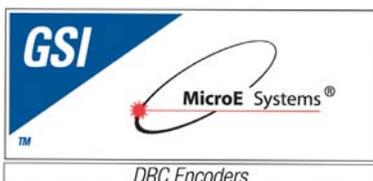


MODEL T23BA Incremental Optical Modular Rotary Encoder



- Resolutions to 2680 cycles / revolution (10,720 counts / revolution)
- Frequency response up to 100 KHz all channels
- Optional zero reference output
- 15 hub I.D.'s sizes available in both English and Metric hub sizes
- Factory pre-aligned for installation without test equipment

The Model T23BA series is an incremental optical rotary kit style encoder providing a multiple variety of TTL and Amplified Analog outputs at resolutions to 2680 cycles per shaft revolution. The hub and disc is captivated within the unit and is available in 15 I.D.'s allowing use with either English or Metric diameter shafts. The photo head assembly is factory pre-aligned for proper quadrature relationship and disc to reticle gap, allowing installations typically in one minute without any test equipment.



T23BA SPECIFICATIONS

ELECTRICAL

Resolution range:	Up to 2680 cycles per shaft revolution, (10720 counts after quadrature).
Light source:	Gallium aluminum arsenide L.E.D. rated @ 100,000 Hrs. MTBF (mfg's spec).
Light sensor:	Photodiodes.
Excitation voltage:	+5Vdc, $\pm 5\%$.
Output format:	Two count channels (A & B) in phase quadrature with an optional ZR output.
Quadrature:	$90^\circ \pm 22.5^\circ$ (at 10 KHz output frequency).
Symmetry:	$180^\circ \pm 18^\circ$ (at 10 KHz output frequency).
Rise and fall time:	1 microsecond max. into 1,000pf load capacitance.
Frequency response:	DC to 100 KHz max.
Zero reference width:	$1\pm 1/2$ cycle, 1/4 cycle or 1/2 cycle gated, depending on electronic configuration.
ZR alignment:	Full cycle: Center of ZR aligns between 90° and 180° of channel A. 1/2 cycle aligns with negative transition of channel B. 1/4 cycle aligns with both A & B high.
Phase sense:	Channel A leads Channel B for counterclockwise rotation of the shaft, as viewed from the cover side of the unit.
Wire Type:	Units with loose wires 26 AWG. Units with shielded cable 26 AWG wires with an overall shielded PVC jacket.

MECHANICAL

Moment of inertia:	1×10^{-4} oz. In. sec ² .
Max. acceleration:	5×10^5 Radian / sec ² .
Min. shaft length:	0.625 inch. (15.9mm).
Hub I.D. tolerance:	Nominal +.0002" to +.0005"
Weight:	2 oz. typical.
Shaft perpendicularity: to mounting surface:	0.002" T.I.R.
Max. shaft run-out:	0.001" T.I.R.
Max. shaft axial play rotating:	0.002" T.I.R.
Nominal gap setting:	Factory set (0.003").
Mounting hardware:	If the 1.812" (46mm) bolt circle is used, #2-56, #4-40, or M2

ENVIRONMENTAL

Operating temperature:	Standard -0°C to $+70^\circ\text{C}$ ($+32^\circ$ to $+158^\circ\text{F}$).
Storage temperature range:	-25°C to $+90^\circ\text{C}$ (-13°C to $+194^\circ\text{F}$).
Shock:	50 G for 11 millisecond duration.
Vibration:	20 Hz to 2000 Hz @ 5 G.
Humidity:	To 98% R.H. (non-condensing).

T23BA

HUB I.D.	HUB I.D.
2E = 1/8"	03 = 3MM
3E = 3/16"	04 = 4MM
4E = 1/4"	05 = 5MM
5E = 5/16"	06 = 6MM
6E = 3/8"	07 = 7MM
7E = 7/16"	08 = 8MM
8E = 1/2"	09 = 9MM
	10 = 10MM

B

CABLE TYPE	ZERO REFERENCE
B = 18" WIRES	0 = WITHOUT
C = 18" CABLE SHIELDED	1 = 1/4 CYCLE
	2 = 1/2 CYCLE
	4 = 1 CYCLE

OUTPUT CIRCUITRY

3 = SQ. WAVE SINGLE ENDED (7404)
6 = DIFFERENTIAL LINE DRIVER (RS422)
7 = COMP. SQ. WAVE (7404)
9 = AMPLIFIED ANALOG, SQ. WAVE ZR
D = SQ. WAVE SINGLE ENDED (7406)
E = SQ. WAVE SINGLE ENDED (7406) W/ PULLUPS
F = SQ. WAVE SINGLE ENDED (LM339) W/ PULLUPS
G = COMP. SQ. WAVE (7406)
G = COMP. SQ. WAVE (7406) W/ PULLUPS

NOTE: INTERNAL PULLUPS ARE 2K RESISTORS

SPECIAL MOD

LINE COUNT (CYCLES / REV)
1000
1500
1800
2000
2500
2540
2680

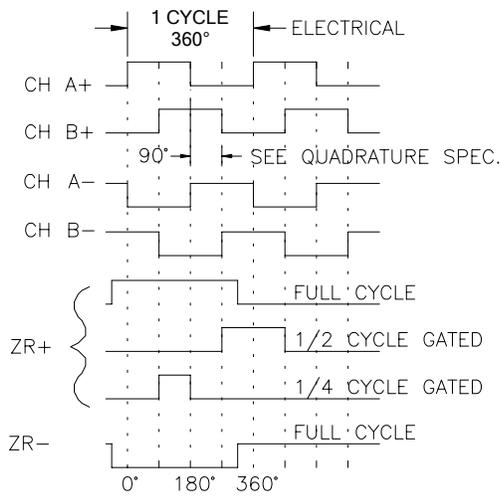
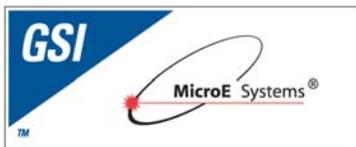


FIGURE 1

TABLE 1
ELECTRICAL CONNECTIONS

FUNCTION	LOOSE WIRES OR CABLE COLORS	
CHANNEL A+	Orange	Orange
CHANNEL A-	N/A	Green
CHANNEL B+	Yellow	Yellow
CHANNEL B-	N/A	Blue
CHANNEL ZR+	Gray	N/A
+5VDC	Red	Red
COMMON	Black	Black
CHANNEL GZ+	N/A	Brown
CHANNEL GZ-	N/A	Gray



DRC ENCODER

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T23BA INSTALLATION INSTRUCTIONS

Tools for installation:

- #4-40 mounting screws. Qty 2
- .050" hex driver Allen wrench.

Optional tools for verifying gap and electrically verifying signals:

- +5 VDC regulated power supply.
- .003" shim stock.

1. Carefully unpack the unit. Remove the shipping band that is located between the disc of the encoder and the p.c. board. If the shaft of your motor is longer than .80" than you must remove the label located on the top of the cover.
2. Carefully guide the optical encoder onto the test shaft, or motor shaft. Slide the entire encoder down until it is sitting on the base of the motor. Check to see that there are no burrs or raised areas on the shaft and the hub is sitting all the way down at the bottom of the encoder base.
3. Lightly push down on the outer edges of the aluminum hub and disc assembly so that the hub is sitting on the bottom of the encoder housing. This will center the base of the encoder with the center of the shaft. While applying a light downward pressure to the hub, toward the encoder mounting surface rotate the base until your two mounting holes are in line. Continue applying light pressure down toward the mounting surface, and lock the base of the encoder down to the motor or mounting surface using two #4-40 screws.
4. Next insert the .050" hex Allen head driver into the set screw located near the center of the aluminum hub. View figure 1, "set screw access channel". Press down on the gapping plug and using the Allen wrench slide the hub and disk assembly up until a stop is felt. Tighten the set screw against the shaft. Finally release the gapping plug. (Note the air gap between the disc and reticle assembly should now be set at .003".) Although it is not necessary, you can verify the correct gap setting with a piece of non abrasive plastic shim stock .003" (green color stock).
5. If you are not going to verify electrical outputs, install the cover on the encoder with the 2 #2-56X3/16 screws provided.

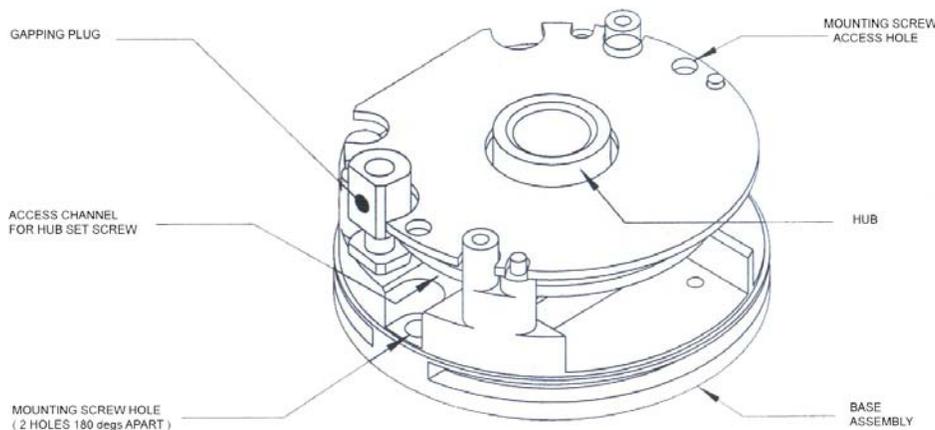
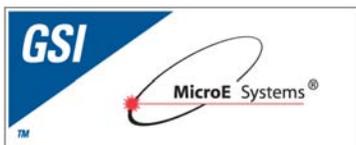


FIGURE 1



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