

## H1 Features

- Ball-bearing option tracks to 10,000 RPM
- 2-channel quadrature, TTL squarewave outputs
- 3rd channel index option available on some resolutions
- 32 to 5,000 cycles per revolution (CPR)
- 128 to 20,000 pulses per revolution (PPR)
- Wide operating temperature
- Single +5VDC supply



## H1 Product Description

The H1 series ball-bearing optical shaft encoder has a glass-filled polymer enclosure. This non-contacting rotary to digital converter is designed to provide digital feedback information. The H1 is fully assembled with a brass shaft, two 1/4 in. ID by 1/2 in. OD ball bearings, and a mounting plate. The mounting plate comes with 2 mounting holes for #4 size screws.

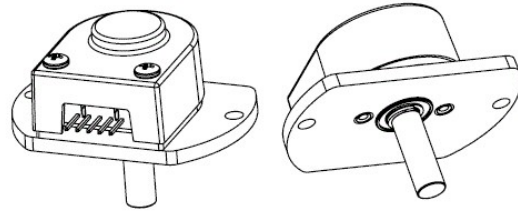


The H1 is designed to drive cables up to 10 feet long. For longer cable lengths, adding a PC4

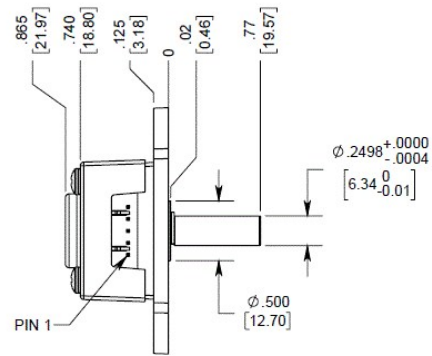
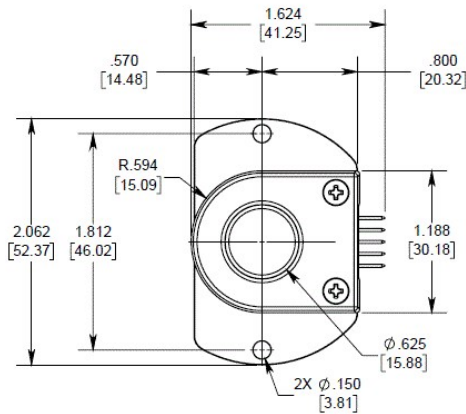
(<https://www.usdigital.com/products/accessories/interfaces/cable-drivers/pc4/>)/PC5 (<https://www.usdigital.com/products/interfaces/encoder/cable-drivers/pc5/>) differential line driver is recommended. A connection to the H1 series encoder is made through a 5-pin standard connector. The mating connectors are available from US Digital with several cable options and lengths.

## Mechanical Drawings

H1 Ball Bearing Optical Shaft Encoder



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UNITS: INCHES [MM]  
METRIC SHOWN FOR REFERENCE ONLY

## Specifications

### ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature, CPR < 2000	-40 to 100	C
Operating Temperature, CPR ≥ 2000	-25 to 100	C
Electrostatic Discharge, IEC 61000-4-2	± 4	kV
Vibration (10Hz to 2kHz, sinusoidal)	20	G
Shock (6 milliseconds, half-sine)	75	G



## MECHANICAL

PARAMETER	VALUE
Max. Acceleration	100000 rad/sec <sup>2</sup>
Max. Shaft Speed (mechanical)	10000 RPM (1)
Max. Shaft Torque	0.05 in-oz
Max. Shaft Loading	2 lbs.
Bearing Life	life in millions of revs = $(90/P)^3$ where P = radial load in pounds
Weight	1.49 oz.
Max. Shaft Runout	0.006 in. T.I.R.
Mounting Plate Screw Torque	(#4-40) 4-6
Moment of Inertia	0.001 oz-in-s <sup>2</sup>
Technical Bulletin TB1001 - Shaft and Bore Tolerances	Download ( <a href="https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/">https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/</a> )

(1) The maximum speed due to electrical considerations is dependent on the CPR. See the EM1 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) and EM2 (<https://www.usdigital.com/products/encoders/incremental/modules/em2/>) product pages.

## PHASE RELATIONSHIP

B leads A for clockwise shaft rotation, and A leads B for counterclockwise rotation when viewed from the shaft side of the encoder.



## ELECTRICAL

- Specifications apply over the entire operating temperature range.
- Typical values are specified at  $V_{cc} = 5.0V_{dc}$  and  $25^{\circ}C$ .
- For complete details, see the EM1 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) or EM2 (<https://www.usdigital.com/products/encoders/incremental/modules/em2/>) product pages.

PARAMETER	MIN.	TYP.	MAX.	UNITS	CONDITIONS
Supply Voltage	4.5	5.0	5.5	V	
Supply Current		27	33	mA	CPR < 500, no load
		54	62	mA	CPR $\geq$ 500 and < 2000, no load
		72	85	mA	CPR $\geq$ 2000, no load
Low-level Output			0.5	V	$I_{OL} = 8mA$ max., CPR < 2000
			0.5	V	$I_{OL} = 5mA$ max., CPR $\geq$ 2000
		0.25		V	no load, CPR $\geq$ 2000
High-level Output	2.0			V	$I_{OH} = -8mA$ max. and CPR < 2000
	2.0			V	$I_{OH} = -5mA$ max. and CPR $\geq$ 2000
		4.8		V	no load and CPR < 2000
		3.5		V	no load and CPR $\geq$ 2000
Output Current Per Channel	-8		8	mA	CPR < 2000
	-5		5	mA	CPR $\geq$ 2000
Output Rise Time		110		nS	CPR < 2000
		50		nS	CPR $\geq$ 2000, $\pm 5mA$ load
Output Fall Time		100		nS	CPR < 2000
		50		nS	CPR $\geq$ 2000, $\pm 5mA$ load

## PIN-OUT

PIN	DESCRIPTION
1	Ground
2	Index
3	A channel
4	+5VDC power
5	B channel



## Notes

- Cables and connectors are not included and must be ordered separately.
- US Digital® warrants its products against defects in materials and workmanship for two years. See complete warranty (<https://www.usdigital.com/company/warranty>) for details.

## Configuration Options

H1	CPR (Cycles Per Revolution)	Index	Housing
	32	IE (Index)	D (Default)
	50	NE (Non-Index)	
	96		
	100		
	192		
	200		
	250		
	256		
	360		
	400		
	500		
	512		
	540		
	720		
	800		
	900		
	1000		
	1024		
	1250		
	2000		
	2048		
	2500		
	4000		
	4096		
	5000		

**PLEASE NOTE: This chart is for informational use only.** Certain product configuration combinations are not available. Visit the H1 product page (<https://www.usdigital.com/products/H1>) for pricing and additional information.