

# ENC-A5DI Differential Encoder with Index Channel



## FEATURES

- Accepts +/- 0.010" Axial Shaft Play
- 50 to 5,000 Cycles per Revolution (CPR)
- Tracks 0 to 300,000 Cycles per Second
- 200 to 20,000 Pulses per Revolution (PPR)
- 2-Channel Quadrature Differential Squarewave Outputs
- Third Index Channel
- Operating Temperature of -40° to +100° C
- Powered from a Single +5VDC Power Supply
- RoHS Compliant and REACH Certified



## DESCRIPTION

The ENC-A5DI is a differential encoder designed for quick and simple assembly to any minimum shaft length 0.445" and shaft size ranging from 0.079" to 0.394" in diameter. The ENC-A5DI module is designed to detect the rotary position with a code wheel. When attached to the end of a shaft, the encoder provides digital feedback information. This differential encoder consists of a LED source lens and a monolithic detector IC enclosed in a small polymer package. These modules implement phased array detector technology providing superior performance and tolerances over traditional aperture mask type encoders. The ENC-A5DI series provides digital quadrature differential outputs on all resolutions and are capable of sinking or sourcing 8 mA each. These encoders are powered from a single +5VDC power supply and are RoHS compliant and REACH certified.

## ORDERING INFORMATION

# ENC - A5DI - 0050 - 394 - H - G

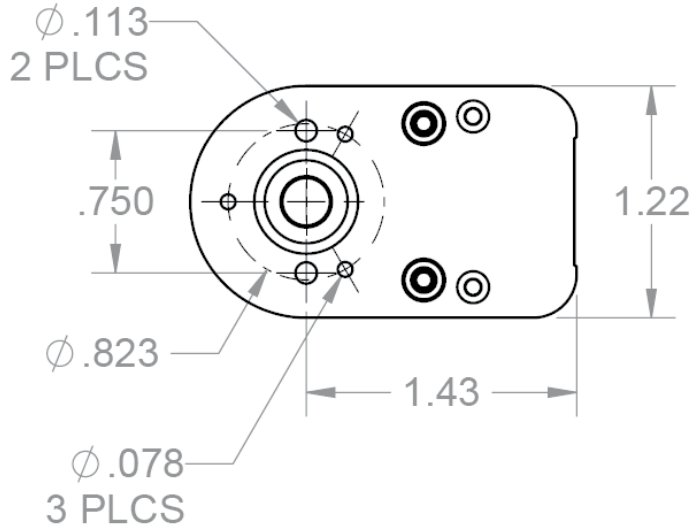
Index	CPR			Bore Size		Cover Options
I = Index (3rd Channel)	50	400	1250	079 = 2mm	236 = 6mm	E = Cover Extension
	96	500	2000	118 = 3mm	250 = 1/4"	H = Hole in Cover
	100	512	2048	125 = 1/8"	276 = 7mm	Blank = Default
	192	540	2500	156 = 5/32"	313 = 5/16"	
	200	720	4000	157 = 4mm	315 = 8mm	
	250	900	4096	188 = 3/16"	375 = 3/8"	
	256	1000	5000	197 = 5mm	394 = 10mm	
	360	1024				

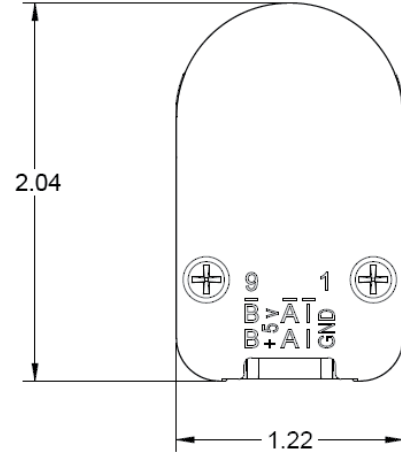
Base Options
3 = Base Mounting Holes Become 0.125"
A = Adds Self-Aligning Shoulder to Base
G = Adds 1.812" Mounting Ears to Base
R = Adds 3-Slot Adapter to Bottom of Base
Blank = Default

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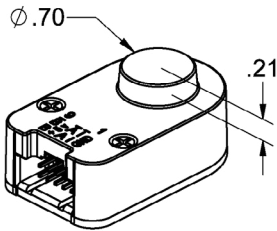
**DEFAULT OPTION:**



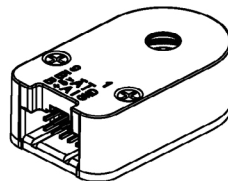
Note: Dimensions are in inches



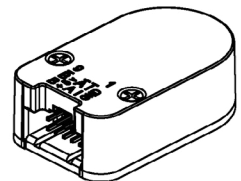
E-Option:



H-Option:



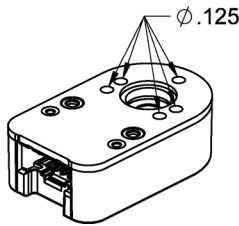
Default Option:



Note: Dimensions are in inches

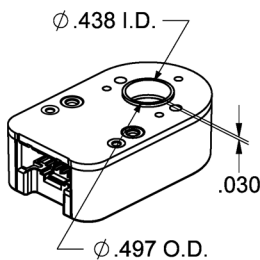
Cover Options:	Description
E - Option	E-Option provides a cylindrical extension cover for larger shafts. The required shaft length is .445" to .750". Note: E-option + R-Option the required shaft length is .570" to .875".
H - Option	Shafts 2mm to 1/4", a .295" diameter hole is supplied. Shafts 5/16" to 10mm, a .438" diameter hole is supplied. Required shaft length > 0.445" Note: H-Option + R-Option the required shaft length is > .570"
Default Option	The required length is .445" to .570" Note: Default Option + R-Option the required shaft length is .570" to .695"

**3-OPTION:**



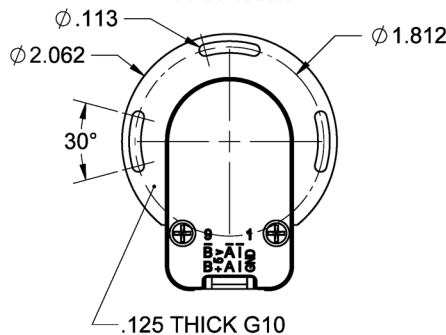
3-Option: Makes all five hole diameters .125"

**A-OPTION:**



A-Option: Adds a .497" diameter alignment shoulder designed to slip into a .500" diameter recess in the mounting surface centered around the shaft.

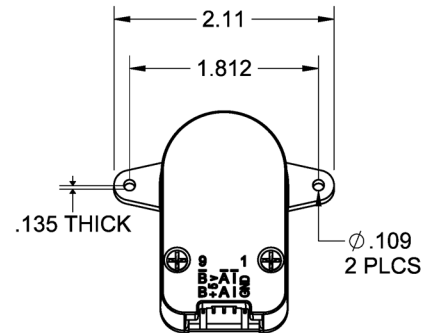
**R-OPTION:**



R-Option: Adapter is an 1/8" thick fiberglass adapter which is pre-mounted to the base of the encoder. It allows the encoder to rotate +/- 15 degrees.

\*This option adds 1/8" to the required shaft length.

**G-OPTION:**

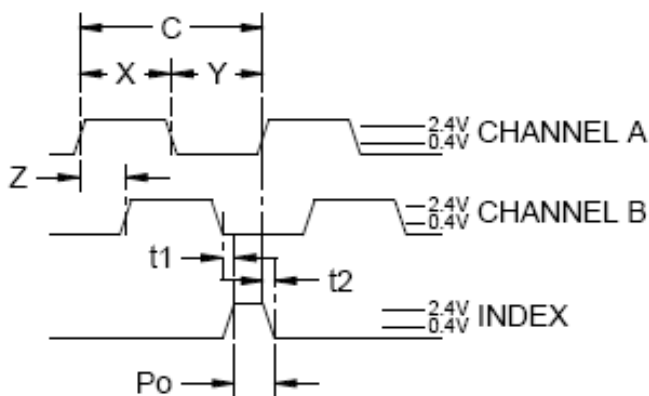


G-Option: Includes molded ears which enables it to be mounted to a 1.812" diameter bolt circle. Mounting holes are designed to fit 4-40 screws. Will work with shaft lengths of .445" to .570" and does not add to the required shaft length.

Note: All dimensions are in inches

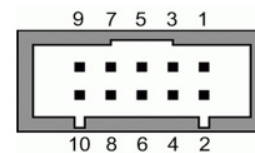
(Note: Base Mounting Screws are NOT included. #2-56 or #4-40 screws can be used to mount the base to your mounting surface.)

Differential Encoder Timing Diagram



ROTATION:  
CW - A LEADS B, CCW - B LEADS A

**DIFFERENTIAL ENCODER PINOUT**  
TOP OF ENCODER FACING PLUG



Pin #	Function
1	Ground
2	Ground
3	I-Channel
4	I+Channel
5	A-Channel
6	A+Channel
7	Power
8	Power
9	B-Channel
10	B+Channel

Model #	Description
CPR(N):	The Number of Cycles Per Revolution
One Shaft Rotation:	360 mechanical degrees, N cycles
One Electrical Degree (°e):	1/360th of one cycle
One Cycle (C):	360 electrical degrees (°e). Each cycle can be decoded into 1 or 4 codes, referred to as X1 or X4 resolution multiplication
Symmetry:	A measure of the relationship between (X) and (Y) in electrical degrees, nominally 180 °e
Quadrature (Z):	The phase lag or lead between channels A and B in electrical degrees, nominally 90 °e
Index (CH I):	The Index Output goes high once per revolution, coincident with the low states of channels A and B, nominally 1/4 of one cycle (90°e)

Timing Characteristics	Symbol	Min	Typ	Max	Units
Cycle Error	C	-	3.0	5.5	°e
Symmetry	X,Y	150	180	210	°e
Quadrature	Z	60	90	120	°e
Index Pulse Width	Po	60	90	120	°e
Ch. I Rise After Ch. B or Ch. A Fall	t1	10	100	250	ns
Ch. I Fall After Ch. B or Ch. A Rise	t2	70	150	300	ns

Parameter	Max	Units
Vibration (5 to 2kHz)	20	g
Shaft Axial Play	+/- 0.01	in.
Shaft Eccentricity Plus Radial Play	0.004	in.
Acceleration	250,000	rad/sec <sup>2</sup>

Parameter	Min	Typ	Max	Units
<b>Supply Voltage</b>	4.5	5.0	5.5	Volts
<b>Supply Current</b>				
CPR < 500, no load	-	29	36	mA
CPR ≥ 500 and < 2000, no load	-	57	65	
CPR ≥ 2000	-	73	88	
<b>Output Low</b> (I <sub>OL</sub> = 8mA max)	-	0.2	0.4	Volts
<b>Output High*</b>				
I <sub>OL</sub> = -8mA max	2.4	3.4	-	Volts
<b>Differential Output Rise/ Fall Time</b>	-	-	15	nS

\* Unloaded high level output voltage is 4.80V typically, 4.2V minimum.

Recommended Operating Conditions	Min	Max	Units
Temperature (CPR < 2000)	-40	100	°C
Temperature (CPR ≥ 2000)	-25	100	°C
Load Capacitance	-	100	pF
Count Frequency (CPR ≤ 1250)	-	300	kHz
Count Frequency (CPR 2000-2500)	-	360	kHz
Count Frequency (CPR 4000+)	-	720	kHz

Speed Calculation	Units
CPR < 2000	18x10 <sup>6</sup> / CPR RPM
CPR ≥ 2000 and < 4000	21.6x10 <sup>6</sup> / CPR RPM
CPR ≥ 4000	43.2x10 <sup>6</sup> / CPR RPM

\*60,000 RPM is the maximum RPM due to mechanical limitations.

## Cables:

The following cables are compatible with Anaheim Automation's A5DI series encoder. Select a cable length from the table below:

Cable Part Number	Length
ENC-CBL-AA4706	1 ft.
ENC-CBL-AA4706-5	5 ft.
ENC-CBL-AA4706-10	10 ft.
ENC-CBL-AA4706-20	20 ft.

*NOTE: For pricing and other information on cables and centering tools, please visit Accessories on our website.*

## Centering Tools:

Centering tools are optional, but recommended for a more precise installation.

# ENC-CTOOL - 250

Bore Size	
079=2mm	236=6mm
118=3mm	250=1/4"
125=1/8"	276=7mm
157=4mm	313=5/15"
188=3/16"	375=3/8"
197=5mm	394=10mm