

X13 Series – 13mm Laser Trackball, Panel Mount, Quadrature Output



1. DESCRIPTION

Utilizing the latest and most advanced laser tracking technology, the X13 series laser Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications.

The laser tracking engine provides accurate cursor motion at all speeds, combining the benefits of solid state sensing (no moving parts except the ball) with the aesthetics, functionality and performance associated with the Cursor Controls product range.

The design incorporates a removable top ring as standard to allow for easy cleaning, decontamination, sterilisation and maintenance - ensuring continued optimum performance and operation under the harshest of conditions.

The X13 series trackballs are available with a variety of electrical outputs, tracking force options, and sealing capabilities up to IP68.

The trackball has been designed to be back of panel mounted as part of OEM keyboards and consoles

2. FEATURES

- Solid state sensing technology – laser tracking engine (Generation II)
- Sealing up to IP68
- Output: TTL Quadrature
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options

3. APPLICATIONS

- Medical systems
- Marine systems
- Custom keyboard applications
- Industrial consoles
- OEM custom solutions available

4. SPECIFICATIONS

4.1 MECHANICAL

4.1.1	Weight	~15 grams
4.1.2	Ball size	Ø12.7mm (0.5")
4.1.3	Ball material	Epoxy resin
4.1.4	Tracking force options	10 grams nominal – damper ring (see section 8 for ordering code details) 10-30 grams – Silicone rubber seal (see section 8 for ordering code details)
4.1.5	Ball load	50N (5Kg) maximum downward pressure for 2 minutes @20°C
4.1.6	Resolvable ball speed	30 IPS (inches per second)
4.1.7	Mounting position	All angles
4.1.8	Tracking engine	Laser navigation technology (Generation II) - solid state sensing
4.1.9	Top plate material / colour	PC/ABS / Black
4.1.10	Sealing gasket	Silicone seal (DC7091 black)

4.1 ELECTRICAL

4.2.1	Protocol	TTL Quadrature (Minimum of 4KHz sampling rate required)
4.2.2	Supply voltage	4.4V to 5.25V D.C.
4.2.3	Supply current	12mA typical, 25mA maximum
4.2.4	Resolution	300 counts per ball revolution +/- 10% @ 1 inch-per-second
4.2.5	Output connector	8 Way, right-angled JST film connector, part no: 08FM-1.0SP-1.9-TF
4.2.6	Mating output connector	Flexible flat cable (FFC), 1.0mm pitch
4.2.7	Laser safety class	Embedded class 1 laser safety, IEC 60825-1 – see section 9 for further details

4.2 ENVIRONMENTAL

4.3.1	Operating temperature	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
4.3.2	Storage temperature	-40°C to + 85 °C (IEC 60068-2-1, IEC60068-2-2)
4.3.3	Operating humidity	93% RH @ 40°C, non-condensing (IEC 60068-2-78)
4.3.4	Storage humidity	10%-95% non-condensing (IEC 60068-2-78)
4.3.5	Vibration	2g, 10-500Hz, 1 octave/min, 10 sweep cycles (IEC 60068-2-6)
4.3.6	Operating Shock	15g/11ms, ½ sine, 3 shocks in +ve and –ve direction, all 3 axes (IEC 60068-2-27)
4.3.7	Mechanical lifetime	1 million ball revolutions
4.3.8	MTBF	in excess of 100,000 hours (MIL-STD-217F)
4.3.9	ESD	15kV air-discharge and 8kV contact discharge (IEC 61000-4-2)
4.3.10	EMC	Radiated immunity - limits according to level 2 of IEC 61000-4-3 Radiated emissions to EN55022 class B
4.3.11	Sealing capability	IP68 (BS EN 60529) *

*When mounted in an IP68 enclosure

5. CONNECTION DETAILS

Connection is made to the X13 Series trackball by means of a single 8-way, right-angled, JST film connector (or equivalent). Table 1 highlights the connection details. Custom connections are available (please contact your local sales office for further details).

5.1 Output Connector: CN1

Description: header 8 way FM 1.0mm pitch

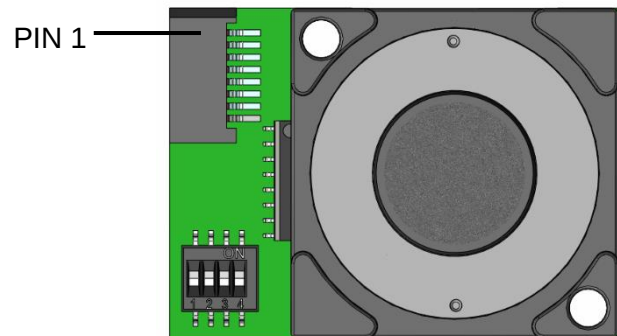
Manufacturer: JST (or equivalent)

Part No: 08FM-1.0SP-1.9-TF

Mating connector: Flexible flat cable (FFC), 1.0mm pitch

Pin Number	TTL Quadrature
1	+5V
2	X1
3	X2
4	Y1
5	Y2
6	0V
7	N.C
8	N.C

Table 1 Output connections



6. TRACKBALL CONFIGURATION

The X13 Series trackball provides features that may be selected using the DIP switch located on the printed circuit board. Table 2 details the assigned function of each switch.

6.1 DIP Switch Functions

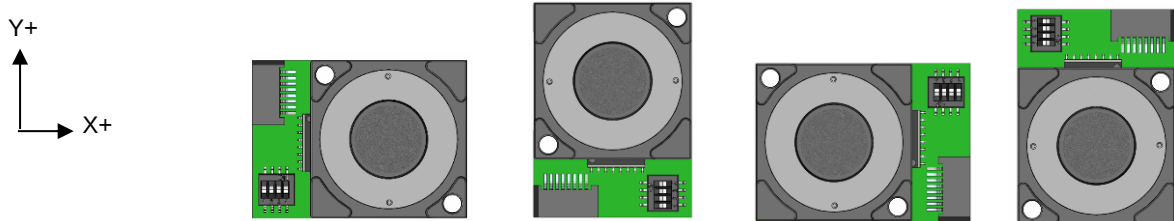
DIP Switch	Function	OFF	ON
1	Orientation 1 Setting	See Figure.1	See Figure.1
2	Orientation 2 Setting	See Figure.1	See Figure.1
3	Factory setting	Switch must be set in OFF position	
4	Factory setting	Switch must be set in OFF position	

Table 2 DIP switch functions

Factory default setting: All DIP switches OFF

6.2 Orientation

The orientation function allows the user to mount the X13 Series trackball device in one of four positions (see figure. 1 below). The orientation of the device is determined by the direction in which the output connector is facing (when viewed from the top of Trackerball device). The Tracker ball orientation can be selected to accommodate customer requirements for connector location and wiring.

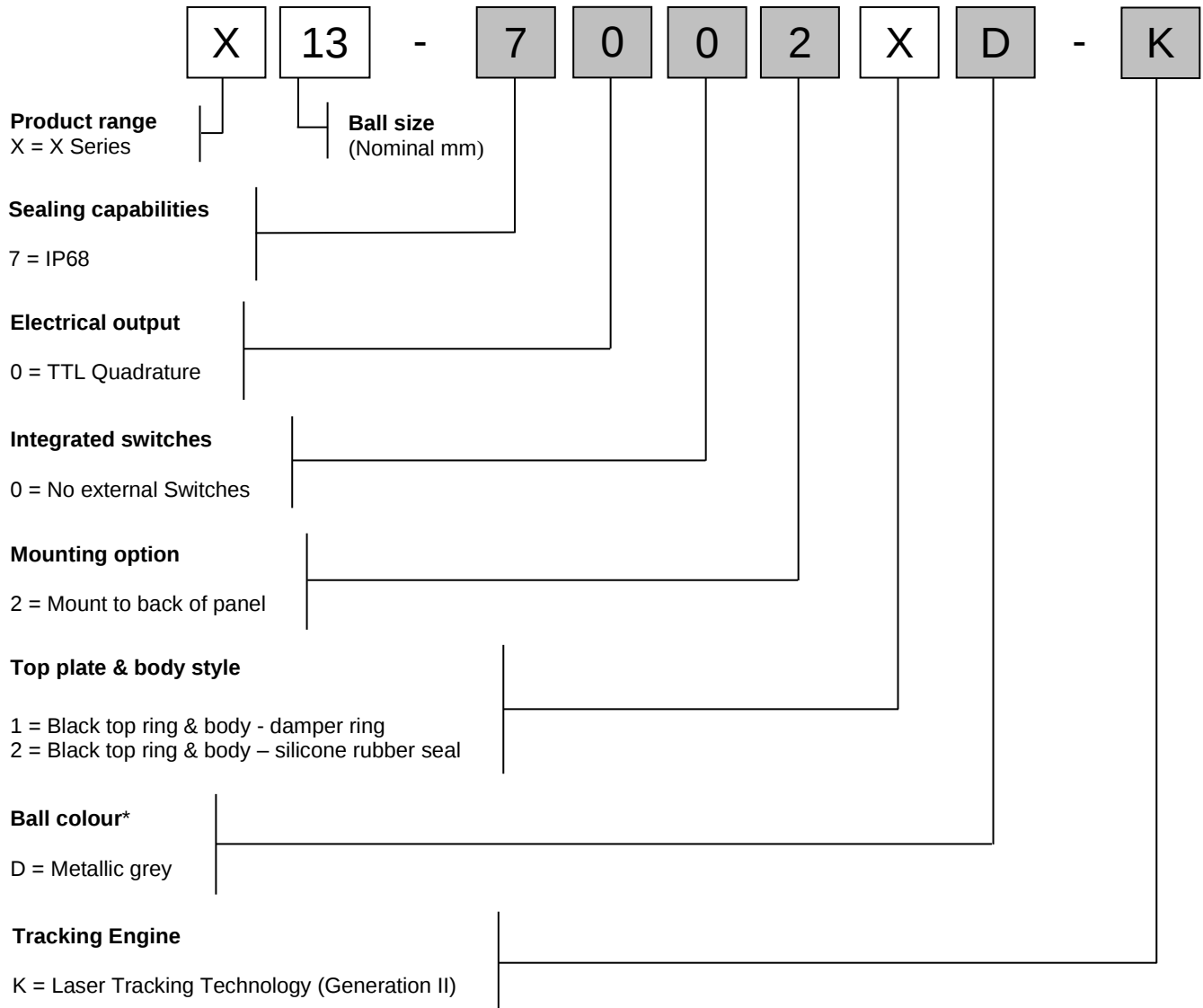


Switch 1(Orientation 1)	OFF	ON	OFF	ON
Switch 2 (Orientation 2)	OFF	OFF	ON	ON

Figure 1 Mounting Orientations

8. PRODUCT ORDERING CODE SYSTEM

Please construct your standard product ordering code by selecting the numbers and letters to suit your specification:



*For further options on ball colours please contact your local sales representative

8.1 Ordering Example

X13-70021D-K: X13, IP68, TTL Quadrature, no switches, mount to back of panel, black top ring - damper ring, metallic grey ball, laser tracking technology (generation II).

9. LASER SAFETY INFORMATION

The X-series trackballs contain a single 840-870nm semiconductor laser. The device is designed such that it fulfills laser safety class 1 regulations according to IEC60825-1 edition 3.0, 2014.

The laser radiation emitted is invisible to the human eye.

Although not considered harmful, staring into the laser beam is not advised.

Deliver labels as given below with the product and include these labels in the product documentation:

Explanatory Label:

To be printed in the documentation, optional on the product



Invisible laser radiation

Take the following precautions to avoid hazardous exposure to laser radiation:

- Do not try to disassemble the trackball.
- Do not contact any leads other than those indicated in this specification

10. DOCUMENT HISTORY

Issue	Date	Author	Remarks
A	26.10.2020	N.S	Document released

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