

# ServoTek

PRODUCTS INC.

## Product Selection Guide



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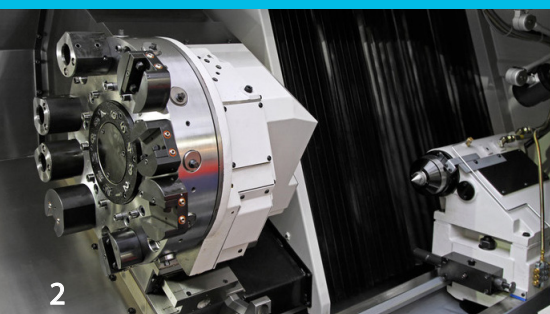
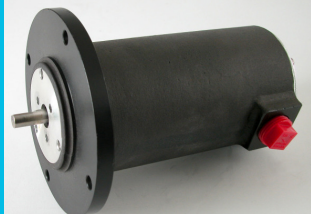
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# ServoTek Products

Becoming a member of the Bellofram Group of Companies in 2011, ServoTek Products Inc., is a world renowned manufacturer of Instrument-grade DC tachometers, low cost encoders, and tachsyn transducers, serving OEM customers involved in aerospace, automotive, industrial machinery control, robotics, lift and process monitoring related applications.

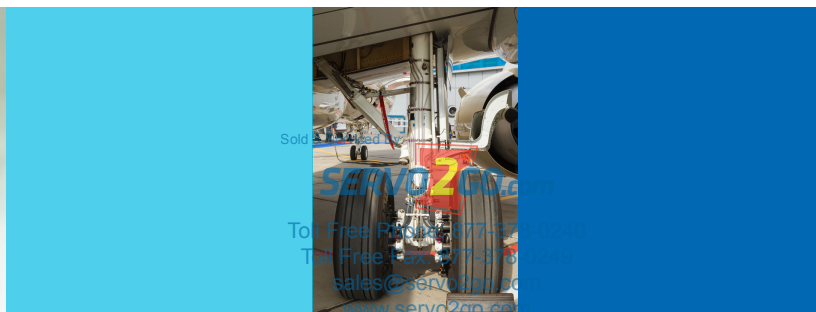
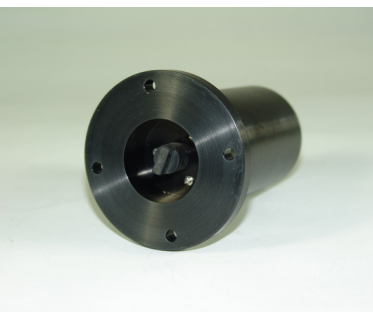
ServoTek Products are known for their rugged designs, high-reliability performance in challenging environments, and proven pedigree across thousands of successful field installations.



Our Tachsyn tach/commutator is a unique transducer that can be used as a brushless dc tachometer and/or as a brushless dc motor commutator. The Tachsyn transducer is a magnetic sensing device in which the output windings, field winding, and permanent magnet are all located in the stator, thus maximizing reliability.

Our tachometer generators provide a convenient and economical means of converting rotational speed into an isolated analog voltage signal. ServoTek tachometers offers better than 0.1% linearity output, and the ripple is less than 3% of the DC value. We also offer tachometers with lower ripple of 1.5% of the dc value.

ServoTek Incremental Encoders offers a low cost solution for measuring shaft speed/position. The encoders can be used to supply digital feedback for motor speed control and speed indication. ServoTek offers both the hollow shaft design, and the screw mount design for applications where space is limited.



# DC Tachometer Generators

## Technical Data

ServoTek Products DC Tachometer generators provide a convenient and economical means of converting rotational speed into an isolated analog voltage signal suitable for remote indication and control. While the following contain information on our most popular models, we also manufacture countless specials. The data presented here is true of all models outlined in this web page.

## Construction

ServoTek Tachometer generators are housed in aluminum casings protected in accordance with MIL-C-5541 or MIL-A-8625. Alnico permanent magnets are used. Armature shafts are stainless-steel, and rotate on fully-shielded stainless-steel ball bearings. Commutators are made from alloy containing 95% silver. Armature laminations are wound with Isomid insulated wire, over Teflon slot insulation. The entire armature is impregnated and baked, resulting in a NEMA Class H insulation system.

## Brush Life

Brushes and commutators (in generators) are rated for a minimum of 100,000 hours operation at 3,600 RPM (equivalent to 10 years continuous operation) at 1mA output. (50,000 hours on Series E.)

## Linearity

Linearity at any speed is better than 0.1% of the output at the rpm.

## Ripple

The ripple rms value will not exceed 3% of the DC value at any speed in excess of 40 rpm on standard units; 1.5% on low-ripple models.

## Bidirectional Operation

All ServoTek generators operate in either rotational direction. That direction can be determined by output voltage polarity. Output (in either direction) is held to a tolerance of 0.25% of the average output.

## Stability

Optimum brush and commutators combination gives 0.1% stability. Highly stable output gives no evidence of long-term drift.

## Breakdown Voltage

ServoTek tachometer generators are factory tested with an ac potential of 1,250 volts rms applied for one second between (either) terminal and the shaft. (Series E—500 volts.)

## Temperature Range

Tachometers are designed for continuous operation in ambient temperatures ranging from -55°C to 100°C (-67°F to +212°F). Voltage output at 25°C will not deviate by more than 0.01% per degree of change within the range of -20°C to +75°C. All units are temperature compensated, with the exception of Series D and E.

## Six Armature / Winding specifications

ServoTek Tachometer Generators are grouped in six series, each identified by a letter immediately following the digit string in the middle of the model number. This series designator identifies armature length and characteristics.



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# Tachometers with 1-10VDC Outputs

## A-Series DC Tachometer – 1 to 10V Output

This low-cost high-performance generator has available 3 different shaft styles and diameters for direct drives. It also is available with 3 different mounting options. Various voltage output options are available as well as a choice of Tolerance and Ripple.

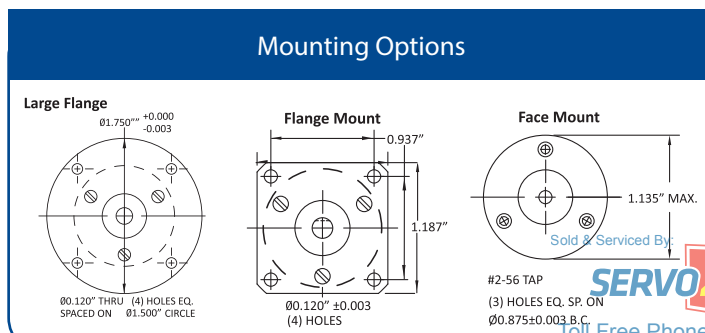
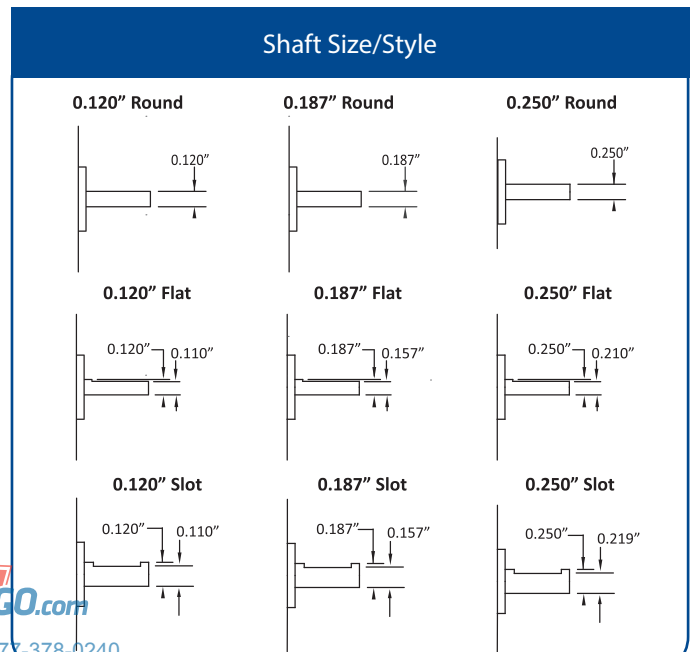
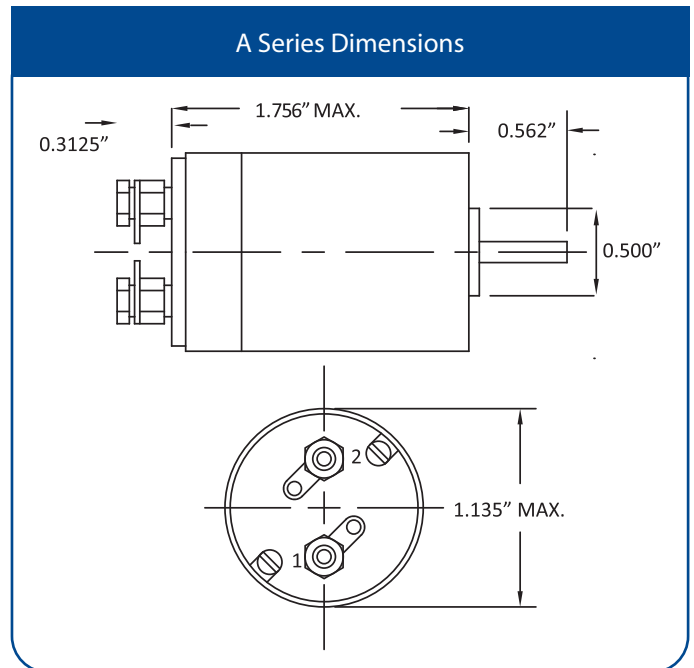
Features include: Class H Insulation, No phase shift, Low driving torque Low ripple, Bi-directional operation

## 1 to 10 Volt Series A Tachometers - Ordering Chart

Part Number				
Mounting				
SA				Face
SB				Flange
SU				Lrg. Flange
Volt/1000 RPM				
030				3.0 V
050				5.0 V
070				7.0
100				10.0
Shaft Size				
12*				.120"
18				.187"
25				.250"
Shaft Style				
R				Round
F				Flat
S				Slot
Tolerance/Ripple				
A				5%/5%
B				3%/5%
C				5%/3%
D				3%/3%
F				5%/1.5%

Custom Voltage options are available upon request and review from ServoTek Technical staff. Special ripple is also available. Contact ServoTek Applications Engineering for questions.

\*.120" shafts can not be used with the Lrg. Flange (SU) mount.



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# Tachometers with 11-24VDC Outputs

## B Series DC Tachometer – 11 to 24V Output

This high-performance generator has available 3 different shaft styles and diameters for direct drives. It also is available with 3 different mounting options. Various voltage output options are available as well as a choice of Tolerance and Ripple.

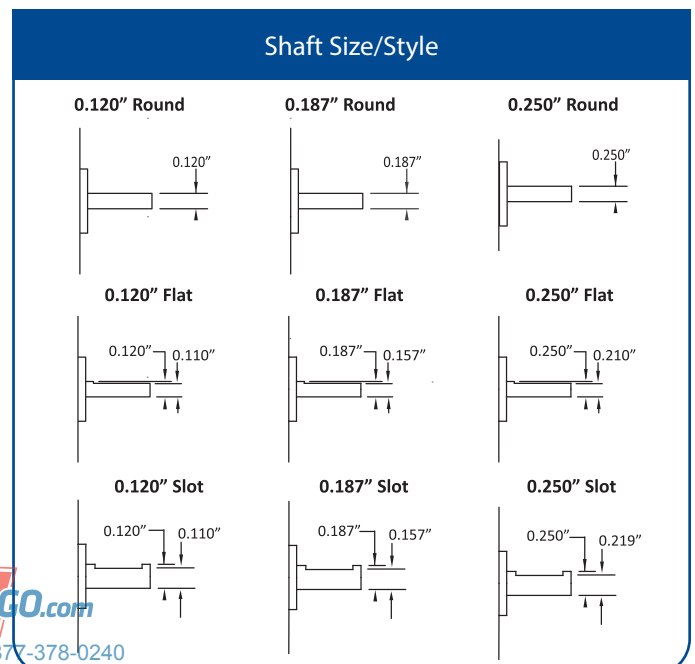
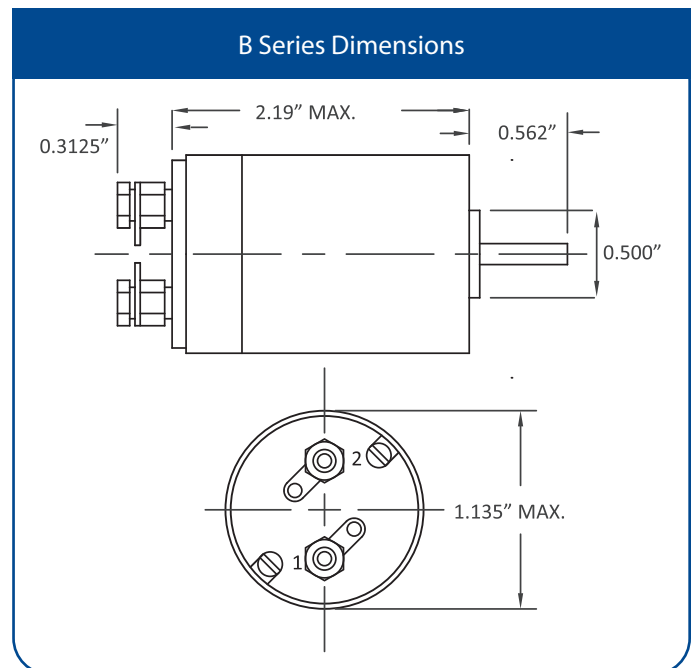
Features include: Class H Insulation, No phase shift, Low driving torque Low ripple, Bi-directional operation

### 11 to 24 Volt Series B Tachometers - Ordering Chart

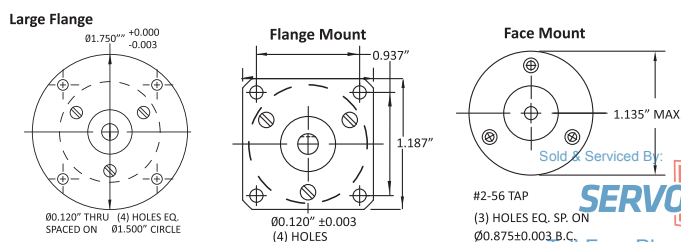
Part Number				
Mounting				
SA				Face
SB				Flange
SU				Lrg. Flange
Volt/1000 RPM				
150				15.0 V
208				20.8 V
240				24.0 V
Shaft Size				
12*				.120"
18				.187"
25				.250"
Shaft Style				
R				Round
F				Flat
S				Slot
Tolerance/Ripple				
A				5%/5%
B				3%/5%
C				5%/3%
D				3%/3%

\*.120" shafts can not be used with the Lrg. Flange (SU) mount.

Custom Voltage options are available upon request and review from ServoTek Technical staff. Special ripple is also available. Contact ServoTek Applications Engineering for questions.



### Mounting Options



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# Tachometers with 25-50VDC Outputs

## D Series DC Tachometer – 25 to 50V Output

Rugged construction and high output voltages make the D series tachometer ideally suited for industrial applications. The output bearing is fitted with a seal to prevent contamination. Various voltage output options are available as well as a choice of Tolerance and Ripple.

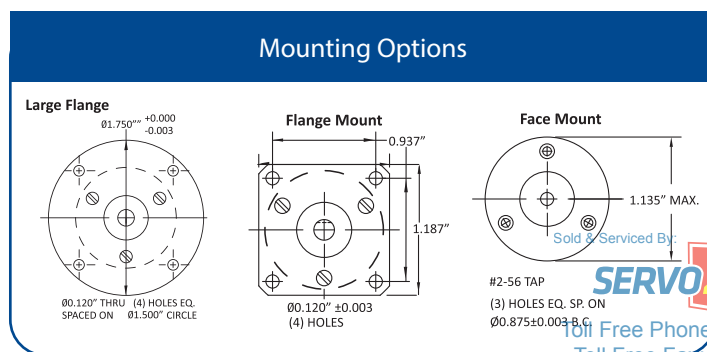
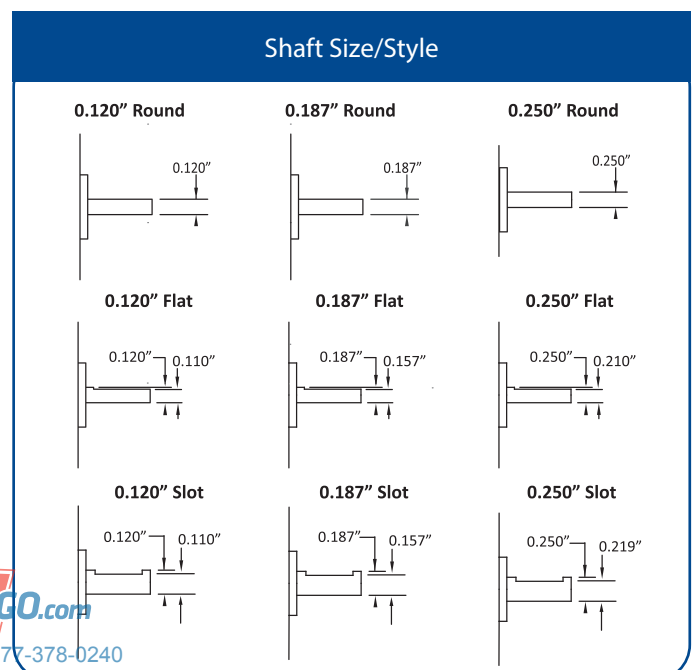
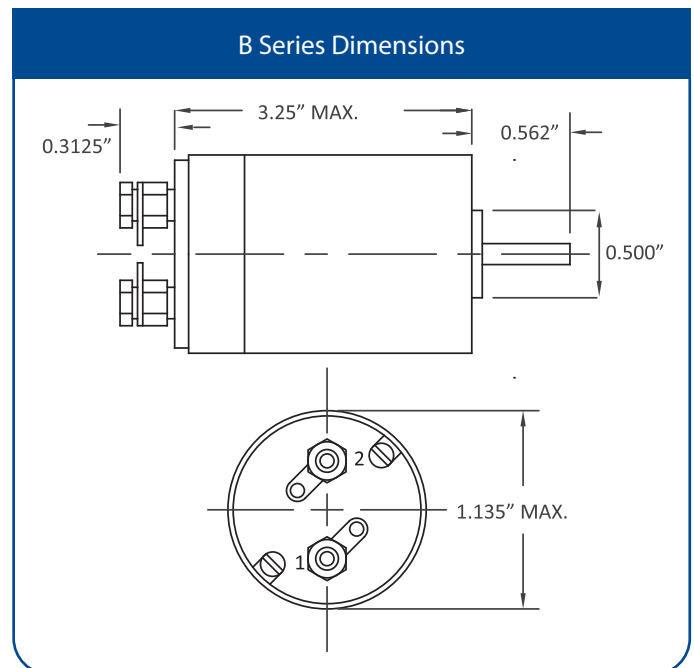
Features include: Class H Insulation, No phase shift, Low driving torque, Low ripple, Bi-directional operation

### 25 to 50 Volt Series D Tachometers - Ordering Chart

Part Number				
<b>Mounting</b>				
SA				Face
SB				Flange
SU				Lrg. Flange
<b>Volt/1000 RPM</b>				
300				30.0 V
330				33.0 V
450				45.0 V
500				50.0 V
<b>Shaft Size</b>				
12*				.120"
18				.187"
25				.250"
<b>Shaft Style</b>				
R				Round
F				Flat
S				Slot
<b>Tolerance/Ripple</b>				
A				5%/5%
B				3%/5%
C				5%/3%
D				3%/3%

Custom Voltage options are available upon request and review from ServoTek Technical staff. Special ripple is also available. Contact ServoTek Applications Engineering for questions.

\*.120" shafts can not be used with the Lrg. Flange (SU) mount.



# Tachometers with 3VDC Outputs

## E Series DC Tachometer – 3V Output

The E tachometer is a subminiature tach and is the smallest in the series for Servo Tek tachometers.

Very suitable for all types servo systems providing 0.25 oz/in driving torque.

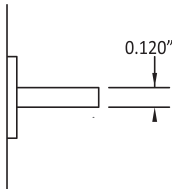
Features include: Class H Insulation, No phase shift, Low driving torque, Low ripple, Bi-directional operation

## 1 to 10 Volt Series A Tachometers - Ordering Chart

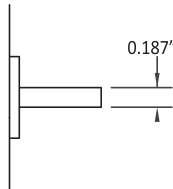
Part Number			
<b>SS-779E-1</b>	.120" shaft		Synchro mount
<b>SS-7251E-1</b>	.187" shaft		Synchro mount

### Shaft Size/Style

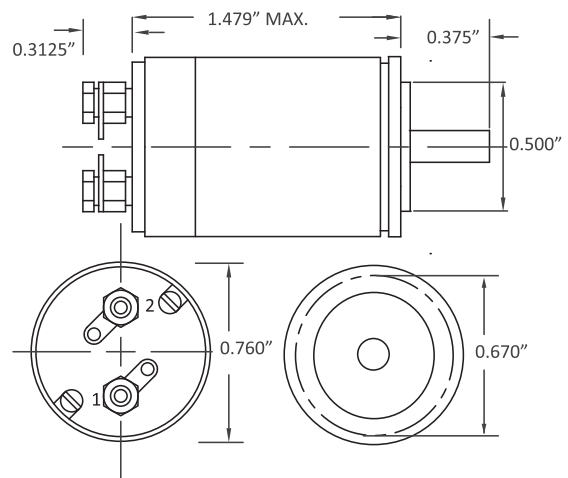
#### 0.120" Round



#### 0.187" Round



### E Series Dimensions



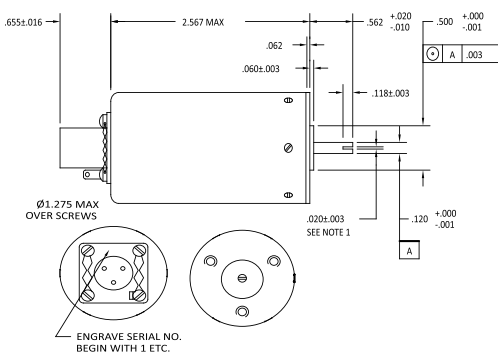
## Servo Tek Specialty Tachometers for Auto & Aerospace

Servo Tek Tachometers are widely used in specialty applications in the Aerospace and Automotive markets. Servo Tek has been a supplier to many of the major Aerospace suppliers including braking and landing systems. Automotive applications are primarily acceleration and braking test apparatus.

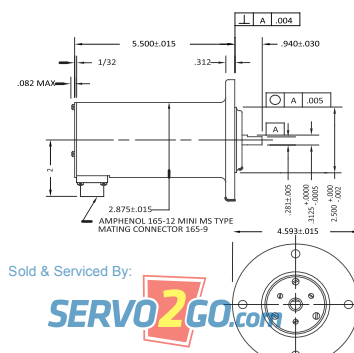
Many of our Tachometers can be customized to accommodate temperature issues, environmental issues and pressure concerns in high altitude applications.

## Contact a Servo Tek Applications Engineer for your specific requirement.

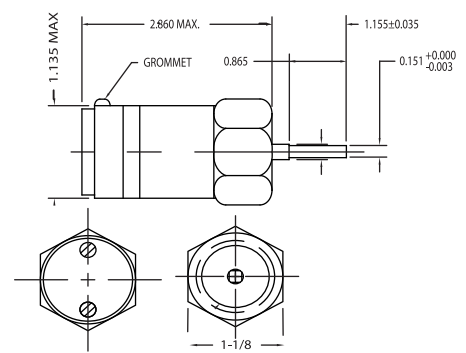
### Aerospace Specialty Tachometer



### Specialty Industrial Tachometer



### Automotive Specialty Tachometer



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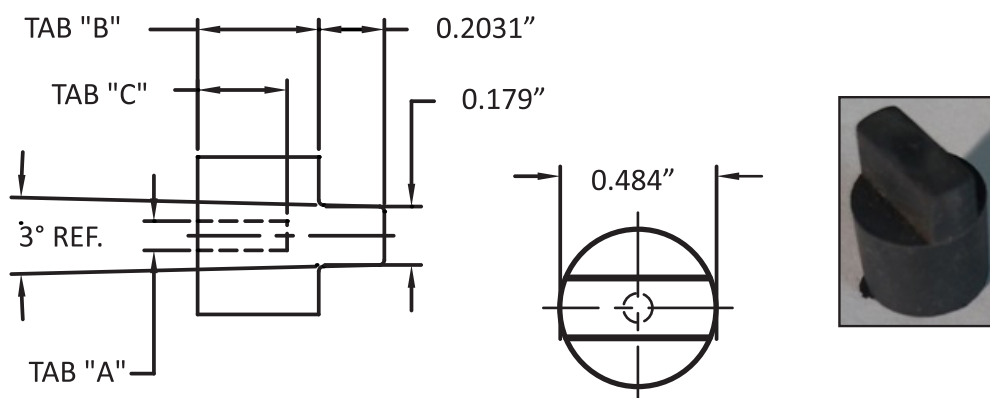
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# Servo Tek Accessories for Tachometers

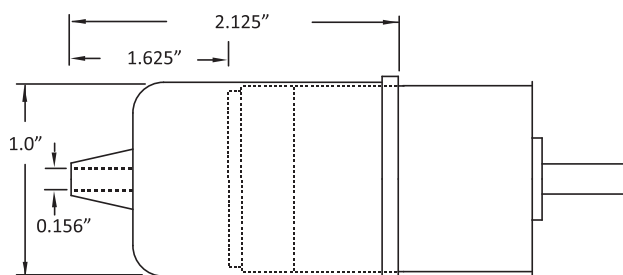
## Silicone Rubber Coupling



Part Number	Material	Durometer	"C"	"B"	"A"
<b>ST-9502-1</b>	Silicone	65/60	0.277	0.375	.095/.090
<b>ST-9502-2</b>	Silicone	65/60	0.392	0.490	.161/.156

## Rubber Boot

Part Number	Material
<b>ST-13063-1</b>	Indoor - Black Nitrile for hydraulic oil
<b>ST-13063-2</b>	Outdoor - Gray Silicone for ozone/salt



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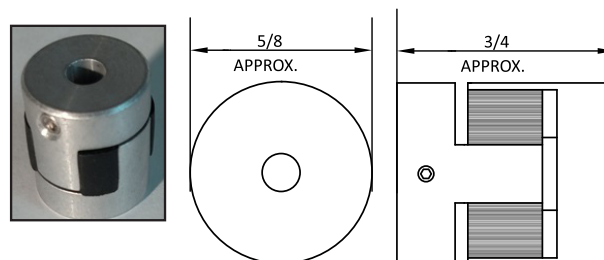
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## Shaft Couplings

Part Number	Bore	Part Number	Bore
<b>ST-9776-1</b>	.120x.120	<b>ST-9776-8</b>	.187x.250
<b>ST-9776-2</b>	.187x.187	<b>ST-9776-9</b>	.187x.312
<b>ST-9776-3</b>	.250x.250	<b>ST-9776-10</b>	.250x.312
<b>ST-9776-4</b>	.312x.312	<b>ST-9776-11</b>	8mmx.187
<b>ST-9776-5</b>	.120x.187	<b>ST-9776-12</b>	.375x.187
<b>ST-9776-6</b>	.120x.250	<b>ST-9776-13</b>	.375x.120
<b>ST-9776-7</b>	.120x.312	<b>ST-9776-14</b>	.375x.250
		<b>ST-9776-15</b>	.355x.120





# PT Series Encoders

## PT Series Encoders

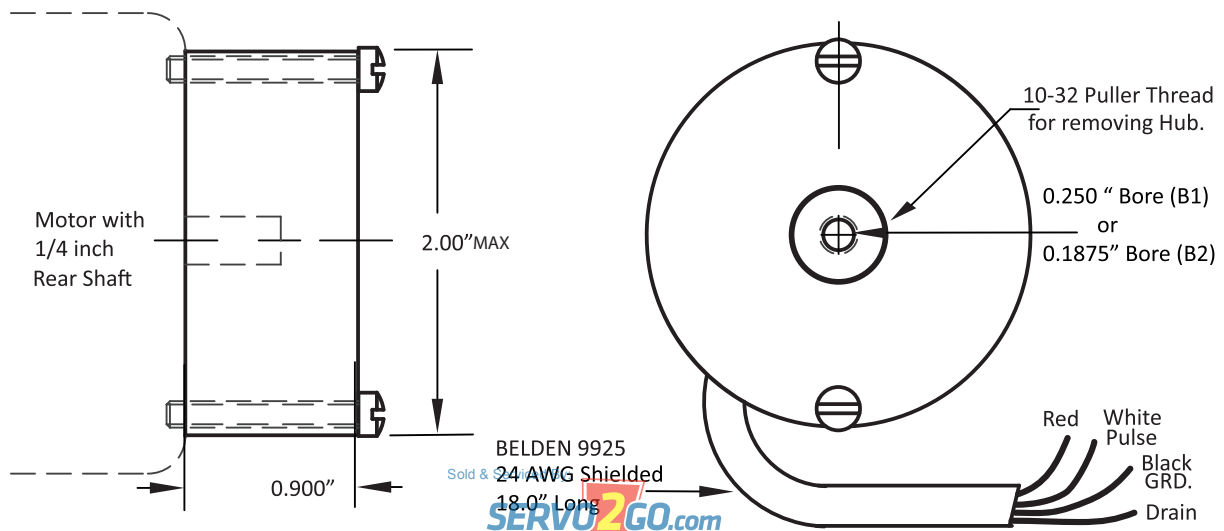
PT		-		-	
<b>Mount/Bore</b>					
A1					4-40x2 / 1.812BC / .251" Bore
A2					4-40x2 / 1.812BC / .188" Bore
B1					6-32x2 / 1.500BC / .251" Bore
B2					6-32x2 / 1.500BC / .188" Bore
<b>Pulses</b>					
01					1
10					10
12					12
24					24
30					30
60					60
100					100
<b>Input voltage</b>					
05					5V
12					12V
15					15V
24					24V

Low cost modular encoders ideal for OEM and motor manufacturers. Provides a low cost solution to digital feedback requirements. Hollow shaft design and incorporates the hub and housing into one assembly. Provides a single or dual channel digital signal.

### Features include:

Small size with standard mounting hole centers, Operating temperatures up to 80C, Maximum speed of 20,000 rpm, Hub bore accommodates mounting shaft up to 0.251"

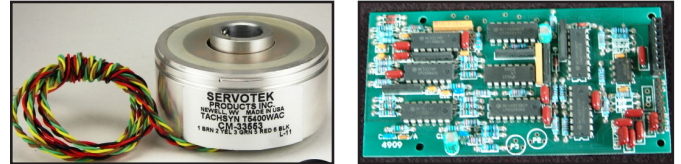
## PTB1 & PTB2 Series Dimensions



# ServoTek Tachsyn Transducer

## Tachsyn Series—DC Tachometers Brushless DC Tachometer/Commutator

The Tachsyn tachometer/commutator are a unique transducer that can be used as a brushless dc tachometer and/or as a brushless dc motor commutator. The Tachsyn transducer is a magnetic sensing device in which the output windings, field winding, and permanent magnet are all located in the stator, thus maximizing reliability. The very-low-inertia rotor has no windings, but is, instead, contoured with high-and-low reluctance poles.



Tachsyn transducers are available in models to commutate 4-pole brushless dc motors. Any size may be used when a simple tach signal is all that is required. Pancake-shaped Tachsyn transducers are easily mounted, cantilever-style, to the back of a motor or other device, with synchro-type adjustment for phasing. The Tachsyn tach/commutators offer an economical solution to many velocity-loop problems, whether brushless or standard servo.

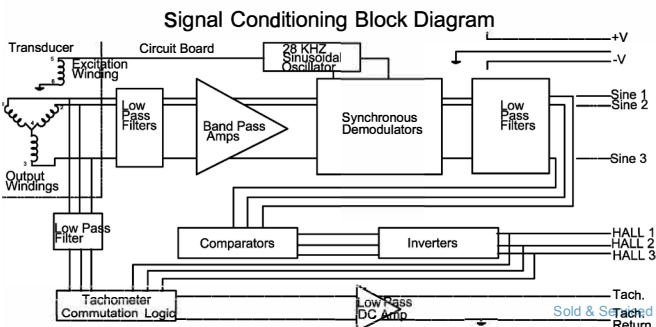
### Features:

- Can be used as a brushless dc tachometer and/or as a brushless dc motor commutator
- Very-low-inertia rotor has no windings, but is, instead, contoured with high- and low-reluctance poles
- A signal conditioning circuit board completes the Tachsyn signal conditioning and may be housed up to 100 feet from the hot-running motor, leaving only the non-electronic transducer to take the heat
- The a signal conditioning circuit provides ac field excitation for the transducer, as well as condition for its output signals
- Output signals include a linear, low-ripple dc tachometer voltage and either hall-equivalent or sine wave commutation signals
- Tachsyn transducers are available in models to commutate 4-, 6-, 8-pole brushless dc motors
- Tachsyn tach/commutators offer an economical solution to many velocity-loop problems, whether brushless or standard servo

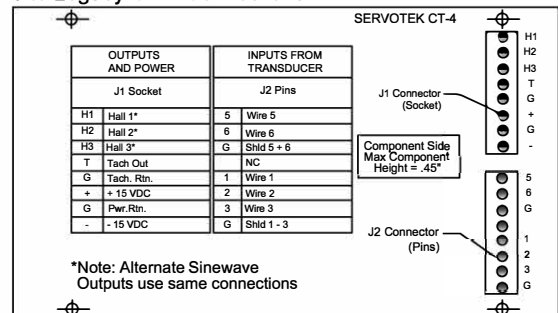
### General Information:

Each Tachsyn Transducer requires a signal conditioning circuit board, or customer-built equivalent, connecting cable with doable barreled shield.

If, at the top speed, the calculated voltage exceeds bus-1 VDC, then use a lower output multiplier in the right column and recalculate. For the best signal-to-ambient-noise ratio in slow speed applications, use the maximum multiplier which will not exceed bus-1 VDC.



### For Legacy CT-4 Connections



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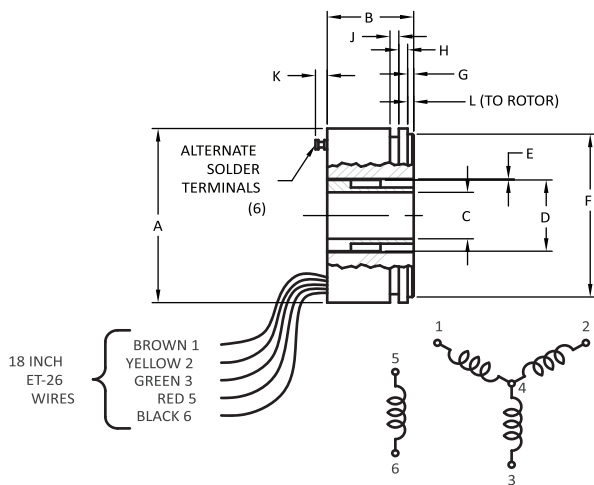
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# ServoTek Tachsyn Transducer

## Ordering Information

Part Number	Bore	Poles	Gain	V/1000	Inertia Moment	Rotor
<b>T4421WAB</b>	0.500"	4	1.15	1.0 ± 10%	0.94x10 <sup>-4</sup>	No
<b>T4421WAB-R</b>	0.500"	4	1.15	1.0 ± 10%	0.94x10 <sup>-4</sup>	Yes
<b>T4421WAC</b>	0.500"	4	1.00	1.0 ± 10%	0.94x10 <sup>-4</sup>	No
<b>T4421WAC-R</b>	0.500"	4	1.00	1.0 ± 10%	0.94x10 <sup>-4</sup>	Yes
<b>T4421WBC</b>	0.250"	4	1.00	1.0 ± 10%	0.94x10 <sup>-4</sup>	No
<b>T4421WBC-R</b>	0.250"	4	1.00	1.0 ± 10%	0.94x10 <sup>-4</sup>	Yes
<b>T5400WAC</b>	0.500"	4	1.00	1.0 ± 10%	1.59x10 <sup>-4</sup>	No
<b>T5400WAC-R</b>	0.500"	4	1.00	1.0 ± 10%	1.59x10 <sup>-4</sup>	Yes
<b>T5400WBC</b>	0.250"	4	1.00	1.0 ± 10%	1.59x10 <sup>-4</sup>	No
<b>T5400WBC-R</b>	0.250"	4	1.00	1.0 ± 10%	1.59x10 <sup>-4</sup>	Yes



DIM.	TACHSYN MODEL NO.		
	T4421	T5400/T5401	TOL.
A	1.875	2.060	±.002
B	.883	.929	±.002
C	.5000	.5000	+ .0007 - 0
D	.767	.767	REF
E	.011	.011	REF
F	1.750	1.998	+ 0 - .001
G	.06	.062	±.010
H	.09	.093	±.005
J	.09	.050	±.005
K	.12	.12	MAX
L	.062	.062	±.003
ROTOR ASSY -R OPTION	2933-X	2970-X	----

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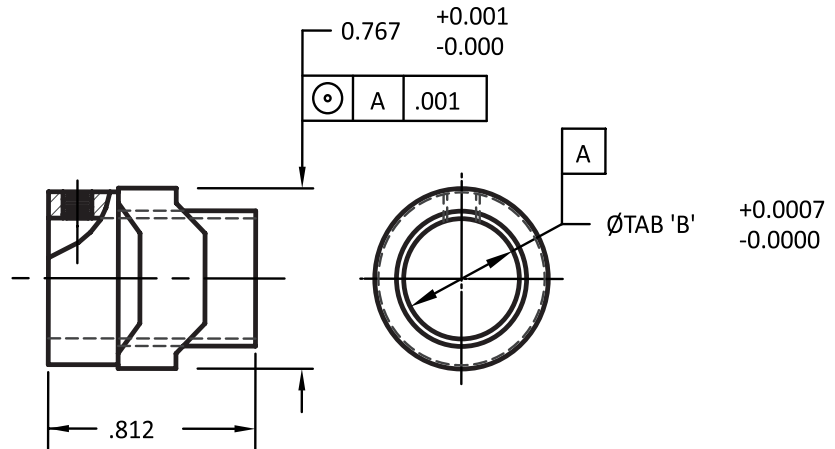
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# Servo Tek - Tachsyn Transducers Rotors

## Rotor Dimensions For Part Numbers With -R Option

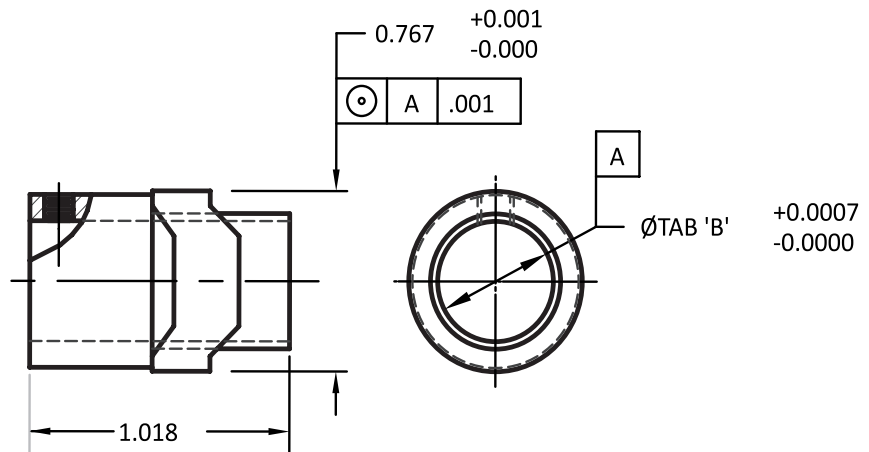
2933-2	.2500
2933-1	.5000
PART NO.	TAB B*
ROTOR ASSEMBLY	

\* FOR OTHER TAB "B" DIMENSIONS,  
CONSULT THE FACTORY.



2970-2	.5000
2970-1	.2500
PART NO.	TAB B*
ROTOR ASSEMBLY	

\* FOR OTHER TAB "B" DIMENSIONS,  
CONSULT THE FACTORY.



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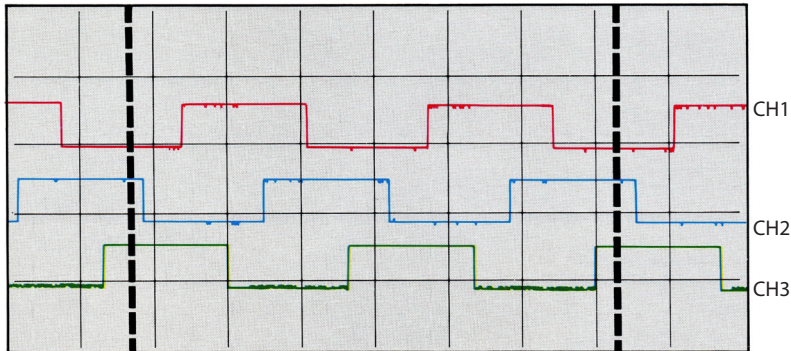
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# Output Waveforms

Series T4421 Tachsyn Transducer with CT-440, at 1800 RPM. One revolution shown between bold vertical lines.

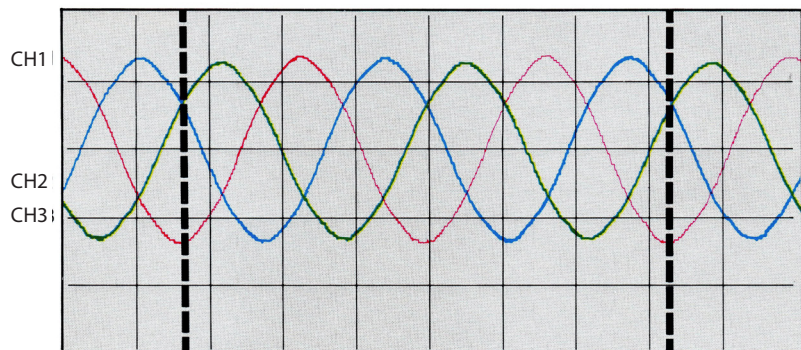
20.00 V/DIV 5.00ms/DIV



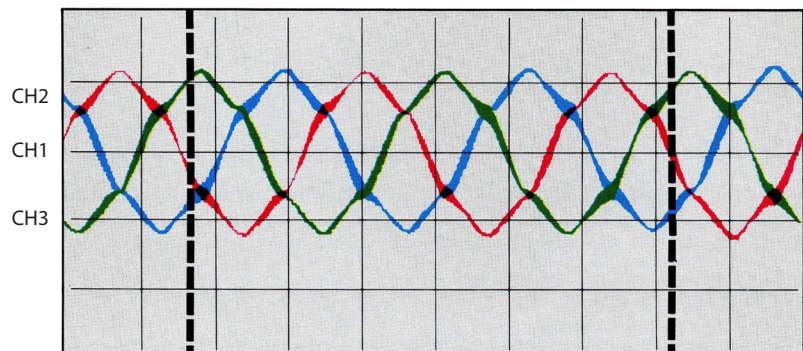
Hall-equivalent output from signal conditioning board with 4.0 multiplier.

Three phase sine wave output from signal conditioning board with 4.0 multiplier

2.00 V/DIV 5.00ms/DIV

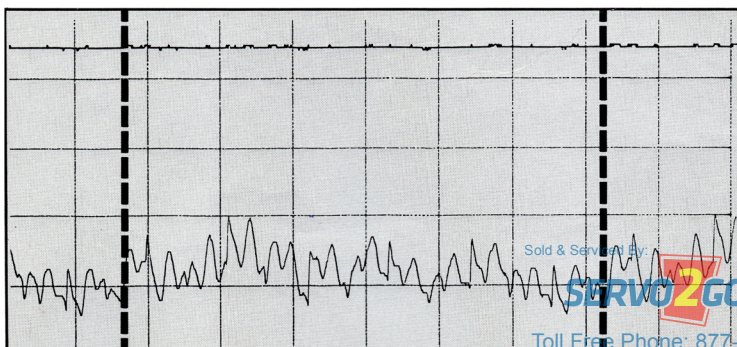


1.00 V/DIV 5.00ms/DIV



Raw three-phase Tachsyn Transducer output with PM field and ac excitation.

5.00ms/DIV



7.35 VDC

OVDC

DC tach output from signal conditioning board with 4.0 multiplier relative to zero volts. Scope is dc coupled. 5V/DIV

Tach output from signal conditioning board with 4.0 multiplier. Shown with scope ac coupled to amplify the ripple. 200m V/DIV