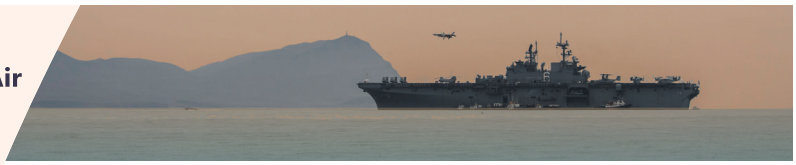
Supporting RF Systems on Land, on the Sea, and in the Air



Rotary-Field Ferrite Phase Shifters

Ku to L-Band
Highly Accurate
Unlimited Phase Shift

MAG Analog Rotary-Field Ferrite Phase Shifters are uniquely designed to provide unlimited phase shift with modulo-360 degree phase control characteristics that are independent of frequency, temperature, power level, and ferrite material parameters. These units, available in frequency ranges from L-Band to Ku-Band, are capable of handling high power levels while maintaining rms phase error to less than one degree. A very successful application of these units is the low sidelobe, single-axis scanning antenna of the E-3 Airborne Warning and Control System (AWACS).

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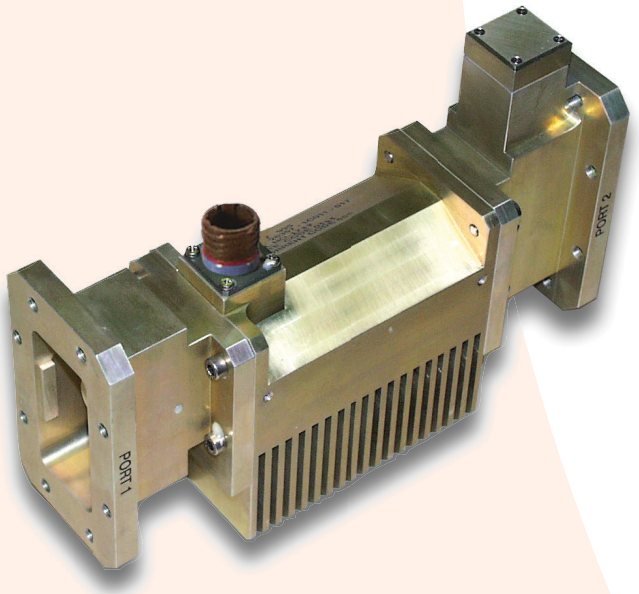
In addition to the aforementioned E-3 AWACS, MAG Rotary-Field Phase Shifters are deployed in diverse systems on land, on the sea, and in the air. Rotary-Field technology is especially suited to air defense radar and synthetic aperture radar applications, and can also be found in laboratory settings for particle physics and fusion research.



Rotary-Field Phase Shifter geometry consists of a transducer from rectangular to circular ceramic filled waveguide, a linear to circular polarizer, a rotatable half-wave plate, a circular to linear polarizer, and a transducer back from circular to rectangular waveguide. The phase shift angle is proportional to twice the angle of rotation of the half-wave plate, controlled electronically by digital or analog drivers. Major design choices involving ferrite material type and size, quarter-waveplate, matching transformer, and driving yoke are optimized for specific system requirements. See the table on the reverse side for typical data at various frequency ranges.

Rotary-Field Ferrite Phase Shifters

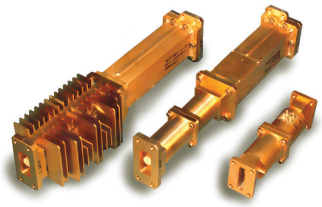
PARAMETER	FREQUENCY BAND				
	L	S	C	X	Ku
Percent Bandwidth	15	12.7	8.8	10.5	5.0
Average Insertion Loss (dB)	1.2	0.6	0.6	0.7	0.7
Insertion Loss Modulation (dB)	0.2	0.3	0.3	0.3	0.3
Maximum Return Loss (dB)	-13.98	-14.0	-15.6	-17.7	-17.0
Peak RF Power (Kilowatts)	8	40	25	4	2
Average RF Power (Watts)	400	600	250	60	40
Typical RMS Phase Error (Degrees)	4.0	1.0	1.0	1.0	1.0
Switching Time (Microseconds)	250	300	250	200	200
Switching Time with Boost (Microseconds)	250	100	100	100	100
Coil Current (Milliamperes)	2400	900	500	230	160
Coil Resistance (Ohms)	1.0	1.0	3.0	9.5	14.0
Size (Inches)	2.5 x 7.0 x 13.4	2.0 x 6.6 x 8.0	2.0 x 3.0 x 4.8	1.25 x 1.25 x 3.2	1.0 x 1.25 x 2.0
Weight (Ounces)	282	62	30	6	4
Operating Temperature Range (Degrees C)	0 to 55	0 to 50	-20 to 50	-40 to 70	-40 to 90

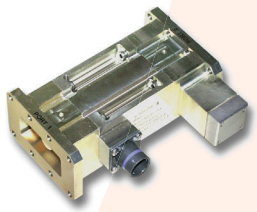
Sample of programs supported by MAG as OEM:

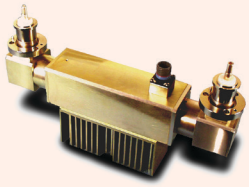
APQ-164 B-1B ORS
APQ-181 B-2
APS-143 CP-140 Imaging
APY-1/2 E-3 AWACS
AR320 3D Air Defense
ARTS-V1 / CLPS
ARTS-V2
ASARS-2 Synthetic Aperture
ARSR-4 FAA Long Range
ASTOR
DWSR-2501C Doppler Weather
Global Hawk Synthetic Aperture
I-15/23 Reflectarray
I-30 Simulator
MPN-14K Landing Control
PAAS Test Range
Princeton Plasma Physics Laboratory
RAC 3D Air Defense
Skyshield 35 Air Defense
Smart-L 3D Air Defense
SPN-35C Approach Control
SPQ-9B Surveillance / Tracking
TPAAS Test Range
TRS-3D Multimode
TRS22XX 3D Air Defense
ZPQ-1 Predator TESAR

MAG DMSMS program support:

MPQ-64 Sentinel SHORAD
APY-1/2 E-3 AWACS
BMEWS / PAVE PAWS
HAWK
SPN-35C Approach Control
MSQ-T43 MTE System







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