

OPTICAL ENCODER > ABSOLUTE KIT ENCODER > TRACKER



FEATURES:

- Modular Kit Optical Encoder
- All Electronics Contained in Read Station
- True Absolute 24-bit Position Output
- Vacuum Compatible
- Sample rate to 1kHz
- In-Situ Auto Calibration (360° or limited angle)
- Radial alignment reporting
- Radiation tested sample to 40 krad(Si) Co60

APPLICATIONS:

- Commercial Space Applications
- SmallSats
- Mechanisms/Gimbals
- Laser Communications
- Satellite Constellations
- Large Thru-Bore Designs

THIS DATASHEET COVERS COMMERCIAL AND COMMERCIAL SPACE TRACKER UNITS- SEE MM-275 FOR SPACE QUALIFIED TRACKER OFFERINGS

OPTICAL ENCODER > ABSOLUTE KIT ENCODER > TRACKER**DESCRIPTION:**

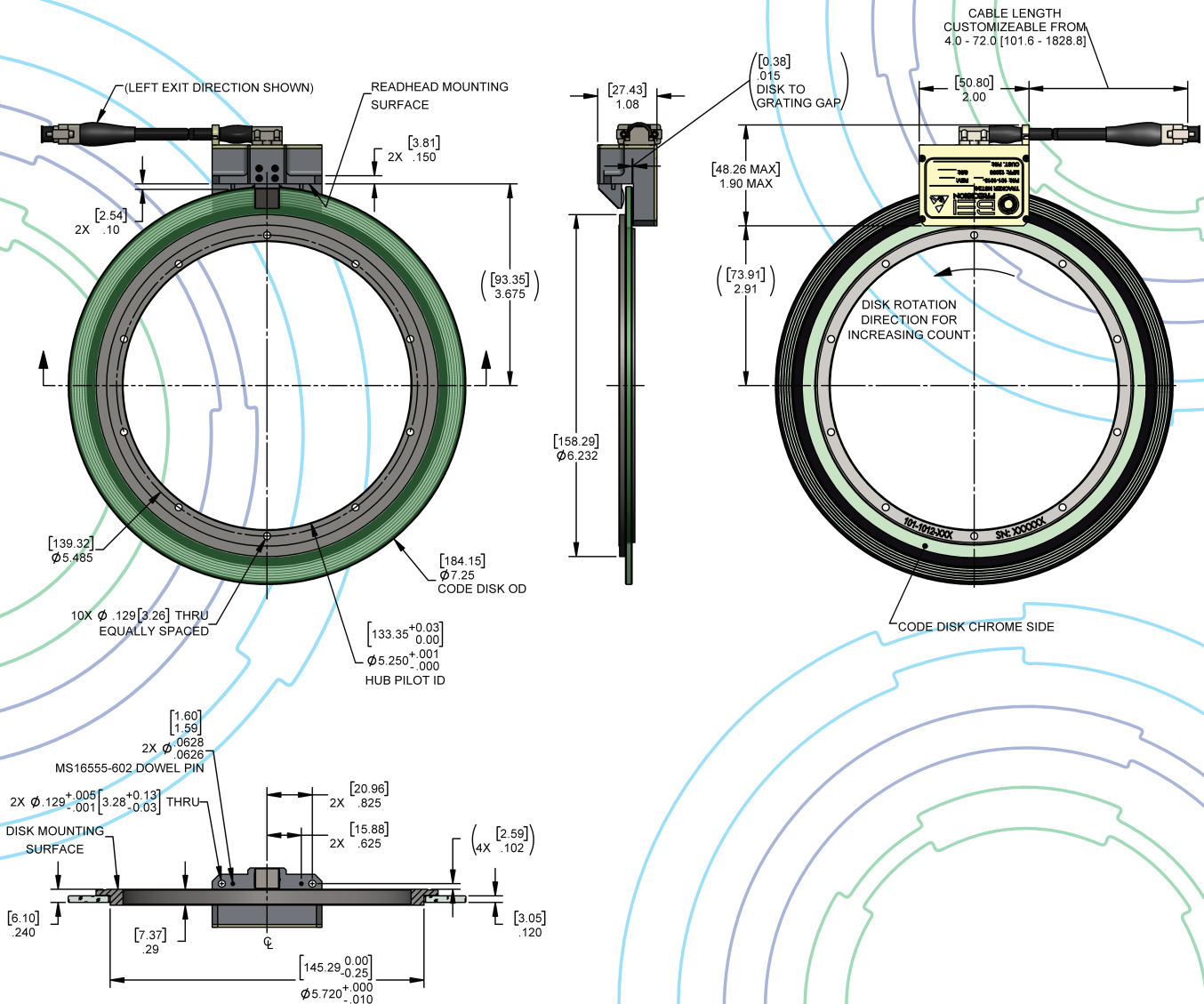
BEI Precision Systems & Space Company is now offering an Absolute Modular Encoder configuration in the nanoSeries® Encoder family, intended for a commercial space application. This is a single read station, absolute optical encoder available in disk sizes 3.0" (76.2 mm) OD to 12.0" (304.8 mm) OD disk diameter. This model achieves a resolution of up to 24 bits with accuracy of < 2.5 arcsec RMS (excluding user bearing and spindle errors). The encoder comes equipped with in situ auto-calibration capability for full revolution movements and also for limited angles (minimum sweep 22.5°). Mounting and alignment on a loose pilot shaft along with a radial alignment reporting feature makes precise alignment of the code disk and readhead easy and fast. The optical system uses a large air gap (0.015 in.) and is tolerant to shock and vibration induced gap variations.

The absolute encoder data is derived from several tiers of multi-speed sinusoidal data tracks which are digitized and merged into a contiguous data word. The resultant absolute position word is not sensitive to power interruptions. This technique minimizes the number of data tracks (minimizes size and parts count). All data is derived from ratiometric tracks on the code disk, resulting in excellent tolerance to aging, temperature, etc.

FOR MORE INFORMATION CONTACT
SALES@BEIPRECISION.COM

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READHEAD & CODE DISK IN INSTALLED STATE
 (7.25" CODE DISK & LEFT-EXIT READHEAD SHOWN)



NOTES:

- SEE APPLICABLE OUTLINE DRAWING FOR COMPLETE DIMENSIONAL SPECIFICATIONS AND MOUNTING INTERFACE RECOMMENDATIONS.
 - 190-0324-01 (7.25")
 - 190-0324-02 (3.00")
 - 190-0324-03 (4.00")
 - 190-0324-04 (5.00")
 - 190-0324-05 (6.00")
 - 190-0324-08 (9.00")
 - 190-0324-10 (11.00")
 - 190-0324-11 (12.00")
- UNBRACKETED DIMENSIONS ARE INCHES AND BRACKETED [X.XX] DIMENSIONS ARE MILLIMETERS.

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CONNECTOR PINOUT:

The standard nanoSeries® TRACKER output connector is a 9-socket Micro-D Connector (M83513/04-A__N type) with the following pinout:

Pin	MNEMONIC	I/O	Description
1	+POS	Out	Position data output
6	-POS	Out	Position data output
3	+CMD	IN	Command word input
8	-CMD	IN	Command word input
2	+CLK	IN	Synchronous clock input
7	-CLK	IN	Synchronous clock input
4	+5 VDC	---	Supply Voltage
9	5V RTN	---	Supply Voltage return
5	CHAS	---	Chassis (case) ground

I/O: LVDS or RS422

OUTPUT PROTOCOL:

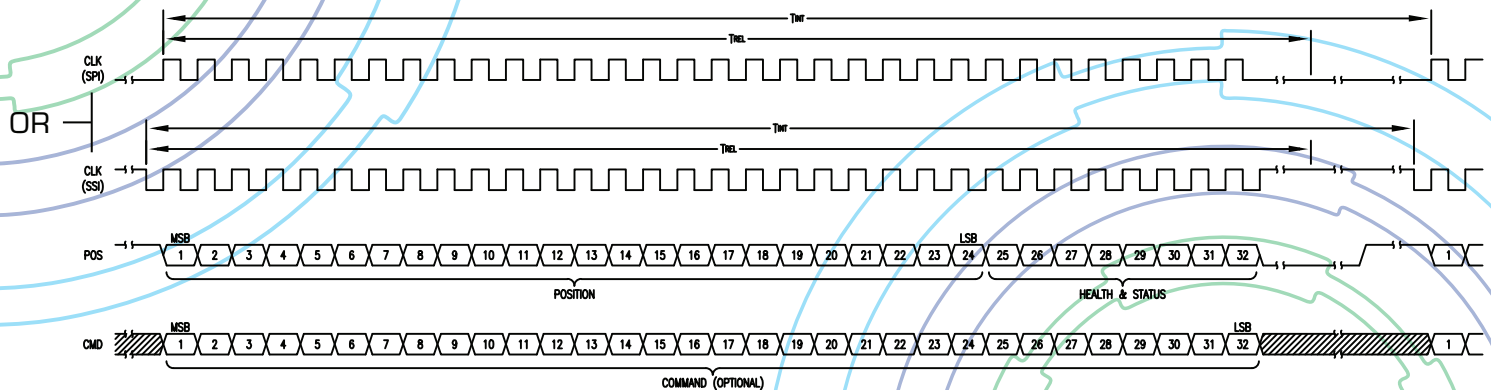


Figure 1.
 Electrical Interface Timing Diagram (System)
 Timing Values Per Table 1

Parameter	Symbol	Min	TYP	Max	Units
Encoder Data Relevancy*	T_{REL}	43	45.5	48	μ S
Encoder Interrogation Period	T_{INT}	1000	—	—	μ S
Clock Frequency		1.5	2	2.5	MHz

*Although data is sampled within 45 μ S (typ) of the CMD pulses, it is not shifted out until the next cycle
 Table 1.

Electrical Interface Timing Values (See 190-0323-03 For Details)

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GENERAL SPECIFICATIONS:

	Quanta/ Revolution	Resolution (Arc Seconds)	Accuracy (RMS) (Arc Seconds)	Speed (rps for full accuracy)
NST 24/xxx	16,777,216 (24-BIT)	0.077 (0.375 μ rad)	2.5 ⁽¹⁾	5 max ⁽²⁾
Interrogation Rate		1kHz max		
Acquisition Time		45.5 μ sec typ (See note on Table 1)		
Slew Speed (non-operating)		5 rps max		
Operating Temperature Range		-40°C to +85°C		
Storage Temperature Range		-55°C to +90°C		
Mass, Max (grams)	Structural Component Material ⁽³⁾	Stainless Steel Hub (M1 or M3 option)		Titanium Hub (M2 option)
		Readhead with 36" cable	151	124
		Readhead with L" cable	103.2+1.35(L)	75.5+1.35(L)
		3.00" Disk/Hub	59	44
		4.00" Disk/Hub	97	72
		5.00" Disk/Hub	144	98
		6.00" Disk/Hub	243	166
		7.25" Disk/Hub	292	210
		9.00" Disk/Hub	470	310
		11.00" Disk/Hub	634	414
12.00" Disk/Hub	700	457		
Input Power	+5 VDC \pm 10% at 40 ma nominal			
Altitude	Vacuum-compatible (all materials < 1.0% TML and < 0.1% CVCM)			
Vibration	20.7 grms from 10 to 2000 Hz per MIL-STD-202, Condition 1, profile F			
Shock	50g at 11ms half-sine pulse per MIL-STD-202, Method 213B, Test Condition A ⁽⁴⁾			
Relative Humidity	To 99% (avoid condensation)			
Electromagnetic Compatibility	Per MIL-STD-461F: CE102: Conducted Emissions, Power Leads, 10kHz – 10MHz			
ESD (HBM)	8kV			

(1) Does not include mounting errors

(2) TRACKER is a strobed encoder, higher speeds = greater position lag

(3) Structural component materials are limited to readhead housing, disk hub, and optics housing. Other components are made of aluminum.

(4) Tested to this limit. Actual limit is much higher. Consult Factory.

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ORDERING INFORMATION:

NST 24 / 300 P1 M1 D1 CS - L 36

Resolution
Bits/Turn

Outside disk diameter
(x100)
300 = 3.00 inch
400 = 4.00 inch
500 = 5.00 inch
600 = 6.00 inch
725 = 7.25 inch
900 = 9.00 inch
1100 = 11.00 inch
1200 = 12.00 inch

Input voltage
P1: 5VDC

Structural Component Materials
M1 = 416 stainless steel
M2 = titanium
M3 = titanium readhead, steel disk hub
(See Note 3 pg 5)

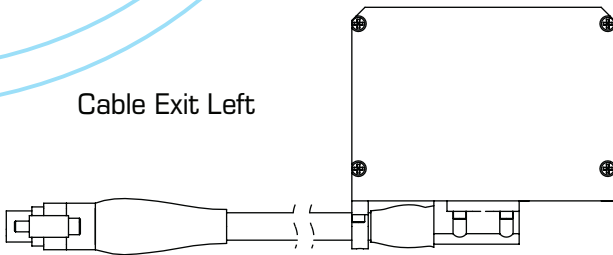
Serial Output Data Driver
D1 = LVDS
D2 = RS485

Product Assurance Level
(omitted) = Commercial, vacuum-compatible materials
CS = Commercial, Space Assembly, TVAC bakeout

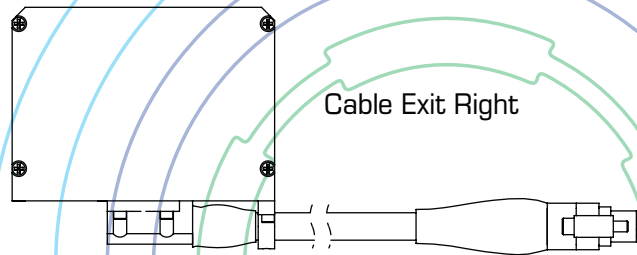
Cable Length
(4-72 inches in 1 inch increments)
36 = 36 inch
24 = 24 inch
12 = 12 inch
4 = 4 inch

Cable Exit
L = Left from electronics side
R = Right from electronics side

Cable Exit Left



Cable Exit Right



SPECIAL MODELS:

Many other sizes and configurations are possible at a nominal cost. Available options (priced separately) include special materials, cable or connector variations, etc. Contact the factory for price and delivery information.