



An Affiliate of ELECTRO SWITCH

T7XXX OEM Industrial Trackball

NEMA 12 (IP54) OEM Industrial Trackball Sub-Assembly

T7XXX INDUSTRIAL TRACKBALL

CTI's OEM T7XXX 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 1.5 inch (38mm) 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 30g. Lastly, the quadrature signal is directly correlated to the optical encoders, metal encoder wheels, and encoder wheel count (480 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 T7XXX Series industrial trackball sub-assembly mounts with four screws and occupies just 0.90" (22.86mm) 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.

T7XXX MANUFACTURING OPTIONS

| | |
|-------|---|
| V/V1 | Vibration Dampening Material (Standard / Light) |
| P1357 | Optional Operating Temperature Range -40°C to 80°C (-40°F to 176°F) |

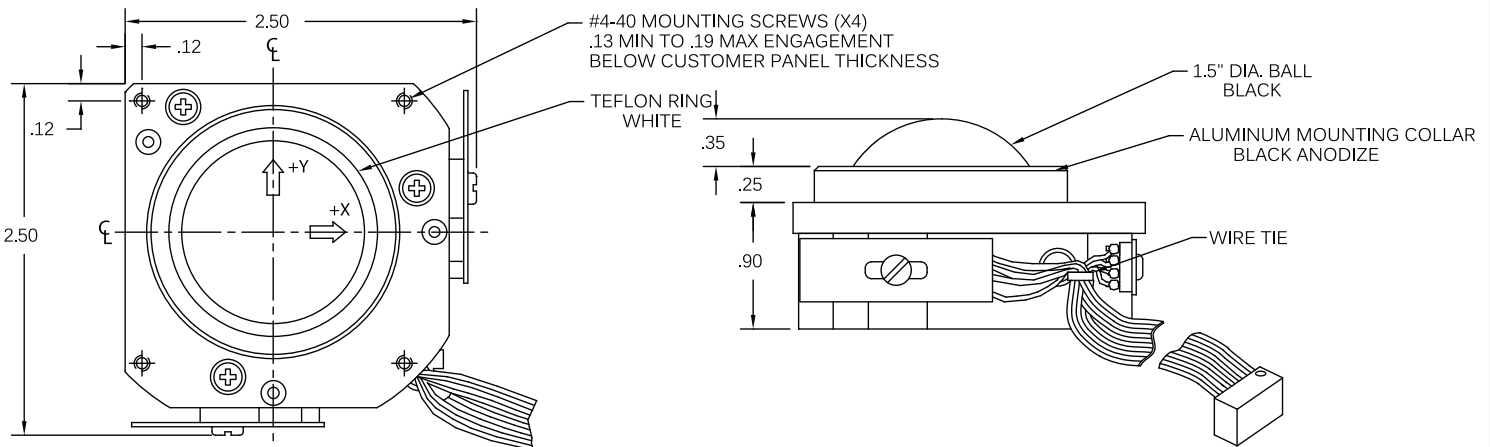
*For complete ordering information refer to Technical Drawings

T7XXX TECHNICAL DRAWINGS

[761698](#)

[T7XXX OEM Industrial Trackball](#)

T7XXX OEM MILITARY TRACKBALL TECHNICAL DRAWING



CTI Technical Drawing 761698

performance

durability

reliability

• Shown above T7XXX OEM Aerospace Trackball

T7XXX 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
- 1.5" (38mm) Diameter Trackball



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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) | | | |

T7XXX SPECIFICATION

| | | | | | | |
|-------------------------|---|-------------------------|------------------------|-----------------------------|---------------|----------------------|
| T7XXX Measurements | Width: 2.32" (58.93mm) | Height: 2.32" (58.93mm) | Depth: 1.33" (33.78mm) | Weight: 105g 125g (P1356) | | |
| Trackball Specification | Diameter | 1.3" (33mm) | Resolution | 416 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 | | | | | |

T7XXX 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 | | | | | |

T7XXX MECHANICAL SPECIFICATION

| | | | | | | |
|-----------------|--|--------------------|--------------------|--|--|--|
| Life Expectancy | 20,000,000 random cycles | | | | | |
| Shock | Peak Value 100g | Peak Duration 11ms | Waveform Half Sine | | | |
| Vibration | Frequency / Displacement 5 -55 Hz @ 0.013 DA | | | | | |

T7XXX 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 (P1357 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 | | | |
| | IPC-A-610 II | | Acceptability of Electronics Assemblies Certification | | | |
| | European Standards | 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 | | | |
| | IEC 60945 and EN60945 | | Maritime navigation and radiocommunication Conformance | | | |

performance

durability

reliability