

# Series HS35 Sealed Hollow Shaft

- Hollow Shaft design eliminates mounting bracket, flexible shaft coupling, and installation labor
- Direct shaft mount eliminates shaft alignment procedures
- Flexible tether minimizes bearing load
- Unbreakable disk
- Robust metal hubshaft
- Electrically isolated and Thermally insulated



Dual Isolated Outputs Model



Single Output model shown with LED Output Indicators



MOTOR MOUNT

## APPLICATION/INDUSTRY

The Dynapar brand Series HS35 Sealed Hollowshaft encoder is designed for easy installation on motor or machine shafts. Its hollowshaft design eliminates the need for a flexible shaft coupling, mounting bracket, flower pot, or flange adapter. This not only reduces the installation depth, but also lowers total cost.

## DESCRIPTION

The Series HS35 Sealed Hollowshaft is equipped with an unbreakable disk that meets the demands of the most severe shock and vibration generating processes. Its floating shaft mount and spring tether eliminate bearing loads and flexible shaft couplings to eliminate wear and maintenance.

Series HS35 has complete electrical protection from overvoltage, reverse voltage, and output short circuits. In addition, the Series HS35 is not only electrically & thermally isolated, but also environmentally sealed with shaft seals at both ends.

## FEATURES AND BENEFITS

### Mechanical and Environmental Features

- Unbreakable code disk
- Flexible mounting
- Eliminated bearing loads
- Shaft seals at both ends of hollowshaft
- Sealed connector or cable exit
- Insulated from motor housing/shaft temperatures to 125°C

### Electrical Features

- Overvoltage, reverse voltage, & output short circuit protection
- Noise immunity to EN50082-2
- Electrically isolated

## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

Code: Incremental  
 Resolution: 1 to 2500 PPR (pulses/revolution)  
 Accuracy: (worst case any edge to any other edge) ±7.5 arc-min.  
 Format: Two channel quadrature (AB) with optional Index (Z) and complementary outputs  
 Phase Sense: A leads B for CW shaft rotation viewing the shaft clamp end of the encoder  
 Quadrature Phasing: 90° ± 22.5° electrical  
 Symmetry: 180° ± 18° electrical  
 Index: 180° ± 18° electrical (gated with B low)  
 Waveforms: Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

### ELECTRICAL

Input Power: (each output)  
 4.5 min. to 26 VDC max. at 100 mA max., not including output loads  
 Outputs:  
 7273 Open Collector: 30 VDC max., 40 mA sink max.  
 7272 Push-Pull and Differential Line Driver: 40 mA sink or source  
 4469 Differential Line Driver: 100 mA sink or source  
 Frequency Response: 100 kHz min.  
 Electrical Protection: Overvoltage, reverse voltage and output short circuit protected  
 Noise Immunity: Tested to EN50082-2 (Heavy Industrial) for Electro Static Discharge, Radio Frequency Interference, Electrical Fast Transients, Conducted and Magnetic Interference  
 Mating Connector:  
 6 pin, style MS3106A-14S-6S (MCN-N4);  
 7 pin, style MS3106A-16S-1S (MCN-N5);  
 10 pin, style MS3106A-18-1S (MCN-N6)  
 5 pin, style M12: Cable with connector available  
 8 pin, style M12: Cable with connector available

### MECHANICAL

Bearing Life: 80,000 hours at 3600 RPM;  
 128,000 hours at 1800 RPM  
 Shaft Loading: 40 lbs. radial, 30 lbs. axial  
 Shaft Speed: 3600 RPM max. (*Important: see Operating Temperature derating for > 1800 RPM*)  
 Shaft Bore Tolerance: Nominal +0.0003"/+0.0005" (+0.008/+0.013 mm)

### Mating Shaft Requirements:

Runout: ±0.025" (±0.63 mm) radial typical;  
 Endplay: ±0.050" (±1.27 mm) axial typical;  
 Minimum: 1.25" (32 mm) recommended;  
 Maximum: 2.0" (51 mm) to fit inside cover;  
 Solid shaft recommended; keyway allowed; flatted shaft should not be used  
 Starting Torque: 5.0 oz-in max.  
 Running Torque: 4.5 oz-in max.  
 Moment of Inertia:  
 ≤ 5/8" bore: 7.9 x 10<sup>-4</sup> oz-in-sec<sup>2</sup>  
 > 5/8" bore: 25.6 x 10<sup>-4</sup> oz-in-sec<sup>2</sup>  
 Weight: 16 oz. max.

### ENVIRONMENTAL

Operating Temperature:  
 Standard: -40 to +70°C;  
 Extended: 0 to +100°C;  
 ≤ 5/8" bore: Derate 5°C per 1000 RPM above 1800 RPM;  
 > 5/8" bore: Derate 10°C per 1000 RPM above 1800 RPM.  
 Storage Temperature: -40 to +90°C  
 Shock: 50 G's for 11 milliseconds duration  
 Vibration: 5 to 2000 Hz at 20 G's  
 Humidity: to 98% without condensation  
 Enclosure Rating: NEMA4/IP66 (dust proof, washdown)

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## ELECTRICAL CONNECTIONS

### 6, 7 & 10 Pin MS Connectors and Cables - Code 7= 0 to 8, A to G

Connector & mate/accessory cable assembly pin numbers and wire color information is provided here for reference. HS35 models with direct cable exit carry the same color coding as shown for each output configuration.

| Encoder Function | Cable #108594-*<br>6 Pin Single Ended |            | Cable #112123-*<br>6 Pin Dif Line Drv w/o ldx |            | Cable #108596-*<br>7 Pin Dif Line Drv w/o ldx |            | Cable #108595-*<br>7 Pin (If Used) |            | Cable #1400635-*<br>10 Pin (If Used) |            | Cable #108615-*<br>12 Pin CCW (If Used) |            |
|------------------|---------------------------------------|------------|---|------------|---|------------|------------------------------------|------------|--------------------------------------|------------|---|------------|
|                  | Pin                                   | Wire Color | Pin   | Wire Color | Pin   | Wire Color | Pin                                | Wire Color | Pin                                  | Wire Color | Pin                                     | Wire Color |
|                  | Sig. A                                | E          | BRN   | E          | BRN   | A          | BRN                                | A          | BRN                                  | A          | BRN                                     | 5          |
| Sig. B           | D                                     | ORN        | D   | ORN        | B   | ORN        | B                                  | ORN        | B                                    | ORN        | 8                                       | ORN        |
| Sig. Z           | C                                     | YEL        | —   | —          | —   | —          | C                                  | YEL        | C                                    | YEL        | 3                                       | YEL        |
| Power +V         | B                                     | RED        | B   | RED        | D   | RED        | D                                  | RED        | D                                    | RED        | 12                                      | RED        |
| N/C              | F                                     | —          | —   | —          | —   | —          | E                                  | —          | E                                    | —          | 7                                       | —          |
| Com              | A                                     | BLK        | A   | BLK        | F   | BLK        | F                                  | BLK        | F                                    | BLK        | 10                                      | BLK        |
| Case             | —                                     | —          | —   | —          | G   | GRN        | G                                  | GRN        | G                                    | GRN        | 9                                       | —          |
| Sig. $\bar{A}$   | —                                     | —          | C   | BRN/WHT    | C   | BRN/WHT    | —                                  | —          | H                                    | BRN/WHT    | 6                                       | BRN/WHT    |
| Sig. $\bar{B}$   | —                                     | —          | F   | ORN/WHT    | E   | ORN/WHT    | —                                  | —          | I                                    | ORN/WHT    | 1                                       | ORN/WHT    |
| Sig. Z           | —                                     | —          | —   | —          | —   | —          | —                                  | —          | J                                    | YEL/WHT    | 4                                       | YEL/WHT    |
| 0V Sense         | —                                     | —          | —   | —          | —   | —          | —                                  | —          | —                                    | —          | 2                                       | GRN        |
| 5V Sense         | —                                     | —          | —   | —          | —   | —          | —                                  | —          | —                                    | —          | 11                                      | BLK/WHT    |

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### 5 & 8 Pin M12 Accessory Cables when Code 7= H or J

Connector pin numbers and cable assembly wire color information is provided here for reference.

| Encoder Function | Cable # 112859-<br>5 Pin Single Ended |            | Cable # 112860-<br>8 Pin Single Ended |            | Cable # 112860-<br>8 Pin Differential |            |
|------------------|---------------------------------------|------------|---------------------------------------|------------|---------------------------------------|------------|
|                  | Pin                                   | Wire Color | Pin                                   | Wire Color | Pin                                   | Wire Color |
| Sig. A           | 4                                     | BLK        | 1                                     | BRN        | 1                                     | BRN        |
| Sig. B           | 2                                     | WHT        | 4                                     | ORG        | 4                                     | ORG        |
| *Sig. Z          | 5                                     | GRY        | 6                                     | YEL        | 6                                     | YEL        |
| Power +V         | 1                                     | BRN        | 2                                     | RED        | 2                                     | RED        |
| Com              | 3                                     | BLU        | 7                                     | BLK        | 7                                     | BLK        |
| Sig. $\bar{A}$   | —                                     | —          | —                                     | —          | 3                                     | BRN/WHT    |
| Sig. $\bar{B}$   | —                                     | —          | —                                     | —          | 5                                     | ORG/WHT    |
| *Sig. $\bar{Z}$  | —                                     | —          | —                                     | —          | 8                                     | YEL/WHT    |

\* Index not provided on all models. See ordering information

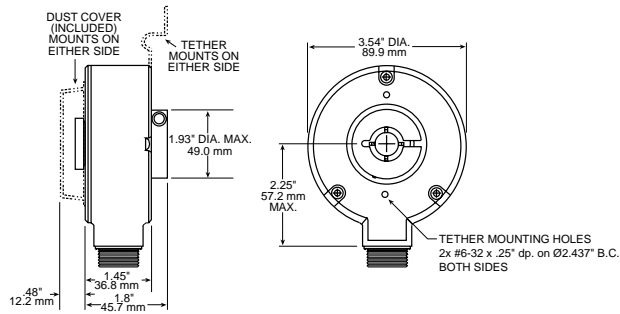
Cable Configuration: PVC jacket, 105 °C rated, overall foil shield; 24 AWG conductors, minimum

See "Accessories" Section for Connectors and Cable Assemblies Ordering Information

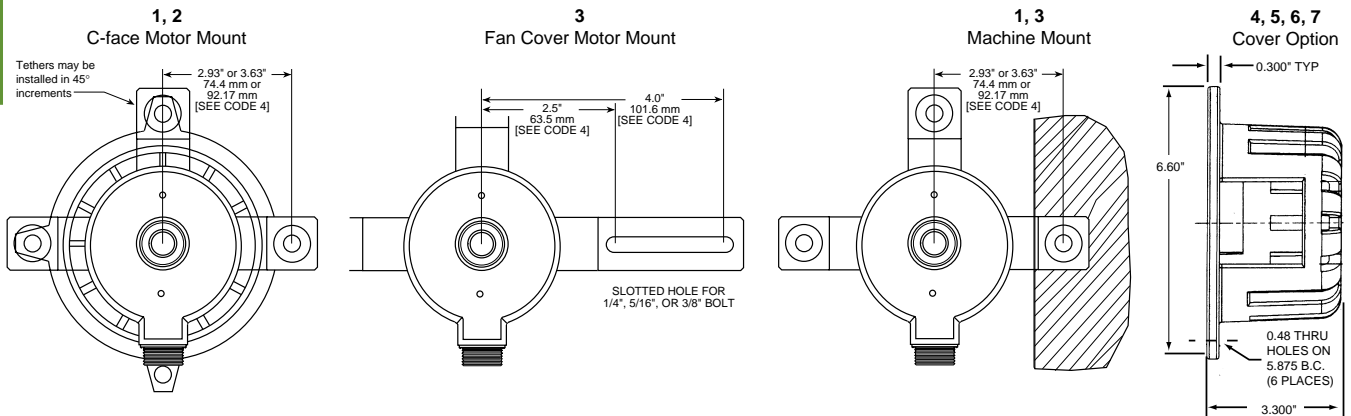
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## DIMENSIONS

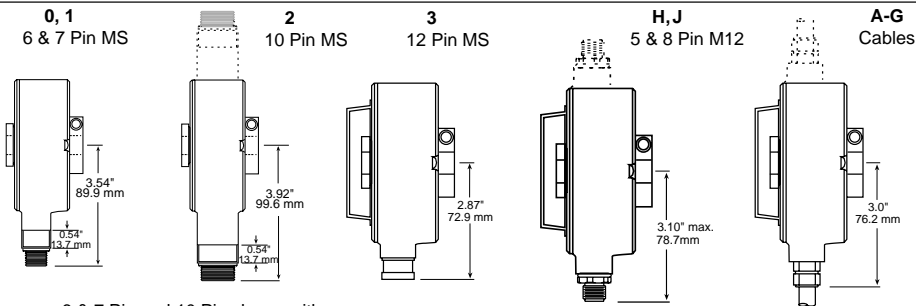
### Dimensions



### Code 4: Fixing



### Code 7: Termination



6 & 7 Pin and 10 Pin shown with LED Output Indicator Option - Code 8: PS

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## ORDERING INFORMATION

| Code 1: Model                                       | Code 2: PPR   | Code 3: Bore Size  | Code 4: Fixing  | Code 5: Format  | Code 6: Output  | Code 7: Termination  | Code 8: Options  |  |
|---|---|--|---|---|---|--|--|--|
| <b>HS35</b>   | □□□□  | □  | □   | □   | □   | □  | □□   |  |
| Ordering Information                                |   |  |   |   |   |  |  |  |
| HS35 Size 35 heavy-duty, sealed hollowshaft encoder | 0001 0500<br>0003 0512<br>0010 0600<br>0012 0900<br>0050 1000<br>0060 1024<br>0064 1200<br>0100 1270<br>0120 1500<br>0240 1800<br>0250 2000<br>0300 2048<br>0360 2400<br>2500 | 0 6 mm<br>1 1/4"<br>2 5/16"<br>3 8 mm<br>4 3/8"<br>5 10 mm<br>6 12 mm<br>7 1/2"<br>8 5/8"<br>9 15 mm<br>A 16 mm<br>B 19 mm<br>C 3/4"<br>D 20 mm<br>E 7/8"<br>F 24 mm<br>G 1"<br>H 1-1/8" | 0 None - customer supplied<br>1 Clearance hole for 3/8" bolt on 5.88" dia. bolt circle (to fit 4-1/2" NEMA C-face)<br>2 Clearance hole for 1/2" bolt on 7.25" dia. bolt circle (to fit 8-1/2" NEMA C-face)<br>3 Slotted hole for bolt on 2.5" to 4.0" radius (to fit standard AC motor fan cover slots)<br>Available when Code 5 is 0-4:<br>4 Same as '1', w/ cover kit<br>5 Same as '3', w/ cover kit<br>Available when Code 5 is 5:<br>6 Same as '1' w/ dual cover kit<br>7 Same as '3' w/ dual cover kit | 0 single ended, unidirectional (A)<br>1 single ended, bidirectional (AB)<br>2 single ended, bidirectional with index (ABZ)<br>available when Code 6 is 3, 4, 5, 6, A or B:<br>3 differential, bidirectional (AĀ BĀ BĪ)<br>available when Code 6 is 3, 4, 5, 6, A or B and Code 7 is 2, 3, or 7 thru G, J:<br>4 differential, bidirectional with index (AĀ BĀ ZĪ ZĪ)<br>available when Code 6 is 3, 4, 5, 6, A or B, and Code 7 is 2, 7, A thru G, J:<br>5 Dual isolated differential, bi-directional w/index (AĀBĪZĪ) | 0 5-26V in, 5-26V open collector out<br>1 5-26V in, 5-26V open collector out w/ 2.2kΩ pullups<br>2 5-26V in, 5-26V push-pull out<br>available when Code 5 is 3, 4 or 5:<br>3 5-26V in, 5V line driver out (7272)<br>4 5-26V in, 5-26V line driver out (7272)<br>5 5-26V in, 5V Differential Line Driver out (4469)<br>6 5-15V in, 5-15V Differential Line Driver out (4469)<br>A same as '3' with high temp. to 100°C<br>B same as '4' with high temp. to 100°C | 0 6 pin connector<br>1 7 pin connector<br>2 10 pin connector<br>3 12 pin connector<br>5 6 pin connector, plus mating connector<br>6 7 pin connector, plus mating connector<br>7 10 pin connector, plus mating connector<br>8 12 pin connector, plus mating connector<br>A 18" (.5m) cable<br>B 36" (1m) cable<br>C 72" (2m) cable<br>D 10' (3m) cable<br>F 13' (.3m) cable with 10 pin connector plus mating connector<br>G 13" (.3m) cable<br>J 8 Pin M12 Connector<br>available when Code 5 is 0 thru 2<br>H 5 Pin M12 Connector | available when Code 7 is 0 - 2 or 5 - 7:<br><b>PS</b> LED Output Indicator |  |
| 109473-0001   | Tether kit (clearance hole for 3/8" bolt on 5.88" dia. bolt circle)   |  |   | 110533-0001 Cover Kit, 56C face   |   |  |  |  |
| 109473-0002   | Tether kit (clearance hole for 1/2" bolt on 7.25" dia. bolt circle)   |  |   | 110533-0002 Cover Kit, fan cover  |   |  |  |  |
| 109473-0003   | Tether kit (slotted hole for bolt on 2.5" to 4.0" radius)   |  |   | 110533-0003 Dual Cover Kit, 56C face  |   |  |  |  |
| 112121-0001   | Spare Hub Clamp (Bore size Code 3: 0 - 9)   |  |   | 110533-0004 Dual Cover Kit, fan cover   |   |  |  |  |
| 112121-0002   | Spare Hub Clamp (Bore size Code 3: A - H)   |  |   |   |   |  |  |  |

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