

# SERIES HS35R

**Dynapar™ brand**

## Heavy Duty Hollowshaft Encoder

### Key Features

- Phased Array Sensor for Reliable Signal Output
- Rugged Design Withstands up to 400G Shock and 20G Vibration
- Unbreakable Code Disc up to 5000 PPR
- Heavy Duty Design Rated for IP67
- Customizable Mounting Options including Torque Arm with Optional Grounding Strap

IND  
Industrial Duty



CE  
EN 61326-1



## SPECIFICATIONS

### STANDARD OPERATING CHARACTERISTICS

**Code:** Incremental, Optical

**Resolution:** 1 to 5000 PPR (pulses/revolution) See Ordering Information

**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:

For resolutions 200 to 300 PPR and 1200 PPR and above: 90° ±30° electrical; all other resolutions: 90° ±15°

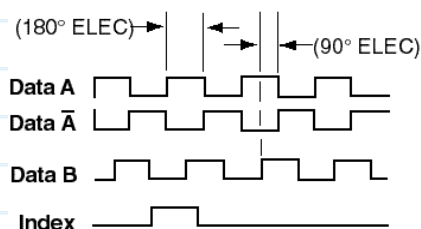
#### Symmetry:

For resolutions 200-300 PPR and above 1024 PPR: 180° ±25° electrical; all other resolutions: 180° ±18°

**Index:** 150° to 330° A leads B, CW (from clamp end) (Reverse Phasing, A leads B for CCW also available: See Code 7 in Ordering Information)

**Waveforms:** Squarewave with rise and fall times less than 1 microsecond into a load capacitance of 1000 pf

### DATA AND INDEX Not all complements shown A shown for reference



Index Width: 150° to 330°

A leads B, CW (from clamp end)

(Reverse Phasing, A leads B for CCW also available: See Code 7 in Ordering Information)

### ELECTRICAL

**Input Power:** 5-26VDC, 5-15VDC. 80 mA max., not including output loads.

#### Outputs:

7272 Push-Pull: 40mA, sink or source

7272 Differential Line Driver: 40 mA, sink or source

7273 Open Collector: 40mA, sink max

4469 Differential Line Driver: 100mA, sink or source

High-Power Mosfet Line Driver

**Frequency Response:** 125 kHz (data & index)

**Noise Immunity:** Tested to EN61326-1

**Electrical Immunity:** Reverse polarity, short circuit protected with 7272 or 7273 line drivers only

**Termination:** MS Connector; M12 Connector; cable exit w/seal. See Ordering Information

#### Mating Connector:

6 pin MS, style MS3106A-14S-6S (MCN-N4)

7 pin MS, style MS3106A-16S-1S (MCN-N5)

10 pin MS, style MS3106A-18-1S (MCN-N6)

10 pin, NEMA4 style (MCN-N6N4)

10 pin Bayonet, MS3116-F12-10S (MCN-B1)

12 Pin CCW M23 Connector (MCN-C2)

Cable w/ 5 pin M12 Connector (112859-XXXX)

Cable w/ 8 pin M12 Connector (112860-XXXX)

Note: "MS" type mating connectors and pre-built cables are rated NEMA 12. "M12" Cable assemblies are rated IP67

### MECHANICAL

**Bore Diameter:** 6mm to 28mm, 1/4" to 1-1/8", electrically isolated

**Mating Shaft Length:** 1.25", Minimum, 1.60", Recommended

**Shaft Speed:** 6000 RPM, Maximum (Enclosure Rating is IP64 at speed over 5000 RPM)

**Starting Torque:** 8.0 in-oz. maximum (at 25°C)

**Running Torque:** 5.0 in-oz. maximum (at ambient)

**Bearings:** ABEC 1

**Housing and Cover:** Powder Coated Aluminum

**Shaft Material:** 6061-T6 Aluminum

**Disc Material:** Mylar (unbreakable)

**Weight:** 1.76lb (28 Oz) Typical

### ENVIRONMENTAL

**Standard Operating Temperature:** -40 to +85°C (0 to +70°C with 4469 line driver, see "Ordering Information"). At shaft speed above 3000 RPM, derate 10°C per 1000 RPM

**Extended Temperature Range:** -40 to +100°C

(See ordering information)

**Storage temperature:** -40 to +100°C

**Shock:** 400G, 6mSec

**Vibration:** 5 to 3000 Hz, 20G

**Humidity:** Up to 98% (non-condensing)

**Enclosure Rating:** IP67 (IP64 at shaft speed above 5000 RPM)

## Ordering Information

To order, complete the model number with code numbers from the table below:

| Code 1: Model                                | Code 2: PPR          | Code 3: Bore Size         | Code 4: Fixing                                                 | Code 5: Output Format                                                                                               | Code 6: Termination                                                | Code 7: Options                                                                                                                                                     |
|----------------------------------------------|----------------------|---------------------------|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>HS35R</b>                                 | <input type="text"/> | <input type="text"/>      | <input type="text"/>                                           | <input type="text"/>                                                                                                | <input type="text"/>                                               | <input type="text"/>                                                                                                                                                |
| Ordering Information                         |                      |                           |                                                                |                                                                                                                     |                                                                    |                                                                                                                                                                     |
| <b>HS35R</b> Heavy-Duty, Hollowshaft Encoder | <b>0001 0500</b>     | <b>0</b> 6mm              | <b>0</b> None                                                  | <b>0</b> ABZ, 5-26VDC push-pull (7272)                                                                              | <b>0</b> 6 Pin Connector                                           | <b>Blank</b> No Option<br><b>01</b> Reverse Phasing (A leads B, CCW)<br><br>Available when Code 5 is 0-9, A-G and when Code 6 is 0-2 or 5-7<br><b>PS</b> LED Output |
|                                              | <b>0003 0512</b>     | <b>1</b> 1/4"             | <b>1</b> 4.5" C-face tether                                    | <b>1</b> ABZ, 5-26VDC O/C (7273)                                                                                    | <b>1</b> 7 Pin Connector                                           |                                                                                                                                                                     |
|                                              | <b>0010 0600</b>     | <b>2</b> 5/16"            | <b>2</b> 8.5" C-face tether                                    | <b>2</b> ABZ, 5-26VDC O/C w/2.2kOhm (7273)                                                                          | <b>2</b> 10 Pin Connector                                          |                                                                                                                                                                     |
|                                              | <b>0012 0900</b>     | <b>3</b> 8mm              | <b>3</b> Slotted tether (to fit standard AC motor fan cover)   | <b>H</b> Same as "0" with Extended temp range                                                                       | <b>3</b> 12 Pin Connector                                          |                                                                                                                                                                     |
|                                              | <b>0015 1000</b>     | <b>4</b> 3/8"             |                                                                | <b>J</b> Same as "1" with Extended temp range                                                                       | <b>4</b> 10 Pin Bayonet Connector                                  |                                                                                                                                                                     |
|                                              | <b>0032 1024</b>     | <b>5</b> 10mm             |                                                                | <b>K</b> Same as "2" with Extended temp range                                                                       | <b>5</b> 6 Pin+Mating Connector                                    |                                                                                                                                                                     |
|                                              | <b>0050 1200</b>     | <b>6</b> 12mm             |                                                                |                                                                                                                     | <b>6</b> 7 Pin+Mating Connector                                    |                                                                                                                                                                     |
|                                              | <b>0060 1500</b>     | <b>7</b> 1/2"             | Not available when Code 5 is D,E,F,G, Q, R                     | Not available when Code 6 is H                                                                                      | <b>7</b> 10 Pin+Mating Connector                                   |                                                                                                                                                                     |
|                                              | <b>0100 2000</b>     | <b>8</b> 5/8"             | <b>4</b> Same as 1 w/cover                                     | <b>4</b> Differential AB only, 5-26VDC, 5-26VDC out (7272)                                                          | <b>8</b> 12 Pin+Mating Connector                                   |                                                                                                                                                                     |
|                                              | <b>0120 2048</b>     | <b>A</b> 16mm             | <b>5</b> Same as 3 w/cover                                     | <b>5</b> Differential AB only, 5-26VDC in, 5VDC out (7272)                                                          | <b>9</b> 10 Pin Bayonet+Mating Connector                           |                                                                                                                                                                     |
|                                              | <b>0200 2400</b>     | <b>C</b> 19mm             | <b>C</b> Same as A with 56C cover (Single Only)                | <b>A</b> Differential AB only, 5-26VDC in, 5VDC out (4469)                                                          | <b>A</b> 0.5m (18") Cable                                          |                                                                                                                                                                     |
|                                              | <b>0240 2500</b>     | <b>D</b> 3/4"             |                                                                | <b>C</b> Differential AB only, 5-15VDC in, 5-15VDC out (4469)                                                       | <b>C</b> 1m (36") Cable                                            |                                                                                                                                                                     |
|                                              | <b>0250 3072</b>     | <b>E</b> 20mm             |                                                                | <b>L</b> Same as "4" with Extended temp range                                                                       | <b>D</b> 2m (72") Cable                                            |                                                                                                                                                                     |
|                                              | <b>0300 4000</b>     | <b>F</b> 7/8"             | Available when Code 5 is D,E,F,G, Q, R                         | <b>M</b> Same as "5" with Extended temp range                                                                       | <b>E</b> 3m (120") Cable                                           |                                                                                                                                                                     |
|                                              | <b>0360 4096</b>     | <b>H</b> 1"               | <b>6</b> Same as 1 w/dual cover                                | Not available when Code 6 is 0, 1, 5, 6, or H                                                                       | <b>F</b> 0.3m (13") Cable with 10-Pin Bulk-head Connector and Mate |                                                                                                                                                                     |
|                                              | <b>5000</b>          | <b>J</b> 1-1/8"           | <b>7</b> Same as 3 w/dual cover                                | <b>6</b> Differential ABZ, 5-26VDC in, 5VDC out (7272)                                                              | <b>G</b> 0.3m (13") Cable                                          |                                                                                                                                                                     |
|                                              |                      | <b>M</b> 14mm             | <b>8</b> Same as 2 w/ 180 C-face cover (single or dual output) | <b>7</b> Differential ABZ, 5-26VDC in, 5-26VDC out (7272)                                                           | <b>H</b> 5 Pin M12 Connector                                       |                                                                                                                                                                     |
|                                              |                      | <b>N</b> 18mm             |                                                                | <b>8</b> Differential ABZ, 5-26VDC in, 5VDC out (4469)                                                              | <b>J</b> 8 Pin M12 Connector                                       |                                                                                                                                                                     |
|                                              |                      | <b>P</b> 25mm             |                                                                | <b>9</b> Differential ABZ, 5-15VDC in, 5-15VDC out (4469)                                                           |                                                                    |                                                                                                                                                                     |
|                                              |                      | <b>R</b> 28mm             |                                                                | <b>D</b> Dual isolated outputs, same as "6"                                                                         |                                                                    |                                                                                                                                                                     |
|                                              |                      | Not Electrically Isolated | <b>A</b> Rod tether                                            | <b>E</b> Dual isolated outputs, same as "7"                                                                         |                                                                    |                                                                                                                                                                     |
|                                              |                      | <b>K</b> 1-1/4"           | <b>B</b> Rod tether with ground strap.                         | <b>F</b> Dual isolated outputs, same as "8"                                                                         |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           | <b>D</b> Same as B with 56C cover (Single Output)              | <b>G</b> Dual isolated outputs, same as "9"                                                                         |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           |                                                                | <b>N</b> Same as "6" with Extended temp range                                                                       |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           |                                                                | <b>P</b> Same as "7" with Extended temp range                                                                       |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           |                                                                | <b>Q</b> Same as "D" with Extended temp range                                                                       |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           |                                                                | <b>R</b> Same as "E" with Extended temp range                                                                       |                                                                    |                                                                                                                                                                     |
|                                              |                      |                           |                                                                | <b>W</b> ABZ, 10-24VDC Line Driver for cable runs up to 500 ft/120m using the Dynapar cable assemblies listed below |                                                                    |                                                                                                                                                                     |

### Cable Assemblies with MS Connector\*

|                     |                                                                                       |
|---------------------|---------------------------------------------------------------------------------------|
| <b>108594-XXXX</b>  | 6 Pin MS, Cable Assy. For Use with Single Ended Outputs                               |
| <b>112123-XXXX</b>  | 6 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs         |
| <b>108595-XXXX</b>  | 7 Pin MS, Cable Assy. For Use with Single Ended Outputs                               |
| <b>108596-XXXX</b>  | 7 Pin MS, Cable Assy. For Use with Differential Line Driver w/o Index Outputs         |
| <b>1400635-XXXX</b> | 10 Pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs       |
| <b>114448-XXXX</b>  | 10 Bayonet, Cable Assy. For Use with Differential Line Driver with Index Outputs      |
| <b>109209-XXXX</b>  | NEMA4 10 pin MS, Cable Assy. For Use with Differential Line Driver with Index Outputs |

### Cable Assemblies with M23 Connector\*

|                    |                                                                                   |
|--------------------|-----------------------------------------------------------------------------------|
| <b>108615-XXXX</b> | 12 M23, Cable Assy. For Use with Differential Line Driver with Index Outputs, CCW |
|--------------------|-----------------------------------------------------------------------------------|

### Cable Assemblies with M12 Connector\*

|                    |                                                                      |
|--------------------|----------------------------------------------------------------------|
| <b>112859-XXXX</b> | 5 Pin M12, Cable Assy. For Use with Single Ended Outputs             |
| <b>112860-XXXX</b> | 8 Pin M12, Cable Assy. For Use with Single Ended Outputs             |
| <b>112860-XXXX</b> | 8 Pin M12, Cable Assy. For Use with Differential Line Driver Outputs |

### Mating Connectors (no cable)

|                 |                                      |
|-----------------|--------------------------------------|
| <b>MCN-N4</b>   | 6 pin, style MS3106A-14S-6S          |
| <b>MCN-N5</b>   | 7 pin, style MS3106A-16S-1S          |
| <b>MCN-N6</b>   | 10 pin, style MS3106A-18-1S          |
| <b>MCN-N6N4</b> | 10 pin, NEMA4 style                  |
| <b>MCN-B1</b>   | 10 pin bayonet, style MS3116-F12-10S |
| <b>MCN-C2</b>   | 12 Pin CCW M23 Connector             |

### Accessory Kits:

|                    |                                                                   |
|--------------------|-------------------------------------------------------------------|
| <b>114573-0001</b> | Tether Kit, 4.5" C-Face Single Point with 3/8" Bolt               |
| <b>114574-0001</b> | Tether Kit, Slotted with T-bolts for Standard AC Motor Fan Covers |
| <b>114575-0001</b> | Tether Kit, 8.5" C-Face Single Point with 1/2" Bolt               |
| <b>114591-0001</b> | Cover Kit, 56 C-Face                                              |
| <b>114592-0001</b> | Cover Kit, Fan Cover                                              |
| <b>114593-0001</b> | Dual Cover Kit, 56 C-Face                                         |
| <b>114928-0001</b> | Dual Cover Kit, 180 C-Face                                        |
| <b>114594-0001</b> | Dual Cover Kit, Fan Cover                                         |
| <b>116233-0001</b> | Rod Tether Only                                                   |
| <b>116233-0002</b> | Rod Tether + 56 C-Face Cover (Single)                             |
| <b>116233-0004</b> | Rod Tether + Grounding Strap                                      |
| <b>116233-0005</b> | Rod Tether + Grounding Strap + 56 C-Face Cover (Single)           |

\*Note: Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace XXXX with -0020.

# SERIES HS35R



## ELECTRICAL CONNECTIONS

### 6, 7 & 10 Pin MS Connectors and Cables - Code 6 = 0 to 9, A to G

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

| Encoder Function | Cable #108594-XXXX<br>6 Pin Single Ended |            | Cable #112123-XXXX<br>6 Pin Dif Line Drv w/o Index |            | Cable #108596-XXXX<br>7 Pin Dif Line Drv w/o Index |            | Cable #108595-XXXX<br>7 Pin (If Used) |            | **Cable #109209-XXXX or 1400635XXXX<br>10 Pin Differential Line Driver w/ Index |            | Cable #114448-XXXX<br>10 Pin Bayonet |            | Cable #108615-XXXX<br>12 Pin CCW |            | Cable Exit with Seal |
|------------------|------------------------------------------|------------|----------------------------------------------------|------------|----------------------------------------------------|------------|---------------------------------------|------------|---------------------------------------------------------------------------------|------------|--------------------------------------|------------|----------------------------------|------------|----------------------|
|                  | Pin                                      | Wire Color | Pin                                                | Wire Color | Pin                                                | Wire Color | Pin                                   | Wire Color | Pin                                                                             | Wire Color | Pin                                  | Wire Color | Pin                              | Wire Color | Wire Color           |
| Sig. A           | E                                        | BRN        | E                                                  | BRN        | A                                                  | BRN        | A                                     | BRN        | A                                                                               | BRN        | A                                    | BRN        | 5                                | BRN        | BRN                  |
| Sig. B           | D                                        | ORN        | D                                                  | ORN        | B                                                  | ORN        | B                                     | ORN        | B                                                                               | ORN        | B                                    | ORN        | 8                                | ORN        | ORN                  |
| Sig. Z*          | C                                        | YEL        | —                                                  | —          | —                                                  | —          | C                                     | YEL        | C                                                                               | YEL        | C                                    | YEL        | 3                                | YEL        | YEL                  |
| Power +V         | B                                        | RED        | B                                                  | RED        | D                                                  | RED        | D                                     | RED        | D                                                                               | RED        | D                                    | RED        | 12                               | RED        | RED                  |
| N/C              | F                                        | —          | —                                                  | —          | —                                                  | —          | E                                     | —          | E                                                                               | —          | E                                    | —          | 7                                | —          | —                    |
| Com              | A                                        | BLK        | A                                                  | BLK        | F                                                  | BLK        | F                                     | BLK        | F                                                                               | BLK        | F                                    | BLK        | 10                               | BLK        | BLK                  |
| Case             | —                                        | —          | —                                                  | —          | G                                                  | GRN        | G                                     | GRN        | G                                                                               | GRN        | G                                    | GRN        | 9                                | —          | GRN                  |
| Sig. $\bar{A}$   | —                                        | —          | C                                                  | BRN/WHT    | C                                                  | BRN/WHT    | —                                     | —          | H                                                                               | BRN/WHT    | H                                    | BRN/WHT    | 6                                | BRN/WHT    | BRN/WHT              |
| Sig. $\bar{B}$   | —                                        | —          | F                                                  | ORN/WHT    | E                                                  | ORN/WHT    | —                                     | —          | I                                                                               | ORN/WHT    | J                                    | ORN/WHT    | 1                                | ORN/WHT    | ORN/WHT              |
| Sig. $\bar{Z}^*$ | —                                        | —          | —                                                  | —          | —                                                  | —          | —                                     | —          | J                                                                               | YEL/WHT    | K                                    | YEL/WHT    | 4                                | YEL/WHT    | YEL/WHT              |
| 0V Sense         | —                                        | —          | —                                                  | —          | —                                                  | —          | —                                     | —          | —                                                                               | —          | —                                    | —          | 2                                | BLK/WHT    | —                    |
| +V Sense         | —                                        | —          | —                                                  | —          | —                                                  | —          | —                                     | —          | —                                                                               | —          | —                                    | —          | 11                               | GRN        | —                    |

### 5 & 8 Pin M12 Accessory Cables when Code 6 = H or J

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

| Encoder Function | Cable # 112859-XXXX<br>5 Pin Single Ended |            | Cable # 112860-XXXX<br>8 Pin Single Ended |            | Cable # 112860-XXXX<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    |

1) Cable Configuration (Table 1): PVC jacket, 105 °C rated, overall foil shield; 3 twisted pairs 24 AWG (output signals), plus 2 twisted pairs 22 AWG (input power)

2) Cable Configuration (Table 2): PVC jacket, 105°C rated, overall foil shield; 24 AWG conductors, minimum

3) Standard cable length is 10 feet but may be ordered in any length in 5 foot increments. For example, for a 20 foot cable, replace -XXXX with -0020

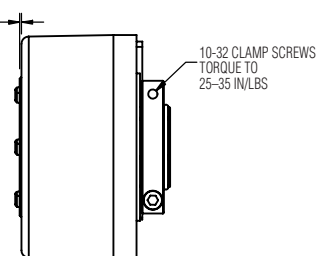
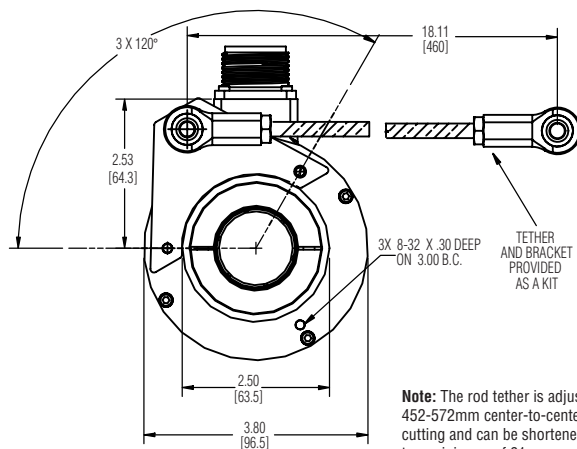
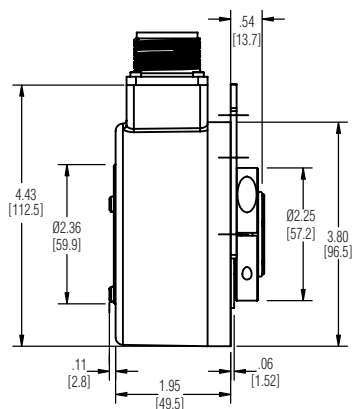
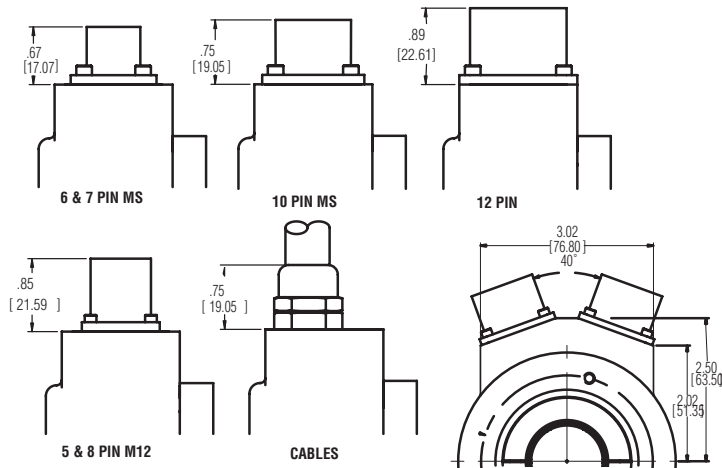
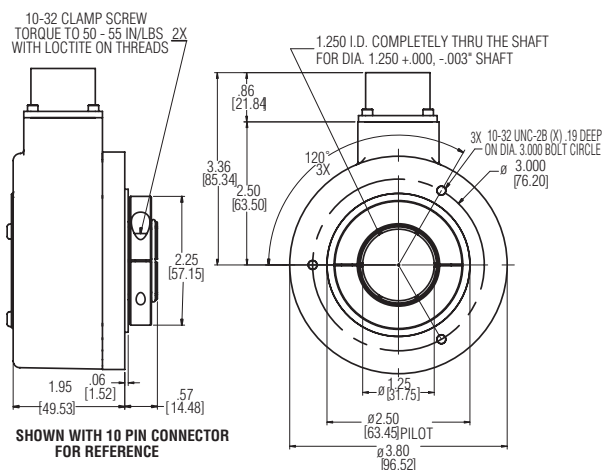
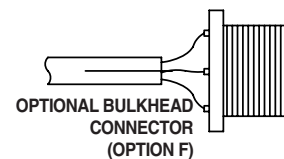
4) \*Index not provided on all models. See ordering information.

5) \*\*For watertight applications, use NEMA4 10 pin cable & connector 109209-XXXX.

6) "MS" Type mating connectors and pre-build cables are rated NEMA 12

7) "M12" Cable assemblies are rated IP67

### DIMENSIONS inch [mm]

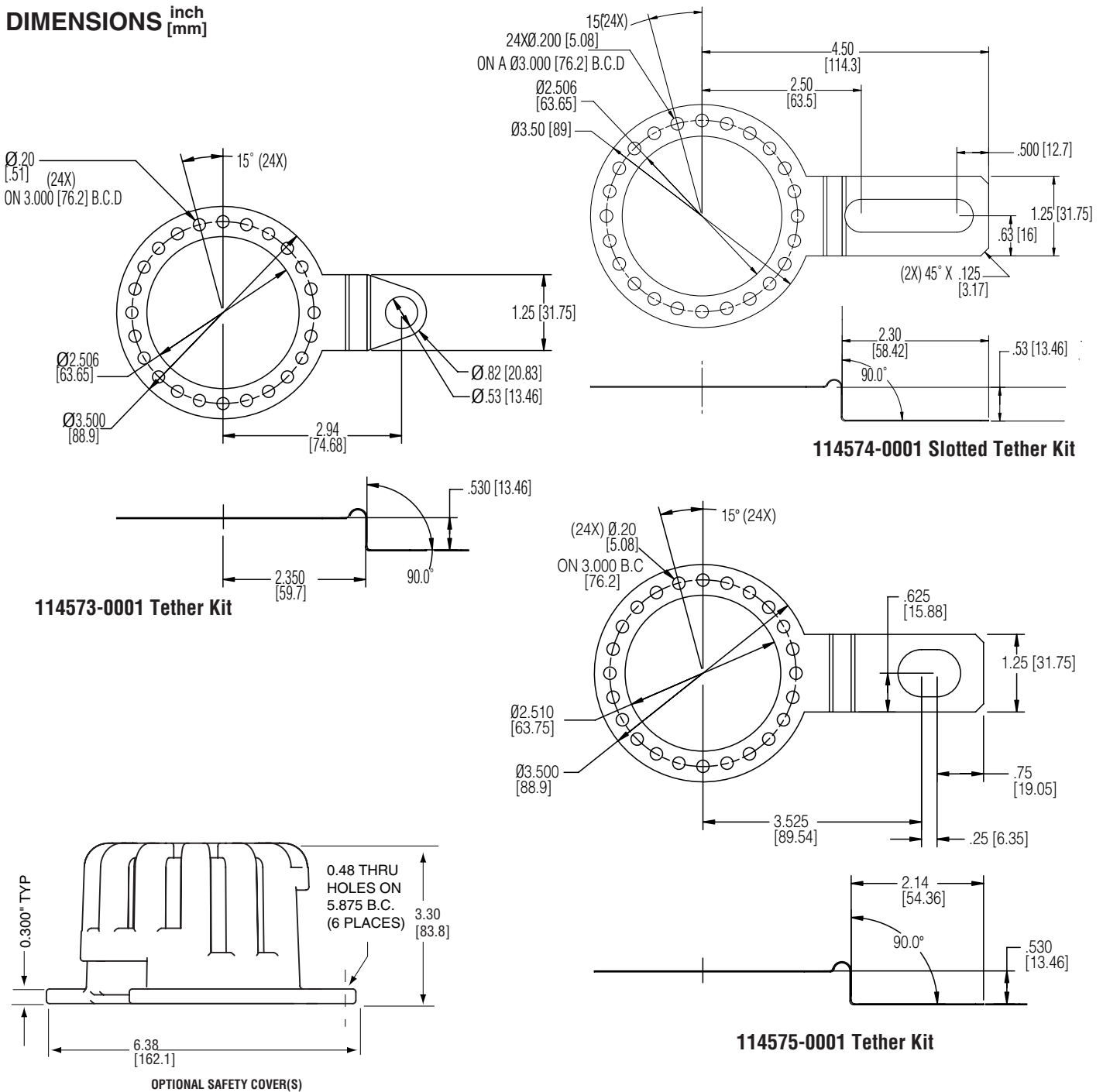


**Note:** The rod tether is adjustable from 452-572mm center-to-center without cutting and can be shortened via cutting to a minimum of 61mm.

# SERIES HS35R



## DIMENSIONS inch [mm]



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