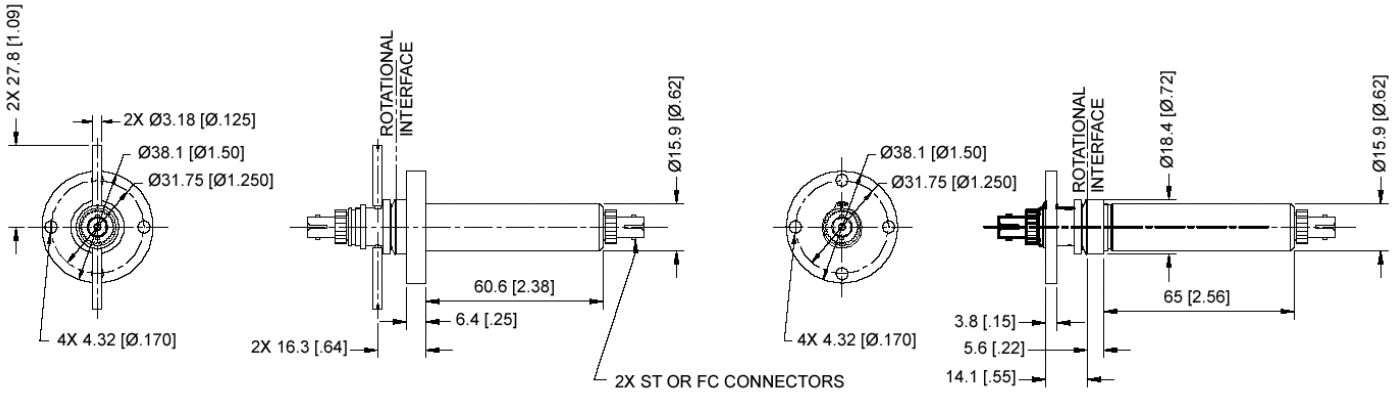
Exterior Surfaces

Stainless steel, aluminum or anodized.

Terminations

ST or FC connector receptacles or pigtailed with cable and connectors to meet customer's requirements.

FO197 Dimensions



Body Mounting Arrangement (B)

Shaft Mounting Arrangement (S)

FO206

Fiber optic rotary joint

Description

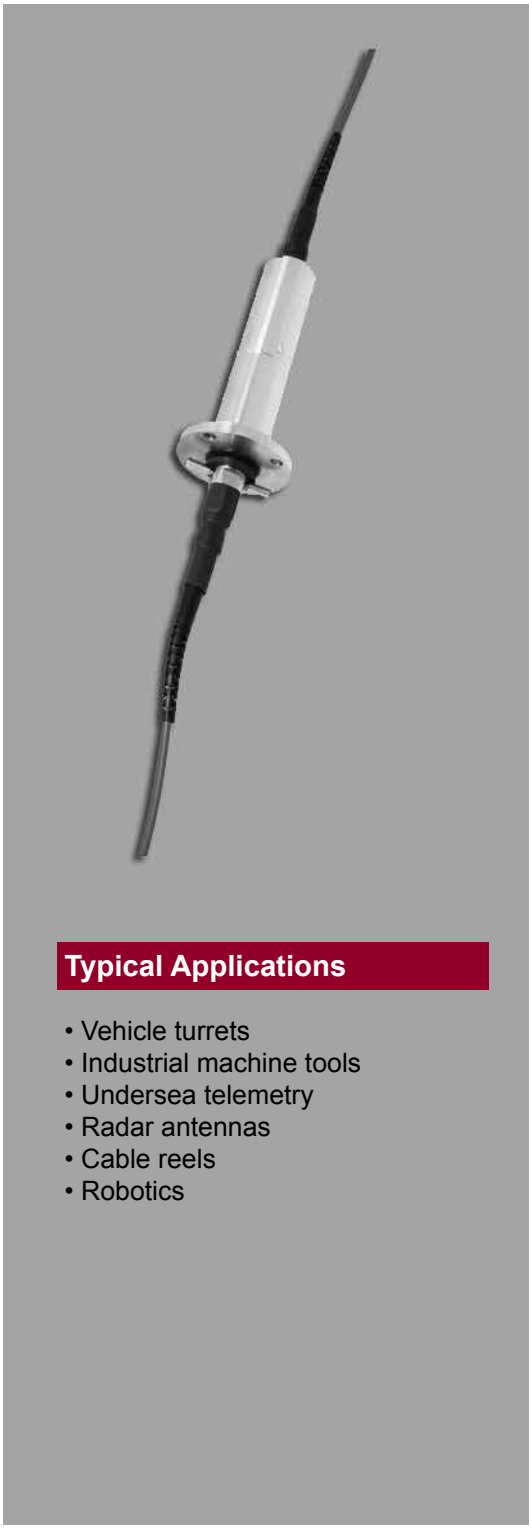
The FO206 is a single-pass, singlemode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of optical signals across rotational interfaces.

The FORJ maintains the full benefit of fiber optics end-to-end in digital and analog transmission to and from rotating equipment. These benefits include high bandwidth and immunity to most forms of EMI.

The FO206 can be combined with our electrical and fluid slip rings, providing a single, compact package for optical signals, electrical power and fluid transfer. Most of the external features on the FO206 can be modified to meet the customer's custom requirements.

Features

- Provides rotary coupling for a singlemode fiber link
- Passive bidirectional device
- Can be combined with our electrical slips and fluid unions
- Connectorized interfaces, for easy fiber cable replacement
- Customized mounting flanges available
- Optional fluid-filled version for deep submergence to 10,000 psi (69,000 kPa)
- Can be integrated into existing slip ring designs
- Stainless steel housing
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810D functional shock (40 g)



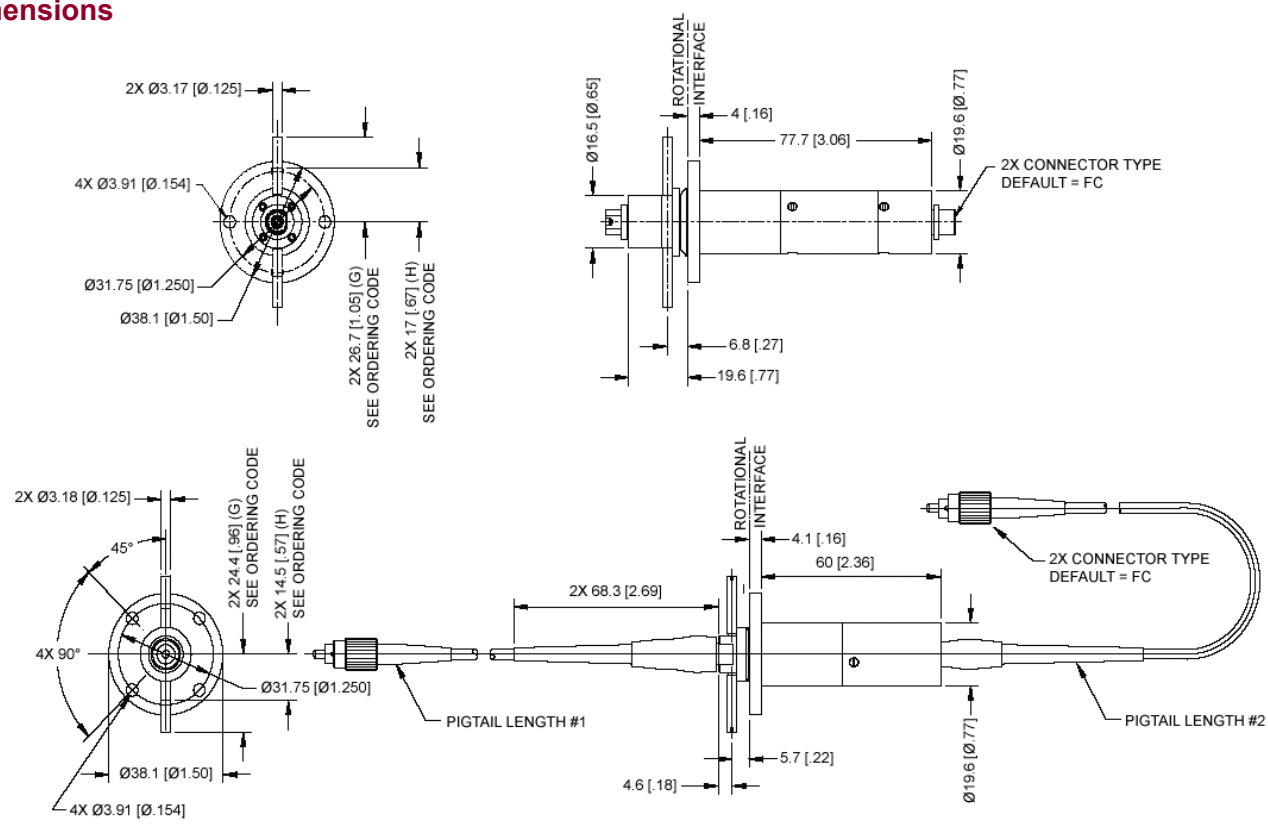
Typical Applications

- Vehicle turrets
- Industrial machine tools
- Undersea telemetry
- Radar antennas
- Cable reels
- Robotics

FO206 Specifications			
Fiber Size (Microns)		9 / 125 SMF-28. Consult factory for other SM fiber types	
Insertion Loss		Typical < 1.5 dB	Maximum < 3.5 dB
Rotation Variation		Typical < 0.5 dB	Maximum < 1.0 dB
Back Reflection	Standard	Typical 22 dB	20 dB Minimum
	Optional	Typical 40 dB	35 dB Minimum
Wavelengths		1310 / 1550 nm. Consult factory for other wavelengths such as CWDM (18 wavelengths from 1271 nm to 1611 nm in 20 nm increments).	
Rotational Speeds		To 1000 rpm. Higher rotational speeds should be discussed with the factory.	
Temperature		-40 to +60 deg C (dry version) -20 to +60 deg C (wet version). Consult factory for extended range.	
Dispersion		< 50 fs / nm (calculated)	
Exterior Surfaces		Stainless steel	
Vibration		Tested to MIL-STD-167-1 (ships)	
Shock		Tested to MIL-STD-810D	
Terminations		Standard is with FC / PC connector receptacles at each end. Alternative connectors types available dependant on configuration (ST, FC / APC). Pigtails can be supplied with cable and connectors to meet customer's requirements.	
Pressure		Up to 10000 psi (69,000 kPa) for fluid filled version*	
Pigtail Length		As required	

**Fluid filled version is slightly larger than shown below.*

FO206 Dimensions



Dimensions in millimeters [inches]

FO285 / FO286

Fiber optic rotary joint



Description

The FO285 (single-pass singlemode) and the FO286 (single-pass multimode) are passive and bidirectional, and allow the transfer of optical signals across rotational interfaces.

With a body diameter of only 9.5 mm and lengths of 26 mm and 19 mm for the FO285 and FO286 respectively, both units are ideally suited to applications where size and weight are critical issues. An extremely cost effective solution for high data rate signals, both models also offer other benefits of fiber optics, including low spark hazard and immunity to electromagnetic interference.

Both models can be combined with our electrical and fluid slip rings, and with our entire line of video and data multiplexers to provide a complete solution.

Features

- Provides rotary coupling for a multimode or singlemode fiber link
- Passive bidirectional device
- Low cost, small size
- Can be combined with our electrical slips and fluid unions
- Alternative drive coupling and mounting arrangements are available (consult factory for specification details)
- Can be integrated into existing slip ring designs
- Stainless steel or aluminum construction
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810F functional shock (40 g)
- 90° fiber exits available for limited space requirements

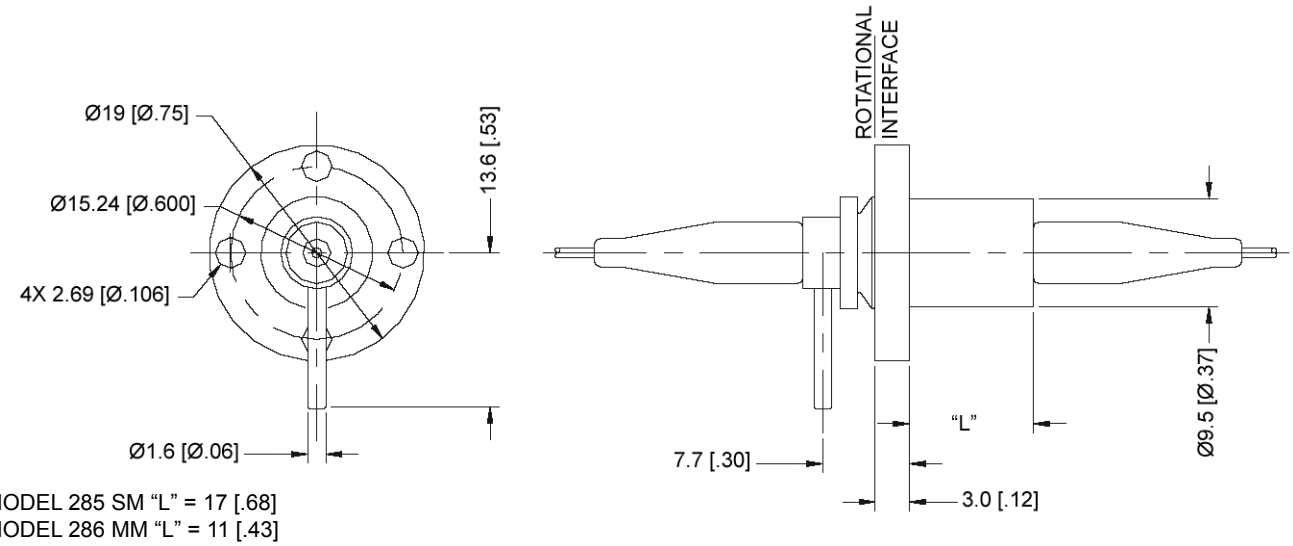
Typical Applications

- Unmanned ground vehicles
- Robots
- Surveillance systems
- Industrial automation
- Unmanned aerial vehicles and sub-systems

Specifications				
	FO285 (Singlemode)		**FO286 (Multimode)**	
Fiber Size (Microns)	9 / 125 SMF-28 (consult factory for other sizes)		50 / 125 or 62.5 / 125 (consult factory for other sizes)	
Insertion Loss	Typical < 1.5 dB	Maximum < 3.5 dB	Typical < 1.5 dB	Maximum < 2.5 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.5 dB	Typical < 0.5 dB	Maximum < 1.0 dB
Back Reflection*	Typical 22 dB	18 dB Minimum	Typical 22 dB	18 dB Minimum
Wavelength	1310 / 1550 nm. Consult factory for other wavelengths such as CWDM (18 wavelengths from 1271 nm to 1611 nm in 20 nm increments).		850, 1300 or 1550 nm (consult factory for multi-wavelengths applications)	
Dimensions	9.5 mm diameter x 26 mm length		9.5 mm diameter x 19 mm length	
Weight/Material	Stainless steel: 16 g (pigtailed with connectors)		Aluminum: 7g, Stainless steel: 14 g (pigtailed with connectors)	
Rotational Speeds	To 1000 rpm. Higher rotational speeds should be discussed with the factory.			
Temperature	-55 to +75 deg C. Consult factory for extended range.			
Vibration	Tested to MIL-STD-167-1 (ships)			
Shock	Tested to MIL-STD-810F			
Terminations	Pigtailed with cable and connectors to meet customer's requirements 900 micron buffered cable standard			
Pigtail Length	As required			

**35 dB minimum back reflection option available for FO285.*

FO285 and FO286 Dimensions



MODEL 285 SM "L" = 17 [.68]
MODEL 286 MM "L" = 11 [.43]

Dimensions in millimeters [inches]

FO310

Sealed high performance fiber optic rotary joint

Description

The FO310 is a sealed single-pass fiber optic rotary joint (FORJ) which is factory configured to transfer optical signals over either singlemode or multimode fiber. The FO310 supports both analog and digital optical signals, and is especially suited for sensitive single-pass optical sensing applications where optical insertion loss and back reflection must be minimized.

The FO310 FORJ has a stainless steel housing and is environmentally sealed to an ingress protection rating of IP67. It can be combined with Moog electrical and / or fluid slip rings, providing a single, complete package for optical signals, electrical power, and fluid transfer over a rotating interface.

This FORJ is assembled with either bulkhead connectors or fiber pigtails and connectors to suit the application. Housing, mounting flange, and drive features can be customized to meet specific customer requirements.

Features

- Passive bidirectional optical transmission
- Low optical insertion loss for common sensor wavelengths
- High return loss (i.e. low back reflection) available
- Provides rotary coupling for either a singlemode or multimode fiber link with the same footprint
- Can be combined with Moog electrical slip rings and fluid unions
- Can be integrated into existing slip ring designs
- Rugged design with IP 67 rating, MIL-STD-167-1 Ships vibration and MIL-STD-810 functional shock (40g)
- Bulkhead connector and Pigtailed versions available

Benefits

- Low back reflection and insertion losses allow for FORJ integration with very sensitive optical sensor measurement systems
- Environmentally sealed design allows for long-life in rugged installations and reduces maintenance costs
- Supports either singlemode or multimode fiber, allowing future upgrade without modifying the surrounding mechanical infrastructure

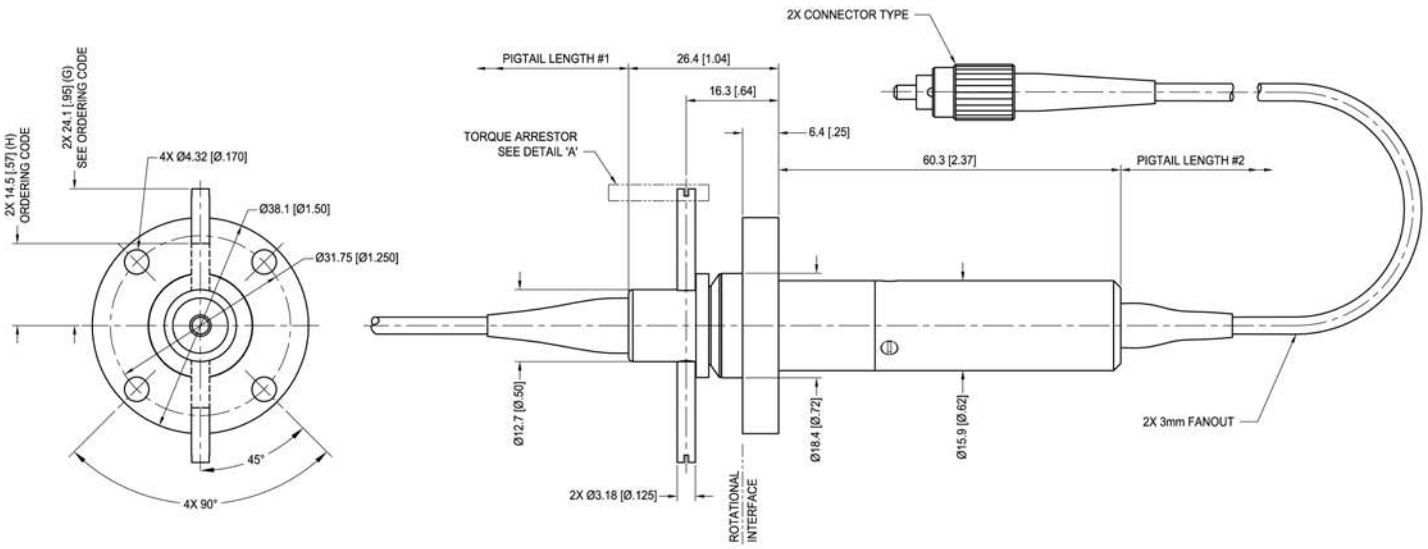


Typical Applications

- Winches and cable reels for optical sensor systems
  - Distributed Temperature Sensing (DTS)
  - Temperature Point Sensor Arrays (TPSA) using Fiber Bragg Gratings (FBG)
- Distributed Acoustic Sensing (DAS)
- Pitch control data and / or fiber-optic blade sensing for wind turbines
- Sensor systems for helicopter rotor blades
- Optical Coherence Tomography (OCT)

FO310 Specifications		
	Singlemode	**Multimode**
Fiber Size	9 / 125 Single Mode	50 / 125 or 62.5 / 125 Multimode
Insertion Loss	Maximum 1.5 dB (Typical 1.0 dB)	Maximum 1.5 dB (Typical 1.0 dB)
Rotation Variation	Maximum 1.0 dB (Typical 0.5 dB)	Maximum 1.0 dB (Typical 0.5 dB)
Back Reflection	Minimum 55 dB	Minimum 30 dB (Typical 32 dB)
Wavelength Options	Optimized for: • 1310 / 1550 nm WDM and CWDM communication bands, and; • 900-1100 nm sensor band (point-source tested at 1060 nm)	Optimized for: • 850 / 1300 nm WDM communication bands, and; • 900-1100 nm sensor band (point-source tested at 1060 nm)
Rotational Speeds	100 rpm. For other requirements contact factory.	100 rpm. For other requirements contact factory.
Temperature	-40°C to +85°C	-40°C to +85°C
Exterior Surfaces	Stainless Steel	Stainless Steel
Ingress Protection	IP67	IP67
Vibration	Tested to MIL-STD-167-1 (Ships)	Tested to MIL-STD-167-1 (Ships)
Shock	Tested to MIL-STD-810D	Tested to MIL-STD-810D
Terminations	Bulkhead or Pigtailed with ST, FC / PC, or FC / APC connectors to meet customer requirements. FC / APC required to achieve extended back reflection specification	Bulkhead or Pigtailed with ST, FC / PC, or FC / APC connectors to meet customer requirements. FC / APC required to achieve extended back reflection specification.
Pigtail Length	As required	As required

FO310 Dimensions



Dimensions in inches [mm]

FO300

Fiber optic rotary joint

Description

The FO300 is a multi-pass fiber optic rotary joint (FORJ). It allows the transfer of optical signals across a rotational interface and is passive and bidirectional. The smaller version “A” accommodates up to 17 separate singlemode or multimode optical fibers. Version “B” supports up to 31 separate channels. The largest version “C” supports up to 52 separate channels. Pressure compensation is available for use in subsea applications, with slightly increased length and diameter.

The FO300 can be combined with electrical and / or fluid slip rings, providing a single package for optical signals, electrical power and fluid transfer.

Features

- Up to 52 fiber optic channels in a very small form factor
- The smaller version “A” accommodates up to 17 separate singlemode or multimode optical fibers, version “B” accommodates up to 31 separate channels and the largest version “C” supports up to 52 separate channels
- Can be combined with electrical slip rings and fluid rotary unions
- Stainless steel construction
- Rugged design



Typical Applications

- Vehicle Turrets
- Radar Antennas
- Material Handling
- Remotely Operated Vehicles
- Fiber Optic Cable Reels
- Floating Production, Storage, Offloading (FPSO) Turrets

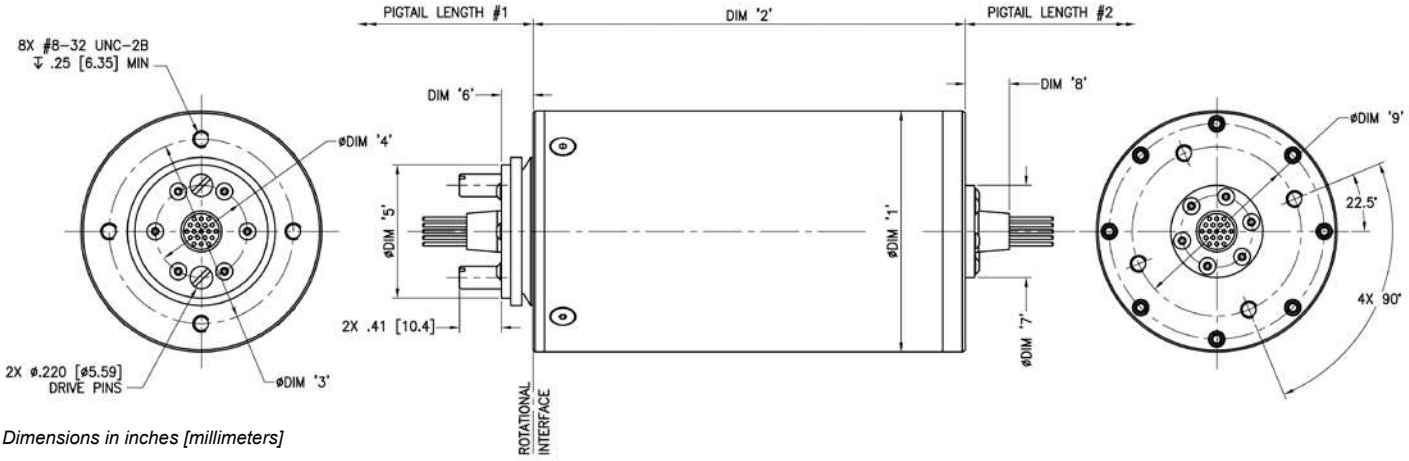
Fiber Optic Rotary Joints (FORJ)

FO300 Specifications			
Fiber Type	9 / 125 Singlemode		50 / 125 or 62.5 / 125 Multimode
Wavelength	1310 nm or 1550 nm, or single CWDM wavelength	1310 nm and 1550 nm, or multiple CWDM wavelength	850 nm and 1300 nm
Version "A" (≤ 17 Channels)			
Maximum Insertion Loss Over Rotation	< 4.0 dB		< 4.0 dB
Insertion Loss Variation Over Rotation	< 1.5 dB	< 2.5 dB	< 1.5 dB
Version "B" (≤ 31 Channels)			
Maximum Insertion Loss Over Rotation	< 4.5 dB		< 5.0 dB
Insertion Loss Variation Over Rotation	< 1.5 dB	< 2.5 dB	< 1.5 dB
Version "C" (≤ 52 Channels)			
Maximum Insertion Loss Over Rotation	< 5.0 dB		NA
Insertion Loss Variation Over Rotation	< 2.0 dB	< 3.0 dB	NA
All Versions			
Minimum Return Loss Over Rotation	18 dB, consult factory for higher return loss		
Rotation Speed	To 100 rpm, consult factory for extended range		
Temperature	-40° C to +60° C, consult factory for extended range		
Exterior Surfaces	Stainless steel		
Vibration	Tested to MIL-STD-167-1 (ships) / MIL-STD-810G 514.6		
Shock	Tested to MIL-STD-810G 514.6		
Connectors	As requested		
Pigtail Length	As requested		

- Consult factory for higher channel count
- Consult factory for different fiber types
- Pigtailed FORJ; measured from outside ends of FORJ flanges, does not include shaft torque pins, strain relief, or pigtails
- Mounting holes for Version "C" are 8X #10-24 UNC-2B, .31 [7.9] minimum thread depth

Dimensions Inches [mm]	Version "A"	Version "B"	Version "C"
DIM "1"	Ø2.35 [59.7]	Ø2.72 [69.1]	Ø3.72 [94.5]
DIM "2"	4.22 [107.2]	5.76 [146.2]	6.79 [172.5]
DIM "3"	Ø1.800 [45.72]	Ø2.100 [53.34]	Ø3.100 [78.74]
DIM "4"	Ø.90 [22.9]	Ø1.06 [26.92]	Ø1.56 [39.6]
DIM "5"	Ø1.30 [33]	Ø1.55 [39.4]	Ø2.05 [52.1]
DIM "6"	.31 [8.1]	.32 [8.1]	.32 [8.1]
DIM "7"	Ø.90 [22.9]	Ø1.24 [31.5]	Ø1.48 [37.6]
DIM "8"	.38 [9.6]	.38 [9.6]	.38 [9.6]
DIM "9"	Ø1.650 [41.91]	Ø1.800 [45.72]	Ø2.720 [69.09]

FO300 Dimensions



Dimensions in inches [millimeters]

FO215

Fiber optic rotary joint

Description

The FO215 is an ultra-compact, two pass, multimode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of optical signals on two separate optical fibers across rotational interfaces.

The FO215 can be combined with our electrical and fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer.

The FORJ can be assembled with pigtail lengths tailored to the customer's application. Housing, mounting flange and drive features can also be customized to meet the customer's requirements.

Features

- Provides rotary coupling for two multimode fibers
- Passive bidirectional device
- Can be combined with our electrical slips and fluid unions
- Connectorized version allows for easy fiber cable replacement
- Customized mounting flanges available
- Optional fluid-filled version for deep submergence to 10,000 psi (69,000 kPa)
- Can be integrated into existing slip ring designs
- Stainless steel housing (aluminum for connectorized version)
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810E functional shock (40 g)



Typical Applications

- Winches and cable reels for remotely operated vehicles
- Remote I / O in industrial machinery
- Video surveillance systems
- Material handling systems
- Sensor platforms
- Robots
- Turrets

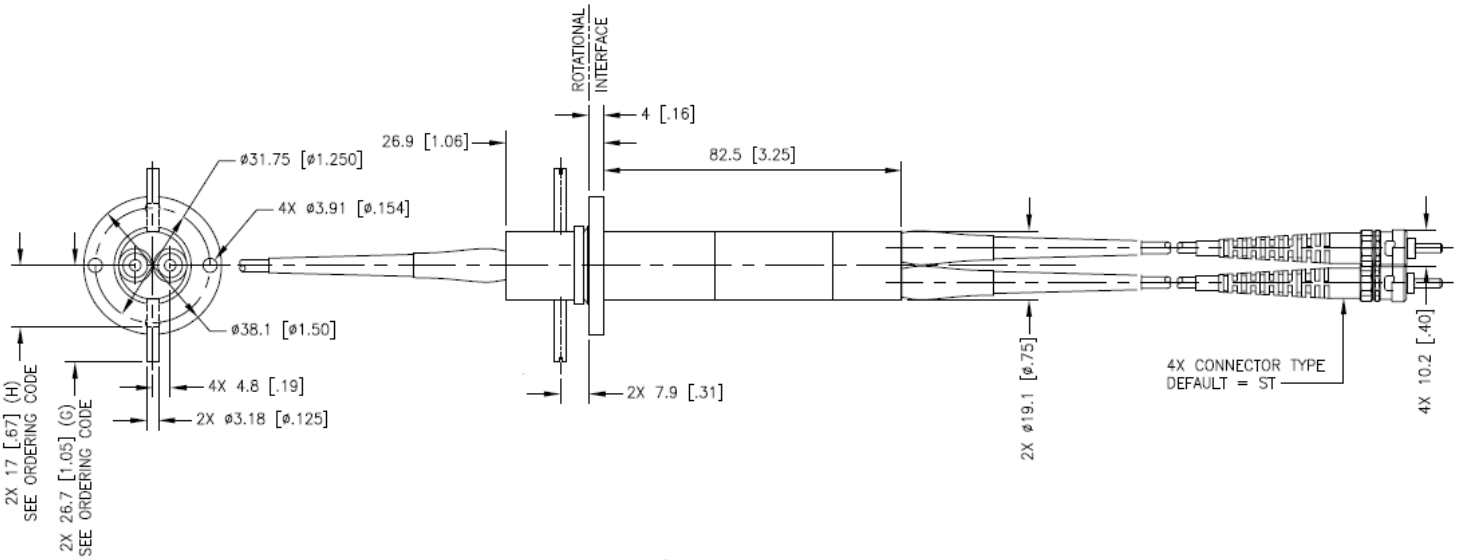
FO215 Specifications			
Fiber Size (Microns):	50 / 125 or 62.5 / 125. Consult factory for other fiber types.		
Insertion Loss*		Typical	Maximum
	Channel 1	< 1.5 dB	< 3.0 dB
	Channel 2	< 4.5 dB	< 5.5 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.0 dB	
Back Reflection	Consult factory		
Wavelengths	850, 1300 or 1550 nm. Consult factory for other multi-wavelength applications.		
Rotational Speeds	To 500 rpm. Higher rotational speeds should be discussed with the factory.		
Temperature	-40 to +60 deg C (dry version) -20 to +60 deg C (wet version) Consult factory for extended range.		
Dispersion	< 10 ps (calculated)		
Exterior Surfaces	Stainless steel (aluminum for connectorized version)		
Vibration	Tested to MIL-STD-167-1 (ships)		
Shock	Tested to MIL-STD-810E		
Terminations	Standard is with pigtail cables terminated with ST connectors at each end. Alternative connectors types available (FC, SC, LC).		
Pressure	Up to 10000 psi (69,000 kPa) for fluid filled version**		
Pigtail Length	As required		

**Add 0.5 - 1.0 dB to the insertion loss for connectorized version*

***Fluid filled version is slightly larger than shown below.*

Note: Optical values given are based on use with LED sources.

FO215 Dimensions



Dimensions in inches [millimeters]

FO257

Fiber optic rotary joint

Description

The FO257 is a compact, two pass, fiber optic rotary joint (FORJ) for plastic optical fiber.

Ideally suited to SERCOS applications, the FO257 can be combined with our electrical and fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer.

The FORJ can be assembled with pigtail lengths tailored to the customer's application. Housing, mounting flange and drive features can also be customized to meet application requirements.

Features

- Provides rotary coupling for two multimode plastic large core fibers
- Passive and bidirectional
- Can be combined with various electrical slip rings and fluid unions
- Customized mounting flanges available
- Can be integrated into existing slip ring designs
- Aluminum housing
- Can be supplied with large core glass pigtails to reduce overall system loss
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810E functional shock (40 g)



Typical Applications

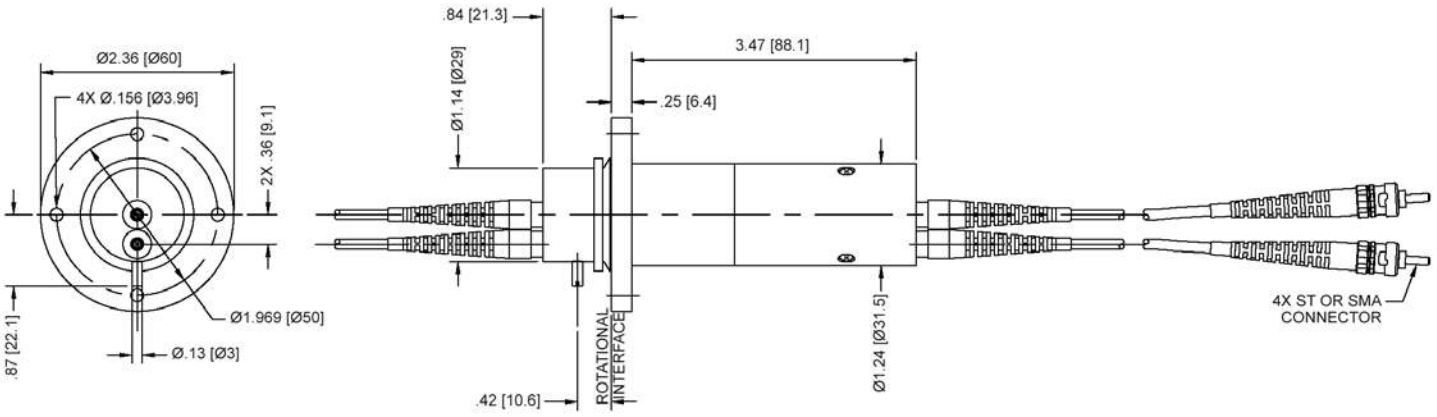
- Automation systems
- Packaging and special machinery
- Medical equipment
- Indexing tables
- Cable reels

FO257 Specifications			
Fiber Size (Microns)	1000 plastic. Consult factory for other fiber types.		
Insertion Loss*		Typical	Maximum
	Channel 1	< 4.0 dB	< 10.0 dB
	Channel 2	< 6.0 dB	< 10.0 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.0 dB	
Back Reflection	Consult factory		
Wavelengths	630 or 650 nm. Consult factory for other multi-wavelength applications.		
Rotational Speeds	To 200 rpm. Higher rotational speeds should be discussed with the factory.		
Temperature	-40 to +60 deg C (dry version)		
Exterior Surfaces	Aluminum		
Vibration	Tested to MIL-STD-167-1 (ships)		
Shock	Tested to MIL-STD-810F		
Terminations	Standard is with pigtail cables terminated with ST or SMA connectors at each end. Consult factory for other connector types.		
Pigtail Length*	As required		

**Insertion loss values are based on a FORJ with 1-meter plastic pigtails at each end. Add 0.01dB for each meter of 1000-micron core glass added to pigtails or 0.15 dB for each meter of plastic 1000-micron core fiber.*

Note: Optical values given are based on use with LED sources.

FO257 Dimensions



FO292

Fiber optic rotary joint

Description

The FO292 is an ultra-compact, two pass, multimode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of optical signals on two separate optical fibers across rotational interfaces.

The FO292 can be combined with our electrical and fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer.

The FORJ can be assembled with pigtail lengths tailored to the customer's application. Housing, mounting flange and drive features can also be customized to meet the customer's requirements. The FO292 can also be installed with one or both ends having a 90° cable exit, providing even more flexibility when installing the unit into existing slip ring assemblies or installations with little clearance space.

Features

- Provides rotary coupling for two multimode fibers
- Passive and bidirectional
- Can be combined with various electrical slip rings and fluid unions
- Smaller and more compact than the standard FO215 with improved back reflection performance
- Customized mounting flanges available
- Optional 90 degree cable exits at either end of the FORJ
- Optional fluid-filled version for deep submergence to 10,000 psi (69,000 kPa)
- Can be integrated into existing slip ring designs
- Stainless steel housing
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810E functional shock (40 g)



Typical Applications

- Winches and cable reels for remotely operated vehicles
- Remote I / O in industrial machinery
- Video surveillance systems
- Material handling systems
- Sensor platforms
- Robots
- Turrets

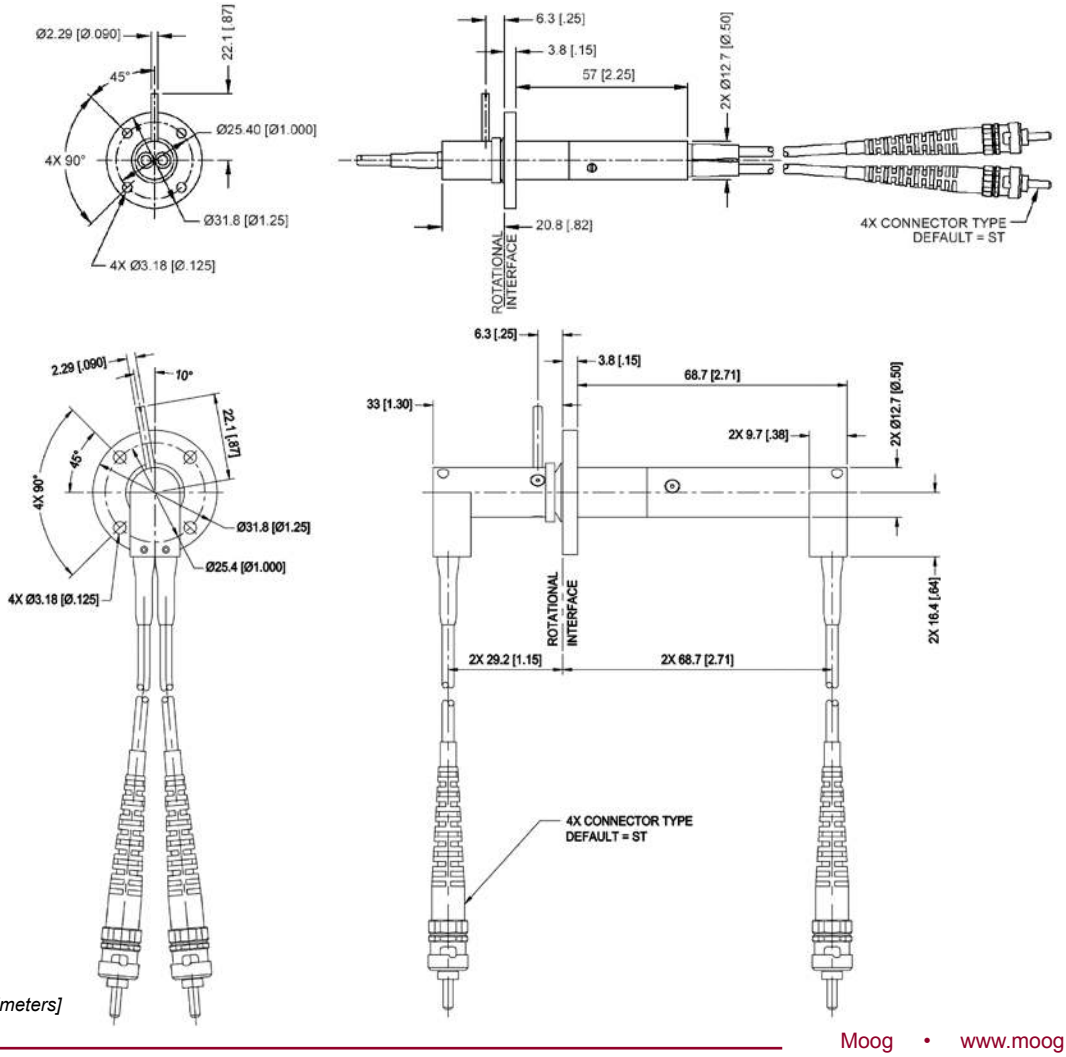
FO292 Specifications			
Fiber Size (Microns)	50 / 125 or 62.5 / 125. Consult factory for other fiber types.		
Insertion Loss*		Typical	Maximum
	Channel 1	< 1.5 dB	< 3.0 dB
	Channel 2	< 4.5 dB	< 6.0 dB
Rotation Variation	Typical < 0.5 dB	Maximum < 1.0 dB	
Back Reflection	Typical 20 dB	18 dB Minimum	
Wavelengths	850, 1300 or 1550 nm. Consult factory for other multi-wavelength applications.		
Rotational Speeds	To 500 rpm. Higher rotational speeds should be discussed with the factory.		
Temperature	-40 to +60 deg C (dry version) -20 to +60 deg C (wet version) Consult factory for extended range.		
Dispersion	< 10 ps (calculated)		
Exterior Surfaces	Stainless steel		
Vibration	Tested to MIL-STD-167-1 (ships)		
Shock	Tested to MIL-STD-810F		
Terminations	Standard is with pigtail cables terminated with ST connectors at each end. Alternative connectors types available (FC, SC, LC).		
Pressure	Up to 10000 psi (69,000 kPa) for fluid filled version**		
Pigtail Length*	As required		

** Add 0.5 dB to the insertion loss to version with 90 degree cable exits.*

*** Fluid filled version is slightly larger than shown below.*

Note: Optical values given are based on use with LED sources.

FO292 Dimensions



Dimensions in inches [millimeters]

FO242

Fiber optic rotary joint

Description

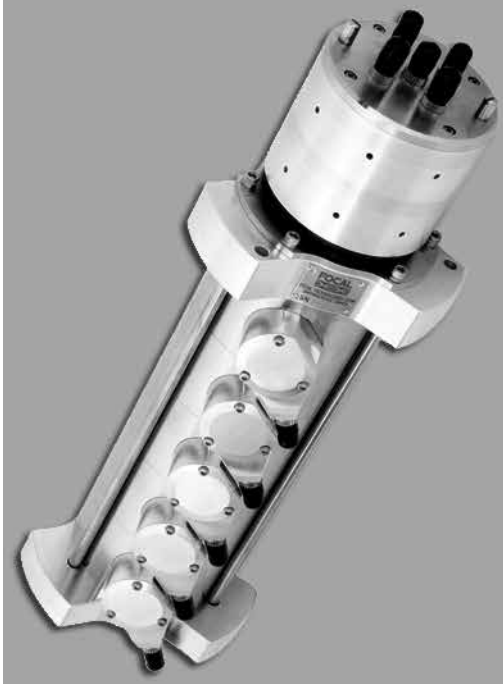
The FO242 is a multi-pass, singlemode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of optical signals across a rotational interface on 2 to 6 separate singlemode optical fibers.

The FO242 can be combined with our electrical and / or fluid slip rings giving a single, compact package for optical signals, electrical power and fluid transfer.

Other options include fluid-filling for pressure compensation permitting operation at any ocean depth, and the combination of the FO190 to include up to 19 multimode passes.

Features

- 2 to 6 singlemode channels
- Can be combined with our electrical slips, fluid unions and the FO190 multimode fiber optic rotary joint
- Alternative drive coupling arrangements are available (consult factory for specification details)
- Tested to 10,000 psi (69,000 kPa) when fluid-filled
- Stainless steel and aluminum construction
- Connectorized interfaces, for easy fiber cable replacement
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810D functional shock (40 g)



Typical Applications

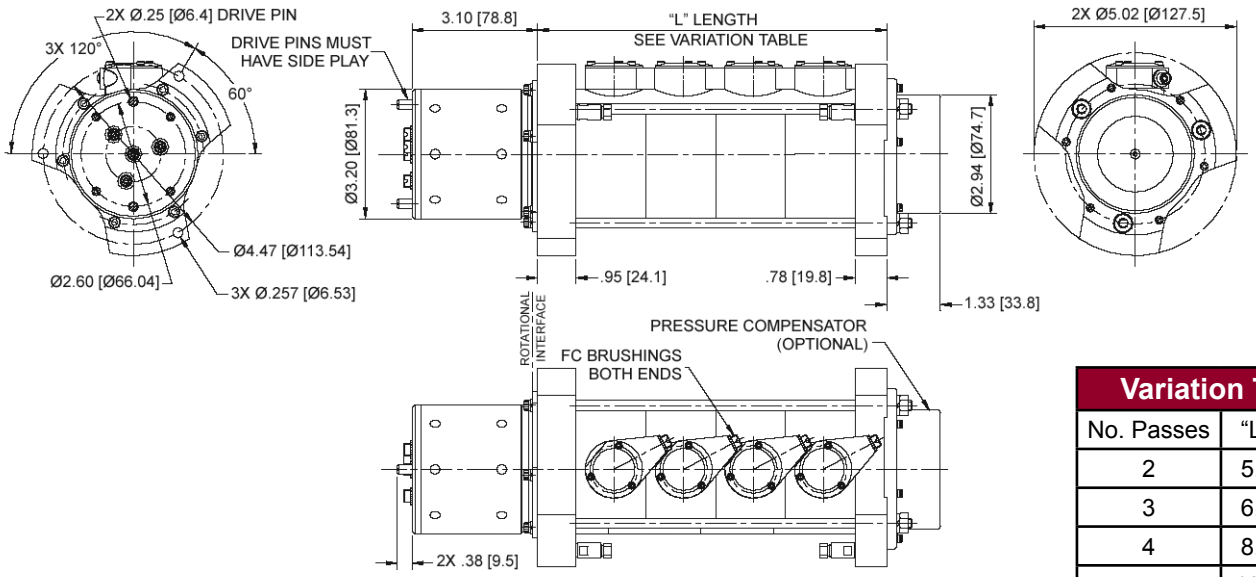
- Remotely operated vehicles
- Floating production systems
- Undersea telemetry
- Seismic streamers
- Radar antennas
- Cable reels

Fiber Optic Rotary Joints (FORJ)

FO242 Specifications											
Fiber Size (Microns)	9 / 125 SMF-28										
Insertion Loss (dB)	Channel	2-pass		3-pass		4-pass		5-pass		6-pass	
		Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.	Typ.	Max.
	1	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0	2.0	3.0
	2	2.5	4.0	2.5	4.0	2.5	4.0	2.5	4.0	2.5	4.0
	3			2.5	4.5	3.5	5.0	3.5	5.0	3.5	5.0
	4					4.0	5.5	5.0	6.5	5.0	6.5
	5							5.5	6.5	6.0	6.5
	6									6.5	7.5
Rotation Variation	Typical < 0.5 dB					Maximum < 1.5 dB					
Back Reflection*	Typical 22 dB					18 dB Minimum					
Wavelengths	1310 / 1550 nm. Consult factory for other wavelengths such as CWDM (18 wavelengths from 1271 nm to 1611 nm in 20 nm increments).										
Rotational Speeds	To 100 rpm dry and 60 rpm fluid filled. Higher rotational speeds should be discussed with the factory.										
Temperature	-40 to +60 deg C standard. Consult factory for extended range.										
Dispersion	< 50 fs / nm (calculated)										
Exterior Surfaces	Stainless steel and aluminum										
Vibration	Tested to MIL-STD-167-1 (ships)										
Shock	Tested to MIL-STD-810E										
Connectors	FC / PC connector bushings standard (ST connector bushings optional)										
Pressure	Up to 10000 psi (69,000 kPa) for fluid filled version										
Pigtail Length	As required										

**Lower back reflection available, consult factory.*

FO242 Dimensions



Variation Table	
No. Passes	"L" Length
2	5.19 (132)
3	6.91 (176)
4	8.64 (220)
5	10.37 (263)
6	12.10 (307)

Dimensions in inches [millimeters]

FO291

Fiber optic rotary joint

Description

The FO291 is a multi-pass, singlemode fiber optic rotary joint (FORJ). It is passive and bidirectional, and allows the transfer of optical signals across a rotational interface on 2 to 9 separate singlemode optical fibers.

The FO291 can be combined with our electrical and / or fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer, with ISO 9000 quality.

Other options include fluid-filling for pressure compensation permitting operation at any ocean depth, and the combination of the FO190 to include up to 19 multimode passes.

Features

- 2 to 9 single mode channels
- Can be combined with our electrical slip rings, fluid rotary unions and the FO190 multimode fiber optic rotary joint
- Alternative drive coupling arrangements are available (consult factory for specification details)
- Tested to 10,000 psi (69,000 kPa) when fluid-filled
- Aluminum and stainless steel construction
- Connectorized interfaces, for easy fiber cable replacement
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810F functional shock (40g)



Typical Applications

- Remotely operated vehicles
- Floating production systems
- Undersea telemetry
- Seismic streamers
- Radar antennas
- Cable reels

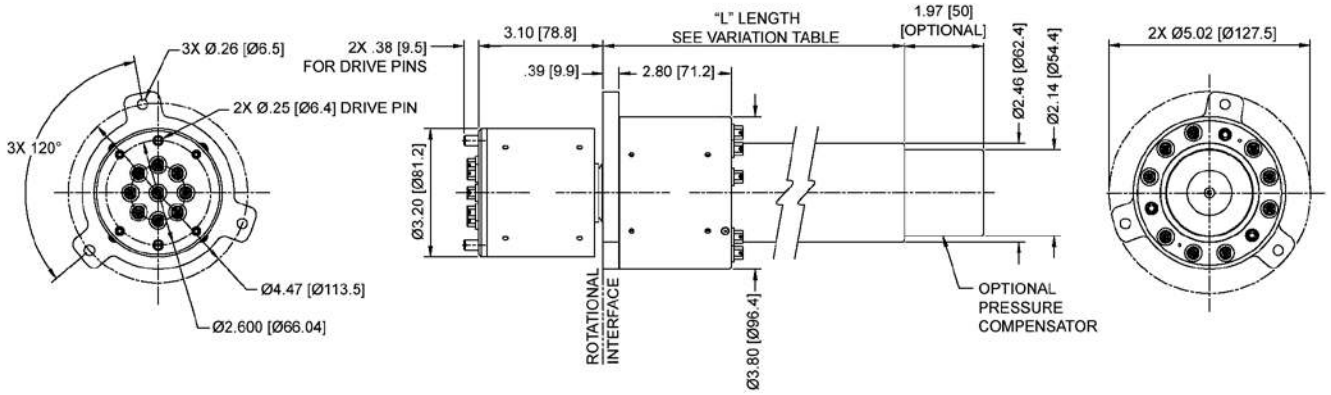
FO291 Specifications									
Fiber Size (Microns)	9 / 125 SMF-28								
Insertion Loss (dB)* (Typical / Maximum) Includes Rotation Variation	Channel	2-Pass	3-Pass	4-Pass	5-Pass	6-Pass	7-Pass	8-Pass	9-Pass
	1	2.0/3.0	2.0/3.0	2.0/3.0	2.0/3.0	2.0/3.0	2.0/3.0	2.0/3.0	2.0/3.0
	2	2.0/3.5	2.5/3.5	2.5/3.5	2.5/3.5	2.5/3.5	2.5/3.5	2.5/3.5	2.5/3.5
	3		2.5/4.0	3.0/4.0	3.0/4.0	3.0/4.0	3.0/4.0	3.0/4.0	3.0/4.0
	4			3.0/5.0	3.5/5.0	3.5/5.0	3.5/5.0	3.5/5.0	3.5/5.0
	5				3.5/5.5	4.0/5.5	4.0/5.5	4.0/5.5	4.0/5.5
	6					4.5/6.5	5.0/6.5	5.0/6.5	5.0/6.5
	7						5.5/6.5	5.5/6.5	5.5/6.5
	8							6.0/6.5	6.0/6.5
	9								6.0/6.5
Rotation Variation	Typical < 1.0 dB, maximum < 2.0 dB								
Back Reflection**	Typical > 22 dB, minimum > 18 dB								
Wavelengths	1310 / 1550 nm. Consult factory for other wavelengths such as CWDM (18 wavelengths from 1271 nm to 1611 nm in 20 nm increments).								
Rotational Speeds	To 100 rpm dry and 60 rpm fluid filled. Consult factory for higher rotational speeds								
Temperature	-40 to +60 deg C standard. Consult factory for extended range								
Dispersion	< 50 fs / nm (calculated)								
Exterior Surfaces	Stainless steel and aluminum								
Vibration	Tested to MIL-STD-167-1 (Ships)								
Shock	Tested to MIL-STD-810F								
Connectors	FC / PC connector bushings standard (ST connector bushings optional)								
Pressure	Up to 10,000 psi (69,000 kPa) for fluid filled version								
Pigtail Length	FORJ is connectorized with FC / PC, ST optional. Pigtail length and connector type optional								

*Insertion loss values include fiber cables attached at both ends of a connectorized FORJ.

**Lower back reflection available, consult factory.

Variation Table	
No. Passes	**" L" Length**
2	3.82 (97)
3	4.70 (119)
4	5.59 (142)
5	6.47 (164)
6	7.36 (187)
7	8.24 (209)
8	9.13 (232)
9	10.01 (254)

FO291 Dimensions



FO190

Fiber optic rotary joint

Description

The FO190 is a multipass fiber optic rotary joint (FORJ) for 2 to 21 multimode fibers. It is passive and bidirectional and allows the transfer of data, video and other signals on separate fibers across rotational interfaces.

The FO190 can be combined with our electrical and / or fluid slip rings, giving a single, compact package for optical signals, electrical power and fluid transfer.

Other options include fluid-filling for pressure compensation permitting operation at any ocean depth, and the combination of the FO242 to include up to 6 singlemode passes.

Features

- 2 to 21 multimode channels
- Lightweight aluminum construction
- Can be combined with our electrical slips, fluid unions and the FO242 singlemode fiber optic rotary joint
- Alternative drive coupling arrangements are available (consult factory for specification details)
- Tested to 10,000 psi (69,000 kPa) when fluid-filled
- Connectorized interfaces, for easy fiber cable replacement
- Rugged design
  - MIL-STD-167-1 ship vibration
  - MIL-STD-810E functional shock (40 g)
  - MIL-STD-901D heavy shock (65 g)



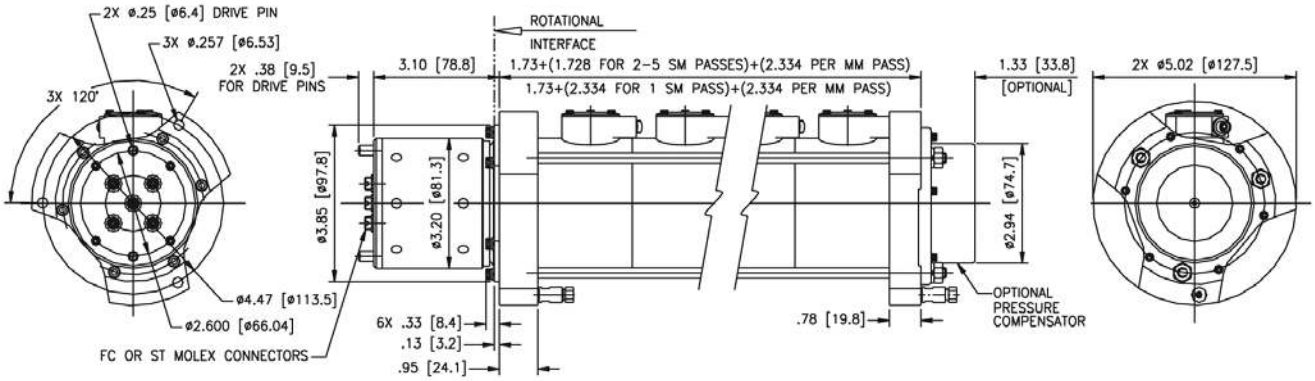
Typical Applications

- Winches and cable reels for ROV's
- Remote I / O in industrial machinery
- Towed arrays and dipping sonar
- Material handling systems
- Surveillance systems
- Cranes

FO190 Specifications	
Fiber Size (Microns)	50 / 125 or 62.5 / 125
Insertion Loss (Maximum Values)	<6.5 dB (50 / 125 fiber) <5.5 dB (62.5 / 125 fiber)
Rotation Variation	<1.5 dB
Wavelengths	850, 1300 or 1550 nm. Consult factory for multi-wavelength applications.
Rotational Speeds	To 100 rpm dry and 60 rpm fluid filled. Higher rotation speeds should be discussed with the factory.
Temperature	-40 to +60 deg C
Dispersion	< 10 picoseconds (calculated)
Return Loss	< -18 dB
Vibration	Tested to MIL-STD-167-1 (ships)
Shock	Tested to MIL-STD-810E and MIL-STD-901D
Connectors	FC / PC connector bushings standard. (ST connector bushings optional.)

Note: Optical values given are based on use with LED sources.

FO190 Dimensions



Dimensions in inches [millimeters]

H18 / H24 FORJ

Fiber optic rotary joints

Description

The H18 / H24 fiber optic rotary joints effectively combine a compact electrical slip ring with a fiber optic rotating joint. Both offer the flexibility of electrical, power and optical signal transfer through a single rotational joint. The H18 and H24 are low cost solutions for high data rate transmission to greater than 2.5 Gb / sec on the optical channel.

Features

- Combined compact electrical slip ring with fiber optic rotating joint
- Flexibility of signal transfer through a single rotational joint
- Low cost solution for high data rate transmission
- Standard 18 or 24 circuit model with 2 amp circuits
- Precision ball bearing for long life
- Speeds up to 250 rpm continuous
- Compact size
- Metal housing available
- Transfer analog and digital signals
- Compatible with data bus protocols

Benefits

- Unique signal handling performance with minimal electrical circuit noise
- Tight packaging to fit in the most demanding space constraints
- Low torque to minimize system torque budget
- Rapid delivery



Typical Applications

- CCTV and dome camera manufacturing
- Robotics
- Upgrading legacy equipment
- Digital communications and video

Fiber Optic Hybrid Units

Specifications		
	Singlemode H1817-950 / H2418-950	Multimode H1810-950 / H2417-950
Wavelengths	1310 and 1550 nm (consult factory for multi-wavelength applications)	850, 1310 and 1550 nm (consult factory for multi-wavelength applications)
Fiber Size	9 / 125 µm (consult factory for other sizes)	50 / 125 or 62.5 / 125 µm (consult factory for other sizes)
Insertion Loss	<3.5 dB (typical: <1.5 dB)	<2.5 dB (typical: <1.5 dB)
Return Loss	<-18 dB (standard). <-35 dB option available (consult factory for details)	<-18 dB
Rotation Variation	<1.5 dB (typical <0.5 dB)	<1.0 dB (typical <0.5 dB)
Maximum Speed	500 rpm (consult factory for higher speeds)	500 rpm (consult factory for higher speeds)
Terminations	Pigtailed cable and connectors	Pigtailed cable and connectors
Jacket Type	900 µm	900 µm

Electrical Circuits

Up to 18 x 2 amps circuits
Up to 4 x 6 amps circuits
Other combinations of the above available on request
Passes rated 240 V (28 AWG - silver plated)
Continuous current rating based on number of current carrying conductors:
- 2 A for 1 - 3 conductors
- 1 A for 4 - 6 conductors
- 0.5 A for 7 - 18 conductors - H18
- 0.5 A for 7 - 24 conductors - H24

Rated Voltage

210 VDC / 240 VAC

Insulation Resistance

200 MΩ at 500 VAC

Electrical Cables

Color coded, silver plated
ETFE or PTFE insulated lead wires

Temperature

-20° to +60° C

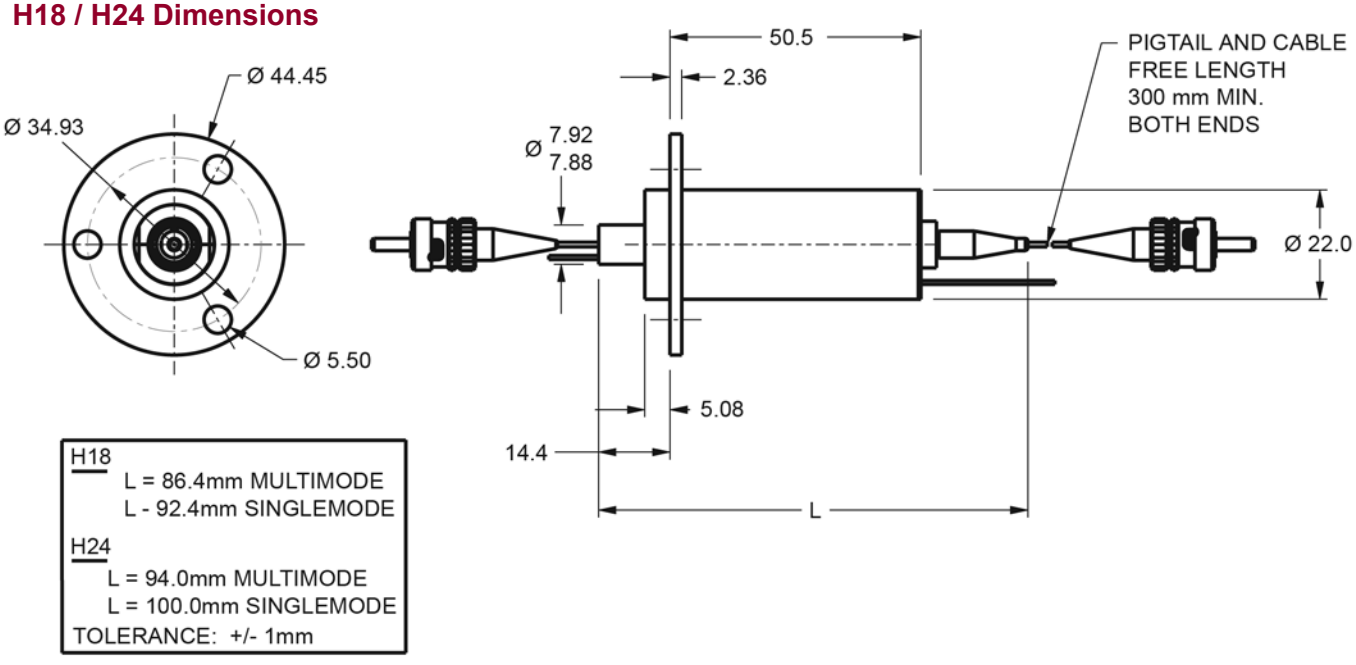
Mounting Options

Flanged as standard
Other configurations available on request

Bearings

Precision ball bearings fitted throughout

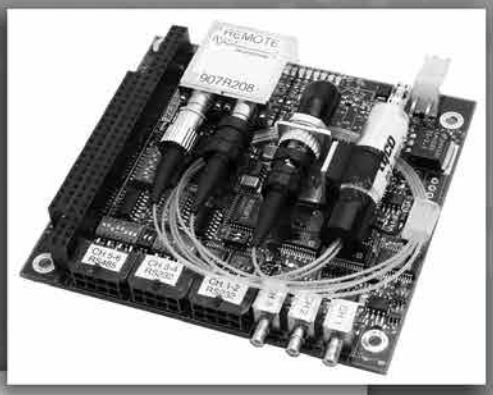
H18 / H24 Dimensions



Dimensions in inches (millimeters)




MODEL 903
Video/Data
Multiplexer
RS-485
RS-232
MODEL 903
Power
Supply
POWER
FOCAL


REMOTE
907R208



Marine / Energy Slip Rings

Designed to function in extreme marine environments

Description

Moog has delivered trusted technology products and services to the offshore petroleum, oceanographic, seismic and maritime industries for more than 20 years. Working from our well-equipped facility in Halifax, Nova Scotia, Canada, we have earned a reputation for unsurpassed service and custom solutions.

Today, we have the capacity to do more. Together with our manufacturing operations in United Kingdom and United States, we are an alliance dedicated to providing integrated custom solutions.

From design to deployment, our experienced team of professionals specializes in providing custom electrical slip rings, fiber optic rotary joints, hydraulic utility swivels and fiber optic multiplexer solutions for the worldwide marine industry. Product features include hybrid packages that combine fiber, electrical, and fluid rotary joints, packaging for harsh environments, explosion-proof / flameproof for hazardous locations, and adaptation to customer's size and mounting constraints.

Innovation and performance in all that we do. From our ability and willingness to customize products, to our unmatched global capacity, Moog Components Group is defining and delivering custom integrated and proven solutions for the harshest marine environments in the world.

Features

- Products designed for the harsh marine environment
- High voltage and high current slip rings (35 kV, 800 A)
- Experience and expertise in all aspects of fiber optics
- Flameproof / explosion proof design
- Ability to customize designs
- Fluid filled and temperature / pressure compensated designs for submerged applications
- Experience with all communications protocols used for the transmission of video and data



Typical Applications

- Remotely Operated Vehicles (ROV)
- Seismic surveying
- Oceanographic winches
- Subsea communications and control
- Floating production, storage and offshore loading
- Downhole / wirelogging and drilling
- Diving
- Marine instrumentation

FOCAL™

Model 129

Slip ring

Description

The Model 129 is a power slip ring used in marine and industrial applications worldwide. When rugged environments demand reliable, continuous operating performance, the 129 is the slip ring of choice. Capable of transmitting up to 5000 volts and 150 amps per slip ring pass, the 129 can reliably transfer power across a rotating interface.

Features

- Stainless steel housing provided for rugged environments
- Hazardous area certification available
- Power and signal transfer integrated into a single unit

Benefits

- Each unit designed, manufactured, and tested in accordance with the highest quality standards
- Maintenance free operation
- Proven reliable, long life performance
- Integration with fiber optic rotary joints and fluid rotary unions to provide a complete rotating interface solution



Typical Applications

- Industrial machinery
- FPSO swivel stacks

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Electrical	
Voltage	Maximum 5000 VAC
Current	Maximum 150 A per pass [1] Maximum current not specified [2]
[1] Higher current ratings possible by wiring passes in parallel	
[2] All current ratings based on a 20 °C ambient temperature	

Electrical Power Performance	
Flashover Voltage	24 000 VAC
Insulation Resistance[1]	Minimum 500 MΩ @ 1 kVDC
Short Circuit Rating	11 kA / 1s, 17 kA peak
Other Devices[1]	RF Rotary Joint, Shaft Encoder, Sensors
[2] Value dependent on wire type	

Electrical Signal Performance	
Contact Resistance	20 mΩ nominal
Insulation Resistance[1]	Minimum 500 MΩ @ 1 kVDC
Insertion Loss (Nominal) RG59 coax	1.5 dB maximum up to 30 MHz
Crosstalk (Nominal) RG59 coax	-15 dB maximum up to 30 MHz
[1] Minimum 100 MΩ for shield passes	

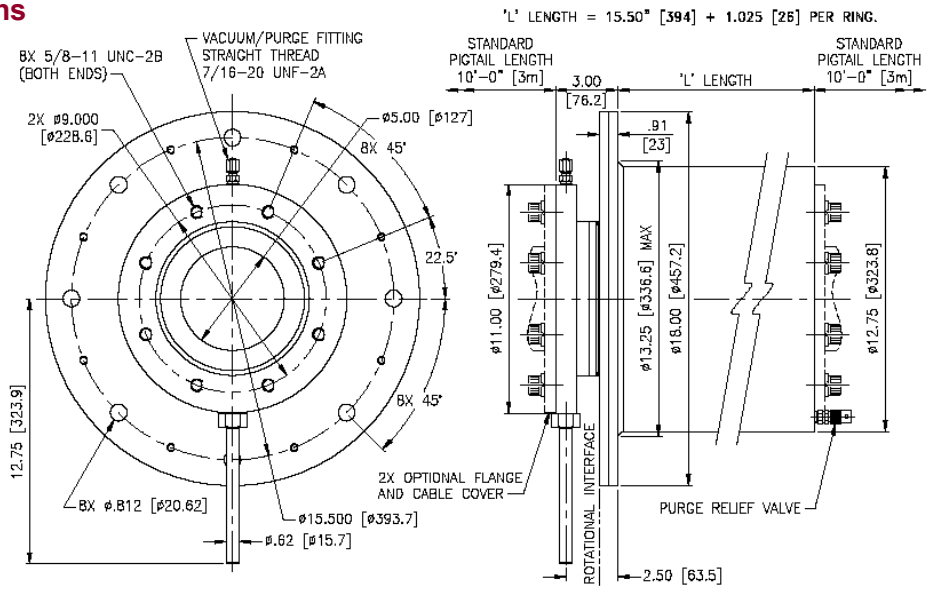
Mechanical	
Rotation Speed	Maximum 50 rpm continuous [1]
Protection Class	IP 66
Operating Temperature	-20 °C to + 55 °C [2]
Housing	Stainless steel (304)
Length "L"	Varies with number of electrical passes
[1] Higher rotational speeds possible. Please consult factory.	

Hazardous Area Option: Model 129X	
CSA Certification	Class 1, Group C, D
KEMA Certification (Model 295-X)	ATEX Ⓔx II 2 G EEx d IIB T5 (in accordance with ATEX directive 94 / 9 / EC)
Can be supplied with purge fittings for use with a certified purge system	

Terminations	
Standard	Loose wire pigtails, 10 ft [3.0 m] in length
Flange & Cable Covers	Various entry threads and orientations available
Cabled Pigtails	Tinned copper braid and heat shrink installed over loose wire pigtails
Special [1]	Supply and installation of connectors, terminals, conduit, cable, glands, junction boxes
[1] Integration of customer supplied product possible	

Additional Options	
Fiber Optics	Fiber Optic Rotary Joint (FORJ) or Optical Converter
Fluid	Fluid Rotary Union (FRU)
Design Certification	ABS, DNV, BV, LRS
Submersed Applications	Fluid filling fittings or fluid filled / pressure compensated at factory Internal pressure compensation
Other Devices[1]	RF Rotary Joint, Shaft Encoder, Sensors, Heater or Heat Trace Cable
Ingress Protection	IP 68
Extended Temperature Range	
[1] Integration of customer supplied product possible	

Model 129 Dimensions



Dimensions in inches [millimeters]

Model 159

Slip ring

Description

The Model 159 is the solution for higher current applications. Designed to accommodate up to 1000 amps total current, the 159 can be customized to fit specific requirements. Incorporating both power and signal transfer into a single unit provides the needed versatility for marine, industrial, and defence applications.

Features

- Stainless steel housing for rugged environments
- Slip ring design provides sealing to IP66 requirements
- Can accommodate a variety of wire and cable types
- Power and signal transfer integrated into a single unit

Benefits

- Each unit is designed, manufactured, and tested in accordance with the highest quality standards
- Maintenance free operation
- Proven, reliable, long life performance
- Integration with fiber optic rotary joints and fluid rotary unions to provide a complete rotating interface solution



Typical Applications

- Winches
- Remote Operated Vehicles (ROV)
- FPSO swivel stacks

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Electrical	
Voltage	Maximum 3500 VAC
Current	Maximum 60 A per pass [1] Maximum 1000 A total current [2]
[1] Higher current ratings possible by wiring passes in parallel	
[2] All current ratings based on a 20 °C ambient temperature	

Electrical Power Performance	
Flashover Voltage	14 000 VAC
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Short Circuit Rating	2.2 kA / 1s, 5.6 kA peak
[1] Value dependent on wire type	

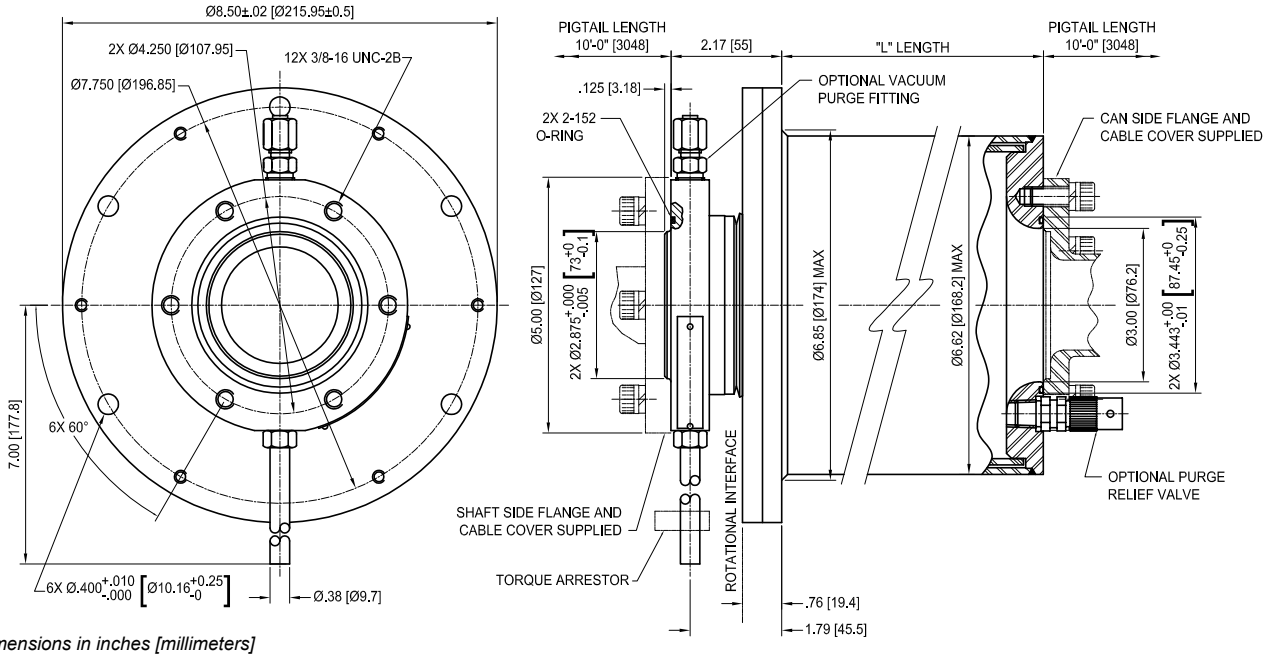
Electrical Signal Performance	
Contact Resistance	20 mΩ nominal
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Insertion Loss (Nominal) RG59 coax	1.5 dB maximum up to 30 MHz
Crosstalk (Nominal) RG59 coax	-15 dB maximum up to 30 MHz
[1] Value dependent on wire type	

Mechanical	
Rotation Speed	Maximum 50 rpm continuous [1]
Ingress Protection	IP 66
Operating Temperature	-20 °C to + 55 °C
Housing	Stainless steel (304)
Length "L"	Varies with number of electrical passes
[1] Higher rotational speeds possible. Please consult factory.	

Terminations	
Standard	Loose wire pigtails, 10 ft [3.0 m] in length
Flange and Cable Covers	Various entry threads and orientations available
Cabled Pigtails	Tinned copper braid and heat shrink installed over loose wire pigtails
Special [1]	Supply and installation of connectors, terminals, conduit, cable, glands, junction boxes
[1] Integration of customer supplied product possible	

Additional Options	
Fiber Optics	Fiber Optic Rotary Joint (FORJ) or Optical Converter
Fluid	Fluid Rotary Union (FRU)
Design Certification	ABS, DNV, BV, LRS
Submersed Applications	Fluid filling fittings or fluid filled/pressure compensated at factory Internal pressure compensation
Other Devices [1]	RF Rotary Joint, Shaft Encoder, Sensors, Heater or Heat Trace Cable
Ingress Protection	IP 66, 68 to "*X*" m
Extended Temperature Range	
[1] Integration of customer supplied product possible	

Model 159 Dimensions



Dimensions in inches [millimeters]

Model 176

Slip ring

Description

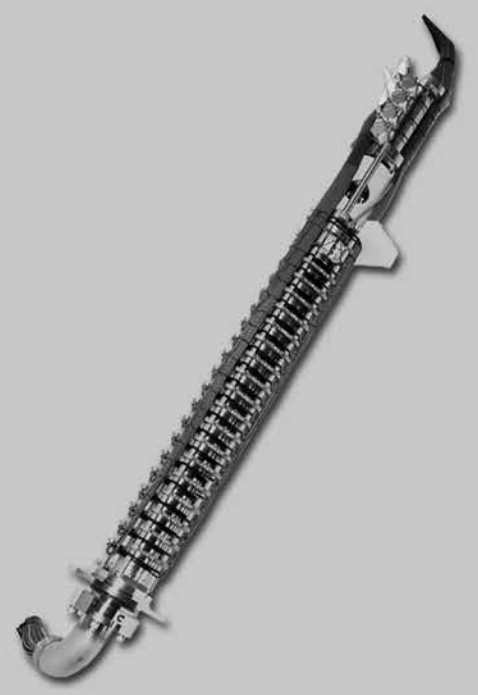
The Model 176 electrical slip rings perform in marine, industrial and defense applications. Comprised of power and signal electrical passes, the Model 176 provides superior performance and reliability in demanding operational environments. The Model 176 can be configured to meet specific customer needs.

Features

- Stainless steel enclosure for open deck use
- Sealed design tested to IP66 standards
- Accommodation of a variety of wire and cable types
- Hazardous area certification available
- Reliable operation under shock and vibration

Benefits

- Compliance with the highest quality standards for design, manufacture and test
- Maintenance free operation
- More than 30 years of proven field performance
- Integration with fiber optic rotary joints and fluid rotary unions to provide a complete rotating interface solution



Typical Applications

- Remote Operated Vehicles (ROV)
- Winch and TMS applications
- Mine countermeasures
- Towed instrument arrays

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Electrical	
Voltage	Maximum 5000 VAC
Current	Maximum 20 A per pass [1] Maximum 720 A total current [2]
[1] Higher current ratings possible by wiring passes in parallel	
[2] All current ratings based on a 20°C ambient temperature	

Electrical Power Performance	
Contact Resistance	20 mΩ nominal
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Short Circuit Rating	1.5 kA / 1s, 3.7 kA peak
[1] Value dependent on wire type	

Electrical Signal Performance	
Contact Resistance	20 mΩ nominal
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Insertion Loss (Nominal) RG59 coax	1.5 dB maximum up to 30 MHz
Crosstalk (Nominal) RG59 coax	-15 dB maximum up to 30 MHz
[1] Value dependent on wire type	

Mechanical	
Rotation Speed	Maximum 50 rpm continuous [1]
Protection Class	IP 66
Operating Temperature	-20°C to +55°C [2]
Housing	Stainless steel (304)
Length "L"	Varies with number of electrical passes
[1] Higher rotational speeds possible. Please consult factory	
[2] -20°C to +40°C for CSA certified Model 176-X	

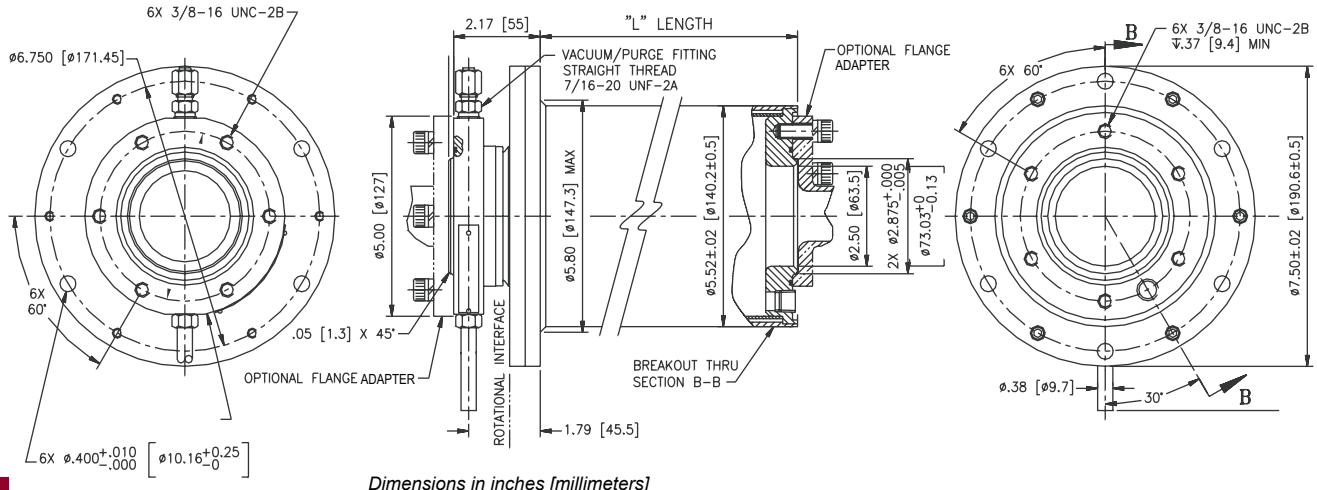
Environment Test	
Temperature	Tested to MIL-STD-810F, methods 501.4 and 502.4
Vibration	Tested to MIL-STD-167-1
Shock	Tested to MIL-STD-810D , method 516.3
Humidity	Tested to MIL-STD-810F, method 507.4

Hazardous Area Option: Model 176-X		
Certification	ETL:	Class I, Division 1, Group C & D, T5 Class I, Zone 1, AEx d IIB T5
	CSA:	Class I, Division 1, Group C & D, T5 Class I, Zone 1, Ex d IIB T5
	ATEX:	CE 0344 Ex II 2 G Ex d IIB T5 Gb
	IECEx:	Ex d IIB T5 Gb
Can be supplied with purge fittings for use with a certified purge system. The maximum total current of Model 176-X is 640 A		

Terminations	
Standard	Wire pigtails, 10 ft [3.0 m] in length
Flange and Cable Covers	Various entry threads and orientations available
Special [1]	Supply and installation of connectors, terminals, conduit, cable, glands, junction boxes
[1] Integration of customer supplied product possible	

Additional Options	
Fiber Optics	Fiber Optic Rotary Joint (FORJ) or optical converter
Covered Pigtails	Tinned copper braid and heat shrink installed over loose wire pigtails
Fluid Classification	Fluid Rotary Union (FRU)
Design Certification	ABS, DNV, BV, LRS
Submersed Applications	Fluid filling fittings or fluid filled / pressure compensated at factory. Internal pressure compensation Model 176 TMS option. Contact factory for details.
Other Devices [1]	RF Rotary Joint, shaft encoder, sensors
Ingress Protection [2]	IP 66, IP 68 to 'x' m
Extended Temperature Range	
[1] Integration of customer supplied product possible	
[2] Contact factory for higher ingress protection	

Model 176 Dimensions



Dimensions in inches [millimeters]

Model 180

Slip ring

Description

Ideal for small systems, the Model 180 is a compact, rugged unit designed to operate in harsh conditions. The 180-X is a fully certified flameproof enclosure for the hazardous area environment. When underwater operational capability is required, the 180 can also be adapted for use as a fluid-filled pressure compensated unit. The Model 180 is available in either standard “L” lengths or custom designs.

Features

- Stainless steel enclosure for open deck use
- Sealed housing design tested to IP66 standards
- Accommodation of a variety of wire and cable types
- Hazardous area certification available
- Reliable operation under shock and vibration
- Compact size

Benefits

- Compliance with the highest quality standards for design, manufacture and test
- Maintenance free operation
- More than 20 years of proven field performance
- Integration with fiber optic rotary joints and fluid rotary unions to provide a complete rotating interface solution



Typical Applications

- Remote Operated Vehicles (ROV)
- Winch and TMS applications
- Industrial machinery
- Seismic surveying

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Electrical	
Voltage	Maximum 1000 VAC
Current	Maximum 7 A per pass [1] Maximum 100 A total current [2]
[1] Higher current ratings possible by wiring passes in parallel	
[2] All current ratings based on a 20°C ambient temperature	

Electrical Performance	
Contact Resistance	20 mΩ nominal
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Insertion Loss (Nominal) RG179 coax	1.5 dB maximum up to 30 MHz
Crosstalk (Nominal) RG179 coax	-40 dB maximum up to 30 MHz
Bit Error Rate	Digital data transmission is greater than 25 Mbps at BER of 10^{-9}
[1] Value dependent on wire type	

Mechanical	
Rotation Speed	Maximum 100 rpm continuous [1]
Ingress Protection	IP 66
Operating Temperature	-20°C to +55°C [2]
Housing	Stainless steel (304)
Length "L"	Varies with number of electrical passes [3]
[1] Higher rotational speeds possible. Please consult factory	
[2] -20°C to +40°C for CSA certified Model 180-X	
[3] Maximum number of electrical passes is 60	

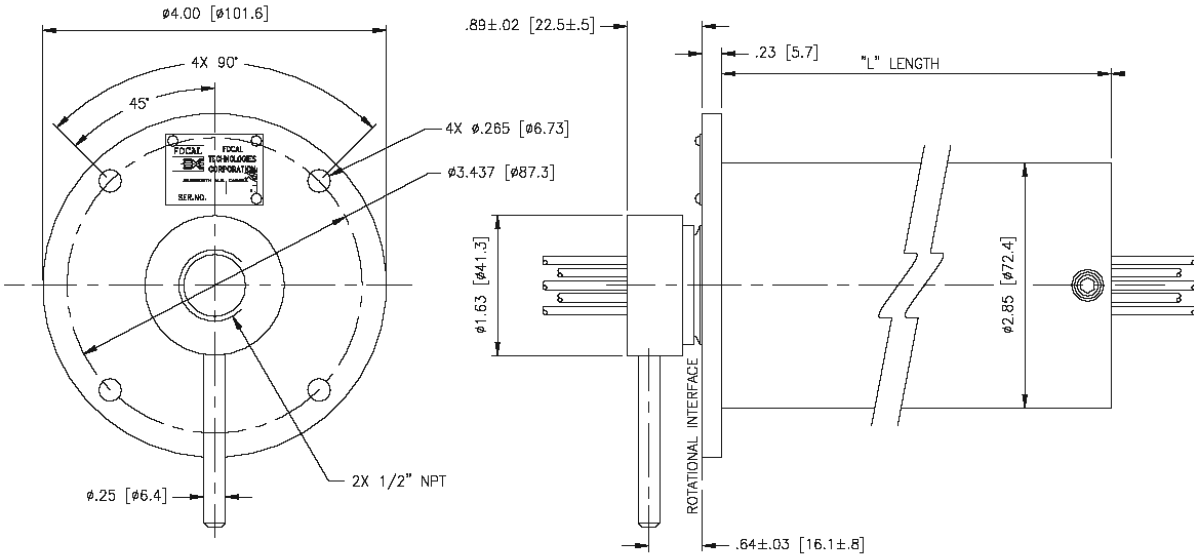
Environment Test	
Temperature	Tested to MIL-STD-810F, methods 501.4 and 502.4
Vibration	Tested to MIL-STD-167-1
Shock	Tested to MIL-STD-810D , method 516.3
Humidity	Tested to MIL-STD-810F, method 507.4

Hazardous Area Option: Model 180-X		
Certification	ETL:	Class I, Division 1, Group C & D, T5 Class I, Zone 1, AEx d IIB T5
	CSA:	Class I, Division 1, Group C & D, T5 Class I, Zone 1, Ex d IIB T5
	ATEX:	CE 0344 Ex II 2 G Ex d IIB T5 Gb
	IECEx:	Ex d IIB T5 Gb
Can be certified as Ex d ib on special order		

Terminations	
Standard	Wire pigtails, 4 ft [1.2 m] in length, exiting via 1/2" or 3/4" NPT female port
Special [1]	Supply and installation of connectors, terminals, conduit, cable, glands, junction boxes
[1] Integration of customer supplied product possible	

Additional Options	
Optics [1]	Fiber Optic Rotary Joint (FORJ) or optical converter
Fluid	Fluid Rotary Union (FRU)
Design Classification	ABS, DNV, BV, LRS
Submersed Applications	Fluid filling fittings or fluid filled / pressure compensated at factory
Other Devices [2]	RF Rotary Joint, shaft encoder, sensors
Ingress Protection [3]	IP 66, IP 68 to 'x' m
Extended Temperature Range	
[1] Maximum number of electrical passes is reduced to 30	
[2] Integration of customer supplied product possible	
[3] Contact factory for higher ingress protection	

Model 180 Dimensions



Dimensions in inches [millimeters]

250

FPSO swivel

Description

We design, manufacture and deliver unique FPSO swivels to meet the demanding requirements of offshore operators worldwide. Typically comprised of Electrical Slip Rings, Hydraulic Utility Swivels and Fiber Optic Rotary Joints, swivels are used in a variety of Floating Production, Storage and Offloading (FPSO) Systems including buoys, turret moorings and offshore loading towers. Our FPSO swivels permit the continuous delivery of electrical power and signals, hydraulic fluids, and fiber optic signals, with unlimited freedom of the vessel to weathervane about its mooring point. All FPSO swivels are approved by a marine authority and are certified for use in hazardous locations.

Features

- Stainless steel construction standard
- Large hollow bores
- Flameproof or purged / pressurized
- Integral junction boxes available
- Fluids for hydraulic control and chemical injection
- Single and multimode fiber
- Wide variety of cable entry methods

Benefits

- Each unit designed, manufactured, and tested in accordance with the highest quality standards
- Optical, electrical and fluid in one assembly
- Modeled with leading CAD software and files shared with customers
- Fully inspected and tested before shipment
- On-site installation support
- Complete document package provided



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295-X

FPSO swivel

Description

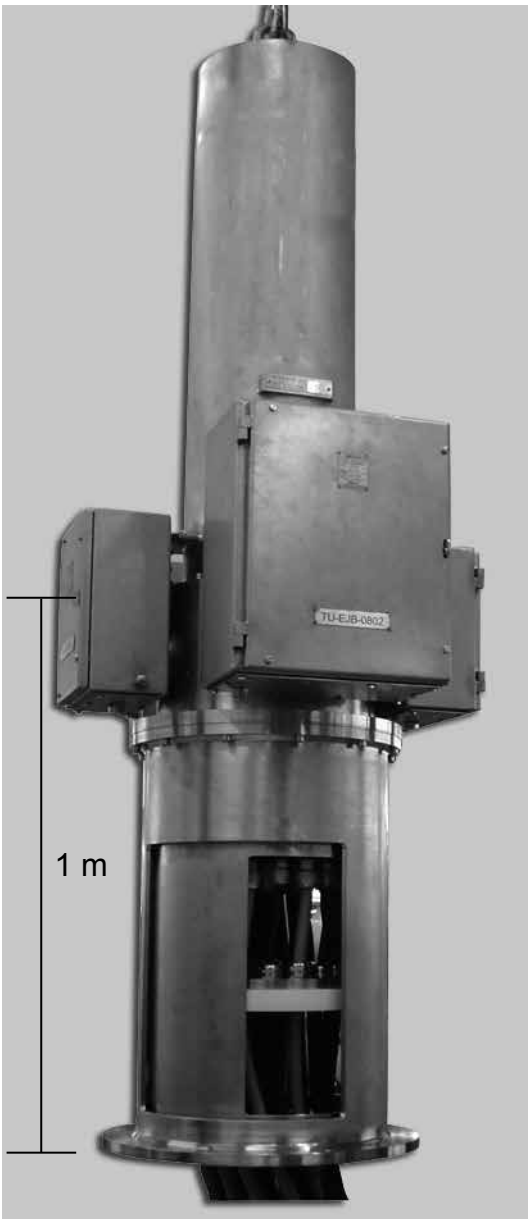
The 295-X is a standardized electrical / optical slip ring designed for the offshore oil industry. This design is type certified for hazardous area environments allowing for shorter design customization and assembly time. Available in sizes ranging to a maximum overall length of approximately 140 inches (3.5 m) and overall diameter of 12 inches (300 mm), this model meets the needs to transfer utility power, electrical and optical signals on a variety of offshore swivel applications.

Features

- 316 stainless steel housing available for corrosion resistance
- Hazardous area certified in accordance with European Community ATEX directive 94 / 9 / EC
- Standardized design can accommodate variety of cable entry methods

Benefits

- Each unit is designed, manufactured, and tested in accordance with the highest quality standards
- Integration with fiber optic rotary joints and fluid rotary unions to provide a complete rotating interface solution
- Design customization to meet both customer and marine authority specifications



Typical Applications

- CALM buoy
- Submerged turret loading vessel
- FPSO swivel stacks

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Electrical

295-X is rated in accordance with customer requirements	
Voltage	Maximum 5000 VAC
Current	Designed to customer specifications

Electrical Power Performance

295-X power performance is design in accordance with customer specifications and Certifying Authority requirements	
Flashover Voltage	Typically 4x V_{rated}
Insulation Resistance	This will vary depending on design specifications. Contact factory for further details.
Short Circuit Rating	

Electrical Signal Performance

Contact Resistance	20 mΩ nominal
Insulation Resistance [1]	Minimum 500 MΩ @ 1 kVDC
Insertion Loss [2] **(Nominal) RG59 coax**	1.5 dB maximum up to 30 MHz
Crosstalk [2] **(Nominal) RG59 coax**	-15 dB maximum up to 30 MHz

[1] Value dependent on wire type.
[2] Performance depends on configuration of signal circuits.

Mechanical

Rotation Speed	Maximum 50 rpm continuous [1]
Protection Class	IP 66
Operating Temperature	-20 °C to + 55 °C
Housing	Stainless steel (304)
Length "L"	Varies with number of electrical passes

[1] Higher rotational speeds possible. Please consult factory.

Hazardous Area Option: 295-X

KEMA Designation for ATEX certified unit.	ATEX CE Ex II 2 G Ex d IIB T5

Terminations

Standard	Integral armoured cables on the geo stationary side, increased safety junction boxes on the rotating side
Special [1]	Supply and installation of connectors, terminals, conduit, cable, glands, junction boxes

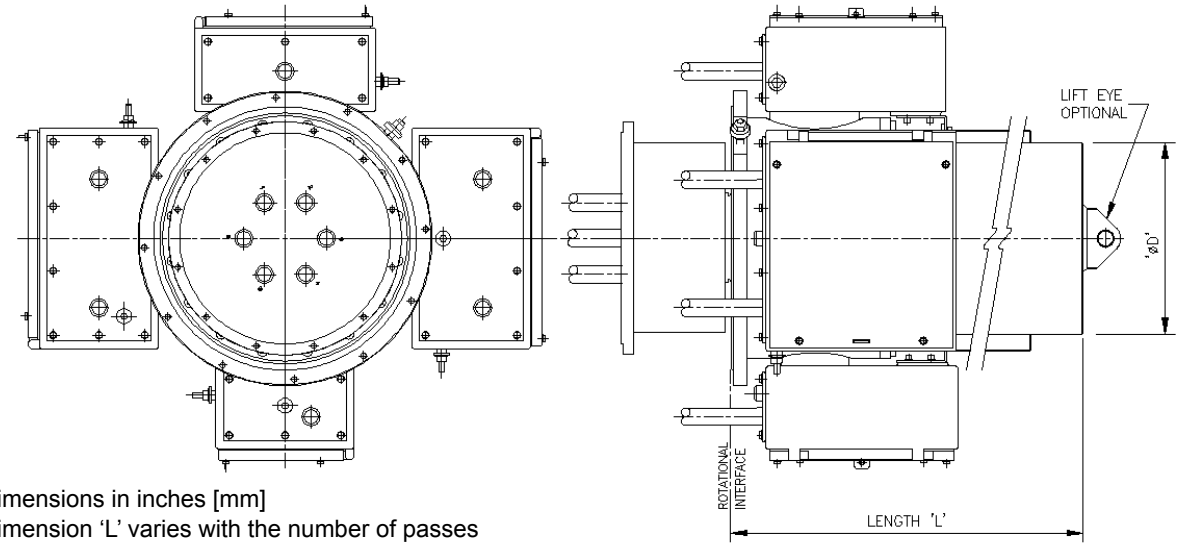
[1] Integration of customer supplied product possible

Additional Options

Fiber Optics	Fiber Optic Rotary Joint (FORJ) or Optical Converter
Fluid	Fluid Rotary Union (FRU)
Design Certification	ABS, DNV, BV, LRS
Submersed Applications	Fluid filling fittings or fluid filled / pressure compensated at factory
Other Devices[1]	RF Rotary Joint, Shaft Encoder, Sensors, Heat Trace Cable
Ingress Protection	IP 68
Extended Temperature Range	

[1] Integration of customer supplied product possible

FO295-X Dimensions



1. Dimensions in inches [mm]
2. Dimension 'L' varies with the number of passes
3. Dimension 'Ø D' maximum 12.75 [323.8]
4. Customer interface and drive arrangement may vary.

Multiplexers and Media Converters

Ruggedized to function in harsh marine environments

Description

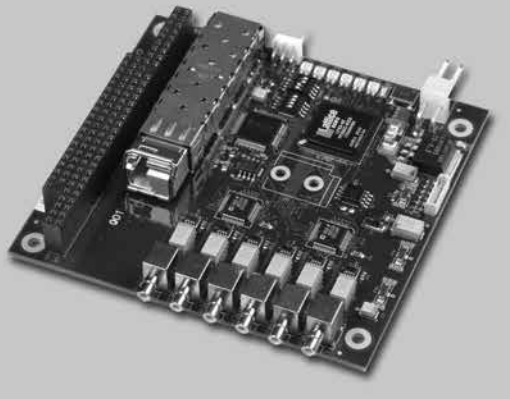
To exploit the full bandwidth of fiber, multiplexing combines many signals of various types — video, serial data, network data, control lines — into one high speed optical signal. Multiplexers that combine a number of electrical signals are typically called time division multiplexers (TDM), as each input signal is assigned a time slot in the outgoing data stream. Moog has a wide range of TDM options that allow multiple electrical channels to be multiplexed onto one or more optical fibers.

Multiplexers that combine a number of optical signals onto one fiber are also available. These multiplexers use wavelength-division multiplexing (WDM) to transmit signals at multiple wavelengths of light on the same optical fiber. Optical splitters and switches may be added to provide redundancy in the fiber links.

Both multiplexing techniques can be used separately or together to simplify optical transmission systems and reduce cost, improve reliability, reduce weight and improve performance. Multiplexed systems also simplify system upgrades since numbers of channels and channel bandwidth is a function of the electronics rather than the transmission line or components. Moog multiplexers accommodate the ever-increasing data rates needed for digital video and industrial data protocols, as well as high speed networks such as Ethernet.

Features

- Support for broadcast quality video in composite (NTSC / PAL), Y / C (S-video), RGB, and YPrPb formats
- Support for digital video formats including SDI and HD-SDI
- Support for many serial data, network, and bus protocols, including TTL, RS-232, RS-485 / 422, Ethernet, CANBus, ARCNET, Profibus, USB, ECL / PECL, and various sonars
- Support for many analog signal formats, including audio, hydrophones, and various sensors
- Modular system for easy reconfiguration with up to 32 video channels and 256 data channels per system
- Low latency data transmission for time-critical control, e.g. force-feedback robotic manipulators
- Embedded diagnostics including LED indicators and PC based diagnostics via serial, Ethernet or Modbus interfaces
- Pressure tolerant electronics and optics available



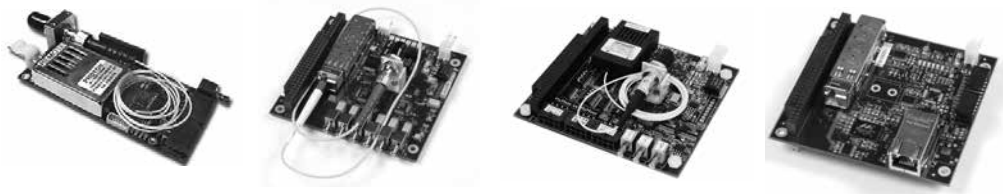
Typical Applications

Industrial
- Remotely Operated Vehicles (ROVs)
- Pipe inspection robots
- Video security systems
- Tether management systems
- FPSO communications

Process control

Military
- Bomb disposal robots
- Tactical networks
- Defense systems
- Armored vehicle turrets
- Electro-optic sensors

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Product Summary

Model Number	Description	Video	Serial Data (RS-232 / 422 / 485)	Ethernet	Diagnostics
Model 903 Family (Rack Mounted 3U Eurocard Form Factor)					
903	Video + Data Multiplexer	8 x NTSC / PAL	64	3 x 10 / 100 M	LED, RS-232, Ethernet*
903-HD	Compact Video + Data Multiplexer	8 x NTSC / PAL	16	-	LED, RS-232, Ethernet*
EIB-10 / 100	3-Port Ethernet Media Converter	-	-	3 x 10 / 100 M	LED
ECL-02	Dual ECL (Sonar) Media Converter	-	2 x ECL / PECL, 30 - 150 Mbps	-	LED, Ethernet*
HDSDI-MC	HD-SDI Media Converter	1 x HD-SDI	-	-	LED
GBES-MC	4-Port Gigabit Ethernet Media Converter	-	-	4 x 10 / 100 / 1000 M	LED
903-GEM	4-Channel Gigabit Ethernet Multiplexer (Switchless)	-	0 - 48**	4 x 10 / 100 / 1000 M	LED, Ethernet*
Model 907 Family (PC / 104 Form Factor)					
907-E	2-Channel Video, Ethernet and Serial Data Multiplexer	2 x NTSC / PAL	4 - 52**	1 x 10 / 100 / 1000 M	LED, Ethernet*
907-R / C	3-Channel Video + Data Multiplexer	3 x NTSC / PAL	6 - 48**	3 x 10 / 100 M	LED
907 PLUS	4-Channel Video + Data Multiplexer	4 x NTSC / PAL	6 - 54**	3 x 10 / 100 M	LED, Ethernet*
907-GEM	4-Channel Gigabit Ethernet Multiplexer (Switchless)	-	0 - 48**	4 x 10 / 100 / 1000 M	LED, Ethernet*
907V	6-Channel Video Multiplexer	6 x NTSC / PAL	0 - 48**	3 x 10 / 100 M	LED, Ethernet*
907-HDM2	2-Channel HD-SDI / Data Mux	2 x HD-SDI	4 - 20**	-	LED, Ethernet*
907-ECL	ECL (Sonar) Media Converter	-	1 x ECL / PECL, 30 - 150 Mbps	-	LED, Ethernet*
907-HDV	HD-SDI Media Converter	1 x HD-SDI	-	-	LED, Ethernet*
907-GBE	Gigabit Ethernet Media Converter	-	-	1 x 10 / 100 / 1000 M	LED, Ethernet*
907-GBES	4-Port Gigabit Media Switch	-	-	4 x 10 / 100 / 1000 M	LED, Ethernet*
907-DIAG-E	Ethernet Diagnostic Card (For Access to 907 Cards)	-	-	1 x 10 / 100 M	LED, Ethernet*
907-FLEX	Flexible Quad Media Converter Card	2 - 4 x 3 G / HD-SDI or 2 - 4 x NTSC	-	1-2 x 10 / 100 / 1000 M	LED, Ethernet*
Model 914 Family (Credit Card Sized Form Factor)					
914-R / C	1-Channel Video + Data Multiplexer	1 x NTSC / PAL	4 - 6**	2 x 10 / 100 M Ethernet Channels	LED
914-MCS	2-Port Ethernet Media Converter	-	-	2 x 10 / 100 M	LED
914-GBE	Gigabit Ethernet Media Converter	-	-	1 x 10 / 100 / 1000 M	LED
914-HDV	HD-SDI Media Converter	1 x HD-SDI	-	-	LED

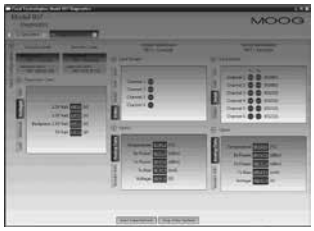
The above list is a small sample of available cards. For full product details please see product data sheets or multiplexer catalog found on the website at: www.moog.com.
*Ethernet diagnostics via FMB-X for 903 and via 907-DIAG-E card for 907.
**Minimum serial channels are included on board; maximum channels require expansion cards.

Multiplexer Diagnostics Software

This software is available to monitor multiplexer performance from the console end of a system. Optical power, voltage levels, and system status can be monitored for both uplink and downlink communications over standard Ethernet, Modbus, and Modbus TCP / IP.

Custom Solutions

Our advanced CAD systems enable rapid development of new interfaces and packages to suit diverse applications. With more than 100 different types of printed circuit boards developed in the last five years, we have established an experienced team of designers with expertise in software, firmware, high-speed digital and analog interfaces, and fiber optics. Existing custom systems support high shock and vibration environments, EMC, and long life requirements of more than 200,000 hours and long data links with up to 200 km of fiber. Moreover, our experience with the detailed design of fiber optic transmitters and receivers provides a level of optimization and performance that is not achievable with typical commercial devices.



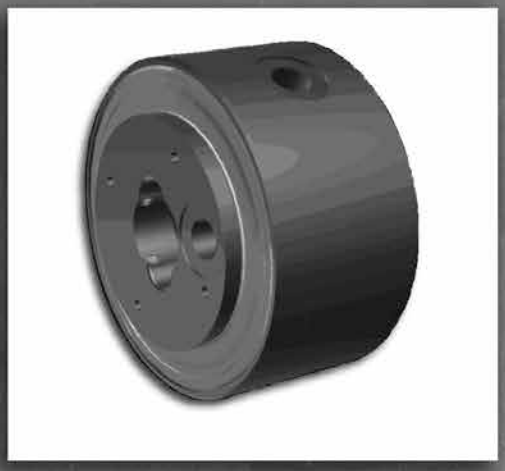
Contact Moog for custom mulitplexer solutions for subsea controls, defense and other specialized rugged applications.



Fluid Rotary Unions (FRU)







Fluid Rotary Unions

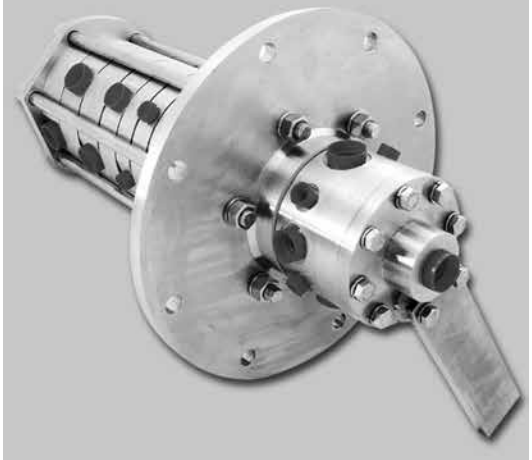
Description

Initially to serve in diver life-support unmbilical systems, fluid rotary unions have been diversified to include a broad range of applications.

Our fluid rotary unions are currently used around the world to ensure reliable transmission of life support, process, power and control fluids. Currently, fluid rotary unions rated for pressures up to 15,000 psi (1000 bar) are available. Seals are selected based on chemical compatibility, design pressure, design temperature, required service life and acceptable leakage rate. Leak collection can be supplied when required for environmental or personnel safety. Fluid rotary unions can be combined with our electrical slip rings, motor, resolvers and fiber optic rotary joints.

Features

- Customized mounting and drive configurations
- Customized materials to satisfy weight, chemical compatibility and other requirements
- Customized port configurations
- Hard coating, standard on high pressure fluid rotary unions, can be selected for improved abrasion resistance and extended seal life
- Leakage detection and collection ports (drain to tank)
- Optional hollow bore



Typical Applications

- Marine and life support systems such as saturation diving
- Training centrifuges for pilots and astronauts
- Industrial indexing tablets
- Chemical injection systems
- FPSO hydraulic power and control systems
- Semiconductor clean room robotics

Fluid Rotary Unions (FRU)

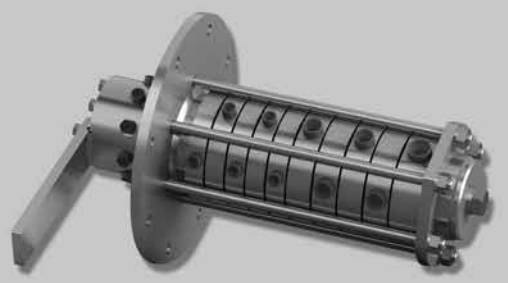
Specifications							
Part #	**Hollow Bore**	**Passes Qty Size**	**Pressure**	**Speed (rpm)**	**Sample Applications**	**Mounting Flange**	**Comments**
70	Optional	≤ 11 ≤ 1 inch	≤ 3000 psi ≤ 200 bar	≤ 10	Diving Industrial Scientific	Standard	1, 2, 3, 4, 12, 13
134	N/A	1 ≤ 1 inch	≤ 4000 psi ≤ 275 bar	≤ 5	Seismic	N/A	See Note 1, 2, 3, 5, 12
136	Optional	≤ 5 ≤1/2 inch	≥ 5000 psi ≥ 345 bar	≤ 1000	Scientific Military Cooling Systems	Optional	See Note 1, 2, 3, 6, 12, 13
255	Optional	Multiple 1/4 - 1-1/2 inch	≤ 5000 psi ≤ 345 bar	≤ 50	Industrial Military	Optional	See Note 1, 2, 3, 7, 12, 13
248	Optional	Multiple ≤ 1/4 inch	≤ 1000 psi ≤ 70 bar	≤ 100	Scientific Industrial	Optional	See Note 1, 2, 3, 8, 12, 13
271	Optional	≤ 5 ≤ 3/4 inch	≤ 1000 psi ≤ 70 bar	≤ 25	Industrial Military Scientific	Optional	See Note 1, 2, 3, 9, 12, 13
278	Standard	2 ≤1/2 inch	≤ 150 psi ≤ 10 bar	≤ 150	Military Cooling Systems	Optional	See Note 1, 2, 3, 12, 13
284	Standard	Multiple 1/4 - 2-1/2 inch	≤ 15000 psi ≤ 1000 bar	≤ 5	FPSO and SPM Hydraulic Controls	Standard	See Note 1, 2, 3, 10, 11, 12, 13
290	Standard	≤ 2 ≤ 3 inch	≤ 200 psi ≤ 15 bar	≤ 5	FPSO and SPM Fire Suppression	Standard	See Note 1, 2, 3, 10, 11, 12, 13
301	N/A	1 1/2 inch	≤ 145 psi ≤ 10 bar	≤ 250	Industrial	Standard	1, 2
306	1-1/2 inch	1 1/2 inch	≤ 145 psi ≤ 10 bar	≤ 100	Industrial	Optional	1, 2
307	Standard	2 1/8 inch	≤ 145 psi ≤ 10 bar	≤ 200	Industrial	Optional	1, 2, 3

Dimensional drawings available upon request.

Notes:

1. Values are representative of a typical range only and do not indicate limits.
2. Typical uses listed. Units suitable for other applications.
3. All models are available combined with ESR and FORJ.
4. Available in a number of std configurations. Utilizes a stacked housing design.
5. Generally a COTS pipe swivel combined with an ESR.
6. May require auxiliary cooling.
7. Utilizes a single piece housing design.
8. Basically a smaller version of the FO255.
9. Includes all FRU that are fully integrated with either ESR and FORJ.
10. Leak measurement and collection ports std.
11. FPSO - floating production and off loading. SPM - Single point mooring.
12. Material selection based on application and includes chemical compatibility, design pressure, design temperature, required service life.
13. Hollow bore may be on axis or a parallel axis wire path as required for the application.

Model 70



Description

The Model 70 is a multi-pass fluid rotary union that has served as the standard FRU to the diving industry for over 30 years. It is available as a stand alone FRU or can be combined with electric slip ring and fiber optic rotary unions. Typically configured with up to 13 passes, inter-port mixing is prevented through the use of double seals and an intermediate vent between passes. It has also proven itself in non diving applications such as centrifuge, indexing tables, and floating oil production swivels where product quality is paramount.

The Model 70 is available in several standard port configurations as illustrated below. The Model 70 is available with the standard seal technology or with a low leakage seal option. In its standard configuration, it is rated for 1000 psi [68 bar] at 10 rpm continuous service and up to 30 rpm intermittent service.

Features

- Configurable with up to 13 ports as standard
- 1/4, 1/2, 5/8 and 1 inch SAE straight thread o-ring ports standard
- Corrosion resistant materials suitable for hot sea water and other harsh chemicals
- Rated to 1000 psi [68 bar] at 10 rpm continuous service
- Maximum speed 30 rpm intermittent
- Polymer bearings eliminate the need for periodic service
- Optional rolling element bearing design available
- Available with hollow bore for ESR / FORJ pigtails

Benefits

- Continuous 360º rotation
- Proven reliability
- Maintenance free service
- Configurable

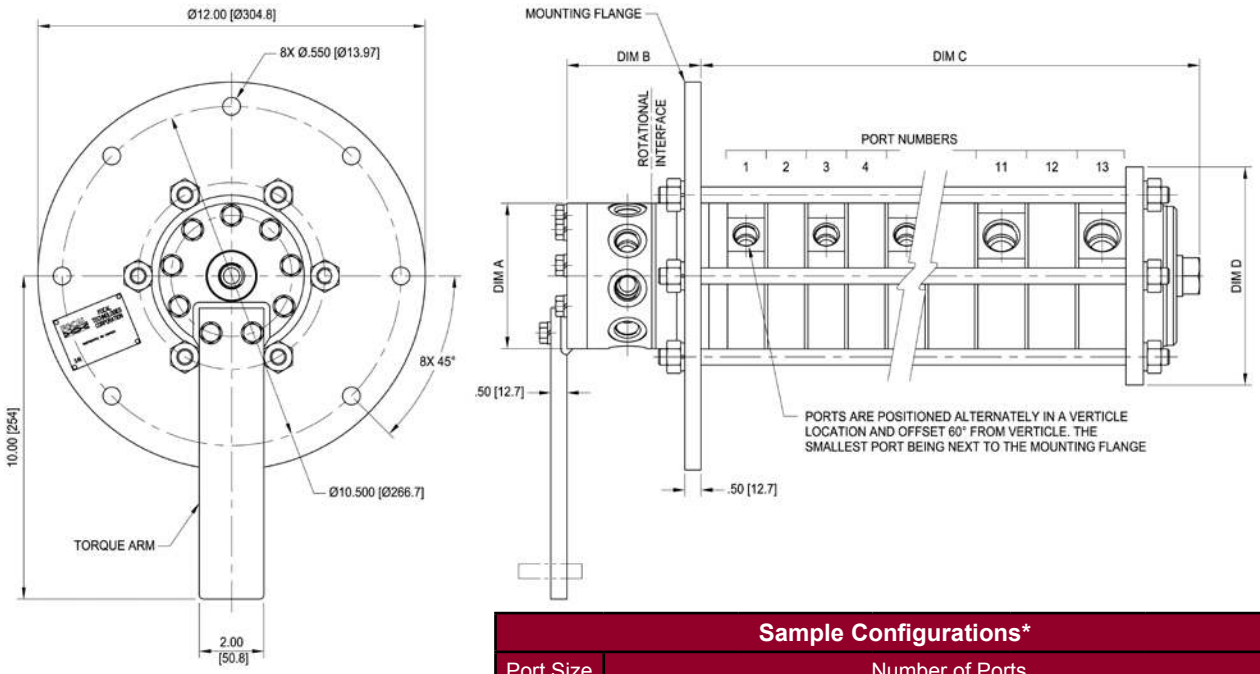
Typical Applications

- Marine – diving umbilical winches, seismic survey winches, hydraulic control winches
- Scientific – centrifuges
- Military – radar turrets
- Industrial – machining centers, rotary index tables, heavy equipment turrets, cable reels, packaging machines, palletizing machines, labeling machines, remote sensing

Model 70 Specifications	
Ambient Temperature Gases Liquids	-40ºC to +60ºC -40ºC to +100ºC 0ºC to +60ºC
Pressure	1000 psi
Rotational Speed	10 rpm continuous 30 rpm intermittent
Torque	Approx. 80 lb-ft [110 N-m]
Shock / Vibration	Mil-Std-167 (ships)
Weight	Dependent on configuration
Environmental	Marine, open deck
Leakage Std. Seal	50 std. mL / min N_2 gas per seal rotating @ 1000 psi max Typically less than 10 std. mL / min N_2 gas per seal rotating @ 1000 psi
Low Leak Seal	2 std. mL / min N_2 gas per seal rotating @ 1000 psi max Typically less than 0.05 std. mL / min N_2 gas per seal rotating @ 1000 psi
Nominal Port Size 1/4 inch 1/2 inch 5/8 inch 1 inch	SAE straight thread O-ring thread size 7/16-20 UNF 3/4-16 UNF 7/8-14 UNF (passage size suitable for 3/4” nominal, 1-1/16-12 UN adapter) 1-5/16-12 UN

Please note that operational life of the unit is dependent upon rotational speed, environment and temperature. Flexible conduit should be used to couple to the rotating component. The torque arm must be loose coupled.

Model 70 Dimensions



Dimensions in inches [millimeters]

Sample Configurations*					
Port Size	Number of Ports				
1”	0	0	1	0	0
5/8”	1	3	1	5	3
1/2”	4	1	4	0	3
1/4”	5	6	5	5	7
DIM ‘A’	4.50 [114]	4.50 [114]	4.50 [114]	4.50 [114]	5.00 [127]
DIM ‘B’	4.14 [105]	4.03 [102]	4.53 [115]	4.15 [105]	4.55 [115]
DIM ‘C’	14.50 [368]	14.88 [378]	16.50 [419]	15.77 [400]	18.39 [467]
DIM ‘D’	6.75 [171.5]	6.75 [171.5]	6.75 [171.5]	6.75 [171.5]	7.25 [184.2]

**Note: There are other configurations available, please contact factory for more information.*

Model 301



Description

The Model 301 is a single pass fluid rotary union that can be operated as a stand alone FRU. Its design has been optimized to allow an AC4598 / AC6200 or can be combined with a Moog electrical slip ring (ESR) to be mounted directly on the Model 301 body, simplifying the integration and mounting arrangement.

The Model 301 utilizes sealed-for-life rolling element bearings to provide long trouble free service. Filled PTFE based seals run on a hardened surface to provide long service life, minimizing frictional heat generation and operational torque. This unit has been tested in excess of 80 million revolutions without a failure. The BSPP ports and mounting flange allow convenient fixturing against an O-ring sealed shaft or separate threaded conduit.

Features

- 1-1/2 inch body O.D. to mount AC4598 / AC6200
- 1 pass with 1/2 inch BSPP ports
- Rated to 145 psi [10 bar] at 250 rpm continuous service
- Maximum working pressure 180 psi [12.5 bar]
- Maximum recommended speed 2000 rpm (intermittent or with sufficient medium flow to cool assembly)
- Stainless steel version available
- Longer housing available to accomodate slip ring length

Benefits

- Continuous 360º rotation
- FRU transfers air, oil, other non-corrosive medium
- Provides long maintenance free service
- Convenient mounting of FRU / ESR combination
- Tested in excess of 80 million revolutions

Typical Applications

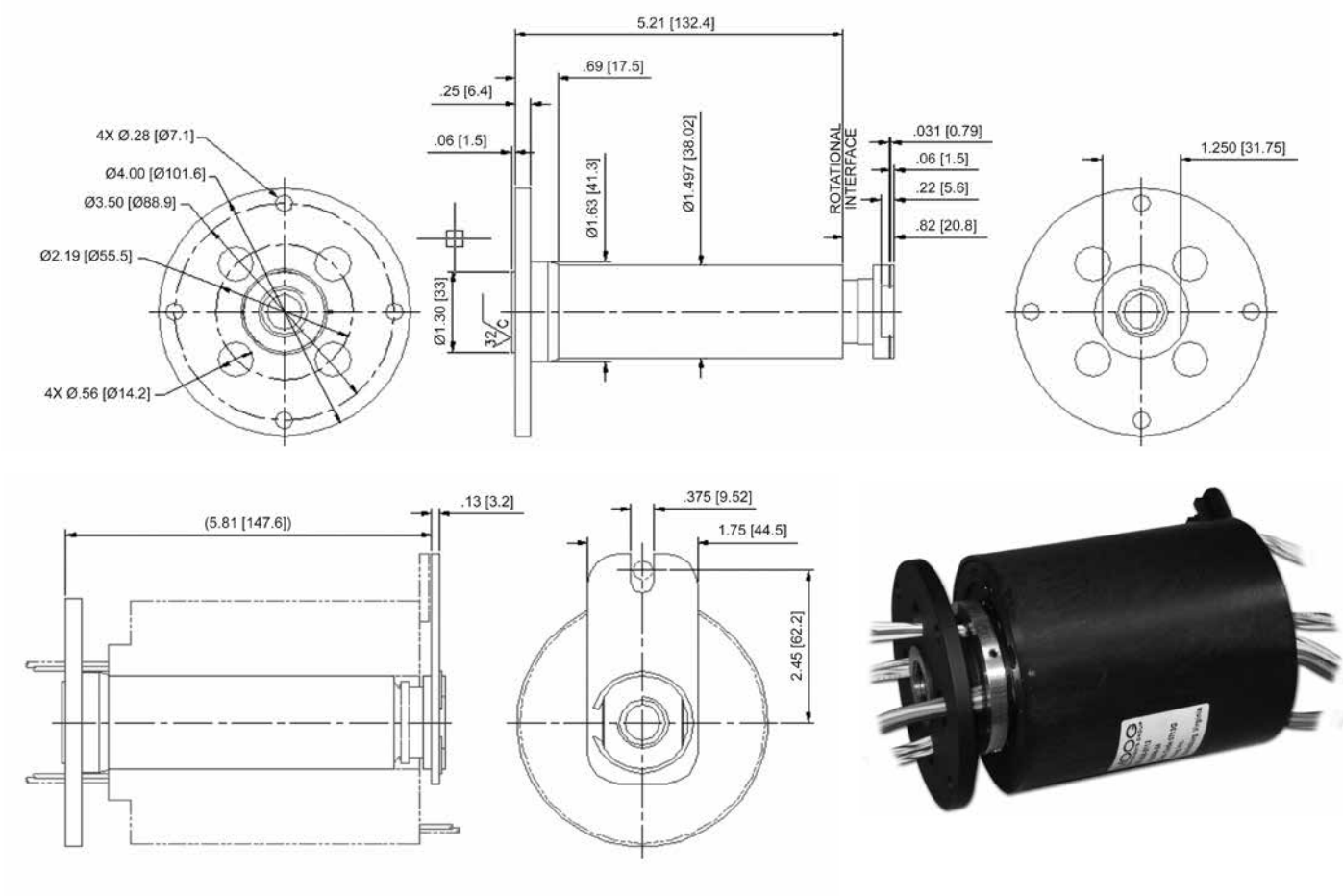
- Industrial – machining centers, rotary index tables, heavy equipment turrets, cable reels, packaging machines, palletizing machines, labeling machines, remote sensing

Fluid Rotary Unions (FRU)

Model 301 Specifications		Options
Operating Temperature	-40º to 60º C with optional ESR -40º to 80º C without ESR installed	• Stainless steel construction • Longer housing available to accomodate slip ring length
Passes Quantity Size	1x 1/2 inch BSPP	
Pressure and Speed	145 psi [10 bar] @ 250 rpm	
Maximum Pressure	180 psi [12.5 bar]	
Maximum Speed	2000 rpm (intermittent or with sufficient cooling from medium)	
Maximum Torque (Estimated)	2.5 lb-in [282 N-mm]	
Environmental	IP65 option (jetted water and dust seal option)	

Please note that operational life of the unit is dependent upon rotational speed, environment and temperature. Flexible conduit should be used on the torque are end to avoid side loading, which can shorten operational life.

Model 301 Dimensions



Dimensions in inches [millimeters]

Shown with optional AC4598 installed (see Model 813 data sheet for more details).

Model 306

Description

A fluid rotary union (FRU) functions as a rotary interface for fluid carrying conduit between stationary and rotating equipment. The fluid being conveyed can be liquid, gas, or vacuum. A fluid rotary union is also called a rotary union, fluid swivel, utility swivel, hydraulic swivel, hydraulic utility swivel, or rotary joint. Unlike flexible conduit, a fluid rotary union allows continuous unrestrained rotation of movable joints in machinery.

The Model 306 is a single pass fluid rotary union. It can be operated as a stand alone FRU. Its design has been optimized to allow easy integration with an AC4598 / AC6200 electric slip ring (ESR). The 1-1/2 inch hollow bore and ESR pigtail channels allow concentric shaft mounting or optional flange mounting with an ESR mounted directly to it using the optional adapter.

The Model 306 utilizes sealed-for-life rolling element bearings to provide long trouble free service. Filled PTFE based seals run on a hardened surface to provide long service life, minimizing frictional heat generation and operational torque.

Features

- 1-1/2 inch through bore
- Pigtail channels integral to shaft
- 1 pass with 1/2 inch BSPP ports
- Rated to 145 psi [10 bar] at 100 rpm continuous service
- Maximum working pressure 4000 psi [275 bar]
- Maximum recommended speed 450 rpm (intermittent or with sufficient medium flow to cool assembly)
- 1/2-13 UNC-2B thread for torque arm
- Optional ESR drive pin matches AC4598 / AC6200 torque arm allowing a single anti rotation interface
- Optional ESR mount for AC4598 / AC6200 leaves reduced bore clear
- Stainless steel version available

Benefits

- Continuous 360º rotation
- FRU transfers air, oil, other non-corrosive medium
- Provides long maintenance free service
- Convenient mounting of FRU / ESR combination



Typical Applications

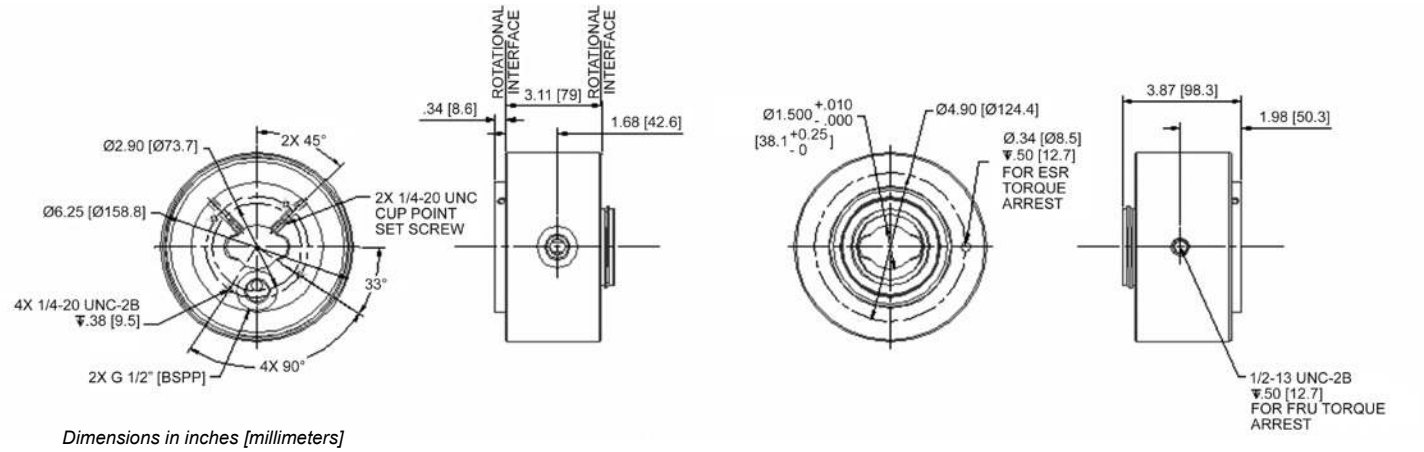
- Industrial machinery – machining centers, rotary index tables, heavy equipment turrets, cable reels, packaging machines, palletizing machines, labeling machines, remote sensing

Fluid Rotary Unions (FRU)

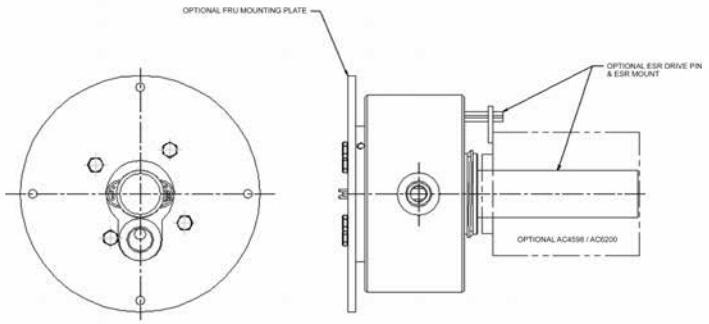
Model 306 Specifications		Options
Operating Temperature	-40ºC to +100ºC	• Stainless steel construction • Torque arm
Passes Quantity Size	1x 1/2 inch BSPP	
Pressure and Speed	145 psi [10 bar] @ 100 rpm and 60ºC	
Maximum Pressure	4000 psi [275 bar]	
Maximum Speed	450 rpm (intermittent or with sufficient cooling from medium)	
Maximum Torque (Estimated)	6 lb-ft [8 N-m]	
Weight	25 lb [11 kg]	
Environmental	IP42	

Please note that operational life of the unit is dependent upon rotational speed, environment and temperature. Flexible conduit should be used on the torque are end to avoid side loading, which can shorten operational life.

Model 306 Dimensions



Dimensions in inches [millimeters]





Do Slip Rings Fit in the Digital World?

Introduction

As the analog world gives way to the digital in more and more applications, design engineers are faced with replacing traditional analog components with their digital equivalents. Nowhere is this more evident than in the electro-mechanical world. Analog resolvers are being replaced by digital encoders and digital drive circuitry has become commonplace for motor control. When part of the system has to rotate, and a rotary connection for power and digital data is required, what does the designer do? Can the traditional slip ring with its sliding electrical contacts handle the job?

The Problem

Slip rings were originally designed to carry AC and DC power from a rotating platform to a stationary structure, or vice versa. Many applications also required, and still require, the transmission of relatively low bandwidth analog and digital control signals. In this environment, the traditional slip ring performs extremely well. Modern control systems now also require the transmission of high bandwidth analog and digital signals through the slip rings. Typical examples are analog and digital video signals. Until recently, bandwidths measured in the tens of megahertz were generally adequate. Today, and in the future, bandwidths will be required that are orders of magnitudes higher.

Basic Slip Ring Configuration

A basic slip ring, shown schematically in Figure 1, is composed of four elements, or components:

- A ring assembly that provides one or more circuit paths. Each ring is electrically conductive and provides a circuit path over a full 360 degrees of rotation of the ring assembly.
- Brushes provide electrical contact between the rotating (usually the ring) and the stationary parts of the assembly. The brushes ride on the ring, and are mounted in a brush block assembly, usually on the stationary structure.
- Input and output leads that connect the ring and brushes to the outside world.
- Connectors that connect to the slip ring assembly wiring. Connectors are optional, and are often specified by the customer.

Factors Affecting Slip Ring Performance

The following factors will determine the data rate that can be transmitted through a slip ring:

- The frequency response, or insertion loss, of the rings and brushes.
- The impedance, as a function of frequency, of the assembly.
- The differential time delay, as a function of frequency, through the device.
- Crosstalk between circuits.
- Frequency response of the leads and connectors.

The primary factor is frequency response, or bandwidth. Digital data streams will begin to suffer errors from insufficient bandwidth when the digital signal is attenuated, or distorted, to such an extent that the digital receivers cannot properly recognize the received signal. A digital signal is composed of a fundamental frequency at the basic signaling rate, as well as the odd harmonics of the fundamental. The required bandwidth of the slip ring may be several times the data rate.

For example, a 1 MHZ square wave may require a bandwidth of 5 or 7 MHz (5th and 7th harmonics). As the data rate is increased, eventually the harmonics is matched to the external system input and output impedances. Using transmission line theory, the designer will vary ring geometry, spacing, and dielectric material, to obtain the needed impedance. Often a ring and brush impedance of 70 to 150 ohms is obtainable, which should be well suited for many of today's digital systems. As a rule of thumb, a smaller diameter ring will result in a higher data rate. For very high data rates and / or large ring diameters, multiple taps and multiple brushes are often used to minimize signal path lengths.

For optimal performance, high frequency digital signals should be driven differentially, and connected to the slip ring using twisted pair, shielded cable such as CAT5 or CAT5e. This same wiring, including the shield, should be continued through the slip ring. Ideally, the internal slip ring wiring would also be twisted pair shielded cable, however, this may not always be possible due to physical constraints. Connectors, if used, must also be designed, or chosen, to have an impedance and frequency response consistent with system requirements.

Crosstalk between sensitive circuits will also be minimized by proper lead routing and shielding. Sensitive circuits (victims) should be routed within the slip ring as far away from noisy circuits (sources) as possible. Also, all unused circuits should be terminated in the characteristic impedance of the cables used.

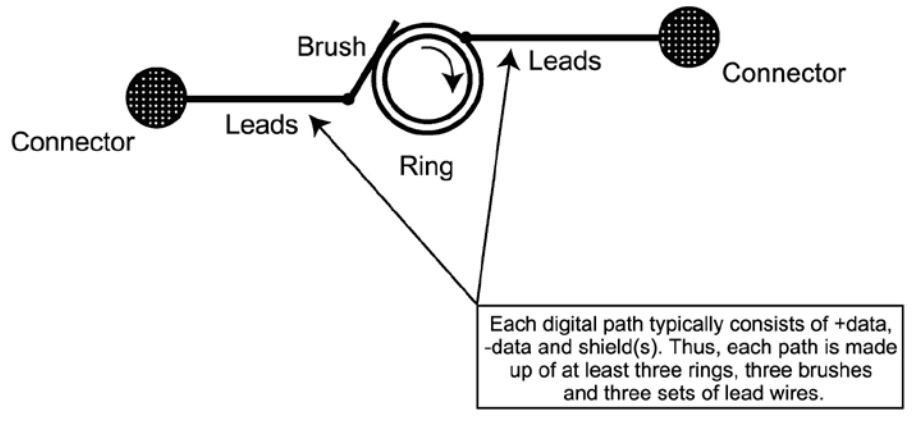
Specifying a High Performance Slip Ring

This article has attempted to make users aware of factors that determine slip ring performance, and of the limitations imposed by the total system in which the slip ring must operate. It is no longer adequate to simply request a device "that will transmit 50 mbs." The best solution is obtained when the entire system is known and understood, and usually requires a compromise between performance, size, weight, number of circuits, external factors, and cost.

The following parameters should be specified to assure satisfactory operation in a specific application:

- Data bus used to transmit data, i.e. Profibus, Ethernet, Firewire
- Cable type used to connect to the slip ring
- Maximum cable length between transmitter and receiver
- Maximum data rate
- Maximum error rate that can be tolerated

Figure 1 - Basic Slip Ring



- Maximum size, i.e. diameter and length
- Number of circuits and their ratings, i.e. voltage, current
- Maximum operating speed of rotation
- Operating environment

Moog has thousands of slip ring designs, including many standard "off the shelf" designs. Our engineering staff is available to modify an existing design or to provide a completely new design, if required. However, customers are encouraged to evaluate a standard design before requesting modifications that may not be needed.

We have tested many of our standard designs for high data rate performance. Devices with through bores of up to six inches have been tested. Testing has included insertion loss, frequency response, bit error rates, differential time delay, and impedance over frequency. In some cases we have identified, and implemented, design modifications to significantly improve performance. As a general statement, all devices that have been tested will support digital data rates of at least 50 mbs. This verifies that our standard units will operate successfully in a wide variety of standard data systems in use world–wide. These include, but are not limited to: Device Net, CAN Open, Profibus, and Ethernet 10Base T. Additionally, several models tested are suitable for Ethernet 100Base T, and Firewire at 400 mbs.

For the most demanding applications, we have integrated single channel and multiple channel fiber optic rotary joints (FORJs) into our standard slip ring assemblies. The FORJ is used to carry the very high data rate signals, or those circuits requiring very low cross talk or high noise immunity, while conventional slip ring technology is used for transmitting power and other control signals. We can also provide the hardware to perform the electrical- to optical- back to electrical conversion.

Slip Ring Fundamentals

A standard slip ring has four elements, or components:

- A **ring assembly** provides one or more circuit paths. Each ring is electrically conductive and provides a circuit path over a full 360° of rotation of the ring assembly.
- **Brushes** provide electrical contact between the rotating (usually the ring) and the stationary parts of the assembly. The brushes ride on the ring, and are mounted in a brush block assembly, usually on the stationary structure.
- Input and output **leads** connect the ring and brushes to the outside world.
- **Connectors** link to the slip ring assembly wiring. They are optional and often specified by the customer.

Applications

Industrial and Commercial

- Semiconductor equipment
- Industrial machinery
- Robotics
- Medical equipment
- Packaging machines
- Cable reels
- Laboratory equipment
- CCTV camera mounts
- Lighting
- Rotary index tables
- Rate tables
- Medical CT scanners
- Amusement rides
- Flight simulation

Aerospace and Military

- Inertial navigation systems
- Missile weapon systems
- Satellite assemblies
- Unmanned aerial vehicles
- Airborne camera platforms
- Shipboard communication systems
- Radar
- Tanks
- Light armored vehicles
- Helicopters
- Aircraft

Marine

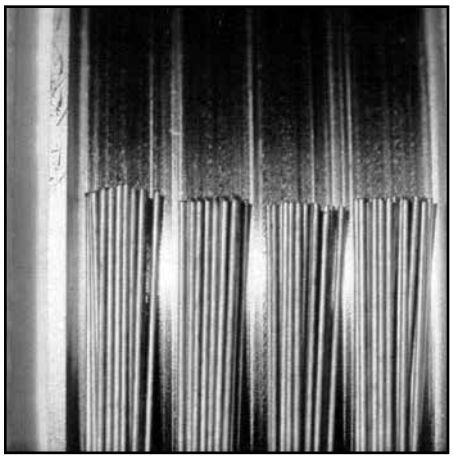
- Remote operated vehicles (ROV)
- Seismic surveying
- Oceanographic winches
- Subsea communications and control
- Floating production, storage and offshore loading (FPSO)
- Diving
- Marine instrumentation
- Downhole / wirelogging and drilling

Moog fiber brush contact technology was initially developed to solve a critical problem in military / aerospace applications. With many years of successful performance in highly critical slip ring applications, the fiber brush technology is available in commercial products as well.

Fiber Brush Technology For Commercial / Industrial Applications

For many years the traditional design for rotary contact slip rings used either a lubricated monofilament brush or a self-lubricating composite brush. While these traditional approaches have proven to be successful through testing and field experience, improved performance is always desirable. To that end, we developed the fiber brush technology. A chart comparing the advantages of different contact technologies is shown on page 161.

Today's industrial / commercial equipment slip ring requirements are becoming more and more demanding. High operational speeds, long life, no maintenance, and data transfer capability, are the general expectations in slip ring performance. Taking advantage of the developments done in our Advanced Materials Research and Development Department, we have transferred the fiber brush technology to cost effective



commercially available products to address today's critical applications.

Military / aerospace applications require slip rings that provide minimal debris generation, low electrical noise, both high and low current transmission capabilities, low outgassing and a long operational life. They must also operate flawlessly in a wide operating temperature range, and at a variety of brush ring surface speeds, as well as in air or vacuum conditions.

Fiber Brush Contact Technology

Fiber brush is the term for a particular design of sliding electrical contacts. Fiber brushes are simply a group of individual metal fibers (wires) that are collimated by and terminated into a metal tube as illustrated in the photo on the left. In this cantilevered design, the free, unterminated end of the fiber brush bundle rides in a groove on the ring surface.

Many Advantages

Fiber brushes have many distinct and measurable advantages over conventional slip ring contacts in military / aerospace applications:

- Multiple points of ring contact per brush bundle
- Ability to perform in ambient conditions as well as in vacuum conditions
- Contact surfaces that do not require lubrication
- Long life
- Low contact force per fiber
- Low contact wear rates
- High power circuit density
- Low dynamic contact resistance (noise)
- High and low current carrying abilities
- Low outgassing
- Very little debris generation
- Wide operating temperature range
- Wide range of brush / ring surface speeds

Proven Performance

As an alternative to traditional sliding contact designs, Moog fiber brush was developed to meet the increasing demands of slip ring performance. The technology has been used in many demanding applications such as:

- CT Scan systems
- High speed testing
- Robotic welding systems
- High-speed, in-line inspection systems
- Radar platforms

A Growing History

Moog started in 1953 as a supplier of high reliability slip rings to the military and aerospace community. Over the years we have developed a reputation as a quality and precision supplier for space, weapons, aircraft and other mission critical program requirements. It is this stringent quality and technology that has now carried over to our commercial products group. We have adapted technology designed and produced for defense applications for use in our growing line of standard commercial products.

All of our experience and expertise helps our customers in a very real measurable fashion. We make a point to fully understand our customers' applications and by teaming with our customers we are able to efficiently coordinate their needs with our engineering and production departments. We have for years had a Commercial Slip Ring Team that provides focus allowing us to slash lead times and develop special designs fast and accurately.

Technology Comparison

Generally, aerospace slip rings and brushes (sliding electrical contacts) are designed using traditional contact technologies such as lubricated monofilament wire brushes or self-lubricated composite brushes. These approaches have been proven successful many times through testing and actual flight experience. There are, however, some disadvantages to these approaches.

Composite Brushes

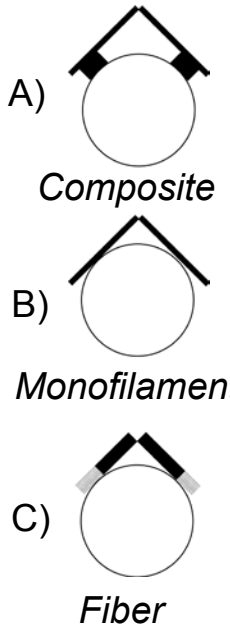
Unlike monofilament brushes, composite brushes provide their own lubrication through the addition of an embedded solid lubricant to the composition of the brush. The nature of this lubrication mechanism requires that the brush must experience wear to transfer the lubricant from the brush to the ring. This wear results in some amount of electrically conductive debris being generated within the slip ring. While small amounts of this debris can generally be tolerated if proper design procedures are followed, the extended life requirements of new aerospace slip rings could result in the generation of intolerable amounts of this conductive debris.

Also, the contact materials used in composite brush slip ring designs can be contaminated by absorption of airborne gasses. The principal form of this contamination is silver sulfide, which appears as tarnish. When exposed to temperatures of less than 178°C, these films have semiconducting properties (increase in electrical conductivity with increased temperature). The presence of silver sulfide films at low temperatures may cause unacceptably high contact resistance on low current circuits. Below is a chart that summarizes the characteristics of the different types of contact technologies.

Monofilament Brushes

Aerospace rated monofilament brushes depend on intentional lubrication of the contact surfaces to perform properly. Many of the liquid lubricants used will not meet NASA outgassing requirements, and the ones that do typically have poor viscosity characteristics at low temperatures. Designs using this contact technology must be analyzed to ensure that sufficient lubrication is maintained throughout the system life requirements.

Types Of Brushes



Materials Choices

One of the most important features of any military or aerospace design is the choice of component materials. Materials must be carefully chosen to reduce outgassing, control dissimilar thermal expansions, reduce galvanic corrosion, and provide nuclear hardening, among other concerns. Materials choices for fiber brush slip rings are much the same as used in traditional slip ring designs with the major exception of the contacts. Fiber brush contacts (fiber and ring surfaces) can be manufactured using alloys of copper, gold, silver and palladium. The actual choice of contact materials depends largely on the electrical requirements of the slip ring. Moog Components Group controls all materials and materials suppliers to verify and ensure consistent quality.

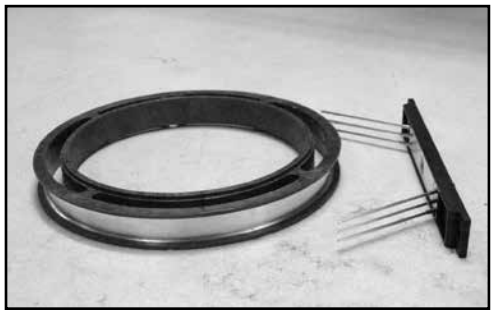
Commercial Fiber Brush Products

Our commercial fiber brush products include a variety of products with power capabilities up to 100 amps and down to low level data transfer, all within the same housed design. These products are highly configurable to meet your requirements with readily available products.

Fiber Brush Slip Ring Technology

Commercial Separate Products

These products are highly configurable to meet your requirements with readily available products.



In addition to these enclosed slip ring capsules we also provide fiber brush separates. When a "self-contained" capsule is not practical due to system size or cost constraints, fiber brush separates are an excellent alternative. These separates are available in the following configurations:

Bore Size	Current
1.8"	2 amps
2.8"	5 amps
	10 amps
	30 amps
	50 amps
4.0"	10 amps
	30 amps
	50 amps

Properly mounted and aligned, fiber brush separates provide the same exceptional performance characteristics of our self-contained capsule designs.

Our Staff

Our staff includes electrical, mechanical, manufacturing and software engineers, metallurgists, chemists, physicists and materials scientists. Our emphasis on research and product development has provided us with the expertise to solve real-life manufacturing problems. Using state-of-the-art tools in our complete analytical facility, our capabilities include a full range of environmental test, calibration and inspection services. We have recognized expertise in tribology (the science of friction and wear), precision gearing, magnetic circuit design, PWM amplifier design and in the supporting materials sciences.

Our engineers can work from your designs, or create a custom design for you.

Consistent Quality

Moog Components Group places a continuing emphasis on quality manufacturing and product development to ensure that our products meet our customer's requirements as well as our stringent quality goals. We have committed to the Total Quality Management Program with a policy of "Do It Right the First Time" and a goal of "Zero Defects". We are ISO 9001 Certified to ensure the consistent quality and reliable performance of our products.

The newest initiative of our division is Demand Flow® Technology (DFT). DFT is a demand driven manufacturing flow system that economically manages in-process inventory. The concept operates with a "line-of-sight" premise which provides visibility for all in-process work. This concept has helped the division be more efficient and flexible to customer schedule changes, reduced inventories and improved organizational operations. Benefits include streamlined processes to accommodate jobs with a quick turn-around, reduced cycle time to cut costs, and greater customer responsiveness.

[1]Roberts E.W., Sliding Electrical Contracts in Space: Observations on Existing Technology and New Trends in Low-Speed Applications, European Space Tribology Laboratory.

Demand Flow® is a registered trademark of the J_C-I-T Institute of Technology, Inc.

Comparison of sliding electrical contacts for space applications.

Composite Brushes Ag / MoS_2 / Graphite	**Monofilament Brushes** Lubricated	**Fiber Brushes** Unlubricated
Most flight history	Considerable flight history	Growing flight history
Meets outgassing requirements	Does not meet outgassing requirements	Meets outgassing requirements
Self lubricating contacts (solid lubricant in brushes)	Requires liquid lubricant on contact surface	No oil or dry film lubricant application required
Requires largest ring-to-ring axial pitch	Requires smallest axial pitch (50% of composite brush pitch)	Requires less axial pitch than composites (70% of composite brush pitch)
Manufacture subject to greatest number of process variables	Manufacture subject to few process variables	Manufacture subject to few process variables
Greatest amount of wear debris generation (approximately 100 times the wear rate of fiber or monofilament brushes)	Much smaller amount of wear debris generation than composite brushes	Smaller amount of wear debris generation than composite and monofilament brushes
High electrical noise if operated in humid environment	Low electrical noise in air and vacuum	Low electrical noise in air and vacuum
Must operate in vacuum or dry inert atmosphere	Operational in air or vacuum with lubricant present	Operational in air or vacuum
Wide operating temperature range	Viscosity limited operating temperature range	Wide operating temperature range
Wide range of surface speeds	Limited range of surface speeds	Wide range of surface speeds

TAKE A CLOSER LOOK

Learn more about Moog's rotary transmission solutions for your specific application.
Visit our web site for more information.

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For product information, visit
www.moog.com

This technical data is based on current available information and is subject to change at any time. Specifications for specific systems or applications may vary.

MOOG