

Description

The S1 series optical shaft encoder is a non-contacting rotary to digital converter. Useful for position feedback or manual interface, the encoder converts real-time shaft angle, speed, and direction into TTL-compatible quadrature outputs with or without index. The encoder utilizes an unbreakable mylar disk, metal shaft and bushing, LED light source, and monolithic electronics. It operates from a single +5VDC supply.

The S1 is normally designed for applications of 6 feet or less. For longer cable lengths, adding a PC4 / PC5 differential line driver is recommended.

Three shaft torque versions are available. The standard torque version has a sleeve bushing lubricated with a viscous motion control gel to provide torque and feel that is ideal for front panel human interface applications.

The no torque added option has a sleeve bushing and a low viscosity lubricant (that does not intentionally add torque) for low RPM applications where a small amount of torque is acceptable.

The ball bearing version uses miniature precision ball bearings that are suitable for high speed and ultra low torque applications.

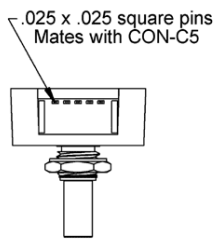
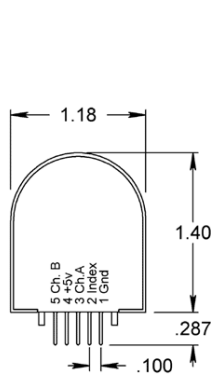
Connection to the S1 series encoder is made through a 5-pin standard connector (sold separately). The mating connectors are available from US Digital with several cable options and lengths.



Features

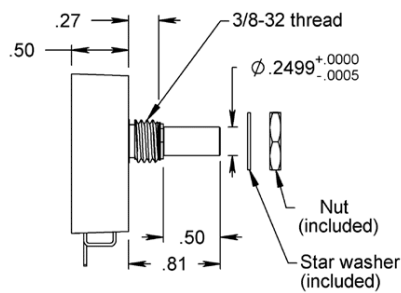
- ▶ Small size
- ▶ Low cost
- ▶ 2-channel quadrature, TTL squarewave outputs
- ▶ 3rd channel index option
- ▶ Tracks from 0 to 100,000 cycles/sec
- ▶ Ball bearing option tracks to 10,000 RPM
- ▶ -40 to +100C operating temperature
- ▶ Single +5VDC supply

Mechanical Drawing

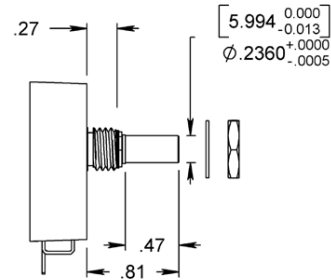


> Module pins are 0.06" shorter for resolutions: 32-I, 720-I, 900-I and 1000-I.

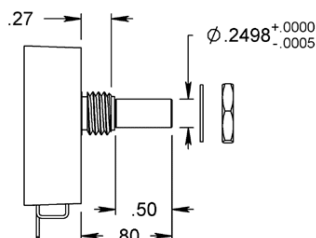
1/4" Sleeve Bushing (Default)



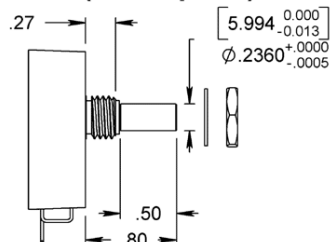
6mm Sleeve Bushing (M6-option)



1/4" Ball Bearing (B-option)



6mm Ball Bearing (BM6-option)



Mechanical

Parameter	Sleeve Bushing	Ball Bearing
Acceleration	250,000 rad/sec ²	250,000 rad/sec ²
Vibration	20 g. 5 to 2KHz	20 g. 5 to 2KHz
Shaft Speed	100 RPM max. continuous	10,000 RPM max. continuous
Shaft Rotation	Continuous and reversible	-
Shaft Torque	0.5 ±0.2 in. oz. 0.3 in. oz. max. (N-option)	0.05 in. oz. max.
Shaft Loading	2 lbs. max. dynamic 20 lbs. max. static	1 lb. max.
Bearing Life	-	(40/P) ³ = life in millions of revs. where P = radial load in pounds
Weight	0.70 oz.	0.70 oz.
Shaft Runout	0.0015 T.I.R. max.	0.0015 T.I.R. max.

Phase Relationship

B leads A for clockwise shaft rotation, and A leads B for counterclockwise rotation viewed from the shaft side of the encoder (see the EM1 / HEDS page).

Electrical

- Specifications apply over entire operating temperature range.
- Typical values are specified at $V_{cc} = 5.0V_{dc}$ and $25^{\circ}C$.
- For complete details see the EM1 and HEDS product pages.

	Supply Current	Output voltage low	Output voltage high	
Resolution	Typ / Max	Max	Min	Based on
50,96, 100, 110, 120, 192, 200, 250, 256, 360, 400, 500, 512, 540 CPR, non-index	17 / 40 mA	0.4 volts @ 3.2mA	2.4 volts @ -200uA	Low-res HEDS
1000, 1016, 1024 CPR, non-index	57 / 85 mA	0.5 volts @ 8mA	2.4 volts @ -40uA	High-res HEDS
32 CPR, with index	27 / 30 mA	0.5 volts @ 8mA	2.0 volts @ -8mA	EM1
50,96, 100, 192, 200, 250, 256, 360, 400, 500, 512 CPR, with index	57 / 85 mA	0.5 volts @ 8mA	2.4 volts @ -40uA	High-res HEDS
720, 900, 1000, 1024, 1250 CPR, with index	55 / 57 mA	0.5 volts @ 8mA	2.0 volts @ -8mA	EM1

Materials

Parameter	Dimension
Shaft	Brass or stainless
Bushing	Brass
Connector	Gold plated

Mounting

Parameter	Dimension
Hole Diameter	0.375" +0.005 / -0
Panel Thickness	0.125 in. max.
Panel Nut Max. Torque	20 in.-lbs.

Environmental

Parameter	Dimension
Operating Temperature	-40 to +125C
Storage Temperature	-55 to +125C
ESD	2 kV minimum
Humidity Non-condensing	5 to 85%

 Pin-out

Parameter	Dimension
1	Ground
2	Index
3	A channel
4	+5VDC power
5	B channel

Ordering Information

S1 -	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>	-	<input type="text"/>
CPR	Shaft		Index		Torque		Housing		
32	236 =6mm dia. sleeve bushing		N =No Index		D =Standard		D =Default		
50	(standard torque)		I =Index (3rd		B =Ball Bearing		S =Sealed Housing		
96	250 = 1/4"		Channel)		N =No Torque				
100					Added				
110									
120									
192									
200									
250									
256									
360									
400									
500									
512									
540									
720									
900									
1000									
1016									
1024									

Rules

- ▶ Index must be something other than I when CPR is 110, 120 or 540
- ▶ Index must be equal to I when CPR is 32, 720 or 900

Notes

- ▶ Cables and connectors are not included and must be ordered separately.
- ▶ For ordering information please see the Compatible Cables / Connectors section above.
- ▶ US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.

Pricing

Quantity	Price
1	\$58.95
10	\$50.79
50	\$44.88

100

\$41.87

- ▶ Add \$1.00 per unit for **Shaft** of 6mm dia. sleeve bushing (standard torque)
- ▶ Add \$5.80 per unit for **Torque** of Ball Bearing
- ▶ Add \$14.00 per unit for **Housing** of Sealed Housing
- ▶ Add 17% per unit for **Index** of I or **CPR** greater than or equal to 1000.