

# Hercules Encoders

## Series 4000

### Heavy Duty Incremental Rotary Shaft Encoder

- Enclosure: SLIMLINE — 3" x 3" x 1½" Space-Saver NEMA 12/13 or NEMA 4 type Sealing — Flush or Flanged Base Styles
- Inherently Anti-Jitter Circuitry, Shatterproof Metal Code Discs
- Internally and Externally Shielded ABEC 5 Stainless Steel Bearings, Mounted Internally
- Low Supply Current Requirement — 30milliamps typical per encoder, maximum of 50 mA
- Operating Voltage Flexibility — 8 to 28 Vdc or 5 Vdc TTL Output, 5V or 8-15V with Line Driver
- Operating Temperature Rating designed for extremes, from -40° to +85° C (-40° to +185° F)

## Specifications

### Mechanical

|                             |  |
|-----------------------------|--|
| Shaft Speed                 | 6000 RPM maximum                                     |
| Shaft Direction             | Bidirectional  |
| Standard Shaft Sizes (Dia.) | .2497", .3747", .4997"                               |
| Shaft Extension(s)          | 0.80" with .50x.05" flat                             |
| Shaft Seals                 | Neoprene or PTFE Options                             |
| Mounting                    | Refer to dimensional drawings                        |
| Bearings                    | ABEC 5 Shielded                                      |
| Radial Loading              | (3/8") 30 lbs. Operating<br>(1/2") 70 lbs. Operating |
| Axial Loading               | (3/8") 15 lbs. Operating<br>(1/2") 35 lbs. Operating |
| Accuracy                    | ±0.1° of Shaft Rotation Typical                      |
| Housing                     | Black Anodized Aluminum                              |
| Weight                      | Standard: 17 oz., Sealed: 26 oz.                     |
| Connector                   | 6 Pin MS3102 or 18" Cable Out                        |

### Electrical

|                           |   |
|---------------------------|---|
| Pulse Rate                | 10 kHz, up to 200 kHz   |
| Outputs                   | NPN w/ pullup; NPN open collector; PNP sourcing<br>Line Drivers (5 Vdc/ TTL level, 8 to 15 Vdc)<br>All line drivers have complementary outputs. |
| Output Ratings            |   |
| Open Collector Transistor | 40 Vdc maximum  |
| Line Drivers 8-15 Vdc     | 15 Vdc maximum  |
| 5 Vdc TTL                 | 5.5 Vdc maximum   |
| Supply Voltage            | 8 to 28 Vdc<br>5 Vdc with 5V TTL level output   |
| Supply Current            | 30 mA typical, 50 mA maximum  |
| Current Sinking           | 250 mA maximum  |
| Output Duty Cycle         | 50/50 w/ ±20% typical tolerance<br>Tighter to ±5% by spec   |
| Pulsed Outputs            | 5-10 µsec or 25-35 µsec   |
| Rise/Fall Times           | 1 µsec typical, other options available   |
|                           | See Wiring Diagrams for Pin Outs  |

### Environmental

|                     |                                      |
|---------------------|--------------------------------------|
| Operating Temp.     | -40° to +85° C (-40° to +185° F)     |
| Shock               | 50 g's for 11 Milliseconds           |
| Vibration           | 5 to 2000 Hertz at 20 g's            |
| Humidity            | 100% Relative Humidity               |
| Enclosures (Sealed) | NEMA 4 type — Water-tight            |
| (Std)               | NEMA 12/13 equiv. — Dust-, Oil-Tight |

### Electrical Connections

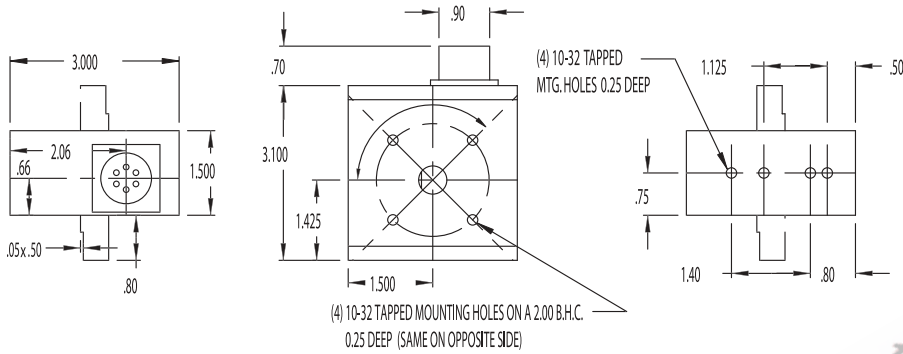
| Function          | Pin | Color |
|-------------------|-----|-------|
| +V                | B   | Red   |
| Common            | A   | Black |
| Channel A         | D   | Blue  |
| Channel B         | E   | Brown |
| Channel $\bar{A}$ | C   | White |
| Channel $\bar{B}$ | F   | Green |

For the latest specifications visit our website  
[www.herculesencoders.com](http://www.herculesencoders.com)



# Dimensional Drawings

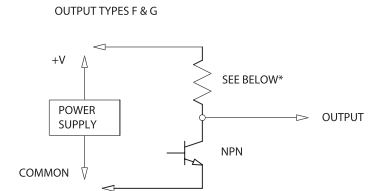
Series 4000 Standard *call for sealed dimensions*



# Wire Drawings



+8 to +28Vdc \*Maximum of 18Vdc for "D" output  
\*3.3K pullup on "A", Not installed on "B", 1.5K on "D"

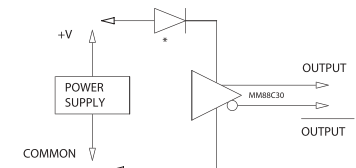


+5 Vdc  
\*3.3K Pullup on "F", Not installed on "G"



+8 TO +28Vdc

OUTPUT TYPES K & L



+8 TO +15Vdc on "L", +5V on "K"  
\*Only installed on "L"

# Ordering Information

Series **4 4 2 1** Encoder Type **A** Channel Outputs **Q** PPR (Pulses per Revolution) **0600**

**Shaft Diameter**  
1=1/4" (0.2497")  
3=3/8" (0.3747)  
4=1/2" (0.4997)

**Shaft Extension**  
1=Single  
2=Double

**Mounting Type**  
1=10-32 BHC on Shaft Ends & Base  
2=Flanged Base (BHC on Shaft Ends)

**Encoder Type**  
\_=Standard Encoder  
S=Sealed (Elastomer)  
T=Sealed (PTFE)

**Channel Outputs**  
A=NPN 3.3K Pullup  
B=NPN Open Collector  
D=NPN 1.5K Pullup  
F=5Vdc TTL NPN w/Pullup  
G=5Vdc TTL NPN OC  
H=PNP Sourcing Output  
K=5Vdc Line Driver  
L=8 to 15 Vdc Line Driver

**Channel Types**  
S=Single Output  
Q=Quadrature Output  
P=1st Output CW Pulses  
2nd Output CCW Pulses  
U=1st Output Pulse Train  
2nd Output Logic High for CW Rotation. Low for CCW Rotation

PPR (Pulses per Revolution)

For all Channel Types

|      |      |      |      |      |      |      |
|------|------|------|------|------|------|------|
| 0025 | 0030 | 0050 | 0060 | 0075 | 0090 | 0093 |
| 0096 | 0100 | 0120 | 0125 | 0128 | 0135 | 0150 |
| 0180 | 0186 | 0192 | 0200 | 0210 | 0240 | 0250 |
| 0256 | 0270 | 0300 | 0360 | 0372 | 0400 | 0420 |
| 0480 | 0500 | 0512 | 0540 | 0600 | 0720 | 0840 |
| 0960 | 1000 | 1024 |      |      |      |      |

Added Channel Types "S" "P" "U" (Square Wave)

0384 0744 0800 1080 1200 1440 1680 1920 2000 2048

Added "S" "P" "U" (5-10 & 25-35 μSec Pulses)

0768 1488 1600 2160 2400 2880 3360 3840 4000 4096

Consult factory for PPR not listed