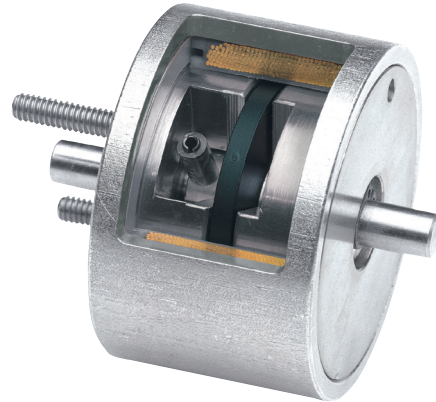


# Ultimag® Rotary Actuators

ROTARY Ultimag®



- Speeds over 100 Hz
- Peak torque of over 225 oz-in
- 100 million actuation life
- Three standard sizes

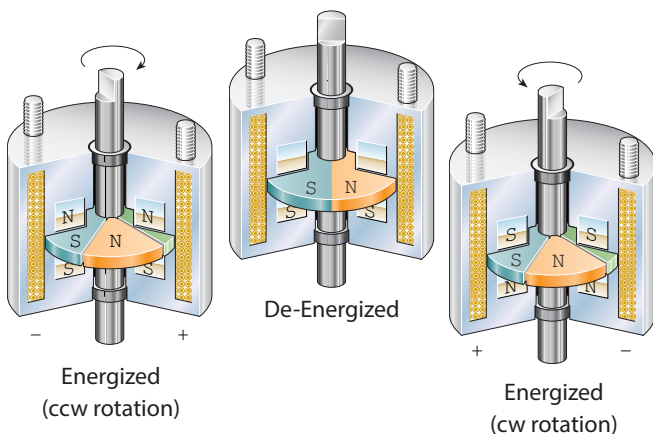


All products are RoHS Compliant

## Ultimag® Principle of Operation

Ultimag® operates on the simple principle of attraction and repulsion of opposite and like magnetic poles. The permanent magnetic armature has twice as many poles as the stator. In the de-energized state, the armature poles each share half a stator pole, causing the shaft to seek mid-stroke. When power is applied, the

stator poles are polarized. This attracts half and repels the other half of the armature poles, causing the shaft to rotate. When the voltage is reversed, the stator poles are polarized with the opposite pole. Consequently, the opposite poles of the armature are attracted and repelled, thus causing rotation in the opposite direction.



The Ultimag Series has been developed in response to application needs for higher speed and higher torque motion control components. We have found that many applications require a working stroke less than 360°, yet still employ motors with their associated complex and expensive controls and linkages. As a result, a powerful, extremely fast short stroke actuator has many design advantages for industrial, office automation, automotive and medical applications.

We have been designing and manufacturing world class, innovative motion control components for over 60 years. Our patented Ultimag series is the latest of our state-of-the-art developments in rotary actuation products.

# Ultimag® Rotary Actuators

## The Ultimag® Difference

Ultimag® offers a bidirectional, center return function not found in rotary solenoids. The Ultimag is substantially faster than other solenoids, and can be operated in an on/off mode or proportionally, in both open loop and closed loop systems.

The Ultimag does not offer 360° of rotation which is definitive of motors. With this stroke limitation in mind, Ultimag provides an inexpensive alternative for limited stroke applications, particularly, when total cost of system control is included.

Ultimag actuators offer a 45° stroke. However, the design is capable of a maximum stroke of 160°. Gears, belts, pulley, etc., can be employed to amplify stroke. In all cases, an increase in stroke will cause a reduction in torque.

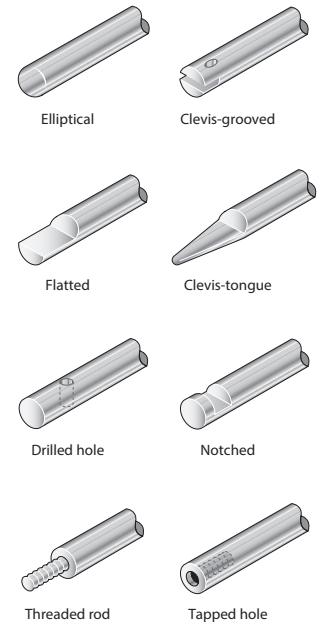
For shorter strokes, electronic or mechanical stops can be used. By having a unit tooled to perform a specific stroke less than 45°, more torque will be obtained.

When adding the Ultimag to your application, the shaft must be supported to avoid stress fractures to the magnet.

## Temperature Limitation

The permanent magnet in the Ultimag is NdFeB. For applications running above 130°C, we do not recommend the Ultimag, since the NdFeB magnets irreversibly degrade after reaching a 150°C temperature.

## Typical Examples of Custom Features



# Ultimag® Selection

Ultimag® Rotary Actuators are available in three sizes. Use the selection overview chart to determine which size offers the desired performance and mechanical specifications. Refer to the individual size specification pages for complete performance and mechanical data.

Model Size	Package Dimensions (in)		Gross Starting Torque (lb-in) @ Specified Duty Cycle				Gross Ending Torque (lb-in) @ Specified Duty Cycle			
	Dia.	Length	100%	50%	25%	10%	100%	50%	25%	10%
<b>4EM</b> ♦★	1.625	1.04	0.88	1.25	1.80	2.88	0.18	0.50	0.88	1.68
<b>5EM</b> ♦★	1.937	1.31	2.00	2.88	3.90	6.30	0.32	0.94	2.00	3.88
<b>6EM</b> ♦★	2.312	1.60	5.00	6.10	10.00	14.00	2.50	3.80	5.00	7.30

All data is at 20°C coil temperature. Torque outputs degrade with elevated temperatures.

\* Not recommended for 100% duty.



## How to Use Ultimag Performance Charts

- Select one of the four columns which provides the appropriate duty cycle. (For example 50%.)
- Reading down this column provides a variety of performance and electrical data including maximum on time, watts, and amp turns.
- Following down the column further into the VDC ratings, select the voltage which most closely matches your supply voltage. (For example, 11.5 for a 12 VDC power supply.)
- Read across (to the left) to select the awg suffix to complete the part number when ordering. (In this example using our 5EM chart, 25 awg is required, thus to order, specify: 194644-025.)

## Performance

	100%	50%	25%	10%
Maximum Duty Cycle*	100%	50%	25%	10%
$K_M$ (oz-in/ $\sqrt{\text{watt}}$ )	10.9	9.2	8.2	6.9
Maximum ON Time (sec) when pulsed continuously <sup>1</sup>	$\infty$	40	15	4
Maximum ON Time (sec) for single pulse <sup>2</sup>	$\infty$	109	36	10
Typical Energize Time (msec) <sup>3</sup>	6.0	5.5	4.5	4.0
Watts (@ 20°C)	2.1	42	84	210
Ampere Turns (@ 20°C)	621	878	1242	1964

## Coil Data

awg (0XX) <sup>4</sup>	Resistance (@20°C)	# Turns <sup>5</sup>	VDC (Nom)	VDC (Nom)	VDC (Nom)	VDC (Nom)
23	1.05	128	4.7	6.6	9.4	14.8
24	2.24	213	6.9	9.7	13.7	21.7
25	3.16	240	8.1	11.5	16.3	25.8
26	4.45	270	9.7	13.7	19.3	30.6
27	8.50	404	13.4	18.9	26.7	42.2
28	11.90	452	15.8	22.3	31.6	50.0
29	21.10	630	21.0	29.7	42.1	67.0
30	29.50	705	24.9	35.2	49.8	78.7
31	50.30	948	32.5	45.9	65.0	103.0
32	82.70	1232	41.7	58.9	83.0	132.0
33	134.00	1576	53.0	74.9	106.0	168.0