

**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)
- +5.0 Volts Input Power < 0.5 Watt
- EEE-INST-002 Qualified Electronics
- Radial alignment reporting
- Radiation tolerant to 50 krad(Si)

APPLICATIONS:

- High Reliability Space Applications
- Earth Observing - featured on NASA PACE
- SmallSats
- Mechanisms/Gimbals
- Laser Communications
- 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 > SPACE TRACKER**DESCRIPTION:**

BEI Precision is now offering a Space Qualified Encoder configuration in the nanoSeries® TRACKER family. This is a single read station, absolute optical encoder available in disk sizes 3.0" (76.2 mm) to 7.25" (184.2 mm) diameter. This model achieves a resolution of 24 bits with accuracy of < 2.5 arcsec RMS (excluding user bearing and spindle errors). Electronic components are qualified to Level 1 or Level 2 per GSFC EEE-INST-002. 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 the 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.

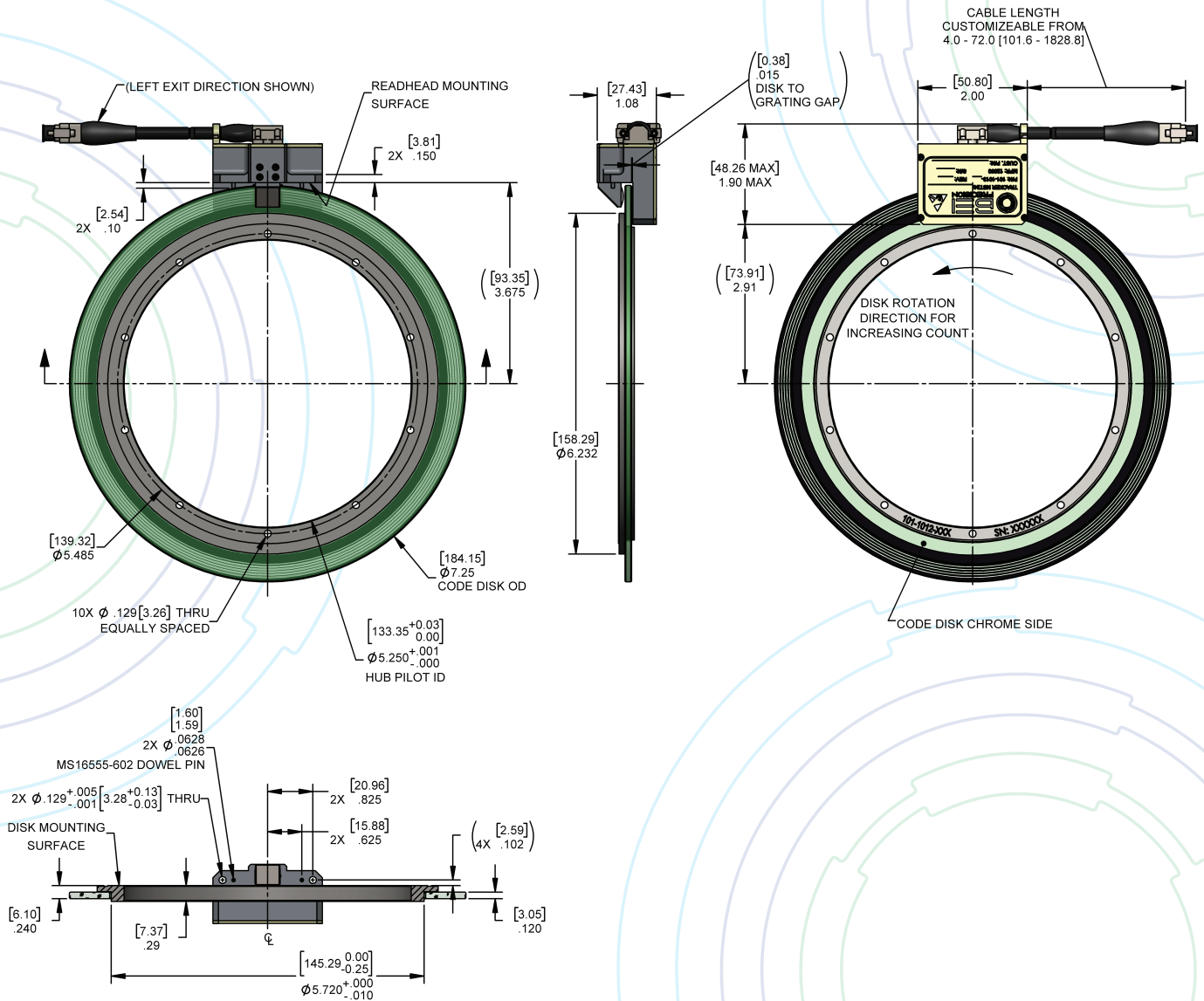
The absolute encoder data is derived from several tiers of multi-speed sinusoidal data tracks which are digitized and merged into a contiguous data word. The resultant absolute position word is not sensitive to power interruptions. This technique minimizes the number of data tracks (minimizes size and 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")
- UNBRACKETED DIMENSIONS ARE INCHES AND BRACKETED [X.XX] DIMENSIONS ARE MILLIMETERS.

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CONNECTOR PINOUT:

The standard nanoSeries® Space 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

OUTPUT PROTOCOL:

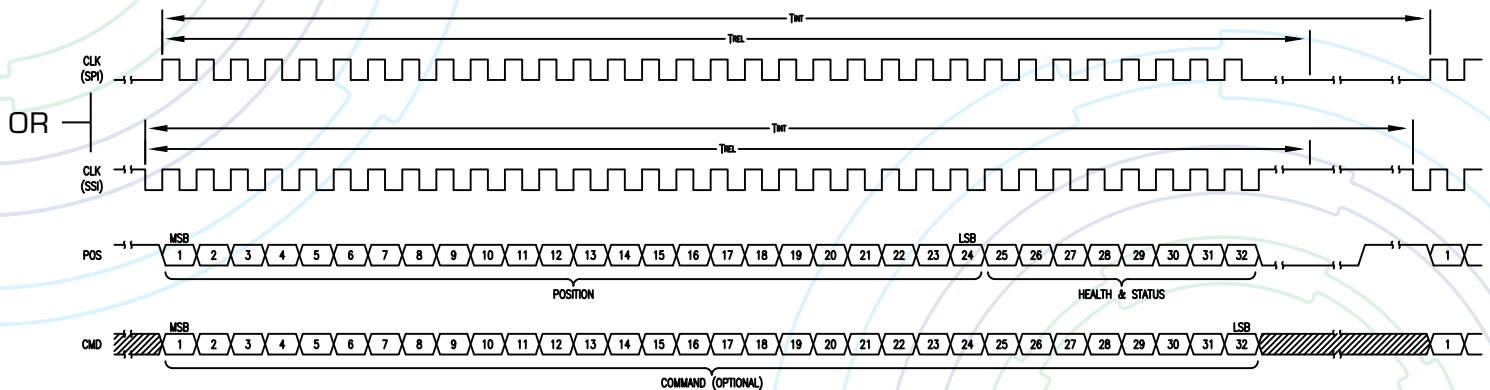


Figure 1.
 Electrical Interface Timing Diagram (System)
 Timing Values Per Table 1

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)		
Operating Temperature Range		-40°C to +67°C		
Storage Temperature Range		-55°C to +90°C		
Mass, Max (grams)		Structural Component Material ⁽³⁾	Stainless Steel	Titanium
			Readhead with 36" cable	151
		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
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		Consult Factory		
ESD (HBM)		8kV		

(1) Does not include mounting errors

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

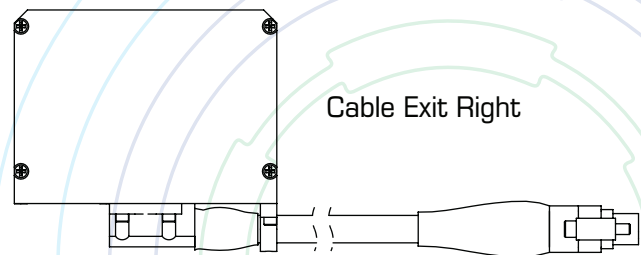
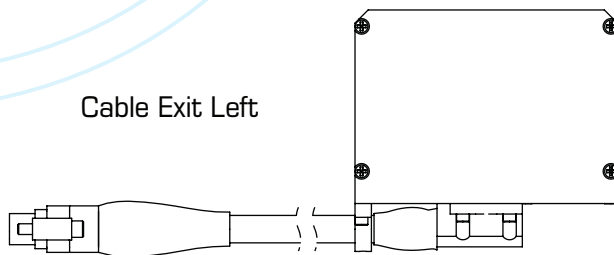
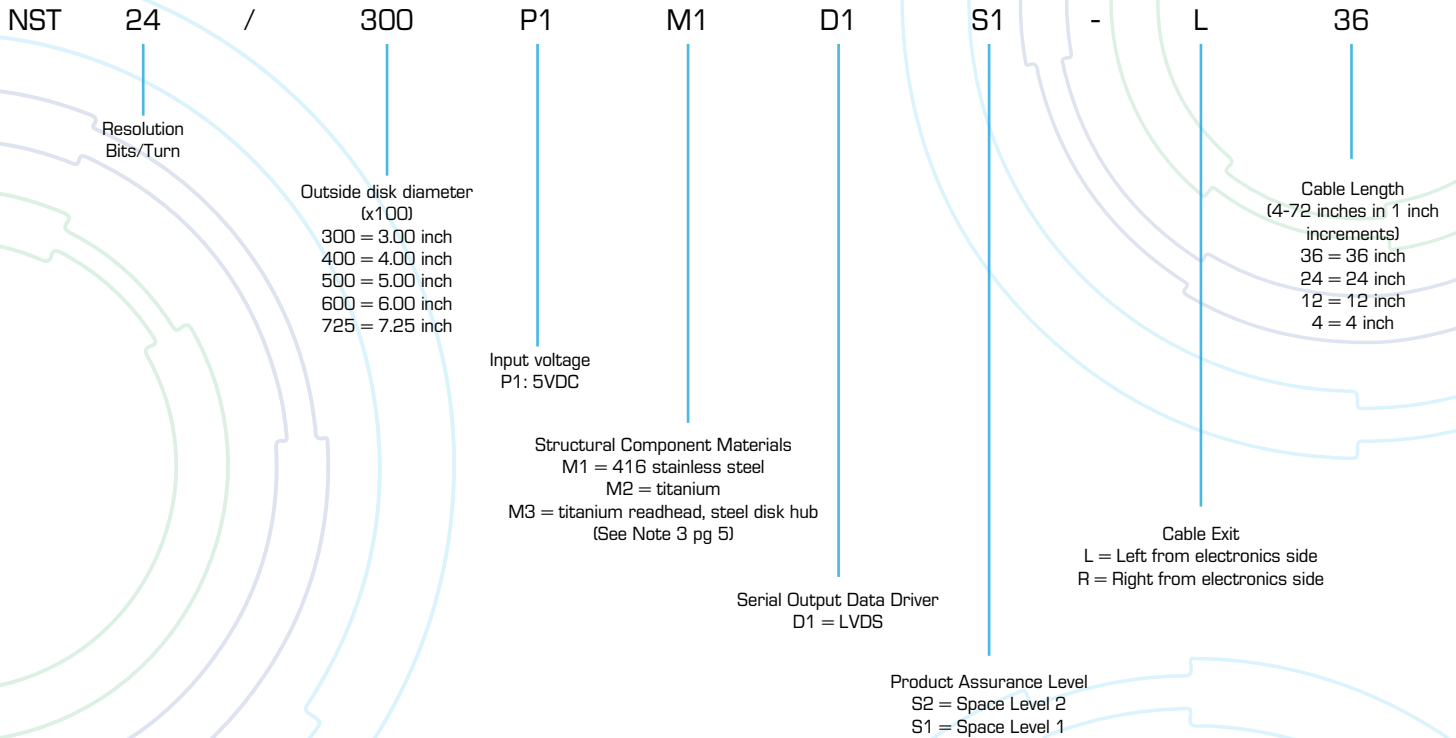
(3) Structural component materials are limited to readhead housing, disk hub, and optics housing. Other components are made of aluminum.

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

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SALES@BEIPRECISION.COM

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ORDERING INFORMATION:



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.