

# AEDA-3200-T

## Mechanical Mounting and Installation Consideration



### Application Note 5080

#### Introduction

The **AEDA-3200-T**, which is a top mounting type module, is a miniature 3 channel incremental encoder with resolutions ranging from 2,500 to 7,500 CPR (up to 30,000 counts after 4X decoding) within a package size of 17 mm diameter.

The AEDA-3200-T consists of a readhead and a code wheel assembly. Due to its miniature size and high resolution, precise alignment between readhead and code wheel assembly is very critical. Specially designed mechanical alignment tool (HEDS-8940) can be ordered separately to facilitate the required precise alignment.

This article describes the package dimensions, recommended customers' components specifications and module assembly.

#### Piece Parts Overview

The miniature AEDA-3200-T encoder consists of a readhead and a code wheel assembly. The readhead consists of metal housing, emitter and detector PCB assembly. Figure 1 shows the overall piece parts.

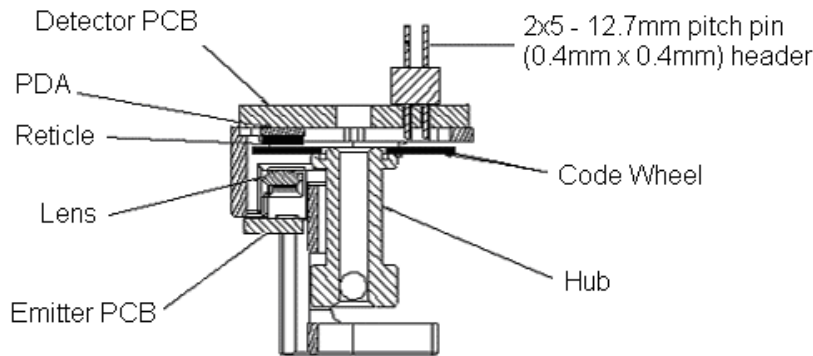


Figure 1. AEDA-3200-T Piece Parts.

**Package dimensions**

The overall dimension of top mounting type AEDA-3200-T is 17 mm in diameter at a height of 17.6 mm (without connector) or 23.2 mm (with connector). Figure 2 shows the overall dimensions.

**Recommended Customers' Components Requirements**

Figure 3 shows a typical integration of customers' components (base plate, bearings and shaft) and the code wheel assembly. To achieve the precise alignment, we recommend that the following specifications, as highlighted in Figures 4 to 6, to be adhered to.

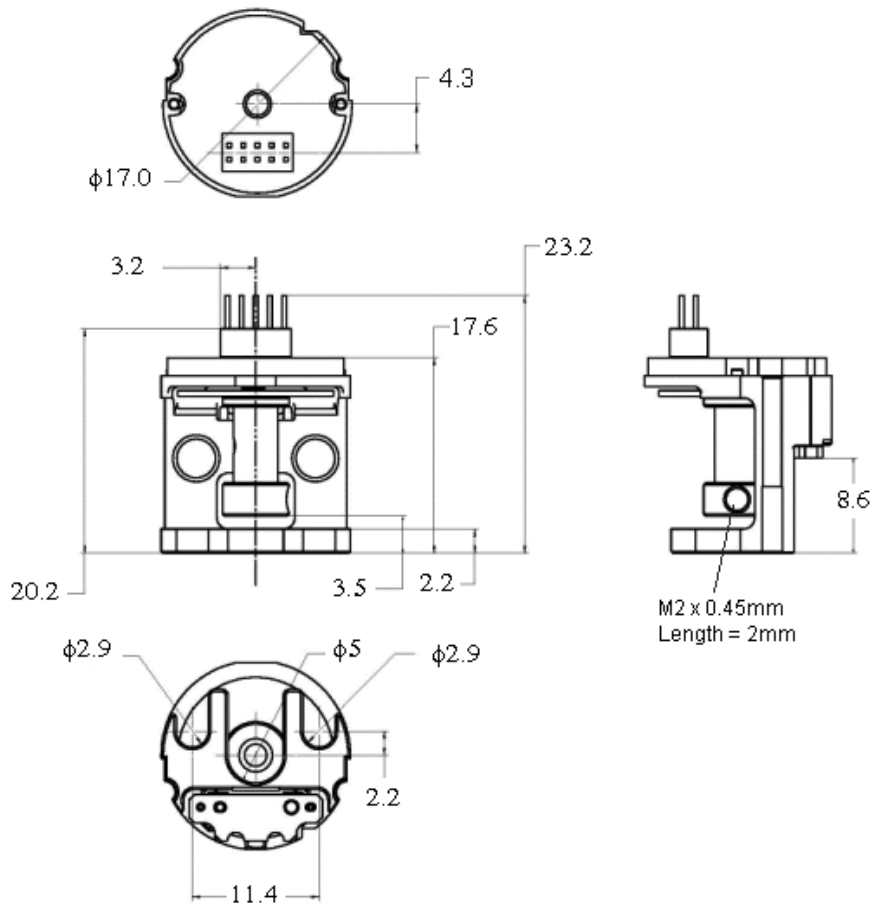


Figure 2. AEDA-3200 Overall Dimensions.

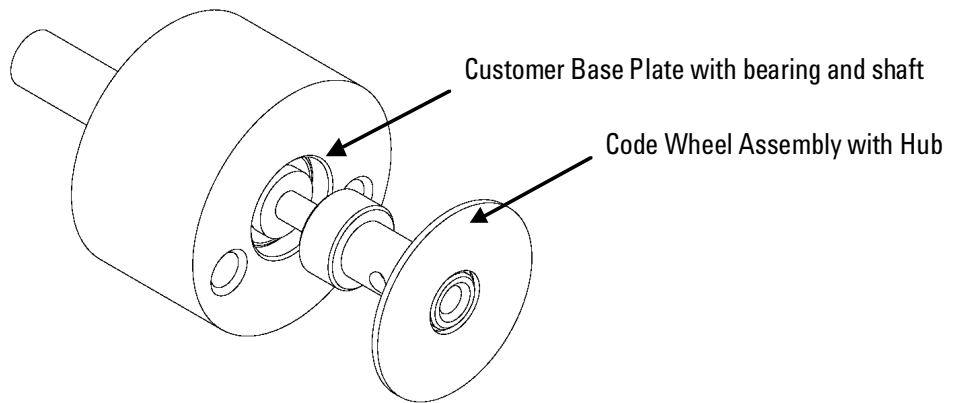


Figure 3. Typical Integration of Customer Components and Code Wheel Assembly.

Figure 4 shows the top view of a typical customer base plate. The location of the M2.5 tap holes are shown. The indicated 18 mm diameter on the customer base plate is just an example; it can be modified depending on the customer's specific requirements for different type of applications.

The recommended surface flatness on customer base plate is  $10\ \mu\text{m}$ . The maximum inner diameter on the base plate to accommodate bearings and shaft is 7 mm. Inner diameter exceeding the recommended 7 mm will weaken the holding structure of the AEDA-3200 readhead onto the customer base plate when mounted by the 2 X M2.5 screws. It is recommended that customer install 2 units of bearings.

For shaft size, customer can choose a range of 2 mm to \*4 mm diameter shaft with a fixed 2 mm diameter on the integration portion to the code wheel hub. Total runout is controlled to  $30\ \mu\text{m}$  as shown in Figure 5. The protrusion length of shaft with respect to customer base plate is 8.0 to 9.0 mm. Figure 6 provides details on the shaft and base plate integration.

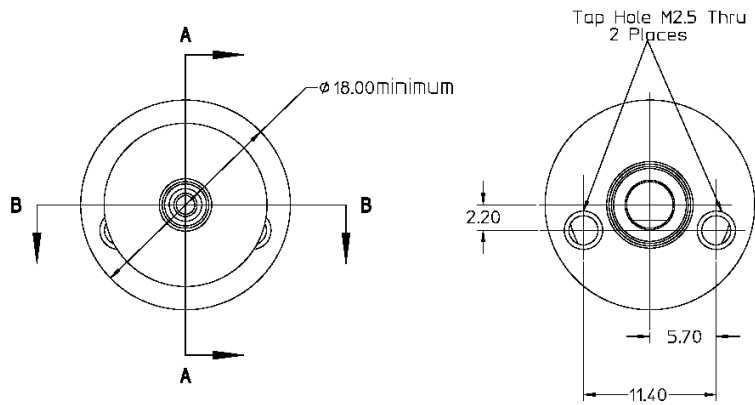
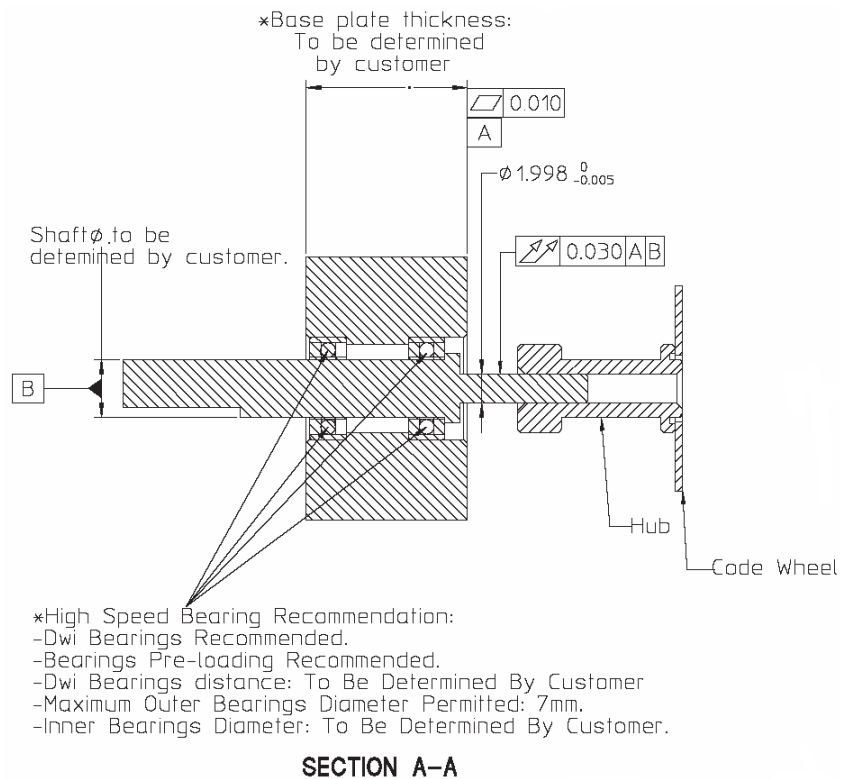
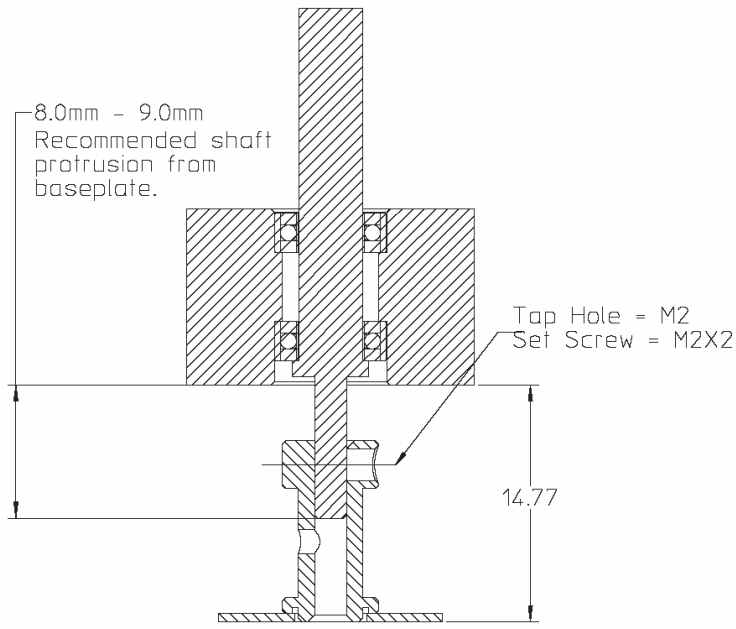


Figure 4. Top View of Customer Base Plate and Two M2.5 Tap Hole Locations.



SECTION A-A

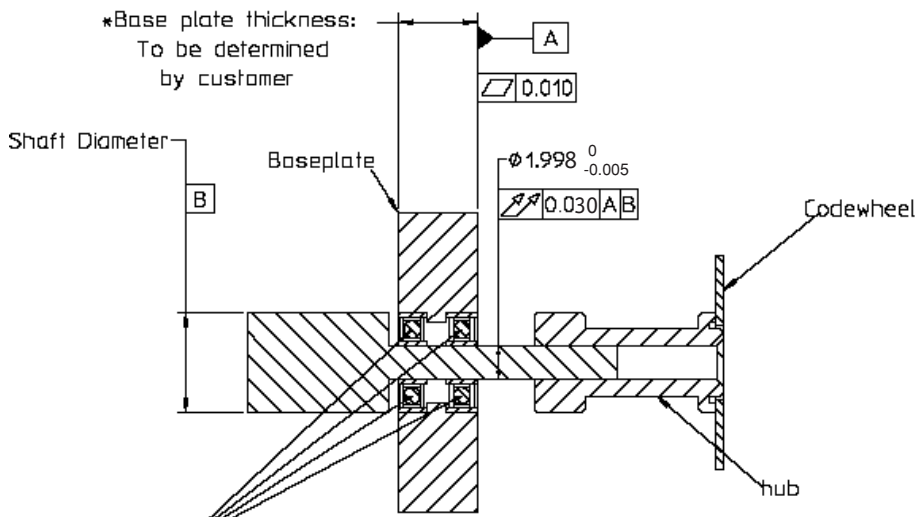
Figure 5. Recommendation on Customer Base Plate, Bearings and Shaft.



**SECTION B-B**

**Figure 6. Details on the Recommended Shaft and Integration With Base Plate Assembly.**

\*For shaft size beyond 4 mm diameter, the alternative design is shown in Figure 7.



- \*High Speed Bearing Recommendation:
- Dwl Bearings Recommended.
- Bearings Pre-loading Recommended.
- Dwl Bearings distance: To Be Determined By Customer
- Maximum Outer Bearings Diameter Permitted: 7mm.
- Inner Bearings Diameter: To Be Determined By Customer.

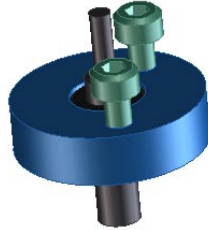
**Figure 7. Recommendation on Customer Base Plate, Bearings and Shaft for shaft size beyond 4 mm diameter.**

## Assembly Procedures

By now, the base plate should be installed with bearings and shaft. Following are assembly procedures for installing the AEDA-3200-T module onto the customer's base plate assembly.

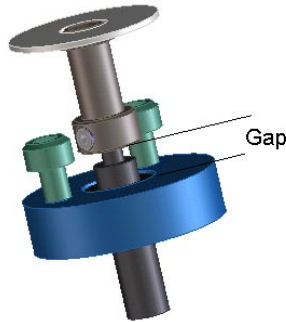
### Step 1

Install 2 units of stainless steel mounting screws (M2.5 hex socket cap screw with 6 mm (min) length) into the pre-installed customer base plate leaving a gap of about 3 mm for subsequent readhead mounting as described in Step 3.



### Step 2

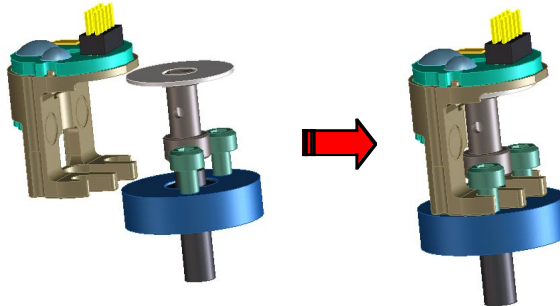
Install the code wheel assembly with hub onto the shaft. The hub comes with 1 X M2 setscrew. Tighten the set-screw lightly so that it is sufficient to prevent the hub from sliding down. The recommended initial gap between the ends of hub to the base plate is 3mm\*. This will prevent the code wheel from hitting into the readhead during the readhead assembly.



\* To avoid the code wheel from hitting the readhead, the recommended allowable gap between end hub and base plate should be between end hub and base plate should be between 2.5 mm and 3.2 mm only.

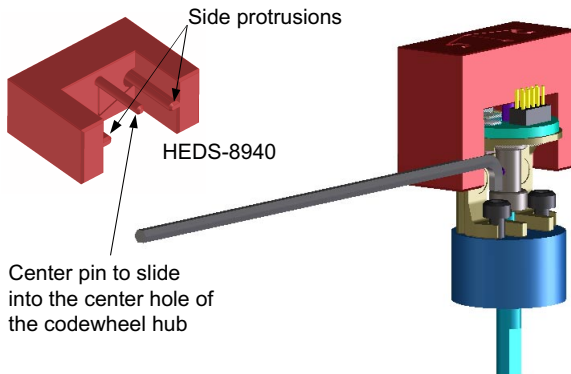
### Step 3

Slide the housing onto the base plate carefully without hitting the code wheel. The housing base slots should be guided into the 2 mounting screws.



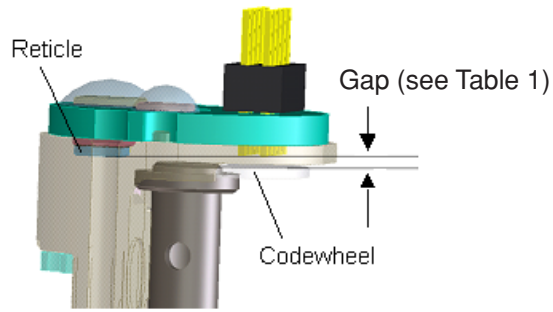
### Step 4

Slide the Mechanical Alignment Tool with the side protrusions sliding onto the half-moon slots of the housing. The center pin of the alignment tool should slide into the codewheel hub. Once the encoder housing has been aligned to the codewheel (shaft), tighten the two M2.5 mounting screws. The recommended tightening torque is \*0.72Nmm.



### Step 5

Loosen the setscrew and set the gap between the top surfaces of code wheel to the reticle to a maximum gap as specified in Table 1. To prevent potential scratch on the reticle or code wheel pattern, we recommend the gap setting material to be mylar shim. The plastic or mylar shim is widely available from standard engineering material distributors. Suggested material includes parts from Macreadys (Part Number: KXPZP770759) or Peter Stubs Limited (Part number: 80018).



Once the gap has been set, tighten the hub set screw at recommended \*0.27N mm torque.

\* Note: The recommended torque value is used as guidance only. Frictions from customer base plate material and quality of machining may require different torque.

Avago recommends to apply glue or epoxy to further secure the two mounting screws (M2.5). This should be done only after the encoder has been aligned to within the specifications. Suggested glue is HERNON 3661 two-part epoxy.

This completes the assembly requirements and procedures for the integration of AEDA-3200-T onto customer base plate.

**Table 1. Recommended gap between codewheel and encoder reticle.**

AEDA-3200 Option	CPR	Recommended Gap ( $\mu\text{m}$ )
A J	2,500	200
B 1	5,000	200
B 7	6,000	200
B J	7,200	100
B K	7,500	100

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