



An Affiliate of ELECTRO SWITCH

T1XXX OEM Industrial Trackball

NEMA 12 (IP54) OEM Industrial Trackball Sub-Assembly

T1XXX INDUSTRIAL TRACKBALL

CTI's OEM T1XXX Series Industrial Trackball sub-assembly is comprised of a proprietary mineral filled rollerball, ABEC 7 shielded bearings, stainless steel shafts, Teflon Ring, Aluminum Collar, Delrin (or Aluminum) housing, optical encoders, metal encoder wheels, and patented infrared LED age compensating circuitry and firmware. The 2.0 inch (50mm) diameter rollerball has a homogeneous density with an unrivaled moment of inertia and the ability to withstand expansion/contraction over an operating temperature range of -40°C to +80°C. Shielded ABEC bearings and the stainless steel shafts ensure a minimum of 100,000 hours of usage. A Teflon Ring with optional Vibration Dampening Material will ensure smooth rotation and variation of the breakout force upon the rollerball for mobile applications. The aluminum mounting collar will retain the rollerball against a shock of 10g. Lastly, the quadrature signal is directly correlated to the optical encoders, metal encoder wheels, and encoder wheel count (640 counts/revolution). With an optional digital interface PCB the quadrature signal is converted to a USB Mouse Protocol or legacy PS/2, RS-232 Microsoft Serial Mouse, or RS-232 Mouse Systems Serial Protocol. Legacy protocols can also be offered using an RS-422/RS-485 electrical interface PCB. Optionally, the USB firmware can double or quadruple the encoder count for high pixel density and/or large screen sizes (i.e. UHD 4k / 8k, 2160p / 4320p). The digital interface PCBs provide header inputs for CTI's NEMA 4 (IP66) sealing [OEM three button switchpad assembly](#) providing left, middle and right mouse button functionality.

The NEMA 12 (IP54) sealing Industrial Trackball sub-assembly is most suitable for critical applications requiring high durability (10+ years), high reliability (99.999% availability), and/or ensured performance over extended operating temperatures. It's well protected against high vibration, exposure to electromagnetic and radio frequency interference, electro static discharges, shocks, and humidity.

This OEM Industrial Trackball sub-assembly and digital interface PCB is offered to Original Equipment Manufacturers as an open frame module with exposed electrical components that requires mounting and encasement. The T1XXX Series industrial trackball sub-assembly mounts with four screws and occupies just 1.23" (31.24mm) of below panel depth. The digital interface PCB is properly positioned adjacent to the trackball sub-assembly and fastened within a metal enclosure. The combined features of the OEM Industrial Trackball sub-assembly meet and/or exceed industry standards specifications in medical, military, and aerospace.

T1XXX MANUFACTURING OPTIONS

V/V1	Vibration Dampening Material (Standard / Light)
P1351	Optional Operating Temperature Range -40°C to 80°C (-40°F to 176°F)

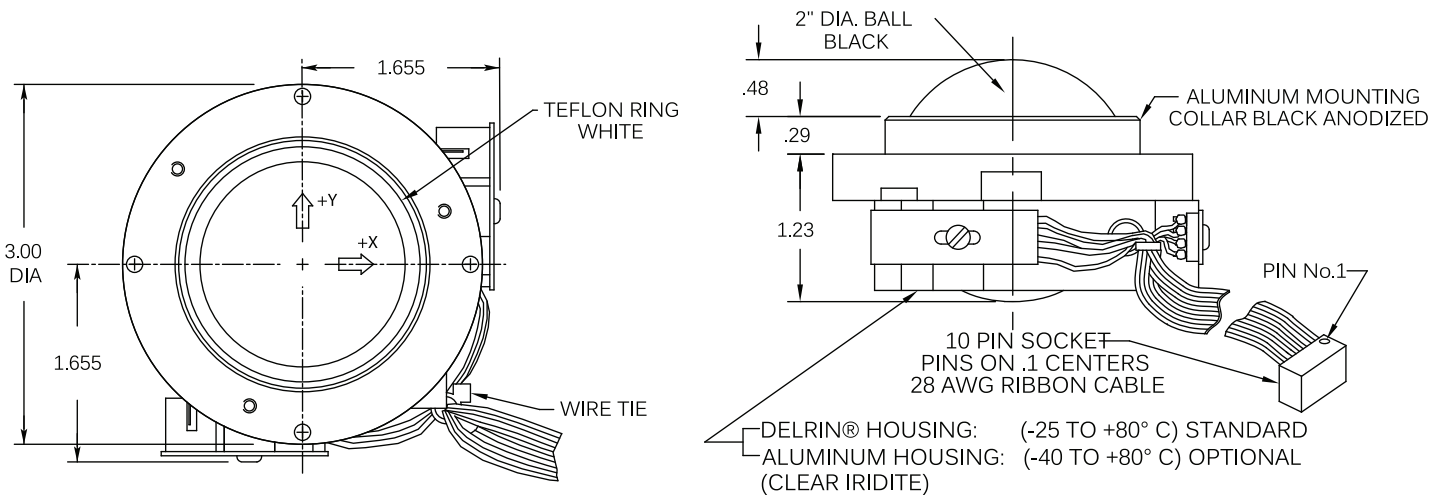
**For complete ordering information refer to Technical Drawings*

T1XXX TECHNICAL DRAWINGS

[761744](#)

[T1XXX OEM Industrial Trackball](#)

T1XXX OEM MILITARY TRACKBALL TECHNICAL DRAWING



CTI Technical Drawing 761644-1 (T1XXX)

• Shown above T1XXX OEM Aerospace Trackball

T1XXX STANDARD FEATURES

- NEMA 12 (IP54) sealing
- Standard Operating Temperature -25°C to 80°C (-13°F to 176°F)
- Optional Operating Temperature -40°C to 80°C (-40°F to 176°F)
- High reliability and durability (MTBF 100,000+ hours, 20,000,000+ random cycles)
- Trackball sub-assembly and PCB layout offers EMI/RFI shielding and Ground Connection (ESD)
- Optional USB Digital Interface PCB with USB Cable
- Optional Serial Digital Interface PCB
- Precision Ground Ball with ± 0.002" Tolerance
- Precision ground and hardened stainless steel shafts
- PTFE Sealing ring in aluminum collar ensures smooth ball rotation
- Micro etched metal encoder wheels allow for greater resolution than possible with plastic
- Precision instrument grade, shielded, bearings (ABEC Grade 7)
- Dual IR Optical Encoders with patented circuitry for LED aging
- 2.0" (50mm) Diameter Trackball
- 0.29" (7.37mm) Collar Ring Height



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OEM INDUSTRIAL TRACKBALL COMPARISON CHART

	T6XXX		T7XXX		T1XXX	T8XXX
Dimensions (Inches)	2.32" x 2.32" x 1.33"		2.50" x 2.50" x 1.50"		3.00" x 3.00" x 2.00"	
Dimensions (mm)	58.93 x 58.93 x 33.78mm		63.50 x 63.50 x 38.10mm		76.20 x 76.20 x 50.80mm	
Trackball Diameter	1.3" (33mm)		1.5" (38mm)		2.0" (50mm)	
Weight	105g (-25° to 80° C)	125g (-40° to 80° C)	130g (-25° to 80° C)	155g (-40° to 80° C)	250g 280g	275g 305g
Trackball Materials	Specially formulated mineral filled ball, precision ground to ± 0.002" tolerance					
	Precision ground and hardened stainless steel shaft					
	PTFE sealing ring in aluminum collar for smooth ball rotation					
	Micro etched metal encoder wheels allow for greater resolution than possible with plastic					
	Precision instrument grade, shielded, bearings (ABEC Grade 7)					
Azimuth	Standard: 0° to 30° incline			Optional: > 30° Incline (Call Factory)		
Vibration	Standard Vibration Dampening (V Option)			Light Vibration Dampening (V1 Option)		
Output Signal	Quadrature (Square Wave)					
	OPTIONAL COMPONENTS					
Electrical Interface	USB Digital Interface PCB: C60U0-C82-x.x			Serial Digital Interface PCB: C6020-C91 (RS-422/RS-485)		
Mouse Protocol	USB with Cable			Microsoft Serial Mouse Protocol (-MSOF Option)		
				Mouse Systems Serial Protocol (-MSYS Option)		
Mouse Button	Optional 3-Button Switch Assembly: C200xA Swich					
Mouse (Cursor Speeds)	Standard Encoder Count (HD 1080p)	2 x Encoder Count (UHD 4k/8k 2160p/4320p)		4 x Encoder Count (UHD 4k/8k 2160p/4320p)		

T1XXX SPECIFICATION

T1XXX Measurements	Width: 3.00" (76.20mm)	Height: 3.00" (76.20mm)	Depth: 2.00" (50.80mm)	Weight: 280g 305g (P1356)
Trackball Specification	Diameter 2.0" (50mm)	Resolution	640 cts/rev	Encoder Wheel 0.73" Dia.; 40 Slots
Operating Systems	Microsoft Windows® Operating System (Windows XP, Windows 7, Windows 8, Windows 10), Mac OS X® or Linux OS			

T1XXX ELECTRICAL SPECIFICATION

MTBF	Greater than 100,000 hours per MIL-HDBK-217F (For Military Trackball & Aerospace Trackball)			
Cabling	Ribbon cable with 10-Pin IDC Connector has Standard 0.1" (25.4mm) Spacing			
Power Requirements	Max 40mA @ 5V without interface PCB		Max 70mA @ 5V with interface PCB	
EMI/RFI Shielding	Designed into Trackball sub-assembly and interface PCB			
ESD Protection	8Kv (Contact), 15Kv (Air)			
Infrared LEDs	Dual IR Optical Encoders with patented circuitry for LED aging			

T1XXX MECHANICAL SPECIFICATION

Life Expectancy	20,000,000 random cycles			
Shock	Peak Value 10g	Peak Duration 11ms	Waveform Half Sine	
Vibration	Frequency / Displacement 5 -55 Hz @ 0.013 DA			

T1XXX ENVIRONMENTAL SPECIFICATION

Operating Temperature	Standard: -25° C to 80° C / -13° F to 176° F	Optional: -40° C to 80° C / -40° F to 176° F (P1351 Option)
Storage Temperature	-40° C to 80° C / -40° F to 176° F	
Relative Humidity	up to 95% condensing per MIL-STD-810G	
Sealing Rating	NEMA 12 (IP 54)	
Operating Environment	Up to 40,000 ft with conformal coating	

CONFORMANCE / CERTIFICATIONS / COMPLIANCE

subject to manufacturing options applied

U.S.A. Standards	U.S. FCC 47 CFR 15 Class A & B	RF Emissions Compliant 8Kv (Contact), 15Kv (Air)
	RTCA DO-160	Airborne Equipment and Instruments Conformance
	MIL-STD-461F	Radiated Emissions and Susceptibility Conformance
	MIL-STD-810G	Protection against humidity, fungus, and salt spray Conformance
	MIL-STD-901D	Protection against shock Conformance
	MIL-STD-167-1	Protection against vibration Conformance
	MIL-HDBK-217F	Military & Aerospace Reliability Conformance
	MIL-I-45208	Quality System Conformance
European Standards	IPC-A-610 II	Acceptability of Electronics Assemblies Certification
	ISO 9001:2008 (Registration No. 74 300 3983)	
	"CE" Compliant	
	Restriction of Hazardous Substance (RoHS) Directive Compliant	
International Standards	Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Directive Compliant	
	IEC 61000-4-2 and EN61000-4-2	ESD 8Kv contact and 15Kv air Conformance
	IEC 61000-4-3 and EN61000-4-3	Radiated Emissions and Susceptibility Conformance
	IEC 61000-6-3 and EN61000-6-3	Electromagnetic Compatibility Conformance

performance

durability

reliability