

Description

The A2K absolute encoder is a non-contacting optical rotary position sensor which reports the shaft angle within a 360 deg. range. As opposed to incremental encoders, the A2K reports the absolute position rather than the change in position. When powered up, it does not require a home cycle, even if the shaft was rotated while the power was off. In multi-turn mode, it tracks the position in a 32-bit counter as long as the power supply is maintained. Internally, an infrared LED flashes through a circular bar code onto a linear array sensor. The microcontroller decodes the image into a unique position. All user programmable parameters such as resolution, origin, direction and mode are permanently stored in an internal EEPROM.

The interface of the A2K utilizes our SEI (Serial Encoder Interface) bus. The SEI bus is a simple, quick, convenient network of devices interfacing to an RS-232 serial port or USB port. The SEI bus supports 1 to 15 devices on a single, 6-wire telephone-type cable up to 1000 feet long (similar to RS-485).

US Digital offers two SEI interfaces: the AD2B adapter for interface to an RS-232 port and the SEI-USB for interface to a USB port. One of these products is required in order to interface the A2K to a PC via our SEI bus. The wall-mount PS-12 power supply furnishes the power for all devices on the SEI bus.

US Digital provides software free of charge for all products which require software for operation. The software comes on a CD with each product shipped or can also be down loaded from US Digital's website here. The software can be used as is or it can serve as an example for creating your own custom application. The absolute encoder software utilizes our SEI Explorer software to configure and communicate with the product from a PC platform.

Our absolute encoders may be used in many stand alone applications that do not require a PC interface. For these applications we provide detailed communications protocols for all of our absolute products (see the SEI Absolute Encoder Communications Protocol page).

Analog output (A-option) is available for each of the above versions. It can stand alone (does not need to connect to a PC), providing an analog voltage proportional to the angular position, with 12-bit resolution. The A-option is fully functional with the SEI bus, but is limited to one device instead of 15 devices.

Features

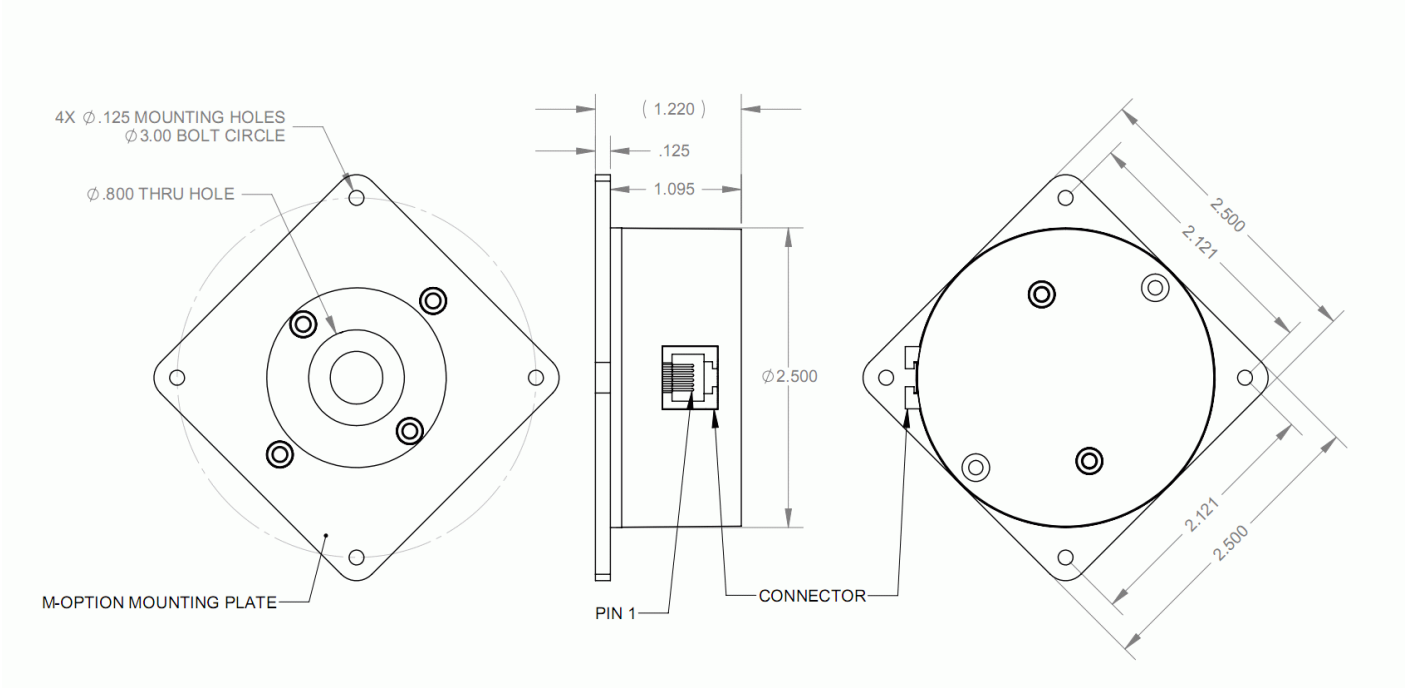
- Installs onto shafts up to 10mm dia.
- 12-bit resolution, and resolution field programmable from 2 to 4096 codes per revolution (3600 factory default)
- Full 360 degrees range, and position update rate is 250 times per second
- Low power drain of 18.5 mA max., and 1.5 mA in sleep mode
- Field programmable parameters such as setting zero position point (free demo software provided)
- EEPROM stores downloadable parameters
- 9600 baud default data rate adjustable up to 115K baud
- 12-bit analog voltage output option (0 to +3.599 volts factory default setting. Field programmable up to 0 to +4.095 volts)
- Multi-turn mode (note: power must be maintained to prevent reset to zero)
- -25 to 70 degrees C. operating temperature

Related Products & Accessories

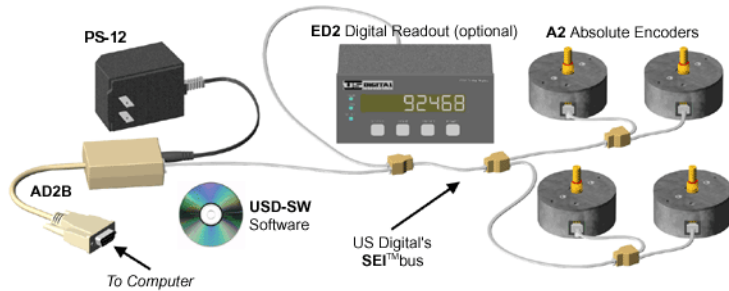
- A2 Absolute Optical Encoder (Base price \$283.50)
- AD2B SEI to RS-232 Adapter (9-pin) (Base price \$59.95)
- CA-MD6-SH-MD6 6-Pin Modular / 6-Pin Modular Shielded Cable (Base price \$10.46)
- CA-MD6-SS-MD6 6-Pin Modular / 6-Pin Modular Silver Satin Cable (Base price \$9.96)
- CA-MD6A-SS-MD6 6-Pin Modular / 6-Pin Modular Silver Satin Cable (A2 Analog) (Base price \$9.95)
- CON-MD6 6-Pin Modular Connectors (Base price \$1.05)
- HBA2 Absolute Blind Hollow Bore Optical Encoder (Base price \$384.00)

▶ SEI-USB SEI to USB Adapter (Base price \$49.00)

 **Mechanical Drawing**



 **SEI Network**



 **Analog Output**

The analog version of the **A2K** has a 12-bit DAC on the output which feeds to 2 lines that are otherwise used for the BUSY handshaking pair. This DAC has a full range of 0 to 4.095 volts which is 1 milli-volt per bit. The value which the internal microcontroller sends to that DAC is the same as the digital value that it sends to the host. Since the resolution (which represents the number of codes per revolution) is field programmable, the range of the DAC will also follow that setup. Our default resolution is 3600 codes per revolution which yields 1 count per tenth of a degree. This makes the DAC output equal to 1 milli-volt per tenth of a degree or 0 to 3.599 volts. When the DAC needs to have the full range to 4.095 volts, the single turn resolution should be set to 4096. This is easily done with the available software which runs on a PC. Cable CA-MD6A-SS-MD6-6FT and either the SEI-USB or the AD2B adapter are

needed to interface the **A2K** analog version to a USB port or RS-232 serial COM port.

Please Note: The BUSY handshaking lines are replaced by the analog output option. This means that only one device will be able to be connected to the SEI bus when using the analog output option.

Electrical

Parameter	Min.	Typ.	Max.	Units
Supply Voltage (PWR)	5.5	-	16	Volts
Supply Current (Active)	-	14	18.5	mA
Supply Current (Sleep)	-	-	1.5	mA
Analog Output Impedance (Anlg+)	950	1000	1050	Ohms
Zero Scale Analog Voltage	0	.0005	.003	Volts
Full Scale Analog Voltage	4.079	4.095	4.111	Volts
Differential Nonlinearity	-1.0	-	1.0	LSB

- Specifications apply over entire operating temperature range.
- Typical values are specified at Vcc= 12V and 25C.

Absolute Maximum Ratings

Parameter	Min.	Max.	Units
Storage Temperature	-40	100	C
Operating Temperature	-25	70	C
Humidity (Non-condensing)	0	95	%
Supply Voltage (PWR)	0	16	Volts
DataH, DataL, Busy+, Busy-	-14	14	Volts
A2 Electrical tracking (Multi-turn Mode)	-	1800	RPM
A2 Electrical Tracking (Single-turn Mode)	-	3600	RPM
A2 Position Update Rate*	-	4	mSec

* The internal microcontroller takes a snapshot of the disk every 4 mSec. and stores the position in memory. It responds immediately to a "report position request" by sending this value which is always the most current position.

Pin-Out

Pin	Description
1	Ground

Pin	Description
2	Busy+ Analog+
3	Busy- Analog-
4	Power
5	DataL
6	DataH

Accessories

Part	Description
Centering Tools	
CTOOL-(Shaft Diameter)	This reusable tool provides a simple method for accurately centering the A2K circuit board around the shaft. It is recommended for the following situations: <ul style="list-style-type: none"> ▸ When using mounting screws smaller than 4-40. ▸ When the position of the mounting holes is in question. <p>Instructions: When mounting the encoder base, slide the centering tool down the shaft until it slips into the centering hole of the encoder base. Tighten the mounting screws, then remove the centering tool.</p>
Hex Tools	
HEXD-050	Hex driver, .050" flat-to-flat for 3-48 set screw.
HEXW-050	Hex wrench, .050" flat-to-flat for 3-48 set screw.
Spacer Tools	
SPACER-13	
Interfaces	
SEI-USB	SEI to USB adapter
AD2B	SEI to RS-232 adapter

Mechanical

Shaft Speed	10,000 rpm max. continuous
Acceleration	10,000 rad/sec ²
Weight	2.5 oz.
Moment of Inertia	0.0001 oz in s ²
Shaft Length	0.60 to .80" from mounting surface

Mounting

The **A2K** can be mounted using the 2 screws on the 1.812" bolt circle. The is also the **M**-option 4-hole mounting plate which uses 4 screws on a 3" diameter bolt circle.

Includes

All encoder components, spacer tool, centering tool, hex wrench, 2 base mounting screws and 2 cover screws.

Options

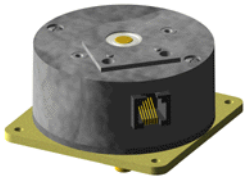
H-option

The **H**-option adds a hole in the housing allowing the shaft to pass through the encoder.

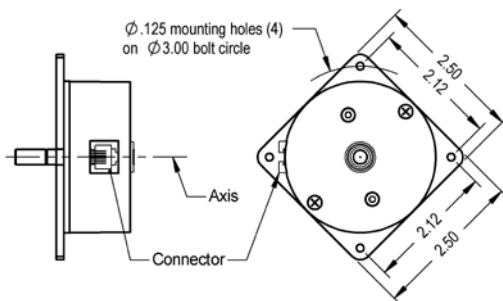
M-option

With the **M**-option adapter plate the 4 holes in the plate will mount to a 3" diameter bolt circle.

Illustration



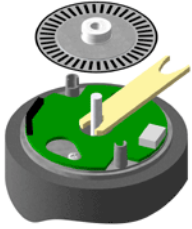
Mechanical Spec



Assembly Instructions

1. Base Mounting

Secure base by inserting screws through holes on the 1.812" bolt circle. Holes in base are designed for #4 screws. Use the centering tool to align base with existing shaft.



2. Spacer Installation

Place spacer tool on circuit board as shown. Position hub/disk assembly above shaft as shown. Slip over shaft and press down until hub and spacer tool bottom out against base.



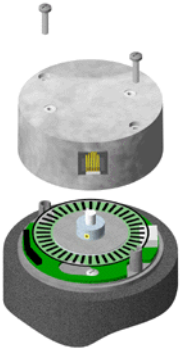
3. Tightening Set Screw

Press the hub disk against the spacer tool and tighten the set screw with the hex wrench provided. The set screw should be snug, but do not overtighten. Remove the spacer tool.



4. Cover Installation

Important: Cover must be oriented as shown. Because cover plugs into the base, use caution during installation. The posts on the base are two different lengths. Match the cover to mate with the proper post. Connector pins can be damaged if not lined up properly. Secure with two 4-40 X 1" pan head screws provided.



Ordering Information

A2K - - - -

Interface

S =Default - SEI Bus
A =Analog Voltage / SEI Bus

Bore

79 =2mm
118 = 3mm
125 = 1/8"
156 = 5/32"
157 = 4mm
188 = 3/16"
197 = 5mm
236 = 6mm
250 = 1/4"
313 = 5/16"
315 = 8mm
375 = 3/8"
394 = 10mm

Cover

D =Default
H =Hole in the cover

Base

D =Default
M =4-Hole mounting plate

Notes

▸ US Digital warrants its products against defects in materials and workmanship for two years. See complete warranty for details.

Base Pricing

Quantity	Price
1	\$303.50
10	\$272.00
50	\$261.50
100	\$251.00

- Add \$20.00 per unit for **Interface** of Analog Voltage / SEI Bus
- Add \$7.00 per unit for **Base** of 4-Hole mounting plate