

## MODEL 715 - INCREMENTAL SHAFT ENCODER



### FEATURES

The original industry-standard Cube  
 Versatile housing styles  
 Bi-directional, constant pulse width  
 Resolutions available to 10,000 CPR

The Model 715 Accu-Coder™ is ideally suited for applications requiring bi-directional feedback with a constant pulse width. The Model 715 is available in two versions. The Model 715-1 provides output pulses for clockwise shaft rotation on one channel and pulses for counterclockwise rotation on another. The Model 715-2 provides output pulses for counting on one channel while the other channel indicates direction of rotation. Critical performance specifications for the most popular resolutions and advanced Opto-ASIC circuitry – a single chip design that eliminates many board level components – increases the reliability of an already dependable and durable encoder. With new options continually being added, the Model 715 excels in a wide variety of industrial applications.

### COMMON APPLICATIONS

Measuring for cut-to-length, labeling & filling, position control, motion following, or slaving applications

### MODEL 715 ORDERING GUIDE

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

<b>715-1</b>	<b>0256</b>	<b>.2</b>	<b>N</b>	<b>S</b>	<b>HD1</b>	<b>6</b>	<b>S</b>	<b>S</b>	<b>N</b>
<b>MODEL</b> 715-1 Two channels 715-2 One channel and direction line	<b>PULSE WIDTH</b> Values from .01 to 100 milliseconds	<b>OUTPUT TYPE</b> S Pull-Up resistor O Open Collector				<b>SHAFT DIAMETER<sup>4</sup></b> 4 1/4", 0.250" <sup>5</sup> 5 5/16", 0.3125" <sup>6</sup> 6 3/8", 0.375" 8 1/2", 0.500" <sup>7</sup> 10 5/8", 0.625" <sup>7</sup>	<b>CONNECTOR TYPE<sup>9</sup></b> S Standard 6-pin MS J 5-pin M12 (12 mm) <sup>8</sup> K 8-pin M12 (12 mm) <sup>8</sup> G Gland nut – 18" cable <sup>10</sup> T Solder or screw terminal <sup>11</sup> B Solder terminal with conduit box		
<b>PULSES PER REVOLUTION (PPR)</b> <b>2-10,000</b> See CPR Options below for available resolutions. (1202 and above is a price adder)	<b>PULSE POLARITY</b> P Positive N Negative					<b>SHAFT TYPE</b> S Single D Double ended <sup>8</sup>		<b>MATING CONNECTOR</b> N No connector Y Yes	
<b>HOUSING TYPE</b> S 2.25" Standard housing S1 2.25" Standard housing with IP50 felt shaft seal <sup>1</sup> IND12 Industrial housing with IP66 shaft seal HD1 3" x 3" x 6" Heavy Duty housing <sup>2</sup> HD3 Heavy Duty housing with conduit connector & terminal strip HD5 Heavy Duty housing with 10 mm outer bearing <sup>2</sup> HD10 Heavy Duty housing with ultra heavy duty bearings, 0.625" or 0.500" shaft <sup>2</sup> HD12 Heavy Duty housing with IP66 outer shaft seal <sup>2</sup> HD14 Heavy Duty housing with IP66 shaft seal and with conduit connector & terminal strip SPY Standard Cube with SPY adaptor <sup>3</sup> EX Explosion-proof housing									
<b>NOTES:</b> 1 Available with 0.250" shaft only. 2 Only available with 6-pin MS or Screw Terminal Connector Types. 3 Only available with 5/16", 0.3125" shaft. 4 Contact Customer Service for custom shaft lengths and diameters. 5 Standard housing only. 6 Standard or SPY housing only.									

#### MODEL 715 PPR OPTIONS

0001 thru 0189*	0193	0198	0200	0205	0210	0240
0250	0256	0276	0298	0300	0305	0333
0336	0350	0360	0400	0480	0500	0512
0600	0700	0720	0800	0960	1000	1024
1250	1270	1800	2000	2048	2500	

2x and 4x of all of the above resolutions are available

\*Contact Customer Service for availability.

Contact Customer Service for other disk resolutions. Not all disk resolutions available with all output types.

#### NOTES:

- Available with 0.250" shaft only.
- Only available with 6-pin MS or Screw Terminal Connector Types.
- Only available with 5/16", 0.3125" shaft.
- Contact Customer Service for custom shaft lengths and diameters.
- Standard housing only.
- Standard or SPY housing only.
- HD10 housing only.
- Not available for HD or EX housings.
- For mating connectors, cables, and cordsets see [Accessories at encoder.com](#). For Connector Pin Configuration Diagrams, see Technical Information or see [Connector Pin Configuration Diagrams at encoder.com](#).
- For non-standard cable lengths, add a forward slash (/) plus cable length expressed in feet. Example: G/6 = 6 feet of cable.
- Screw terminals available for HD and EX housings. Solder terminals available for S and S1 housings.

## MODEL 715

### MODEL 715 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 timed output
Output Types .....	Open Collector – 250 mA max per channel
	Pull-Up – Open Collector with 1.5K ohm internal resistor, 250 mA max per channel
Max Frequency .....	0 to 125 kHz
Electrical Protection.....	Reverse voltage and output short circuit protected. NOTE: Sustained reverse voltage may result in permanent damage.

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.
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Shaft Material.....	303 Stainless Steel
Housing.....	Black non-corrosive finished 6063-T6 aluminum
Bearings.....	Precision ABEC ball bearings

#### Environmental

Operating Temp.....	0° to 85° C
Storage Temp.....	-25° to 85° C
Humidity .....	98% RH non-condensing
Vibration .....	10 g @ 58 to 500 Hz
Shock .....	50 g @ 11 ms duration

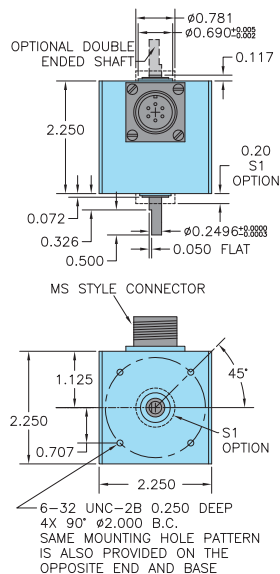
### STANDARD CUBE HOUSING (S, S1) SPECIFICATIONS

#### Mechanical

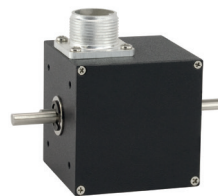
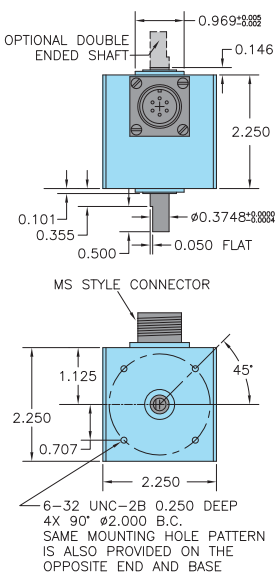
Shaft Type.....	Single or double-ended (specify choice)
Radial Loading.....	15 lb maximum (0.250" diameter shaft)
	40 lb maximum (0.375" diameter shaft)
Axial Loading.....	10 lb maximum (0.250" diameter shaft)
	30 lb maximum (0.375" diameter shaft)
Starting Torque.....	0.13 oz-in typical for 0.250" shaft
	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>
Weight .....	10 oz for standard housing

### STANDARD CUBE HOUSING (S, S1)

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



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

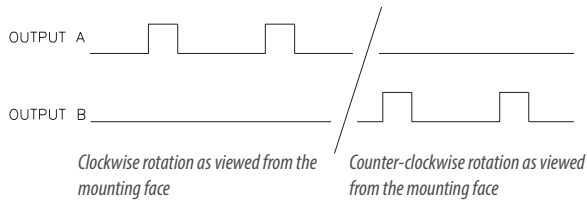


## MODEL 715

### WAVEFORM DIAGRAMS

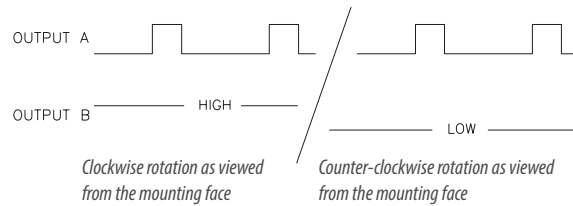
#### Model 715-1 Bi-Directional Encoder

The 715-1 provides two output channels. A constant pulse width is generated on one channel with clockwise shaft rotation, and on the other channel with counter-clockwise shaft rotation. Specify PPR in any even numbered value between 2 and 10,000. Specify any pulse width from 10 microseconds to 100 milliseconds and pulse polarity. Some options require Heavy Duty housing. The Line Driver output option is not available.



#### Model 715-2 Bi-Directional Encoder

The 715-2 provides two output channels. One channel has a constant pulse width output regardless of shaft rotation direction. The other channel indicates direction with logic level "1" for clockwise shaft rotation, and level "0" for counter-clockwise shaft rotation. Options are the same as for the Model 715-1.



### WIRING TABLE

For EPC-supplied mating cables, refer to wiring table provided with cable.

Function	Gland Cable <sup>†</sup> Wire Color	5-pin M12	8-pin M12	6-pin MS	Term. Block
Com	Black	3	7	A,F	1,6
+VDC	Red	1	2	B	2
A	White	4	1	D	4
B	Blue	2	4	E	5
Shield	Bare	--	--	--	--

<sup>†</sup>Standard cable is 24 AWG conductors with foil and braid shield.

### CUBE PIVOT MOUNTING BRACKETS

**176430-01** Single Pivot

**176431-01** Double Pivot

**176430-02** Spring Loaded Single Pivot

**176431-02** Spring Loaded Double Pivot

Encoder sold separately.

Dual Wheel



Single Wheel (shown with Torsion Spring)



## CUBE HOUSINGS

### INDUSTRIAL CUBE HOUSING (IND12)

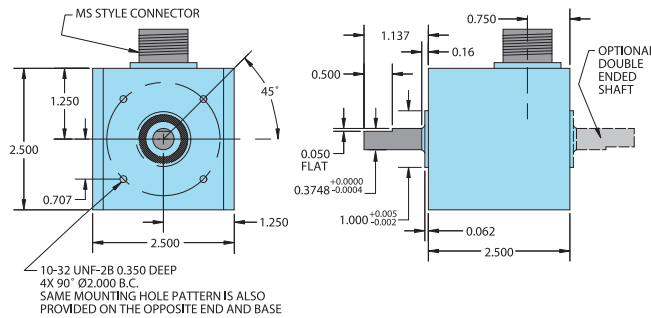
This more robust unit meets requirements between Standard and Heavy Duty housings while retaining the Cube design. The Industrial 12 (IND12) model features an IP66 shaft seal. The tough, sealed aluminum housing has a wall thickness of 0.187" and offers greater protection from wash down, sprays, dust, 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/IP66 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

- HD1 Heavy Duty 3" x 6" housing
- HD3 Heavy Duty w/conduit connector (threaded for 0.500" NPT Conduit) and terminal strip
- HD5 Heavy Duty w/10 mm outer bearing
- HD12\* Heavy Duty w/IP66 rated outer shaft seal
- HD14\* Heavy Duty w/IP66 rated outer shaft seal, conduit connector (threaded for 0.500" NPT Conduit), and terminal strip

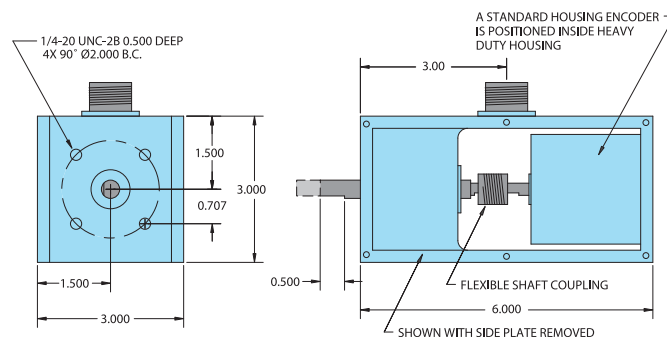
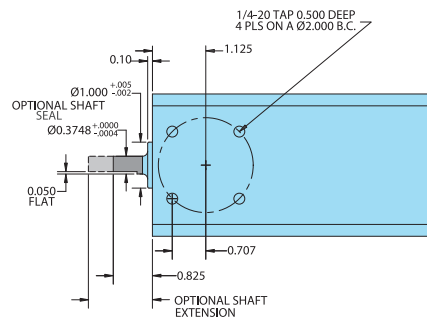
\*These units have an outer boss diameter of 1.000"

#### 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/IP66 seal
Mounting .....	Tapped holes face and base
Weight .....	3.25 lb



## CUBE HOUSINGS

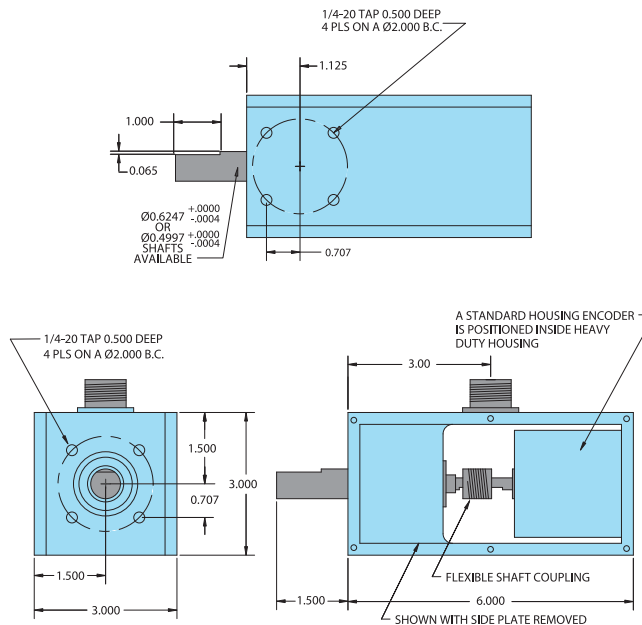
### ULTRA HEAVY DUTY CUBE HOUSING (HD10)

The HD10 Ultra Heavy Duty encoder is designed for use in applications with severe shaft loading conditions. The HD10 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. IP66 shaft seal is standard on all units. The HD10 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 (HD10) Specifications

##### 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 IP66 rated
Mounting .....	Tapped holes face and base
Weight .....	3.85 lb



*All dimensions are in inches with a tolerance of +0.005" or +0.01" unless otherwise specified*

## CUBE HOUSINGS

### 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

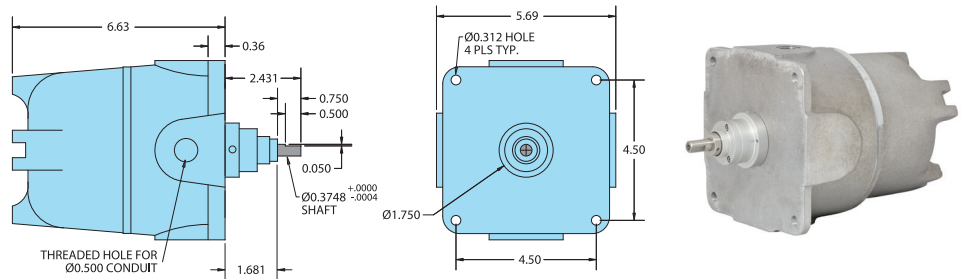
The explosion-proof housing is designed to meet the following:

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:

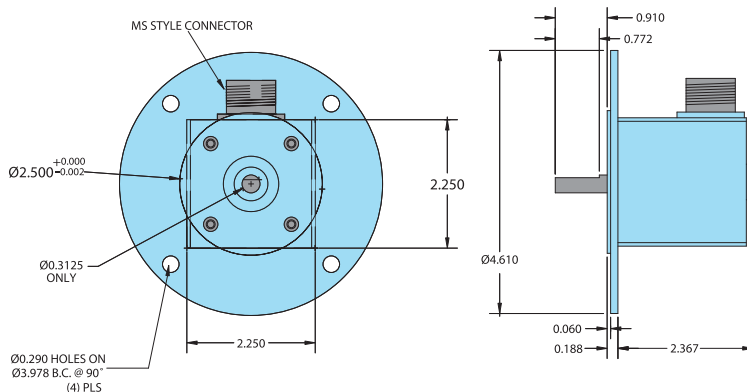
#### Mechanical

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



### CUBE SERIES OPTIONAL 5PY ADAPTOR (175443)

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



All dimensions are in inches with a tolerance of +0.005" or +0.01" unless otherwise specified.



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