



H6 Features

- Ball bearing option tracks to 10,000 RPM
- 2-channel quadrature, TTL squarewave outputs
- 3rd channel index option available on some resolutions
- 64 to 10,000 cycles per revolution (CPR)
- 256 to 40,000 pulses per revolution (PPR)
- Wide operating temperature



H6 Product Description

The H6 series ball bearing optical shaft encoder has a molded plastic, glass-filled enclosure, which utilizes either a 5-pin or 10-pin latching connector. This non-contacting rotary to digital converter is designed to provide digital feedback information.



The H6 is fully assembled with a brass shaft, two 1/4" ID by 1/2" OD ball bearings and a mounting plate. The mounting plate comes with 4 mounting holes for #2 - #4 size screws.

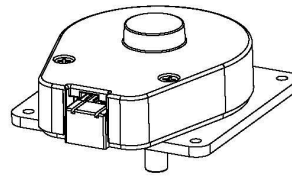
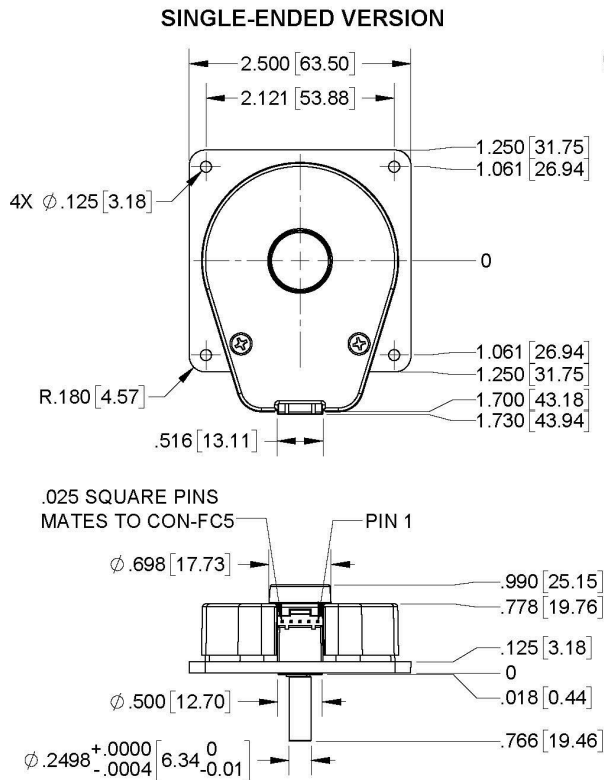
A secure connection to the H6 series encoder is made through a 5-pin (single-ended versions) or 10-pin (differential versions) latching connector (sold separately). The mating connectors are available from US Digital with several cable options and lengths.

For differential versions, the internal differential line driver (26C31) can source and sink 20mA at TTL levels. The recommended receiver is the industry standard 26C32. Maximum noise immunity is achieved when the differential receiver is terminated with a 150 Ω resistor in series with a .0047 μ F capacitor placed across each differential pair. The capacitor simply conserves power; otherwise power consumption would increase by approximately 20mA per pair, or 60mA for 3 pairs.

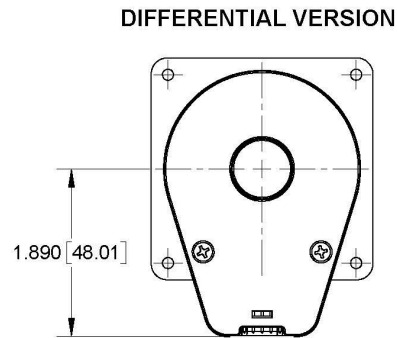


Mechanical Drawings

H6 Ball Bearing Optical Shaft Encoder



SINGLE-ENDED VERSION SHOWN



RELEASE DATE: 08/05/2019

US DIGITAL 1400 NE 136th Avenue
Vancouver, Washington 98684, USA

info@usdigital.com
sales@usdigital.com
support@usdigital.com

Local: 360.260.2468
Toll-free: 800.736.0194

UNITS: INCHES [MM]
METRIC SHOWN FOR REFERENCE ONLY

Specifications

ENVIRONMENTAL

PARAMETER	VALUE	UNITS
Operating Temperature (CPR < 3600)	-40 to 100	C
Operating Temperature (CPR ≥ 3600)	-25 to 100	C
Vibration (5Hz to 2kHz)	20	G
Electrostatic Discharge		
Single-ended (-S version), IEC 61000-4-2	± 4	kV
Differential (-D version), Human Body Model	± 2	



MECHANICAL

PARAMETER	DIMENSION / UNITS
Max. Acceleration	100000 rad/sec ²
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:	
Single-ended	3.02 oz.
Differential	3.15 oz.
Max. Shaft Runout	0.006 in. T.I.R.
Mounting Plate Screw Torque	(#2-56) 2-3
Moment of Inertia	0.001 oz-in-s ²
Technical Bulletin TB1001 - Shaft and Bore Tolerances	Download (https://www.usdigital.com/support/resources/reference/technical-docs/technical-bulletins/shaft-and-bore-tolerances-tb1001/)

(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.



SINGLE-ENDED 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 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) and 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 < 1000, no load
		54	62	mA	CPR \geq 1000 and < 3600, no load
		72	85	mA	CPR \geq 3600, no load
Low-level Output			0.5	V	$I_{OL} = 8mA$ max., CPR < 3600
			0.5	mA	$I_{OL} = 5mA$ max., CPR \geq 3600
		0.05		mA	no load, CPR < 3600
		0.25		mA	no load, CPR \geq 3600
High-level Output	2.0			V	$I_{OH} = -8mA$ max., CPR < 3600
	2.0			V	$I_{OH} = -5mA$ max., CPR \geq 3600
		4.8		V	no load, CPR < 3600
		3.5		V	no load, CPR \geq 3600
Output Current Per Channel	-8		8	mA	CPR < 3600
	-5		5	mA	CPR \geq 3600
Output Rise Time		110		nS	CPR < 3600
		50		nS	CPR \geq 3600
Output Fall Time		35		nS	CPR < 3600
		50		nS	CPR \geq 3600



DIFFERENTIAL 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 (<https://www.usdigital.com/products/encoders/incremental/modules/em1/>) and 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		29	36	mA	CPR < 1000, no load
		56	65	mA	CPR \geq 1000 and < 3600, no load
		74	88	mA	CPR \geq 3600, no load
Low-level Output		0.2	0.4	V	$I_{OL} = 20mA$ max.
High-level Output	2.4	3.4		V	$I_{OH} = -20mA$ max.
Differential Output Rise/Fall Time			15	nS	

PIN-OUT

5-PIN SINGLE-ENDED		10-PIN DIFFERENTIAL	
Pin	Description	Pin	Description
1	Ground	1	Ground
2	Index	2	Ground
3	A channel	3	Index-
4	+5VDC power	4	Index+
5	B channel	5	A- channel
		6	A+ channel
		7	+5VDC power
		8	+5VDC power
		9	B- channel
		10	B+ channel

PRODUCT CHANGE NOTIFICATIONS

Title	Date	Description	Download
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H6 BALL BEARING OPTICAL SHAFT ENCODER

Marketing/Insert - PCN 7058	11/04/2020	As part of our ongoing continuous improvement efforts, improvements are being incorporated into the E6, S6 and H6 series of Optical Encoders, including both single-end and differential output versions.	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-7058-e6-s6-h6-marking-insert/)
Laser Marking - PCN 5253	6/17/2015	As part of our ongoing continuous improvement efforts, US Digital is changing the labeling/marketing method for our E3, E6, H3, H6, S1, S2 and S6 products.	Download (https://www.usdigital.com/support/resources/product-change-notifications/pcn-5253-laser-marking/)



EM1 LED Die - 2/7/2013
PCN 1016

As part of US Digital's continual assurance of supply strategy, we have qualified additional sources for our LED die used in our EM1 encoder module, which in turn impacts all of the following products:

EM1, E2, E3, E5, E6, H1, H15, H3, H5, H6, HB5M, HB6M, HD25, PE, S1, S2, S5, S6, T5 and T6

The device specification will remain the same, i.e. there will be no change to form, fit or function of the product(s) as specified by US Digital. The appropriate quality and reliability testing has been performed on representative products to ensure normal parametric distribution, consistent with US Digital's quality and reliability standards.

Download

[\(https://www.usdigital.com/support/resources/product-change-notifications/pcn-1016-em1-led-die/\)](https://www.usdigital.com/support/resources/product-change-notifications/pcn-1016-em1-led-die/)

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.



H6 BALL BEARING OPTICAL SHAFT ENCODER