

# Model 716

Now up to  
10,000 CPR!



## Features

- The Original Industry-Standard Cube
- Five Versatile Housing Styles
- Thousands of Configurations
- New Resolutions Available to 10,000!

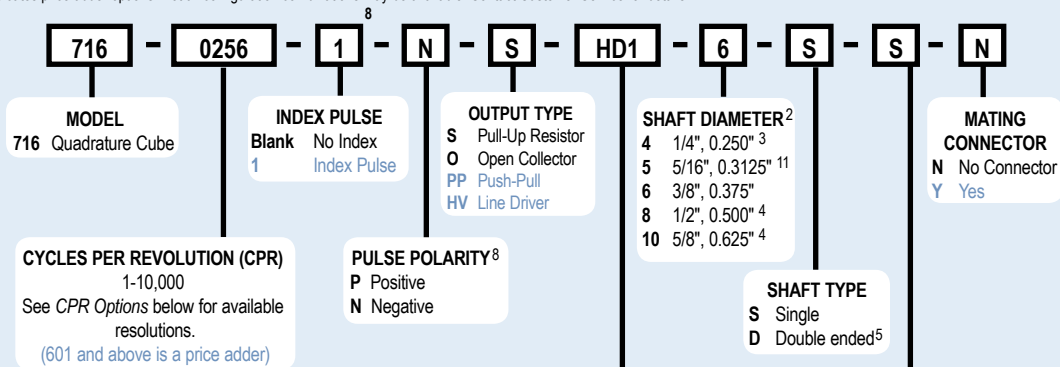
The Model 716 Accu-Coder™ is ideally suited for applications requiring a quadrature output. Designed for compatibility with most programmable controllers, electronic counters, motion controllers, and motor drives, it is ideally suited for industrial applications where it is important that the direction of rotation be known. Increasing critical performance specifications for the most popular resolutions and features advanced Opto-ASIC circuitry, a single chip design that eliminates many board level components. This increases the reliability of an already dependable and durable encoder. With new options continually being added, we just keep getting better, and better!

## Common Applications

Feedback for counters, PLC's & Motors, Cut To Length, Labeling, Measuring For Packaging, Filling & Materials Handling Machines, Wire Winding, Film Extrusion

## Model 716 Ordering Guide

Blue type indicates price adder options. Not all configuration combinations may be available. Contact Customer Service for details.



For specification assistance call  
Customer Service at  
1-800-366-5412

**HOUSING TYPE**

S	2.25" Standard Housing
S1	2.25" Standard Housing with IP50 Felt Shaft Seal <sup>1</sup>
IND12	Industrial Housing with IP65 Shaft Seal
HD1	3" x 3" x 6" Heavy Duty Housing
HD3	Heavy Duty Housing with Conduit Connector & Terminal Strip
HD5	Heavy Duty Housing with 10 mm Outer Bearing
HD10	Heavy Duty Housing with Ultra Heavy Duty Bearings, 0.625" or 0.500" Shaft
HD12	Heavy Duty Housing with IP65 Outer Shaft Seal
HD14	Heavy Duty Housing with IP65 Shaft Seal and with Conduit Connector & Terminal Strip
5PY	Standard Cube With 5PY Adaptor <sup>11</sup>
EX	Explosion-proof Housing

**CONNECTOR TYPE<sup>9</sup>**

S	Standard 6-pin MS Style
Y	7-pin MS Style
X	10-pin MS Style
J	5-pin M12 (12 mm) <sup>5</sup>
K	8-pin M12 (12 mm) <sup>5</sup>
G	Gland Nut - 18" Cable <sup>6</sup>
T	Solder or Screw Terminal <sup>7</sup>
B	Solder Terminal with Conduit Box

- NOTES:**
- 1 Available with 0.250" shaft only.
  - 2 Contact Customer Service for custom shaft lengths and diameters.
  - 3 Standard housing only.
  - 4 HD10 housing only.
  - 5 Not available for HD or EX housings.
  - 6 For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: G/6 = 6 feet of cable. For CPR > 2500. Standard cable length only.
  - 7 Screw terminals available for HD and EX housings. Solder terminals available for S and S1 housings.
  - 8 Complete only if Index Pulse option is selected.
  - 9 For Mating Connectors, Cables, and Cordsets see www.encoder.com
  - 10 Only available with 5/16" (0.3125") shaft.
  - 11 Standard or 5PY housing only.

### Model 716 CPR Options

0001 thru 0189*	0193	0198	0200	0205
0210	0240	0250	0256	0276
0298	0300			
0305	0308	0315	0333	0336
0350	0360			
0400	0480	0500	0512	0580
0597	0600			
0700	0720	0800	0840	0960
1000	1024			
1200	1250	1270	1500	1800*
2000	2048			
2500	3000	3600*	4096	5000
6000	7200*			
8192	10,000			

\*Contact Customer Service For Availability

Contact Customer Service for other disk resolutions; not all disk resolutions available with all output types

# Model 716

## Model 716 Specifications Common to All Cube Housing Styles

### Electrical

Input Voltage.....4.75 to 28 VDC max for temperatures up to 85° C  
4.75 to 24 VDC for temperatures between 85° C and 100° C.

Input Current......80 mA maximum with no output load

Input Ripple .....100 mV peak-to-peak at 0 to 100 kHz

Output Format .....Incremental- Square wave with single channel

Output Types .....Open Collector- 250 mA max per channel  
Pull-Up- 250 mA max per channel  
Push-Pull- 20 mA max per channel  
Line Driver- 20 mA max per channel (Meets RS 422 at 5 VDC supply)

Max Frequency.....1 to 2500 CPR 125 kHz, 2501 to 5000 CPR 250 kHz, 5001 to 10,000 CPR 500 kHz  
Standard Cube- 0 to 20 kHz

Index .....Standard Cube- Once per revolution, 180° electrical minimum non-gated

Symmetry .....180° (±18°) electrical  
Quad Phasing.....90° (±22.5°) electrical

Rise Time.....Less than 1 microsecond

Accuracy.....Within 0.05° mechanical from one cycle to any other cycle, or 3 arc minutes

### Mechanical

Max Speed.....6000 RPM. Higher shaft speeds achievable, contact Customer Service.

Shaft Material.....303 stainless steel

Housing.....Black non-corrosive finished 6063-T6 aluminum

Bearings .....Precision ABEC Ball Bearings

Electrical Conn.....Refer to ordering guide notes

### Environmental

Operating Temp.....0° to 85° C or 0° to 100° C at 5 to 24 VDC

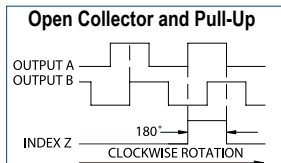
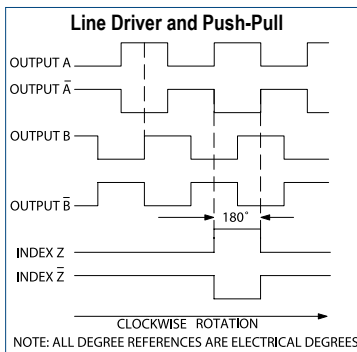
Storage Temp.....-25° to +85° C

Humidity.....98% RH non-condensing

Vibration.....10 g @ 58 to 500 Hz

Shock.....50 g @ 11 ms duration

### Waveform Diagrams



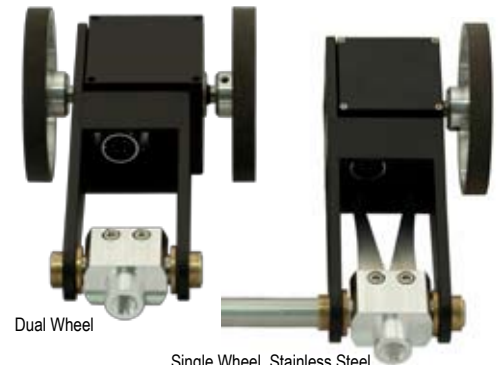
### Wiring Table

Function	Gland Cable Wire Color	5-pin M12	8-pin M12	10-pin MS	7-pin MS HV	7-pin MS O, S PP	6-pin MS HV No Index	6-pin MS O, S PP	Term. Block O, S No Index	Term. Block O, S PP
Com	Black	3	7	F	F	F	A	A, F	1	1, 6
+VDC	Red	1	2	D	D	D	B	B	2	2
A	White	4	1	A	A	A	C	D	3	4
A'	Brown	---	3	H	C	---	D	---	4	---
B	Blue	2	4	B	B	B	E	E	5	5
B'	Violet	---	5	I	E	---	F	---	6	---
Z	Orange	5	6	C	---	C	---	C	---	3
Z'	Yellow	---	8	J	---	---	---	---	---	---
Case	Green <sup>1</sup>	---	---	G	G	G	---	---	---	---
Shield	Bare	---	---	---	---	---	---	---	---	---

<sup>1</sup>E-Cube Only

### Cube Pivot Bracket

- 176430-01 Single Pivot Mounting Bracket
- 176431-01 Double Pivot Mounting Bracket
- 176430-02 Spring Loaded Single Pivot Mounting Bracket
- 176431-02 Spring Loaded Double Pivot Mounting Bracket



## Standard Cube Housing (S, S1)

### Standard Cube Housing (S, S1) Specifications

#### Mechanical

Shaft Size .....0.250" or 0.375"

Shaft Type .....Single or double-ended (specify choice)

Radial Loading .....15 lb maximum (0.250" diameter shaft)  
40 lb maximum (0.375" diameter shaft)

Axial Loading .....10 lb maximum (0.250" diameter shaft)  
30 lb maximum (0.375" diameter shaft)

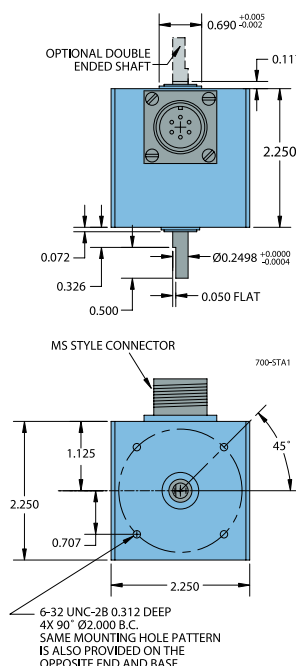
Starting Torque .....0.13 oz-in typical for 0.250" shaft  
0.38 oz-in typical for 0.375" shaft

Moment of Inertia .....6.5 x 10<sup>-6</sup> oz-in-sec<sup>2</sup>

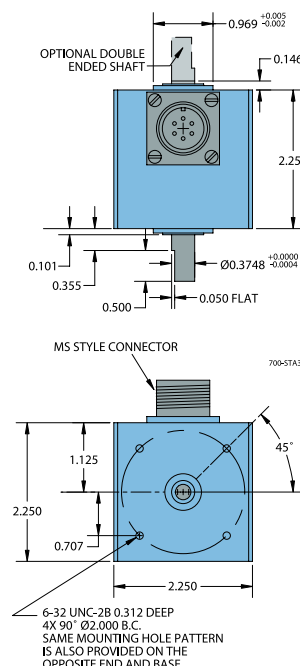
Mounting.....Tapped mounting holes on three sides for base or face mounting

Weight.....10 oz for standard housing

#### Cube Housing With 1/4" Shaft (4)



#### Cube Housing With 3/8" Shaft (6)



# Cube Housings

## Industrial Cube Housing (IND12)

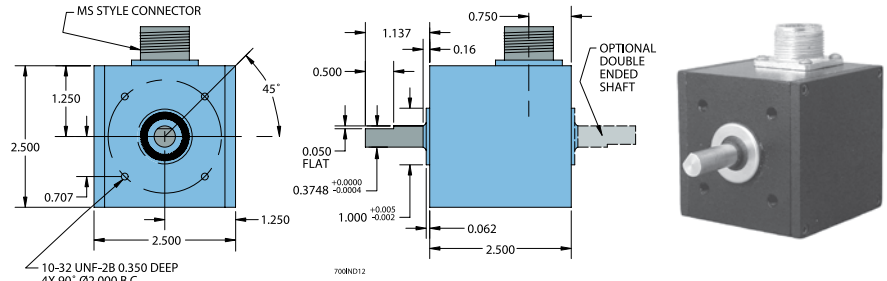
### Industrial Housing Features

This more robust unit meets requirements between Standard and Heavy Duty housings while retaining the Cube design. The Industrial 12 (IND12) model features an IP65 shaft seal. The tough, sealed aluminum housing has a wall thickness of 0.187" and offers greater protection from wash down, sprays, dust, moisture, shock, vibration, and other hazards found in industrial environments.

**Industrial Cube Housing (IND12) Specifications**

Refer to all Standard Cube Housing specifications except as follows:

**Mechanical**  
 Shaft Size..... 0.375" diameter  
 Shaft Type..... Single- or Double-Ended Shaft Available  
 Radial Loading..... 40 lb Maximum  
 Axial Loading..... 30 lb Maximum  
 Starting Torque..... 3 oz-in Starting Torque w/IP65 Shaft Seal



All dimensions are in inches with a tolerance of  $\pm 0.005"$  or  $\pm 0.01"$  unless otherwise specified

## Heavy Duty Cube Housing (HD12)

The Heavy Duty housing uses a separate 0.375" diameter external shaft and bearing assembly to rotate the shaft of an internally mounted Cube Housing. This provides mechanical isolation from external loads and stress. A flexible coupling between the external shaft and the encoder protects the internal unit from axial and radial loading. The 0.250" aluminum walls protect the encoder from external shock, vibration, and the outside environment.

### Heavy Duty Housing Options

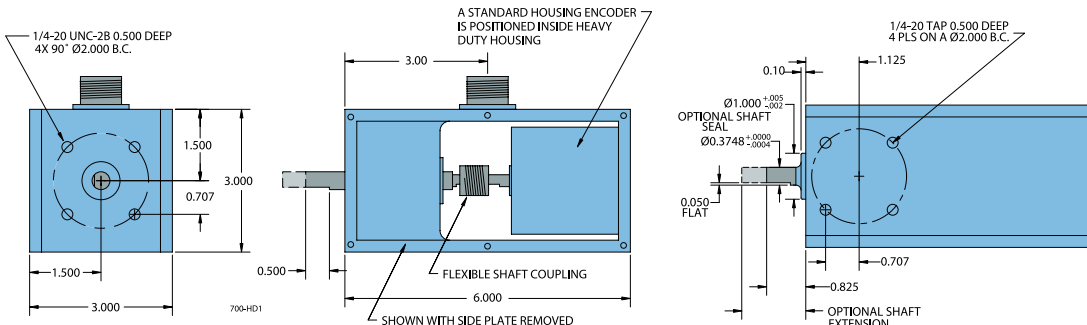
- HD 1 Heavy Duty 3" X 6" housing
- HD 3 Heavy Duty w/conduit connector (threaded for 0.500" NPT Conduit) and terminal strip
- HD 5 Heavy Duty w/10 mm outer bearing
- HD 12\* Heavy Duty w/IP65 rated outer shaft seal
- HD 14\* Heavy Duty w/IP65 rated outer shaft seal, conduit connector (threaded for 0.500" NPT Conduit), and terminal strip

\* These units have an outer boss diameter of 1.000"

**Heavy Duty Cube Housing (HD12) Specifications**

Refer to all cube specifications except as follows:

**Mechanical**  
 Max Speed..... 6000 RPM  
 Shaft Size..... 0.375"  
 Rotation..... Either direction  
 Radial Loading..... 40 lb maximum (50 lb for HD 5)  
 Axial Loading..... 30 lb maximum (35 lb for HD 5)  
 Bearings..... Precision ABEC ball bearings  
 Starting Torque..... 1 oz-in; 3 oz-in w/IP65 seal  
 Mounting..... Tapped holes face and base  
 Weight..... 3.25 lb



## Ultra Heavy Duty Cube Housing (HD10)

The HD 10 Ultra Heavy Duty encoder is designed for use in applications with severe shaft loading conditions. The HD 10 offers two shaft sizes: 0.500" and 0.625". Shaft material is 303 stainless steel. Bearings are conservatively rated at 95 lb radial and 60 lb axial shaft loading. IP65 shaft seal is standard on all units.

The HD 10 Ultra Heavy Duty housing uses a larger external shaft and R10 bearing assembly to rotate the shaft of an internally mounted Cube Housing. This provides mechanical isolation from external loads and stress. A flexible coupling between the external shaft and the encoder protects the internal unit from axial and radial loading. The 0.250" aluminum walls protect the encoder from external shock, vibration, and the outside environment.

**Ultra Heavy Duty Cube Housing (HD 10) Specifications**

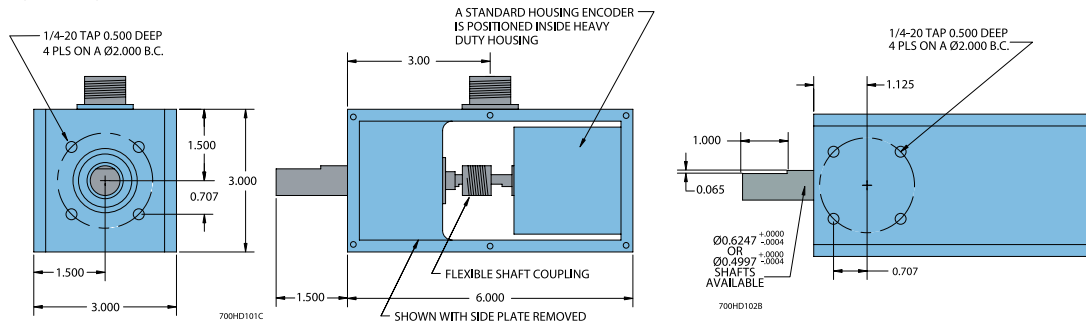
Refer to all cube specifications except as follows:

**Mechanical**  
 Max Speed..... 6000 RPM  
 Shaft Size..... 0.500" or 0.625"  
 Rotation..... Either direction  
 Radial Loading..... 95 lb operating  
 Axial Loading..... 60 lb operating  
 Bearings..... ABEC precision ball bearings  
 Bearing Life..... 15,000 hours at rated load  
 Starting Torque..... 3 oz-in IP65 rated  
 Mounting..... Tapped holes face and base  
 Weight..... 3.85 lb

# Cube Housings

## Ultra Heavy Duty Cube Housing (HD10)

(Continued)



All dimensions are in inches with a tolerance of  $\pm 0.005"$  or  $\pm 0.01"$  unless otherwise specified

## Explosion-Proof Housing (EX)

An explosion-proof housing is available for installing the Cube Series Accu-Coder™ in hazardous locations. The Cube Series encoder is mounted within the explosion-proof housing and is coupled to the 0.375" shaft assembly by a flexible shaft coupling. This decreases radial and axial loading on the internal encoder shaft and bearings to ensure long life. Electrical connection to the Accu-Coder™ is by an internal barrier terminal strip. A threaded hole for 0.500" NPT conduit is provided.

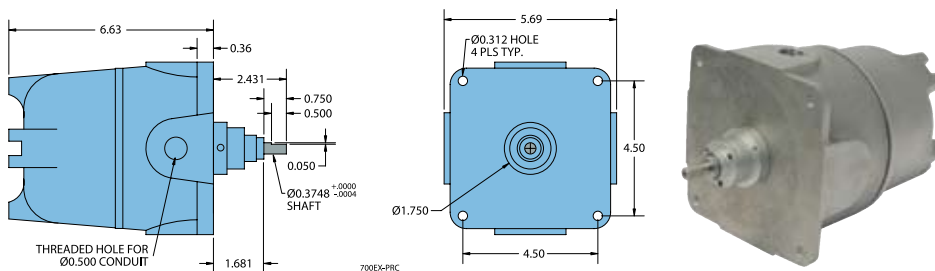
### Explosion-Proof Housing (EX) Specifications

The explosion-proof housing is designed to meet the following:

- NEC Class 1, Groups C and D
- NEC Class 2, Groups E, F, and G
- UL Standard 1203
- Class 1, Division 1, Groups C and D
- Class 2, Division 1, Groups E, F, and G
- CSA Standard C 22.2 No. 30-M 1986
- NEMA 7 and NEMA 9

Refer to all cube specifications except as follows:

Mechanical	
Max Speed	4000 RPM
Radial Loading	30 lb operating
Axial Loading	10 lb operating
Weight	6 lb
Finish	Unpainted Aluminum

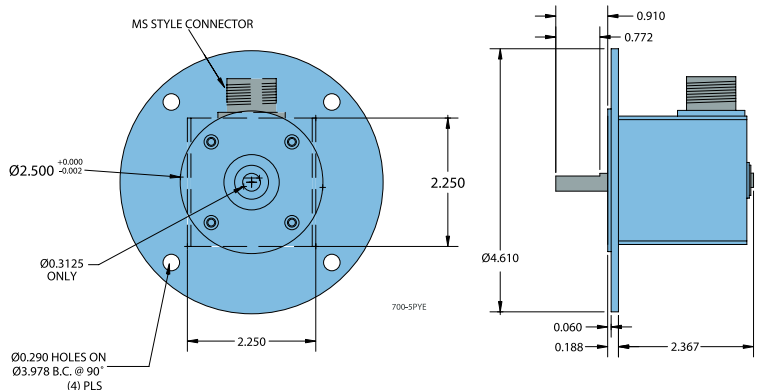


## Cube Series Optional 5PY Adapter (175443)

The all aluminum optional 5PY adapter allows any standard housing Cube Series encoder to replace DC tachometer technology. The 5PY adapter is interchangeable with any 5PY tach generator.

### Ordering Information

Order standard housing Cube Series Accu-Coder™ with 5/16" shaft and specify Accessory Part #175443.



All dimensions are in inches with a tolerance of  $\pm 0.005"$  or  $\pm 0.01"$  unless otherwise specified