H5 Ball Bearing Optical Shaft Encoder

Description:

The **H5** series ball bearing optical shaft encoder has either a molded polycarbonate or a machined aluminum enclosure, which utilizes either a 5-pin or 10-pin finger-latching connector. This non-contacting rotary to digital converter is designed to provide digital feedback information.

The **H5** is fully assembled with a shaft, two 1/4" ID by 1/2" OD heavy duty ball bearings and a mounting plate. The shaft is either made of brass (polycarbonate version) or stainless steel (metal version). This design allows for an optional rear shaft extension (polycarbonate versions only). The mounting plate comes with 2 mounting holes for screws #4 or smaller.

A secure connection to the **H5** series encoder is made through a 5-pin (single-ended versions) or 10-pin (differential versions) finger-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 industry standard 26C32. Maximum noise immunity is achieved when the differential receiver is terminated with a 110 ohm resistor in series with a .0047mf 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.

Features:

- Heavy duty ball bearings track up to 10,000 RPM
- Low cost
- 2-channel quadrature, TTL squarewave outputs
- Optional index (3rd channel)
- Differential outputs available
- Optional Agilent compatible pin-out
- Positive finger-latching connector
- 32 to 1250 cycles per revolution (CPR)
- 128 to 5000 pulses per revolution (PPR)
- Tracks from 0 to 100,000 cycles/sec
- -40 to +100°C operating temperature
- Single +5VDC supply
- US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.

Mechanical Specifications:

Parameter	Dimension / Units
Shaft Speed	10,000 RPM max. continuous
Acceleration	10,000 rad/sec^2
Shaft Torque	0.05 in. oz. max.
Shaft Loading	2 lbs. max.
Bearing Life	$(90/P)^3$ - life in millions of revs. where P = radial load in lbs.
Weight	
Polycarbonate Single-ended (H5S)	1.79 oz.
Polycarbonate Differential (H5D)	1.89 oz.
Metal Single-ended (H5MS)	2.26 oz.
Metal Differential (H5MD)	2.32 oz.
Shaft Runout	0.0006 T.I.R. max.
Moment of Inertia	0.0001 oz. in. s^2
Vibration	20 g. 5 to 2KHz

Single-ended Electrical Specifications:

For complete details see the **EM1 / HEDS** data sheet.

Phase Relationship:

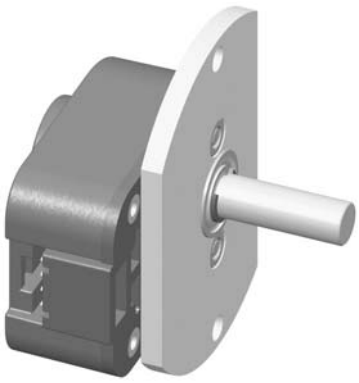
B leads A for clockwise shaft rotation, and A leads B for counterclockwise rotation viewed from the shaft side of the encoder (*see the **EM1 / HEDS** data sheet*).

Differential Electrical Specifications:

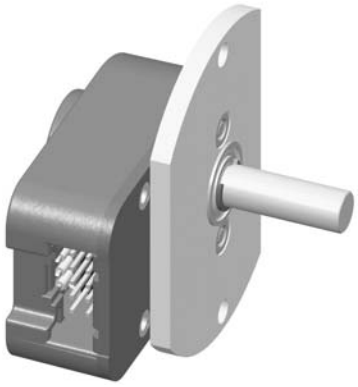
Specification	Min.	Typ.	Max.	Units	Notes
Supply	4.5	5.0	5.5	Volts	
Current Consumption					
Index: 64 CPR	-	28	53	mA	No load
Index: 1800, 2500 CPR	-	56	59	mA	No load
Index: All Other Resolutions	-	58	88	mA	No load
Non-index: <2000 CPR	-	18	43	mA	No load
Non-index: >=2000 CPR	-	58	88	mA	No load
Output Voltage					
Sourcing to +5	2.4	3.4	-	Volts	@ -20mA
Sinking to Ground	-	0.2	0.4	Volts	@ 20mA

- For complete details see the **EM1 / HEDS** data sheet.

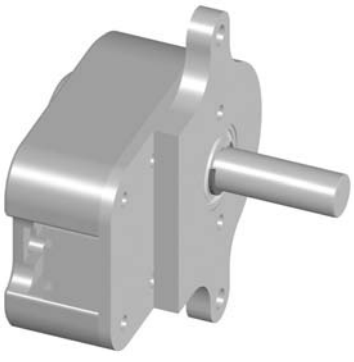
Polycarbonate Single-ended (H5S)



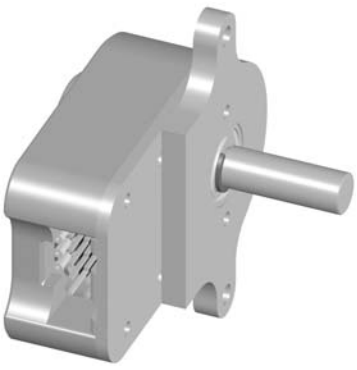
Polycarbonate Differential (H5D)



Metal Single-ended (H5MS)



Metal Differential (H5MD)



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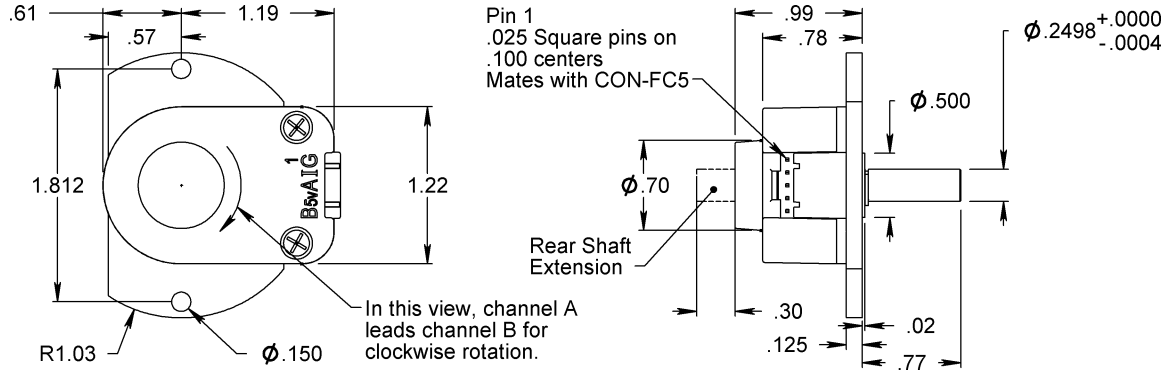
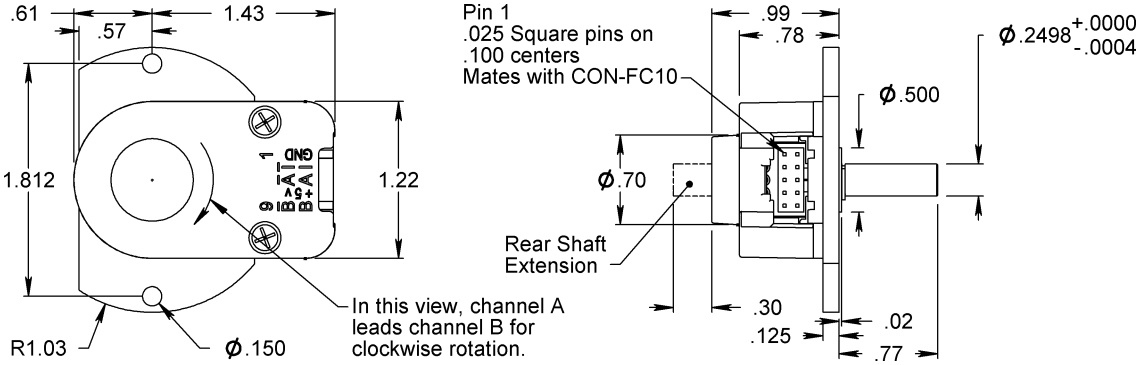
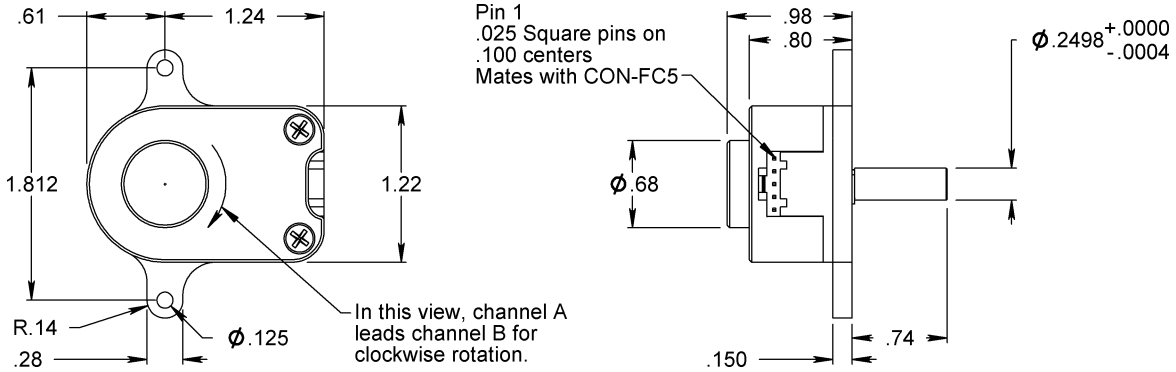
Polycarbonate Single-ended Mechanical Drawing (H5S):



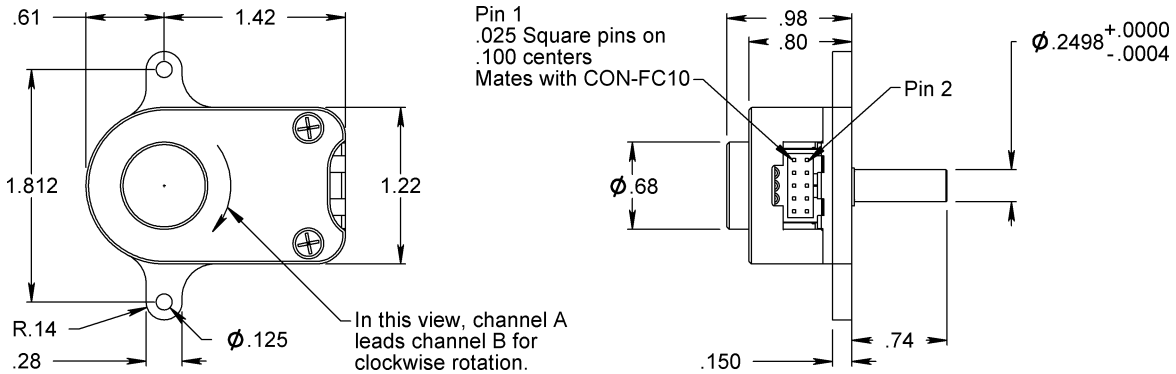
Polycarbonate Differential Mechanical Drawing (H5D):



Metal Single-ended Mechanical Drawing (H5MS):



Metal Differential Mechanical Drawing (H5MD):



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Compatible Cables & Connectors:

Finger-latching:		
5-pin	**10-pin**	**Description**
CON-FC5-22*	CON-FC10	Connector
CA-3133-1FT		Connector on one end with 4 12" wires
CA-3132-1FT		Connector on one end with 5 12" wires
CA-3131-6FT	CA-4217-6FT	Connector on one end of a 6' shielded round cable
	CA-4174-6FT**	Same as CA-4217, *but for L-option only*
CA-3620-6FT	CA-3619-6FT	Connectors on both ends of a 6' shielded round cable
	CA-3807-FT**	Same as CA-3619, *but for L-option only*

* 22 AWG is standard. 24, 26 and 28 AWG are also available.
** Agilent compatible cable assembly.

Attention:
- Specify cable length when ordering.
- Custom cable lengths are available. See the **Cables / Connectors** data sheet for more information.

Pin-outs:

Pin	5-pin Single-ended	10-pin Differential Standard	10-pin Differential Agilent (L-option)
1	Ground	Ground	No connection
2	Index	Ground	+5VDC power
3	A channel	Index-	Ground
4	+5VDC power	Index+	No connection
5	B channel	A- channel	A- channel
6		A+ channel	A+ channel
7		+5VDC power	B- channel
8		+5VDC power	B+ channel
9		B- channel	Index-
10		B+ channel	Index+

Ordering Information:

H5S Standard:	H5S Index/HiRes: (Hi Res: >=1000 CPR)	H5D Standard:	H5D Index/HiRes: (Hi Res: >=1000 CPR)
$59.85 / 1	$68.83 / 1	$73.50 / 1	$83.06 / 1
$55.65 / 10	$64.00 / 10	$69.30 / 10	$78.31 / 10
$51.45 / 50	$59.17 / 50	$65.10 / 50	$73.56 / 50
$49.35 / 100	$56.75 / 100	$61.95 / 100	$70.00 / 100
$47.25 / 500	$54.34 / 500	$59.85 / 500	$67.63 / 500
$45.15 / 1K	$51.92 / 1K	$55.65 / 1K	$62.88 / 1K

H5MS Standard:	H5MS Index/HiRes: (Hi Res: >=1000 CPR)	H5MD Standard:	H5MD Index/HiRes: (Hi Res: >=1000 CPR)
$80.85 / 1	$92.98 / 1	$94.50 / 1	$106.79 / 1
$77.70 / 10	$89.36 / 10	$89.25 / 10	$102.64 / 10
$71.40 / 50	$82.11 / 50	$85.05 / 50	$97.81 / 50
$68.25 / 100	$78.49 / 100	$80.85 / 100	$92.98 / 100
$65.10 / 500	$74.87 / 500	$77.70 / 500	$89.36 / 500
$61.95 / 1K	$71.24 / 1K	$71.40 / 1K	$82.11 / 1K

Cost Modifiers:
- Add $2 for **E**-option.

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Version:
S = Polycarbonate single-ended.
D = Polycarbonate differential.
MS = Metal single-ended.
MD = Metal differential.

CPR:
32**
50
96
100
110*
120*
192
200
250
256
360
400
500
540*
720**
900**
1000
1016*
1024
1250**

Options: (specify in order shown)
I = Index (3rd channel).
L = Agilent compatible pin-out.†
E = Rear shaft extension.††

CPR Notes:
* Index option not available.
** 32, 720, 900, 1250 CPR only available with index.

Options Notes:
† Only available with differential versions (**H5D** and **H5MD)**.
†† Only available with polycarbonate versions (**H5S** and **H5D)**.

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All information subject to change without notice.

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