

# ENC-AMT11S Capacitive Modular Encoder



## FEATURES

- Incremental Resolutions up to 4096 CPR
- Single-Ended
- Kit with 9 Bore Sleeve Options (.079" to .315")
- Radial and Axial Cable Connections
- Digitally Set Zero Position
- Compact Modular Package with Locking Hub
- Resolutions Programmable with AMT Viewpoint PC Software
- -40 to 125°C Operating Temperature



## DESCRIPTION

The AMT11 Modular Incremental Encoder is based on a new type of Capacitive technology. With CUI's new patented Capacitive ASIC technology this encoder is superior in every way compared to other encoder (Magnetic, Optical). The AMT11 is a rugged, high accuracy incremental encoder that offers resolutions up to 4096 CPR. Each AMT11 comes with 9 color coded bore sleeves, ranging from .079" to .315" that will adapt to 9 different motor shaft diameters. Also, included are two mounting tools, one standard and one wide baseplate that has multiple pre-drilled mounting hole patterns designed to mate with a wide range of motors. Furthermore, because of the Capacitive platform it is not susceptible to contaminants such as dirt, dust, and oil that usually plague encoders in industrial environments. With its compact package and low current draw, it's unlike any other encoder. The AMT11 is the perfect solution for your business whether it's for industrial, automation, robotics, or renewable energy applications.

## ORDERING INFORMATION

### ENC - AMT112S - V

Capacitive Modular Encoder

Single-Ended

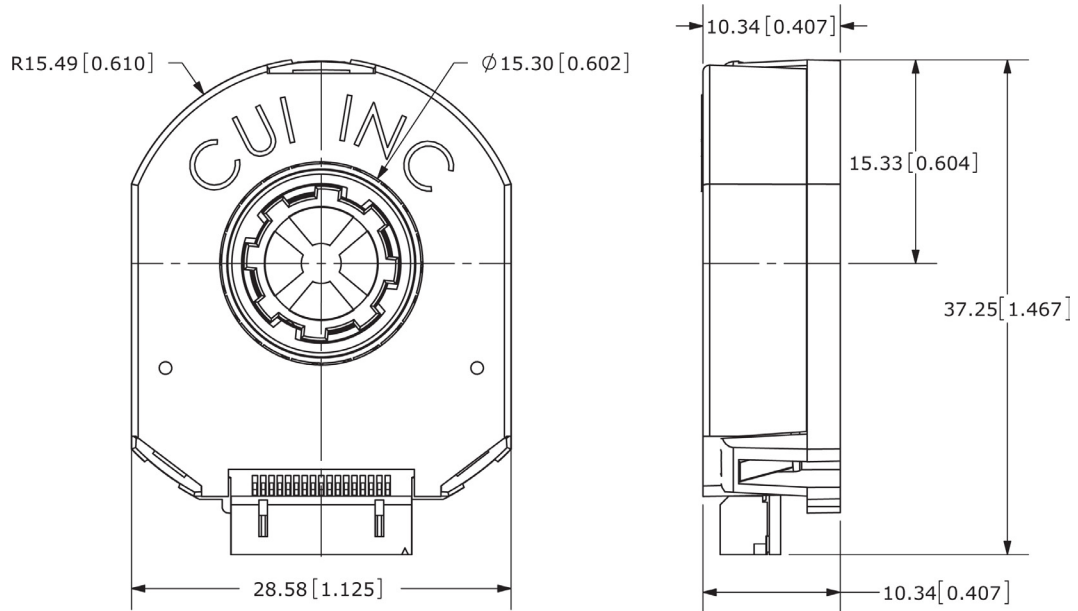
Orientation  
 2 Radial  
 3 Axial

| Selectable Resolutions (CPR) |      |      |      |
|------------------------------|------|------|------|
| 0048                         | 0250 | 0512 | 2000 |
| 0096                         | 0256 | 0768 | 2048 |
| 0100                         | 0360 | 0800 | 2500 |
| 0125                         | 0384 | 1000 | 4096 |
| 0192                         | 0400 | 1024 |      |
| 0200                         | 0500 | 1600 |      |

| V-Kit Includes:           |                |
|---------------------------|----------------|
| Total of 9 Bore Sleeves   |                |
| Diameter                  | Color          |
| .079"                     | Light Blue Sky |
| .118"                     | Orange         |
| .125"                     | Purple         |
| .157"                     | Gray           |
| .188"                     | Yellow         |
| .197"                     | Green          |
| .237"                     | Red            |
| .250"                     | Snow           |
| .315"                     | Blue           |
| Total of 2 Tools          |                |
| Tool A                    | Spacer Tool    |
| Tool C                    | Shaft Tool     |
| Total of 1 Cover, 2 Bases |                |
| Top Cover                 |                |
| Standard Base             |                |
| Wide Base                 |                |

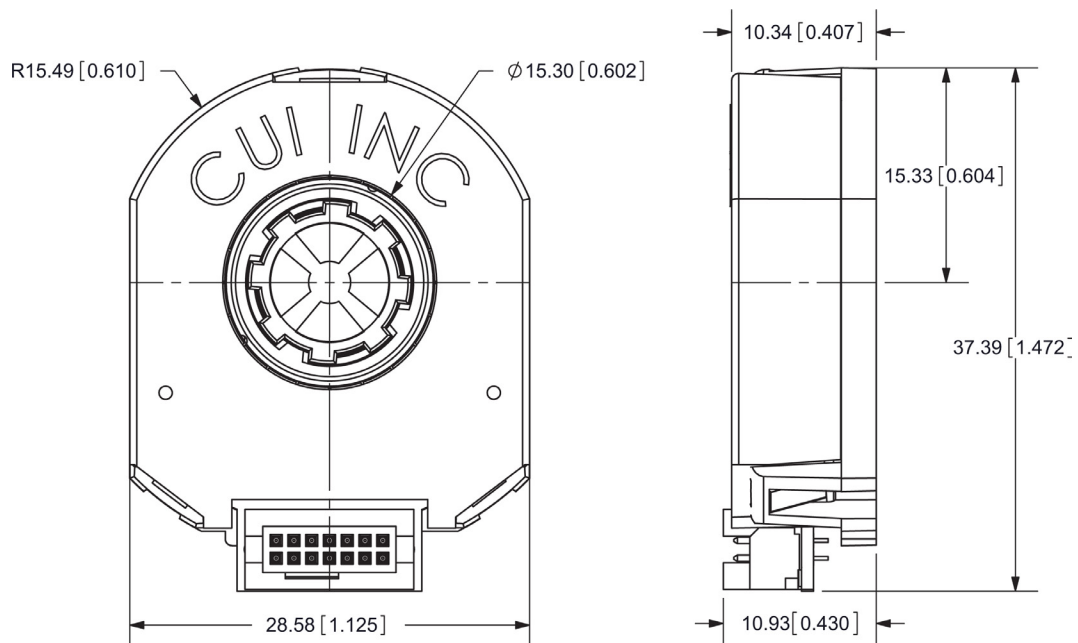
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### ENC-AMT112S (Radial Connection)



DIMENSIONS

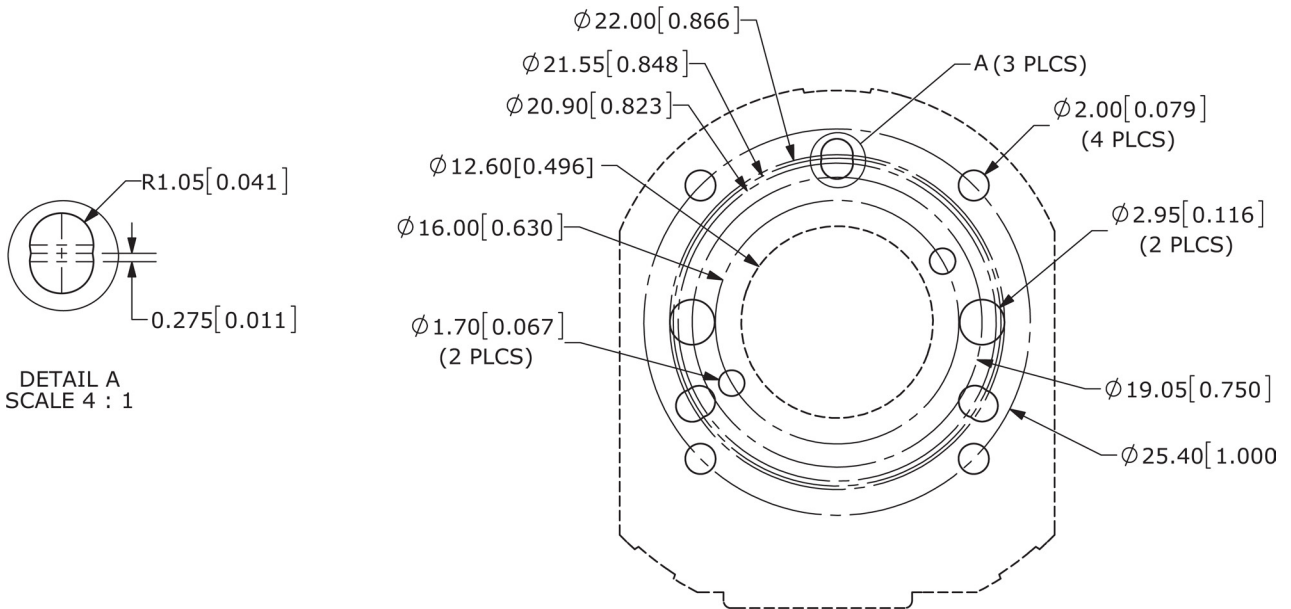
### ENC-AMT113S (Axial Connection)



## ENC-AMT11 Standard Base

Units: mm[inch]

Tolerance:  $\pm 0.1$

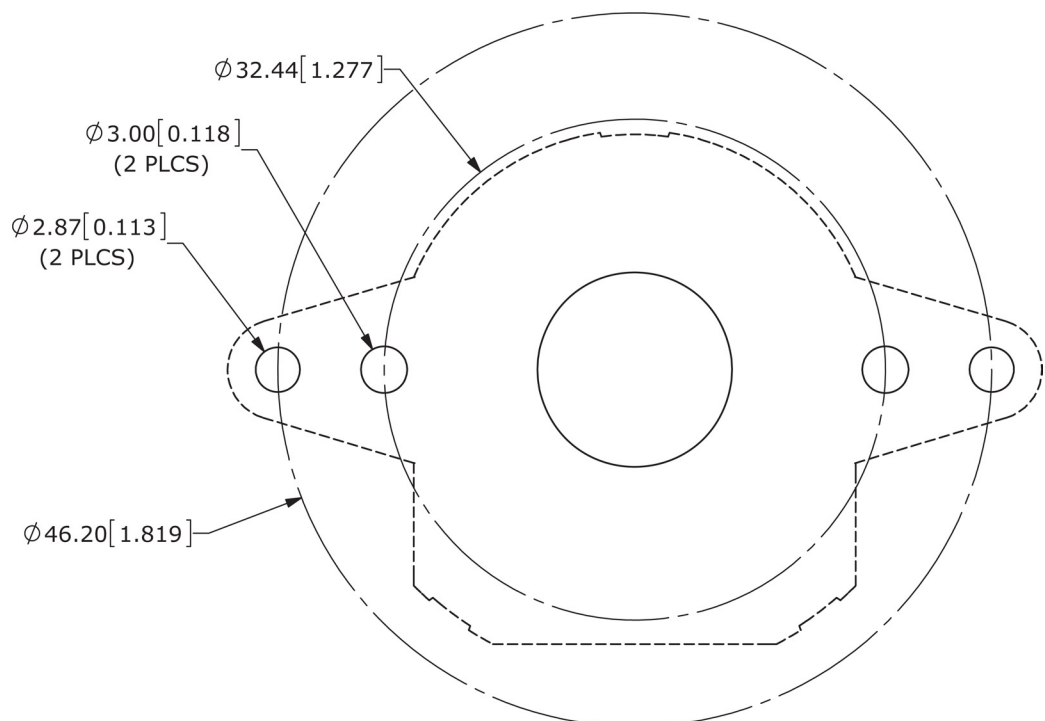


DIMENSIONS

## ENC-AMT11 Wide Base

Units: mm[inch]

Tolerance:  $\pm 0.1$

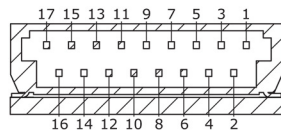
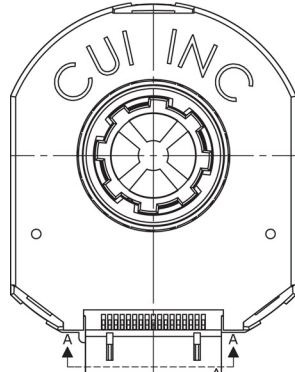


### PINOUT CONNECTOR

| Pin # | Function         |                  |
|-------|------------------|------------------|
|       | ENC-AMT112S      | ENC-AMT113S      |
| 1     | TX_ENC+          | RX_ENC+          |
| 2     | RX_ENC+          | TX_ENC+          |
| 3     | N/A              | N/A              |
| 4     | GND <sup>1</sup> | GND <sup>1</sup> |
| 5     | N/A              | N/A              |
| 6     | +5 V             | +5V              |
| 7     | N/A              | N/A              |
| 8     | B+               | B+               |
| 9     | N/A              | N/A              |
| 10    | A+               | A+               |
| 11    | N/A              | N/A              |
| 12    | Z+               | Z+               |
| 13    | N/A              | N/A              |
| 14    | MCLRB            | MCLRB            |
| 15    | N/A              | N/A              |
| 16    | N/A              | N/A              |
| 17    | N/A              | N/A              |

**Note:** 1. Connect encoder GND to motor chassis as possible.

**ENC-AMT112S**



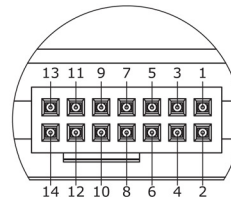
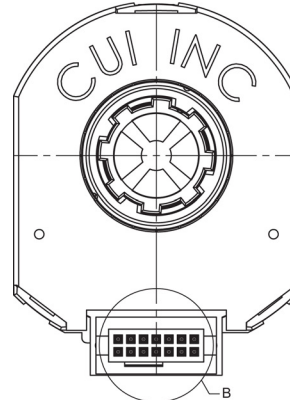
SECTION A-A  
SCALE 4 : 1

**Mating Connector:** JAE FI-W17S

**Mating Cable:** ENC-CBL-AA7062

**Programming Cable:** ENC-AMT-PGRM-17C

**ENC-AMT113S**



DETAIL B  
SCALE 4 : 1

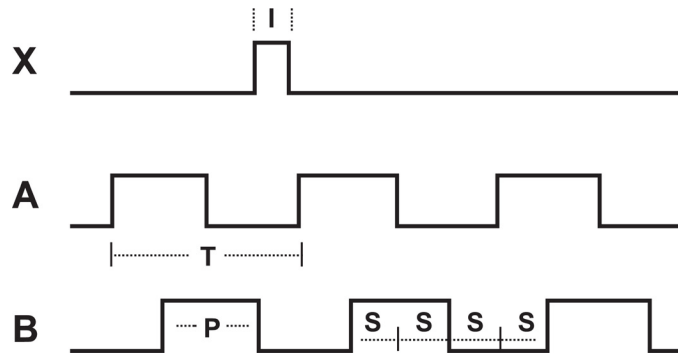
**Mating Connector:** Samtec ISDF-07-D-L

**Mating Cable:** ENC-CBL-AA7061

**Programming Cable:** ENC-CBL-14C-1-036-USB



Quadrature signals with Index showing counter-clockwise rotation



The following parameters are defined by the resolution selected for each encoder, where  $R$  = resolution

| Parameter | Description     | Expression | Units              |
|-----------|-----------------|------------|--------------------|
| T         | Period          | $360 / R$  | Mechanical Degrees |
| P         | Pulse Width     | $T / 2$    | Mechanical Degrees |
| I         | Index Width     | $P / 2$    | Mechanical Degrees |
| S         | A/B State Width | $P / 2$    | Mechanical Degrees |

| Parameter                    | Conditions / Description     | Min     | Typ | Max | Units |
|------------------------------|------------------------------|---------|-----|-----|-------|
| Power Supply                 | VDD                          | 4.5     | 5   | 5.5 | V     |
| Start Up Time                |                              | -       | 200 |     | ms    |
| Current Consumption          | with Unloaded Output         | -       | 16  | -   | mA    |
| Single Ended Channels        | Output High Level            | VDD-0.1 | -   | -   | V     |
|                              | Output Low Level             | -       | -   | 0.1 | V     |
|                              | Output Current (Per Channel) | -       | -   | 15  | mA    |
|                              | Rise / Fall Time             | -       | 8   | -   | ns    |
| Differential RS-422 Channels | Output High Level            | 3       | -   | -   | V     |
|                              | Output Low Level             | -       | -   | 0.1 | V     |
|                              | Output Current (Per Channel) | -       | -   | 25  | mA    |
|                              | Rise / Fall Time             | 7       | 11  | 20  | ns    |

| Parameter                                  | Conditions / Description  | Min | Typ | Max | Units   |
|--|---|-----|-----|-----|---------|
| Channels                                   | CMOS Voltage A, B, Z  | -   | -   | -   | -       |
| Waveform                                   | CMOS Voltage Square Wave  | -   | -   | -   | -       |
| Phase Difference                           | A leads B for CCW Rotation (viewed from front)  | -   | -   | -   | -       |
| Quadrature Resolutions 1*                  | 48, 96, 100, 125, 192, 200, 250, 256, 360, 384, 400, 500, 512, 768, 800, 1000, 1024, 1600, 2000, 2048, 2500, 4096 | -   | -   | -   | CPR     |
| Index 2*                                   | One Pulse per 360 Degree Rotation   | -   | -   | -   | -       |
| Accuracy                                   |   | -   | 0.2 | -   | Degrees |
| Quadrature Duty Cycle (at each resolution) |   | -   | 50  | -   | %       |

Notes: 1\*. Resolution programmed with AMT Viewpoint PC software. Default resolution set to 2048 CPR.

2\*. Zero position alignment set with AMT One Touch Zero module, AMT Viewpoint PC software, or serial commands.

| Parameter                             | Conditions / Description  | Min | Typ  | Max  | Units |
|---------------------------------------|---|-----|------|------|-------|
| Motor Shaft Length                    |   | 9   | -    | -    | mm    |
| Weight                                | Weight Varies by Configuration  | -   | 15.7 | -    | g     |
| Axial Play                            |   | -   | -    | ±0.3 | mm    |
| Rotational Speed (at each resolution) | 48, 96, 100, 125, 192, 200, 250, 256, 384, 400, 500, 512, 800, 1000, 1024, 2048 | -   | -    | 8000 | RPM   |
| Rotational Speed (at each resolution) | 360, 768, 1600, 2000, 4096  | -   | -    | 4000 | RPM   |
| Rotational Speed (at each resolution) | 2500  | -   | -    | 2500 | RPM   |

| Parameter             | Conditions / Description                       | Min | Typ | Max | Units |
|-----------------------|--|-----|-----|-----|-------|
| Operating Temperature |  | -40 | -   | 125 | °C    |
| Humidity              | Non-condensing                                 | -   | -   | 85  | %     |
| Vibration             | 10~500 Hz, 5 Minute Sweep, 2 Hours on each XYZ | -   | -   | 5   | G     |
| Shock                 | 3 Pulses, 6 ms, 3 on each XYZ                  | -   | -   | 200 | G     |
| RoHS                  | 2011 / 65 / EU                                 | -   | -   | -   | -     |

| Parameter  | Conditions / Description   | Min | Typ    | Max | Units |
|------------|--|-----|--------|-----|-------|
| Protocol   | Serial UART  | -   | -      | -   | -     |
| Controller | Driven by Onboard Microchip PIC18F25K80. See Microchip Documentation for A | -   | -      | -   | -     |
| Data Rate  | 8 Data Bits, No Parity, 1 Stop Bit, Least Significant Bit First            | -   | 115200 | -   | baud  |

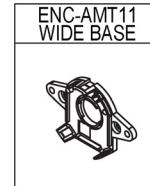
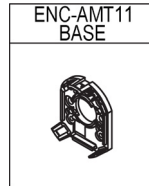
### Covers:

|           |           |
|-----------|-----------|
| ENC-AMT11 | Top Cover |
|-----------|-----------|



### Bases:

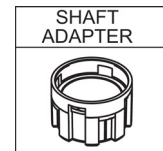
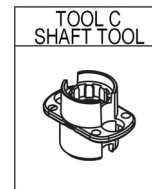
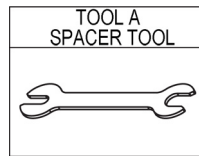
|           |           |
|-----------|-----------|
| ENC-AMT11 | Base      |
| ENC-AMT11 | Wide Base |



### Tools:

|                      |
|----------------------|
| (Tool A) Spacer Tool |
| (Tool C) Shaft Tool  |

Note: Also, included is a Shaft Adapter.



### Sleeves:

The following bore sleeves are provided with the kit:



| SLEEVES        |        |        |       |        |       |       |       |       |
|----------------|--------|--------|-------|--------|-------|-------|-------|-------|
|                |        |        |       |        |       |       |       |       |
| .079"          | .118"  | .125"  | .157" | .188"  | .197" | .237" | .250" | .315" |
| Light Sky Blue | Orange | Purple | Gray  | Yellow | Green | Red   | Snow  | Blue  |

Everything shown below here is not included with the kit. These Connectors and Cables are sold separately:

### Connectors:

| Connector Part Number | Description      |
|-----------------------|------------------|
| JAE FI-W17S           | Mating Connector |
| Samtec ISDF-07-D-L    | Mating Connector |

### Cables:

| Encoder Part # | Cable       | Cable Part Number     | Length |
|----------------|-------------|-----------------------|--------|
| ENC-AMT112S    | Mating      | ENC-CBL-AA7062        | 12"    |
| ENC-AMT112S    | Programming | ENC-AMT-PGRM-17C      | 12"    |
| ENC-AMT113S    | Mating      | ENC-CBL-AA7061        | 12"    |
| ENC-AMT113S    | Programming | ENC-CBL-14C-1-036-USB | 36"    |