X25 Series – 25mm Laser Trackball, Panel Mount, USB & PS/2 Output

1. DESCRIPTION

Utilizing the latest and most advanced laser tracking technology, the X25 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 X25 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
- Outputs: USB & PS2 (auto-select)
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options available
- Various ball colours available
- VX3™ – integrated zoom feature for scroll wheel functionality

3. APPLICATIONS

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

4. SPECIFICATIONS

4.1 MECHANICAL		
4.1.1	Weight	~40 grams
4.1.2	Ball size	Ø25mm (0.98")
4.1.3	Ball material	PROX resin
4.1.4	Tracking force options	20 grams nominal – damper ring (see section 8 for ordering code details)
		20-50 grams – silicone rubber seal (see section 8 for ordering code details)
4.1.5	Ball load	100N (10Kg) 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	Housing material / colour	PC / ABS / Black
4.1.10	Sealing gasket	Cellular silicone (supplied)

4.2 ELECTRICAL		
4.2.1	Protocol	USB & PS/2 (auto-select)
4.2.2	Supply voltage	4.4V to 5.25V D.C.
4.2.3	Supply current	12mA typical, 20mA maximum
4.2.4	Resolution	650 counts per ball revolution +/- 10% @ 1 inch-per-second (linear tracking mode)
4.2.5	Output connector	6 Way JST, right-angled header, part no. S6B-PH-SM3-TB
4.2.6	Mating output connector	6 Way JST connector, part no. PH, CR or KR types (e.g. PHR-6)
4.2.7	Switch Inputs	3 switches: left, middle, and right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
4.2.8	Mating switch connector	4 Way JST connector, part no: PH, CR or KR types (e.g. PHR-4)
4.2.9	Laser safety class	Embedded class 1 laser safety, IEC 60825-1

4.3 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 250,000 hrs @ 25°C, Ground, Benign (MIL-HDBK-217F2)
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 3 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

4.4 ELECTRICAL OUTPUT COMPATIBILITY
Windows 7, 8 & 10
Redhat Linux
Fully compliant with USB 2.0 (Low Speed) framework (chapter 9) and HID specifications

5. CONNECTION DETAILS

Connection is made to the X25 Series trackball by means of two JST connectors (or equivalent). Tables 1 and 2 highlight the connection details. Custom connections are available (please contact your local sales office for further details).

5.1 Output Connector: CN1

Description: 6 Way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S6B-PH-SM3-TB
Mating connector: PH, CR or KR types (e.g. PHR-6)

Pin Number	USB & PS/2 (auto-select)
1	EARTH
2	SEE NOTE 1
3	5V D.C
4	D- , PS/2 Data
5	D+ , PS/2 Clock
6	0V

Table 1 Output connections

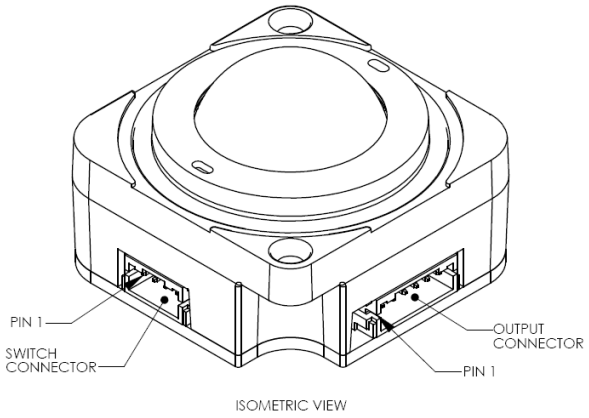
NOTE 1: Pin to be left floating (unconnected)

5.2 Switch Input Connector: CN2

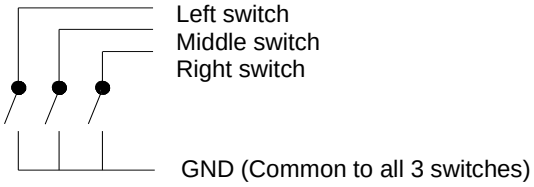
Description: 4-way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S4B-PH-SM3-TB
Mating connector: PH, CR or KR types (e.g. PHR-4)

Pin Number	Function
1	Left switch
2	Middle switch
3	Right switch
4	0V

Table 2 Switch connections



5.3 Switch Schematic



For alternative switch options and configurations please contact your local sales office.

6. TRACKBALL CONFIGURATION

The X25 Series trackball provides features that may be selected using the DIP switch located on the printed circuit board. Table 3 details the assigned function of each switch.

6.1 DIP Switch Functions

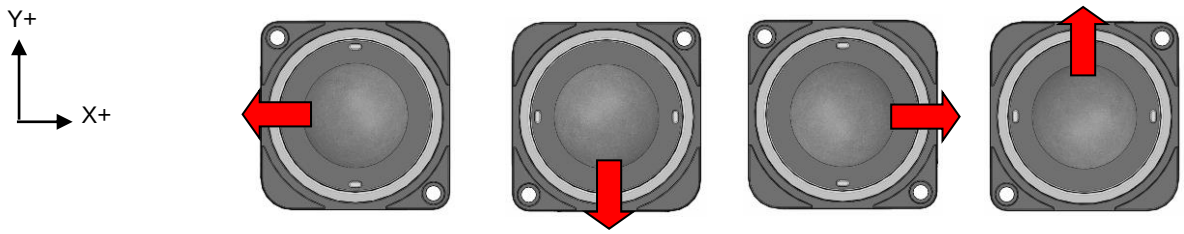
DIP Switch	Function	OFF	ON
1	Orientation 1 Setting	See Figure.1	See Figure.1
2	Orientation 2 Setting	See Figure.1	See Figure.1
3	VX3 - Virtual 3rd Axis Function	Feature Disabled	Feature Enabled
4	Tracking Mode	Ballistic	Linear (1:1)
5	Factory Setting	Switch must be set in the OFF position	
6	Factory Setting	Switch must be set in the OFF position	

Table 3 DIP switch functions

Factory default setting: All switches OFF

6.2 Orientation

The orientation function allows the user to mount the X25 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 direction of the output connector is denoted by the red arrow.
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

6.3 VX3™

VX3 is patent protected facility that provides the same 2 modes of functionality as a scroll wheel on a 3-axis mouse.

Operation:

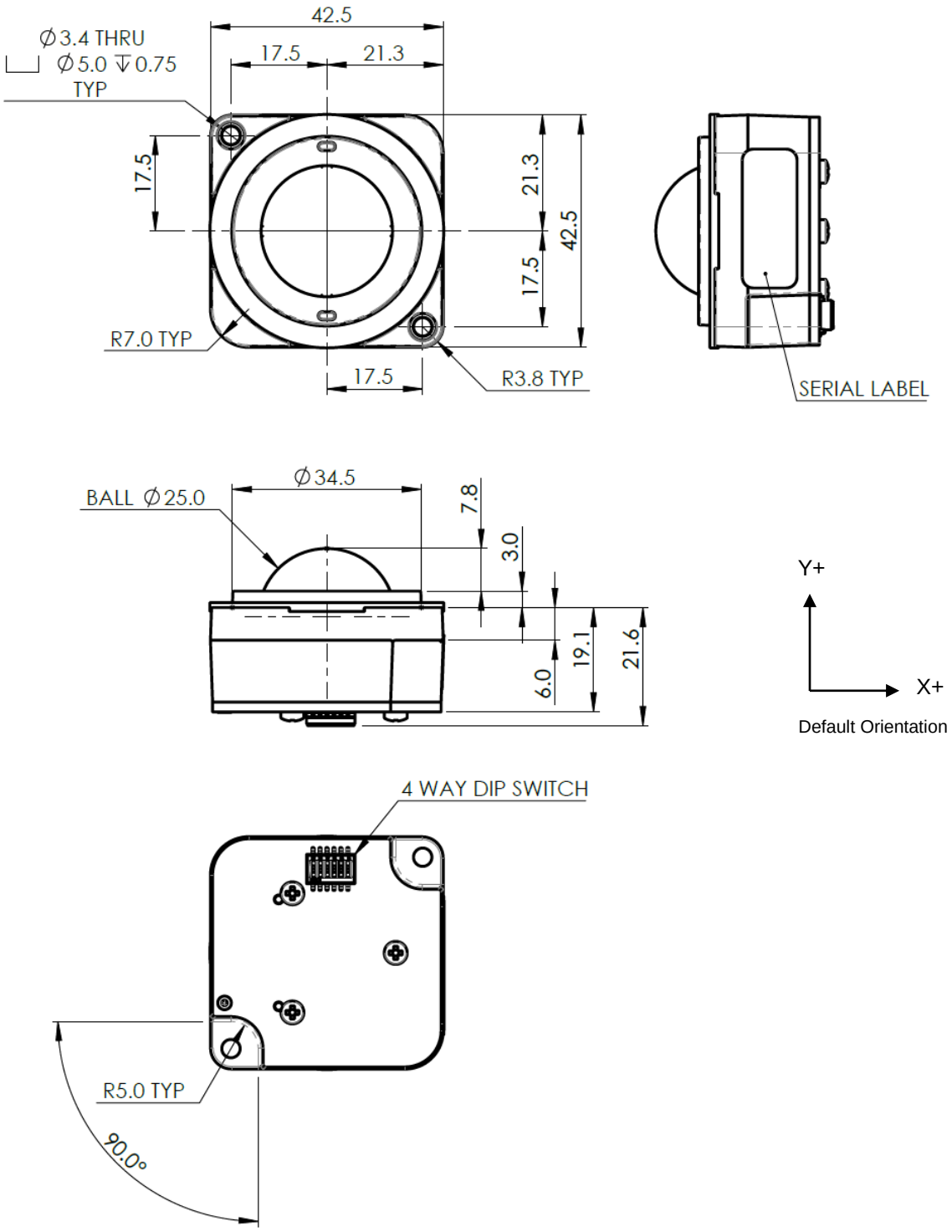
Press middle button once to latch scroll mode one (e.g. dynamic pan feature);
Press middle button again to latch scroll mode two (e.g. 3rd axis zoom feature);
Further middle button presses toggles between scroll mode one and scroll mode two;
Press either left or right buttons to cancel feature and resume normal X-Y cursor operation

6.4 Tracking Mode

Ballistic Tracking: Intuitive tracking algorithm to provide increased cursor resolution when tracking fast whilst retaining the original resolution for tracking accurately at slow speeds.

Linear Tracking: No tracking algorithm. 650 counts per ball revolution maintained at all tracking speeds.

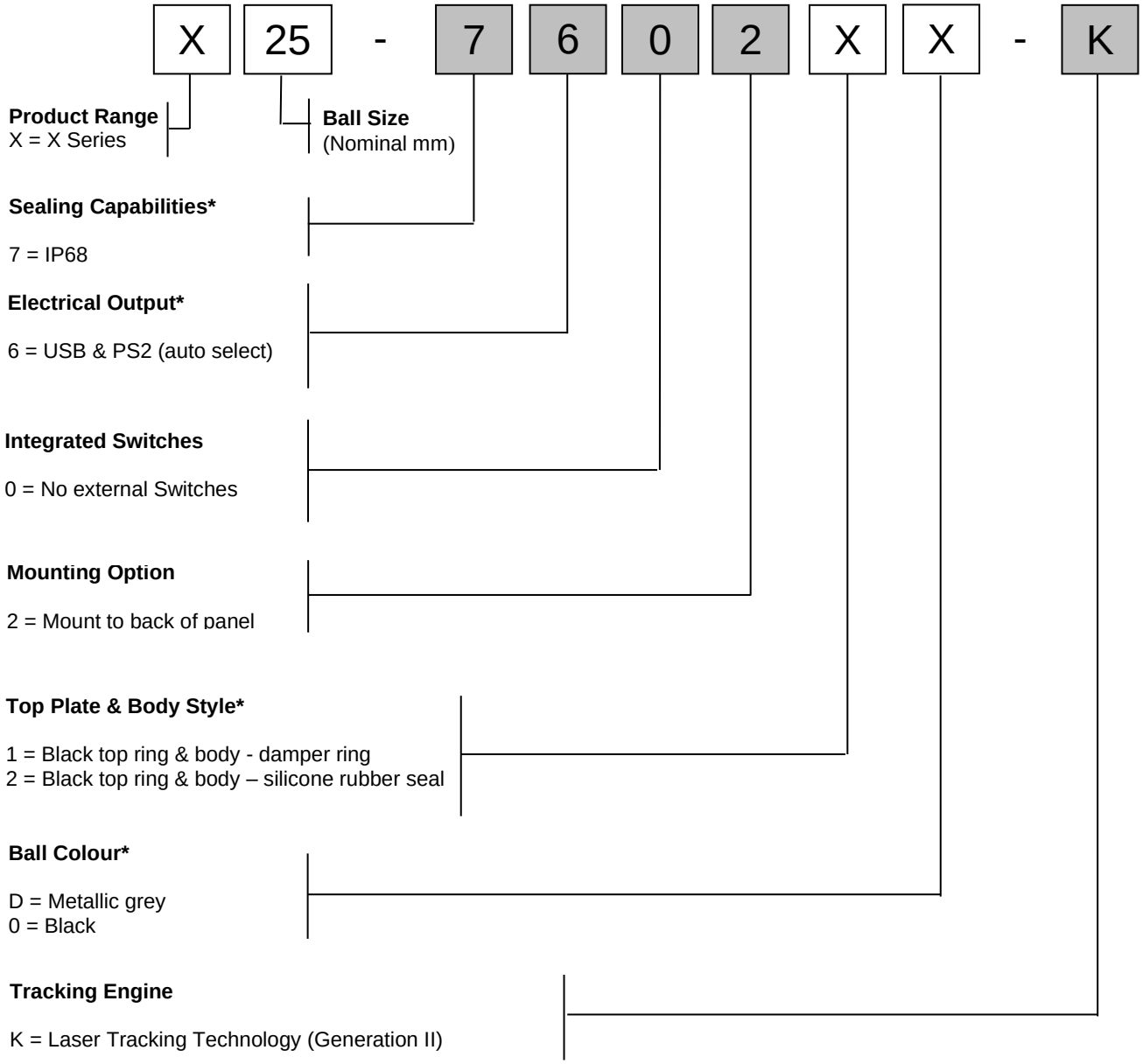
7. DIMENSION DRAWING



Dimensional drawing specifies factory default orientation.
All dimensions are in mm unless otherwise stated.
Tolerances +/- 0.25mm unless otherwise stated
Please note that an IGES model is available on request. Please contact your local sales office for more information.

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 please contact your local sales representative

8.1 Ordering Example

X25-76021D-K: X25, IP68, USB & PS/2, no external switches integrated, mount to back of panel, black top ring & body - 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	22.07.19	N.S	NP1206: Document released
B	13.01.22	C.E.	Outline drawing updated - Labelling clarified and dimensions updated