

HDE SERIES

Made in
U.S.A.

Optical Incremental Shaft Position Encoder

FEATURES

- NEMA 4 Housing
- Two Independent Shaft Seals
- High Noise Immunity
- Short Circuit Protection
- Reverse Polarity Protection
- Heavy Duty Sealed Bearings
- Variety of Mounting Options
- Tachometer Mount 5PY Available
- Size 25 Flange Available
- Infrared LED and SMD Circuitry
- NPN, PNP, Diff. Line Driver and Other Outputs Available

APPLICATIONS

- Speed Controls
- Robotics
- Machine Tools
- Cut to Length
- Position Control
- Index Tables



SPECIFICATIONS

Input

Voltage: 5 or 12-28 VDC, others available
Current: 45 ma. @ 15 VDC typical

Output

Squarewave 50/50 duty cycle
0 - 20,000 pulses/sec.

* Please consult FSI for details, technical bulletins, and see the safety and warranty sheet for additional information.

Mechanical

Housing: Rugged anodized aluminum
Shaft Rotation: Either direction
Shaft speed: 6000 RPM max. *
Bearings: Heavy duty ABEC 3
Bearing Load: 30 lbs. radial, 10 lbs. axial *

Temperature Range:

Standard: 32° - 149° F (0° - 65° C)
Optional: -31° - 167° F (-35°C - 75°C)

DESCRIPTION

The HDE series is a NEMA 4 optical incremental shaft encoder, offering the ultimate in quality and flexibility. It is designed with high precision mechanical components, dual oil tight shaft seals and IRED light sources to provide long life and durability. Comparison of the light signal with a reference signal provides high noise immunity and a wide operating temperature range. The output is a series of square waves, which correspond to shaft rotation. Single channel, quadrature, index pulse, differential line driver, anti-jitter, RS-644 and other special outputs are available with

standard resolutions up to 2500 PPR. In addition to face flange, foot flange, size 25 flange and 5PY mounts, several bearing and connector options are available. The HDE's extensive options and choices combine to offer millions of standard HDE encoders. In addition, FSI has the flexibility to design and manufacture custom encoders.

Over 50 years of engineering experience is embodied in every RSE encoder. FSI, formerly known as Fork Standards, Inc., is committed to manufacturing quality products and providing complete customer satisfaction.



FSI Technologies Inc.

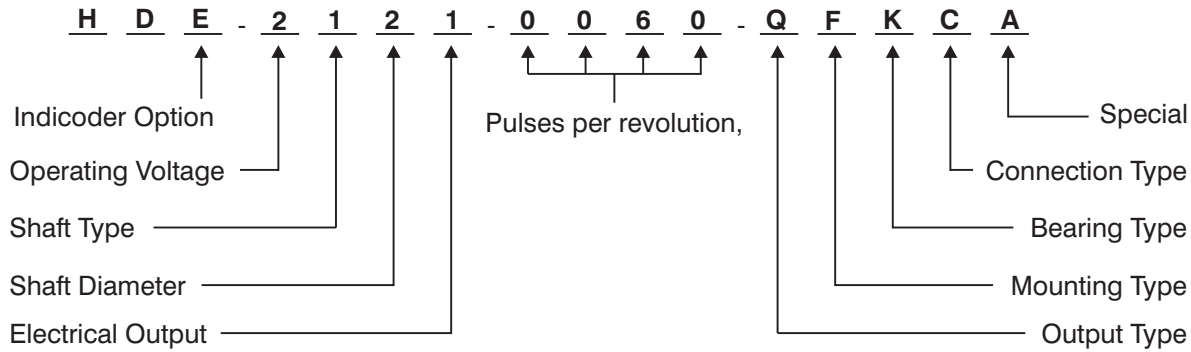
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ORDERING INFORMATION FOR HDE SERIES ENCODERS

Example



Family

HD "HDE" Family (HDE & HDI Prefix)

Indicoder Option

E Without Indicoder option
 I With Indicoder option

Operating Voltage

1 5 VDC
 2 12 - 28 VDC
 3 Special
 4 12 - 28 VDC (In), 5 VDC (Out)
 5 4.5 - 14 VDC
 6 6 - 24 VDC
 7 9 - 15 VDC (Use with electrical output 6)
 8 5 - 28 VDC

Shaft Type

1 Single ended
 2 Double ended

Shaft Diameter

2 3/8"
 3 5/16"
 6 Slotted shaft for screw jacks
 7 1/2" sleeve on 3/8" single ended shaft
 8 5/8" sleeve on 3/8" single ended shaft
 9 3/4" sleeve on 3/8" single ended shaft

Previous "4" is included with B-3 option, specify #3

Previous "5" is included with B-4 option, specify #2

Electrical Output

1 Standard (NPN with pull up resistor)
 2 Open Collector NPN
 3 PNP with pull down resistor
 4 Open Collector PNP
 5 8830 TTL diff. line driver (5 VDC Max)*
 6 88C30 CMOS diff. line dr (15 VDC Max)*
 7 7272 CMOS diff. line dr (30 VDC Max)*

*Note: Differential line driver for index pulse

8 Red Lion pin-out, standard NPN, 4 conductor
 9 Red Lion pin-out, open collector NPN, 4 cond.
 D Dynapar, 2.2 K ohm P/U, no SR
 E Encoder Products, 1.5 K ohm P/U, no SR
 F Encoder Products, open collector, no SR
 G Red Lion pin-out & out, 1.5K ohm P/U, no SR
 H Red Lion pin-out & out, op. collector, no SR
 J RS-644 differential line driver (LVDS)

Output Type

S Single Channel
 Q Quadrature
 P Positive going Index Pulse *
 N Negative going Index Pulse *

Note: With P and N outputs, also specify S, Q, D, B, G

D Count / Direction
 B Up / Down Count
 G Anti-Jitter, Quadrature Output

* Note: Synonyms: Index Pulse, Reference Pulse, Marker Pulse, or Z Channel

Mounting Type

F Base flange: w/blind holes front, back & bottom
 H Blind holes: front, back & bottom
 Y or B-3 5 PY front flange ⊕ (requires 5/16" shaft)
 B-1 Sealed Back Plate Cover ⊕
 B-2 Face Mount Flange ⊕
 B-4 Series 25 Encoder Mount ⊕ (requires 3/8" shaft)

⊕Note: Used in conjunction with F or H option.

Bearing Type (Chrome Steel)

V or None Precision ABEC 3, film seal, oil lube
 T Precision ABEC 3, Teflon® seal, oil lube
 W Precision ABEC 3, rubber seal, oil lube
 K Precision ABEC 3, Teflon® seal, grease lube

Connection Style

C Water tight plastic connector "C-2" Style
 D FSI DB-9 Style Connector
 M Military Style Connector MS Series
 R-3 3' Built-in Cable, No Connector
 R-15 15' Built-in Cable, No Connector
 R-X Custom length Built-in Cable, No Connector
 7 Seven pin MS connector
 9 Eight position screw terminal strip connector

Special Options

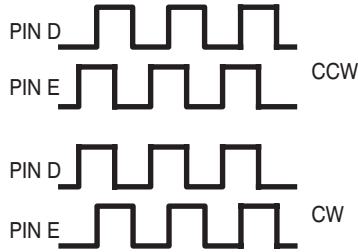
A High speed 36 kHz (below 1000 ppr)
 E Enhanced temp. range -35° C to +75° C
 I Delete 220Ω (no short circuit protection)
 J Replace 220Ω with 100Ω
 L Low power (Q to 600 ppr, S to 1200 ppr)
 2-xxx Electronic 2X line count (xxx=ms.)
 4-xxx Electronic 4X line count (xxx=ms.)

COMMON OUTPUT OPTIONS



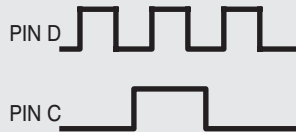
Option S Squarewave

A series of squarewaves corresponding to shaft rotation in either a clockwise (CW) or a counterclockwise (CCW) direction, will appear on Pin D.



Option Q Quadrature

Quadrature Output on Pin E will lead the Pin D squarewave output for CCW shaft rotation and lag the Pin D squarewave output for CW shaft rotation.



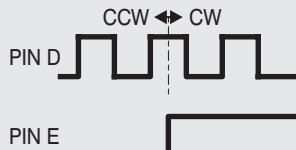
Option P Positive Index Pulse

In addition to the squarewaves, one positive going index pulse per revolution will be on Pin C.



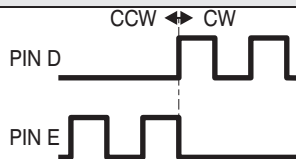
Option N Negative Index Pulse

In addition to the squarewaves, one negative going index pulse per revolution will be on Pin C.



Option D Count / Direction

Squarewave will appear on Pin D regardless of direction of shaft rotation. Pin E will be "high" for CW (Up Count) and "low" for CCW (Down Count).



Option B Up / Down Count

A squarewave will appear on Pin D for CW shaft rotation and on Pin E for CCW shaft rotation.

MATING CONNECTORS AND CABLES

| | |
|----------|--|
| C-1 | 6 pin MS Series plug, clamp and boot - unassembled |
| C-1F4-15 | C-1 plug and 15 ft. of cable, 4 wire - assembled |
| C-1F4-xx | C-1 plug and "xx" ft. of cable - 4 wire assembled |
| C-1F6-xx | C-1 plug and "xx" ft. of cable, 6 wire - assembled |
| C-1R-xx | C-1 plug / Red Lion pin-out & "xx" ft. cable - assembled |
| C-2 | C-2 Mating connector |
| C2F-15 | C-2 (4pin) and 15 feet of cable - assembled |
| C-2F-xx | C-2 (4 pin) and "xx" feet of cable - assembled |
| C-4 | 6 pin MS right angle plug, clamp, & boot - unassembled |
| C-4F4-xx | C-4 and "xx" ft. of cable, 4 wire - assembled |
| C-4F6-xx | C-4 and "xx" ft. of cable, 6 wire - assembled |
| C-5 | 10 pin mating plug - unassembled |
| C-5F-xx | C-5 and "xx" ft. of cable - assembled |
| D-1-15 | FSI DB-9 Connector with 15' cable |
| D-1 | FSI DB-9 Connector only (soldering skill required) |
| D-1-xx | D-1 Connector and "xx" ft. of cable |

Note: C-2 versions exclude water from connections within the mating connectors. Other versions do not.

Note: FSI believes the information on its data sheets to be reliable and accurate as is technical advice provided by the company. FSI makes no warranties (expressed or implied) regarding the accuracy of the information and assumes no liability regarding the usage of this product. See Safety and Warranty data for additional information. All product names referenced herein are trademarks of their respective companies.

See our website (www.fsinet.com) and publications for these additional accessories and related products:

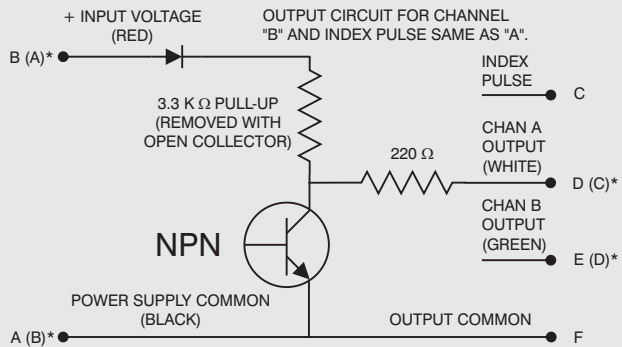
Counters, displays and controls
 Measuring Wheels
 Chariot™ mounting and arm system for linear measurement using measuring wheels
 Standard and pilot bore couplings to couple to large and small diameter shafts

STANDARD LINE COUNTS (PPR)

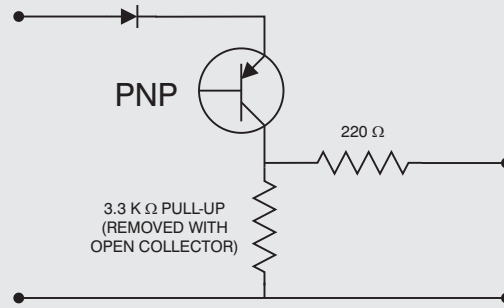
| | | | | | | | | | | | | | | | | | |
|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|
| 1 | 2 | 3 | 4 | 5 | 6 | 8 | 10 | 12 | 15 | 16 | 18 | 20 | 22 | 25 | 28 | 30 | 32 |
| 36 | 38 | 39 | 40 | 48 | 50 | 60 | 64 | 66 | 72 | 80 | 92 | 94 | 96 | 98 | 99 | 100 | 102 |
| 120 | 125 | 127 | 130 | 144 | 150 | 156 | 170 | 180 | 186 | 200 | 216 | 222 | 228 | 240 | 250 | 254 | 256 |
| 260 | 300 | 314 | 336 | 360 | 375 | 400 | 500 | 508 | 512 | 600 | 625 | 720 | 745 | 750 | 762 | 800 | 900 |
| 927 | 1000 | 1024 | 1200 | 1250 | 1270 | 1400 | 1500 | 1800 | 2000 | 2048 | 2250 | 2400 | 2500 | | | | |

WIRING INFORMATION

NOTE: Standard pin out shown - Additional output types are available.

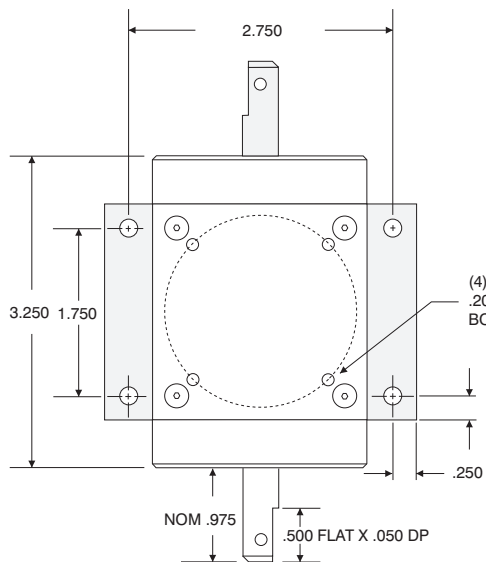


* NOTES: (1) (X) INDICATES PIN OUT FOR OPTIONS 8 & 9.
(2) CHANNEL "B" QUAD & INDEX PULSE ARE OPTIONS - SEE ORDERING GUIDE.

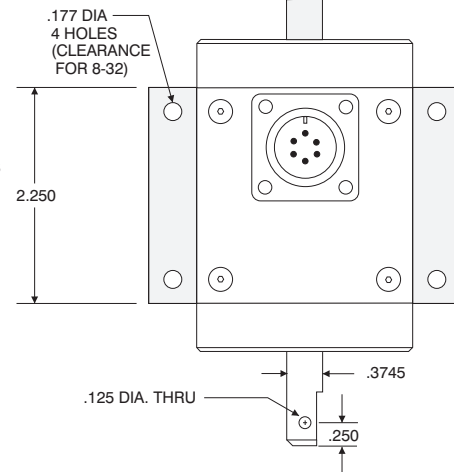


NOTE: "PNP" INPUT AND OUTPUT DESIGNATION SAME AS "NPN"

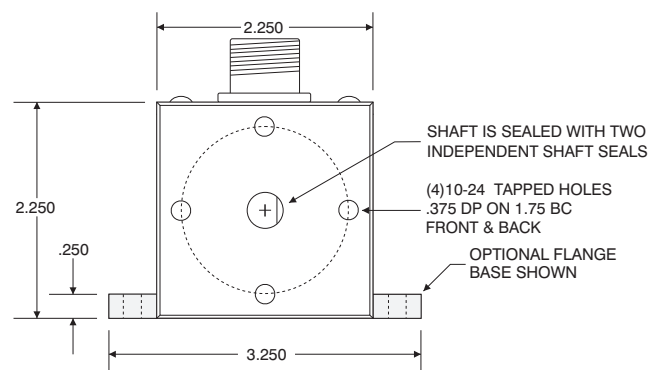
HDE MECHANICAL



NOTE: SHAFT SHOWN WITH DBL. ENDED OPTION. SHAFT DIMENSIONS ARE IDENTICAL FOR BOTH ENDS.



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Bulletin # 2952-1001-07

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