# ENC-A6SIH High Voltage Single-Ended Optical Kit Encoder

## FEATURES

- Powered From a Single 7.5~30VDC Power Supply
- 2-Channel Quadrature Open Collector and TTL Squarewave Outputs
- 100 to 10,000 Cycles Per Revolution (CPR)
- Operating Temperature, CPR < 2000 is -40° to +100° C
- Operating Temperature, CPR ≥ 2000 is -25° to +100° C
- Positive Latching Connector
- Allows for ±0.010” Axial Shaft Play
- RoHS Compliant and REACH Certified

## DESCRIPTION

The ENC-A6SIH is a high voltage Single-Ended Optical Kit Encoder with Index designed for quick and simple assembly that fits any shaft diameters from 0.079” to 1”. It fits to any shaft length over 0.445” diameter when equipped with the Hole in Cover option. However, the default required shaft length is from 0.445” to 0.570” and the Cover Extension required shaft length is 0.445” to 0.750”. The cable driver is built into the encoder and includes a 10-PIN single-ended open collector output. This new output configuration enables Incremental Encoders to accept power up to 30VDC without external adapters. The ENC-A6SIH module is designed to detect the rotary position with a code wheel. The ENC-A6SIH can be attached to any existing shaft to provide digital feedback information. This Single-Ended Encoder consists of a highly accurate aligned solid state light source and monolithic phased array sensor, when combined together they provide a system extremely tolerant to mechanical misalignments. The ENC-A6SIH Single-Ended Optical Kit Encoder has a molded, rugged 20% glass filled polycarbonate that utilizes a 5-Pin latching connector.

## ORDERING INFORMATION

ENC - A6SIH - 0100 - 079 - H - M

| Index |
|---|
| I = Index (3rd Channel) |
| H = High Voltage |

| CPR | | |
|---|---|---|
| 0100 | 1800 | 5000 |
| 0200 | 2000 | 7200 |
| 0400 | 2048 | 8000 |
| 0500 | 2500 | 8192 |
| 0512 | 3600 | 10000 |
| 1000 | 4000 | |
| 1024 | 4096 | |

| Bore Size | |
|---|---|
| 079 = 2mm | 375 = 3/8” |
| 118 = 3mm | 394 = 10mm |
| 125 = 1/8” | 472 = 12mm |
| 156 = 5/32” | 500 = 1/2” |
| 157 = 4mm | 551 = 14mm |
| 188 = 3/16” | 625 = 5/8” |
| 197 = 5mm | 750 = 3/4” |
| 236 = 6mm | 787 = 20mm |
| 250 = 1/4” | 875 = 7/8” |
| 313 = 5/16” | 984 = 25mm |
| 315 = 8mm | 1000 = 1” |

| Cover Options |
|---|
| E = Cover Extension (1) |
| H = Hole in Cover |
| Blank = Default |

| Base Options |
|---|
| 3 = 0.125” Diameter for Three Base Mounting Holes (2) |
| M = Adds 4-Hole Mounting Adapter Plate |
| Blank = Default |

(1) With Cover Extension “E” must choose bore size 079 (2mm) to 394 (10mm)
(2) With Base Option “3” must choose bore size 079 (2mm) to 394 (10mm)

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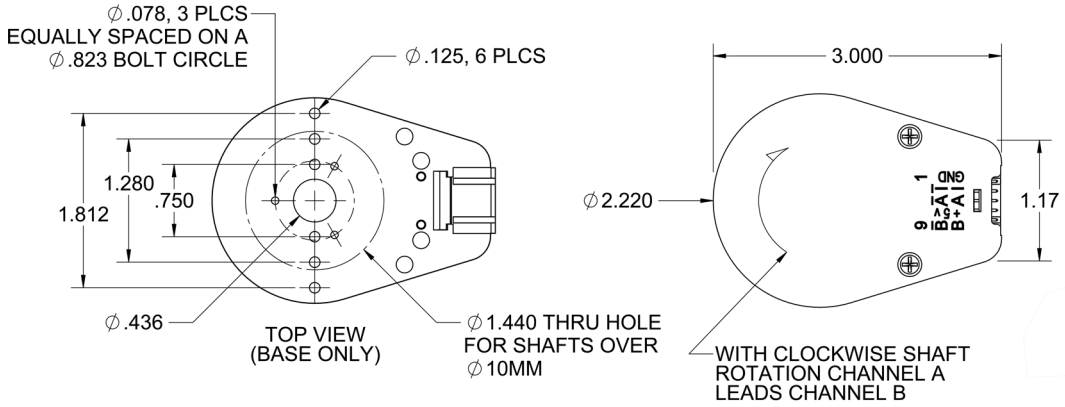
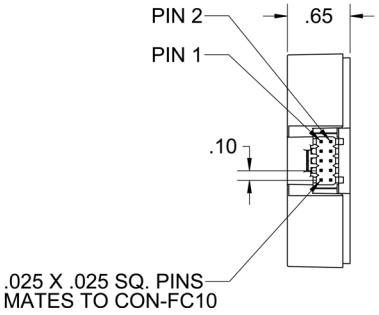
DIMENSIONS

# Default Cover and Base Option

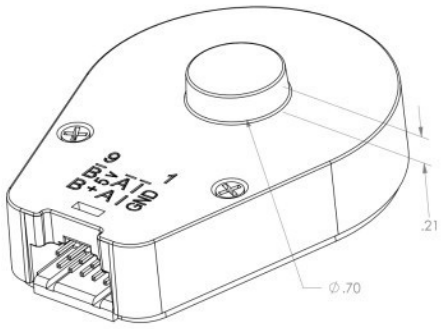


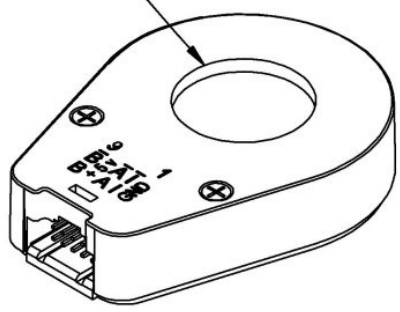

Note: Required shaft length is 0.445-0.570 inches.

COVER OPTIONS

E - Option



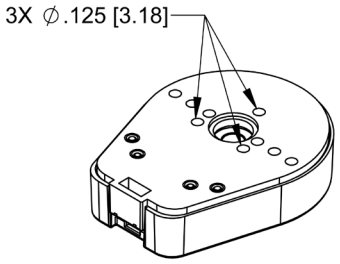
H option thru hole



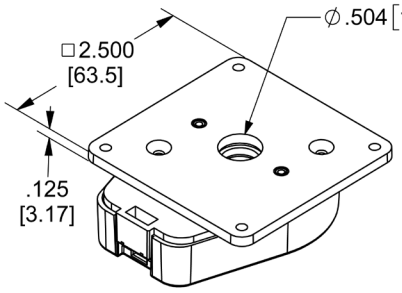
| Cover Options: | Description |
|---|---|
| E - Option | E-Option provides a cylindrical extension cover for longer shafts of up to .750". The required shaft length is .445" to .750". |
| H - Option | H-Option adds a hole to the cover for the shaft to pass through. Shafts 2mm to 10mm, a .438" diameter hole is supplied. Shafts 12mm to 1", a 1.047" diameter hole is supplied. |

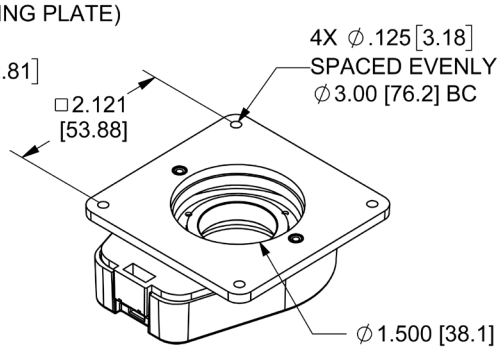
BASE OPTIONS

3-OPTION BASE
(.078 HOLES BECOME .125)




M-OPTION BASE
(MOUNTING PLATE)




FOR SHAFTS ≤ ∅.394 [10]

FOR SHAFTS > ∅.394 [10]
REQUIRES AN ADDITIONAL .125 [3.18] SHAFT LENGTH

| Base Options: | Description |
|---|---|
| 3 - Option | 3-Option makes three of these hole diameters .125” |
| M - Option | M-Option, this adapter plate is for mounting to a 3” diameter bolt circle. |

(Note: Base Mounting Screws are NOT included. #2-56 or M2.5 #4-40 screws can be used to mount the base to your mounting surface.)

PIN/TIMING DIAGRAMS

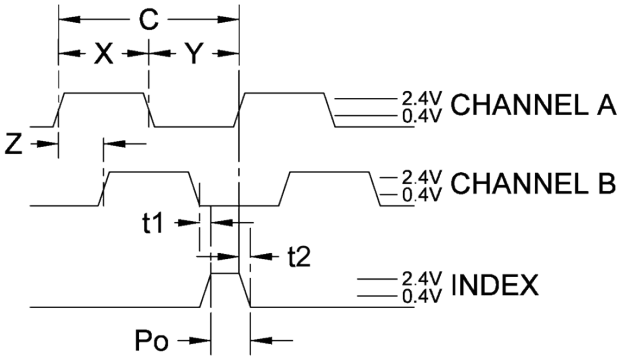
## SINGLE-ENDED ENCODER PINOUT

**TOP OF ENCODER FACING PLUG**

| Pin # | Function |
|---|---|
| 1 | Ground |
| 2 | Ground |
| 3 | Index- (open collector) |
| 4 | Index+ (single-ended) |
| 5 | A- channel (open collector) |
| 6 | A+ channel (single-ended) |
| 7 | 7.5-30V power |
| 8 | 7.5-30V power |
| 9 | B- channel (open collector) |
| 10 | B+ channel (single-ended) |

| 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 |

## SINGLE-END ENCODER TIMING DIAGRAMS




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

SPECIFICATIONS

| Terminology | 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) |

| 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 |

| 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$^2$ |

| Parameter | Min | Typ | Max | Units |
|---|---|---|---|---|
| Supply Voltage | 7.5 | | 30.0 | Volts |
| **Supply Current**<br>CPR < 500, no load<br>CPR ≥ 500 and < 2000, no load<br>CPR ≥ 2000, no load | <br>-<br>-<br>- | <br>8<br>16<br>22 | <br>10<br>19<br>25 | mA |

| Open Collector Parameters | Min | Typ | Max | Units |
|---|---|---|---|---|
| Open Collector "On" Resistance | | 2 | | ohms |
| Open Collector Sink Current | | | 200 | mA |
| Output Low Voltage | | | 0.4 | Volts (200 mA sink current) |
| Open Collector Pullup Voltage | | | 50 | Volts |

| TTL Parameters | Min | Typ | Max | Units |
|---|---|---|---|---|
| **Output Low**<br>$I_{OL}$ = 8mA max (CPR < 2000)<br>$I_{OL}$ = 5mA max (CPR ≥ 2000)<br>no load (CPR ≥ 2000) | <br>-<br>-<br>- | <br>-<br>-<br>0.25 | <br>0.5<br>0.5<br>- | Volts |
| **Output High***<br>$I_{OL}$ = -8mA max (CPR < 2000)<br>$I_{OL}$ = -5mA max (CPR ≥ 2000)<br>no load (CPR < 2000)<br>no load (CPR ≥ 2000) | <br>2.0<br>2.0<br>-<br>- | <br>-<br>-<br>4.8<br>3.5 | <br>-<br>-<br>-<br>- | Volts |
| **Output Current Per Channel** (CPR < 2000) | -8.0 | - | 8.0 | mA |
| **Output Current Per Channel** (CPR ≥ 2000) | -5.0 | - | 5.0 | mA |
| **Output Rise Time** (CPR < 2000) | - | 110 | - | nS |
| **Output Rise Time** (CPR ≥ 2000), ± 5mA load | - | 50 | - | |
| **Output Fall Time** (CPR < 2000) | - | 110 | - | |
| **Output Fall Time** (CPR ≥ 2000), ± 5mA load | - | 50 | - | nS |

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

| Speed Calculation | | Units |
|---|---|---|
| CPR ≤ 1250 | $18x10^6$ / CPR | RPM |
| CPR 2000-2500 | $21.6x10^6$ / CPR | RPM |
| CPR 4000+ | $43.2x10^6$ / CPR | RPM |

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

## Cables:

The following cables are compatible with Anaheim Automation's A5SIH 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 |