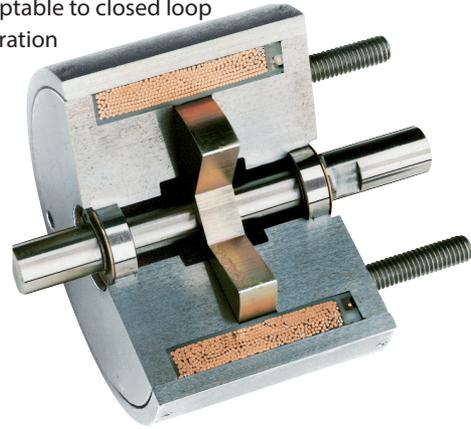


BTA® Brushless Torque Actuators

ROTARY BTA®



- Controllable velocity and position
- Quiet, shock-free operation
- 100+ million cycle life
- No axial stroke
- Adaptable to closed loop operation
- Completely enclosed construction
- Excellent unit-to-unit performance consistency
- Low power consumption



All products are RoHS Compliant

BTA Principle of Operation

The BTA has a single phase coil with three stator poles and matching rotor poles. When the coil is energised, the poles align along the flux path. With the three pole design, it is possible to have a stroke of up to 45°. In practical usage, external stops should be used to attain maximum unit life. Subsequently, the stroke angle is slightly shorter. Use of such mechanical

stops also serve to limit the actuator stroke to its optimum stroke/torque capacity. By not requiring full stroke actuation, the BTA offers maximum design flexibility across a wide range of stroke angles and torque requirements.

BTA rotary, non-axial stroke actuators are a good solution for applications requiring reliable, low hysteresis operation with

a good torque profile as required for proportional operation.

Using simple pulse width modulation (PWM) to control coil current, the BTA allows open or closed loop velocity and position control. Such proportional control is ideal for silent, shock-free actuation applications. (In open loop applications, PWM improves hysteresis over variable DC voltage control.)

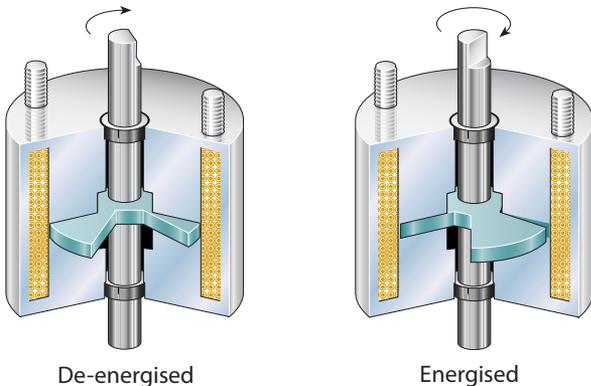
The addition of position feedback, and the subsequent improved system stiffness and accuracy, enables the BTA to be used in closed loop applications.

The bearing system consists of two ball-type bearings which are key to low hysteresis operation.

Quiet

The BTA can operate virtually noise free. Electronically controlled, the BTA provides soft, shock-free cycling without the noise associated with end-of-stroke mechanical stops.

For machines such as the mail sorter pictured at right, which utilises hundreds of these actuators, the BTA is used in conjunction with cushioned external stops to minimise noise and extend the unit's life to that of the precision ball bearings.



BTA® Brushless Torque Actuators

Rapid Cycling

The BTA actuator requires only milliseconds to rotate through its entire stroke. It can maintain this extremely fast operating speed repetitively without diminishing accuracy or repeatability, or reducing the overall life of the unit.

Rugged

The BTA design eliminates the axial travel associated with conventional rotary actuators. In so doing, the BTA eliminates loading on associated mechanical linkages, and reduces the number of moving parts and the wear they receive. The BTA is self-contained in an industry standard size which enables easy mounting and interchangeability. The unit is permanently lubricated and requires no adjustment or maintenance over its entire life.

Powerful . . . with Less Power

The BTA actuator offers considerably more torque than comparable sized rotary actuator designs.

Even with its high torque output, the BTA requires 40% less power input than competitive units. On high volume applications such as this mail sorter, the BTA conserves as much as 18.9 watts per actuator cycle.

Design Considerations

Performance Curves

The torque curves on the following pages are typical data taken with a 20°C coil and have not been derated. Typical derating factors are 30% due to coil heating. Curves shown are gross torque. For net torque subtract return spring torque.

Duty Cycle

Duty cycle is determined by: ON time/(ON + OFF time).

For example: an actuator operated for 30 seconds, then off for 90 seconds.

$30 \text{ sec ON} / (30 \text{ Sec ON} + 90 \text{ sec OFF}) = 30/120 = 1/4$
or 25% duty cycle

BTA actuators are rated for various duty cycles ranging from continuous to 10% duty.

Life

When selecting a BTA actuator, as with any other style, it is important to consider the effects of heat on life. When used with a constant voltage supply, an increase in coil temperature reduces the work output and the life of the unit. Standard life is more than 100,000,000 cycles.

Power Requirements

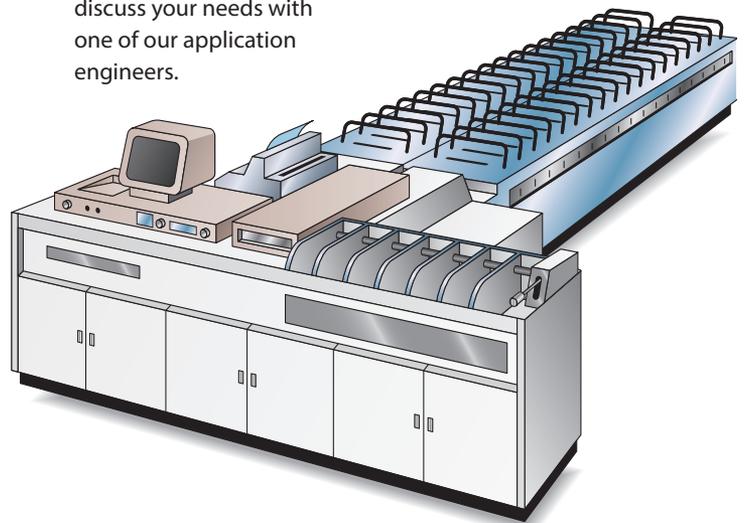
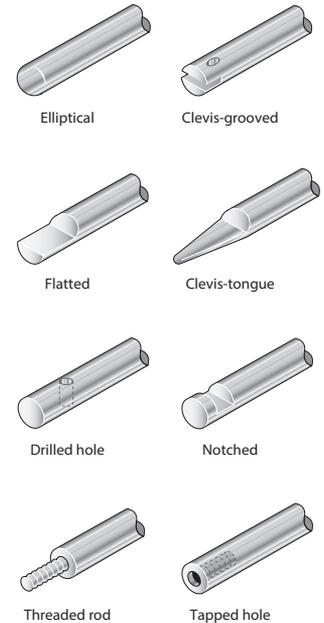
Voltage applied to the actuator must be matched to the coil wire size for proper operation. Actuators are catalogued in coil awgs ranging from #23 up to #35 to accommodate your input power. Refer to the individual model specification pages for coil wire awg recommendations. Many other coil awg sizes are available. Please feel free to contact our application engineering department for availability.

Options and Modified Designs

Even though our standard BTAs are in stock, our customers often require a product with unique features or performance capabilities. In fact, almost 80% of all products that we make are either modified or custom built to meet our customers' exact application requirements.

So, if you don't find what you're looking for in the catalogue, give us a call to discuss your needs with one of our application engineers.

Typical Examples of Custom Features

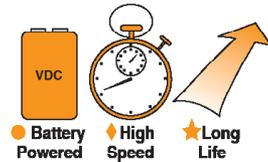


BTA® Selection

Brushless Torque Actuators are available in five 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.

Size	Package Dimensions (mm)			Max	Gross Starting Torque (mNm) @ Specified Duty Cycle				Gross Ending Torque (mNm) @ Specified Duty Cycle			
	Dia.	Length	Stroke		100%	50%	25%	10%	100%	50%	25%	10%
2EVM ●◆★	30.2	18.3	45°	N/A*	31.6	56.5	184.2	N/A*	21.5	37.3	65.5	
3EVM ◆★	34.9	22.6	45°		31.6	50.9	187.6	24.9	35.0	59.5	99.4	
4EVM ◆★	41.3	26.8	45°		45.2	104.0	180.8	322.1	40.7	72.3	113.0	180.8
5EVM ◆★	49.2	32.1	45°		158.2	266.7	418.0	678.0	113.0	180.8	293.8	474.6
6EVM ◆★	58.7	41.3	45°		384.2	655.4	971.8	1457.7	226.0	418.1	542.3	791.0

All data is at 20°C coil temperature. Torque outputs degrade with elevated temperatures.
* Not recommended for 100% duty.



How to Use BTA 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, 7.6 for an 8 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 2EV chart, 28 awg is required, thus to order, specify: 195190-028.)

Performance

	100%	50%	25%	10%
Maximum Duty Cycle	∞	∞	∞	∞
Maximum ON Time (sec) when pulsed continuously	∞	100	36	7
Maximum ON Time (sec) for single pulse	∞	162	44	8
Typical Energise Time (msec)	20	15	11	8
Watts (@ 20°C)	10	20	40	100
Ampere Turns (@ 20°C)	331	469	663	1048

Coil Data				VDC	VDC	VDC	VDC
awg (0XX) ⁴	Resistance (@20°C)	# Turns ⁵		(Nom)	(Nom)	(Nom)	(Nom)
24	0.47	72		2.2	3.1	4.3	6.9
25	0.67	82		2.6	3.7	5.2	8.2
26	0.94	92		3.1	4.3	6.1	9.7
27	1.33	104		3.6	5.2	7.3	11.5
28	2.86	174		5.4	7.6	10.7	16.9
29	4.01	195		6.3	9.0	12.7	20.0
30	7.69	292		8.8	12.4	17.5	27.7
31	10.80	328		10.4	14.7	20.8	32.9
32	19.26	460		13.9	19.6	27.8	43.9
33	26.96	515		16.4	23.2	32.8	52.0
34	45.82	690		21.4	30.3	42.8	68.0
35	63.76	768		25.3	35.7	50.0	80.0