X50 Series – 50mm Laser Trackball, Panel Mount, Protocol Output

1. DESCRIPTION

Utilizing the latest and most advanced laser tracking technology, the X50 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 and on virtually any ball, 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 X50 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
- Sealing up to IP68
- Outputs: USB/PS2 (auto-select) or SUN Systems
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options
- Various ball colours
- 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

Weight	~150 grams
Ball size	Ø50.8mm (2")
Ball material	Phenolic, polyester, epoxy resin
Tracking force options	20 grams nominal – damper ring (see section 8 for ordering code details)
	30-80 grams – PTFE seal (see section 8 for ordering code details)
Ball load	200N (20Kg) maximum downward pressure for 2 minutes @20°C
Resolvable ball speed	40 IPS (inches per second)
Mounting position	All angles
Tracking engine	Laser navigation technology - solid state sensing
Housing material	PC/ABS
Sealing gasket	Cellular silicone (supplied)

4.2 Electrical

Protocol	USB, PS/2 (auto-select) or SUN Systems (see section 8 for ordering code details)
Supply voltage	4.4V to 5.25V D.C.
Supply current	25mA typical, 30mA maximum
Resolution	1200 counts per ball revolution @ 1 IPS (inches per second) +/- 10%
	2400 counts per ball revolution @ 5 IPS (inches per second) +/- 10%
Output connector	10 Way JST, right-angled header, part no. S10B-PH-SM3-TB
Mating output connector	10 Way JST connector, part no. PH, CR or KR types (e.g. PHR-10)
Switch Inputs	3 switches: left, middle, and right.
	Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Mating switch connector	4 Way JST connector, part no: PH, CR or KR types (e.g. PHR-4)
Laser safety class	Embedded class 1M laser safety, IEC 60825-1

4.3 Environmental

Operating temperature	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temperature	-40°C to + 85 °C (IEC 60068-2-1, IEC60068-2-2)
Operating humidity	93% RH @ 40°C, non-condensing (IEC 60068-2-78)
Storage humidity	10%-95% non-condensing (IEC 60068-2-78)
Vibration	5g, 10-500Hz, 1 octave/min, 10 sweep cycles (IEC 60068-2-6)
Operating Shock	15g/11ms, ½ sine, 3 shocks in +ve and –ve direction, all 3 axes (IEC 60068-2-27)
Non-operating shock	50g/11ms, ½ sine, 3 shocks in +ve and –ve direction, all 3 axes (IEC 60068-2-27)
Mechanical lifetime	1 million ball revolutions
MTBF	in excess of 80,000 hours (MIL-STD-217F)
ESD	15kV air-discharge and 8kV contact discharge (IEC 61000-4-2)
EMC	Radiated immunity - limits according to level 3 of IEC 61000-4-3
	Radiated emissions to EN55022 class B
Sealing capability	IP68 (BS EN 60529)

4.4 Electrical Compatibility

The X50 Series trackball has been tested for compatibility with the following operating systems;

Windows 95
Windows 98
Windows 2000
Windows ME
Windows NT4
Windows XP
Windows Vista
Redhat Linux
Sun Sparc
Fully compliant with USB 1.1 framework (chapter 9) and HID specifications

5. CONNECTION DETAILS

Connection is made to the X50 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: P1

Description: 10 Way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S10B-PH-SM3-TB
Mating connector: PH, CR or KR types (e.g. PHR-10)

Pin Number	USB/PS/2	SUN Systems
1		
2	SEE NOTE 1	SEE NOTE 1
3		
4		
5	EARTH	EARTH
6	EARTH	EARTH
7	5V D.C	5V D.C
8	D- , PS/2 Data	Data (1200 baud)*
9	D+ , PS/2 Clock	Do not connect
10	0V	0V

Table 1 Output Connections

* Optional BAUD rates available on request.

**NOTE 1:** Pin to be left floating (not connected)

5.2 Switch Input Connector: P2

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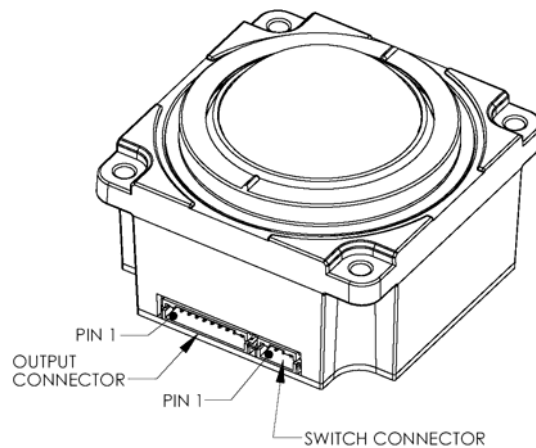Mating connector: PH, CR or KR types (e.g. PHR-4)

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

Table 2 Switch Connections

5.3 Switch Schematic

Left switch
Middle switch
Right switch

GND (Common to all 3 switches)
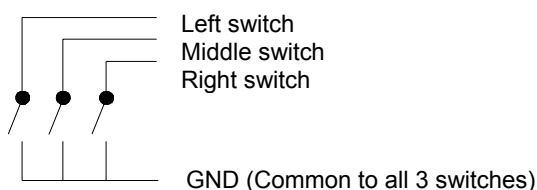
For alternative switch options and configurations please contact your local sales office.

6. TRACKBALL CONFIGURATION

The X50 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 3 Axis Function	Feature disabled	Feature enabled
4	Smart Feature	Feature disabled	Feature enabled
5	Tracking Mode	Ballistic tracking	Linear tracking
6	Factory Setting	N/A	N/A
7	Factory Setting	N/A	N/A
8	N/A	N/A	N/A

Table 3 DIP Switch Functions

Factory default setting: All DIP switches OFF

6.2 Orientation

The orientation function allows the user to mount the X50 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 track ball orientation can be selected to accommodate customer requirements for connector location and wiring.
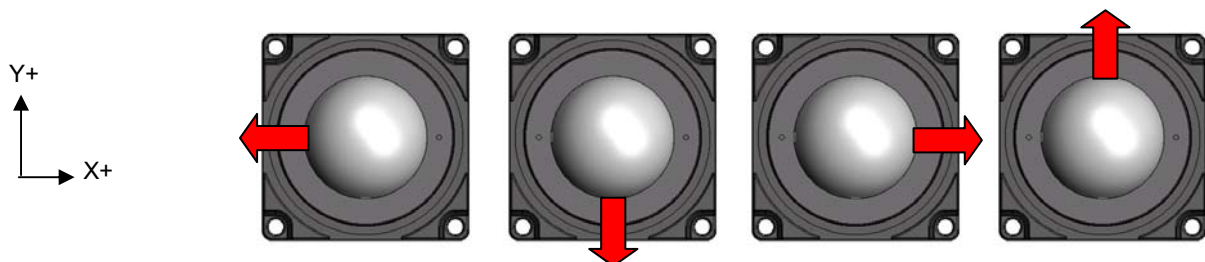
Switch 1(Orientation 1)	OFF	ON	OFF	ON
Switch 2 (Orientation 2)	OFF	OFF	ON	ON

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 Smart Switch

A patent protected button latch facility.

> Operation:
> Press right button for 3 seconds or more to enable;
> Once enabled, pressing any button for approximately 1 second latches that button on;
> Press any button momentarily to de-latch;
> Disabled with a further press of the right button for 3 seconds or more;

6.5 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.1200 counts per ball revolution maintained at all tracking speeds.
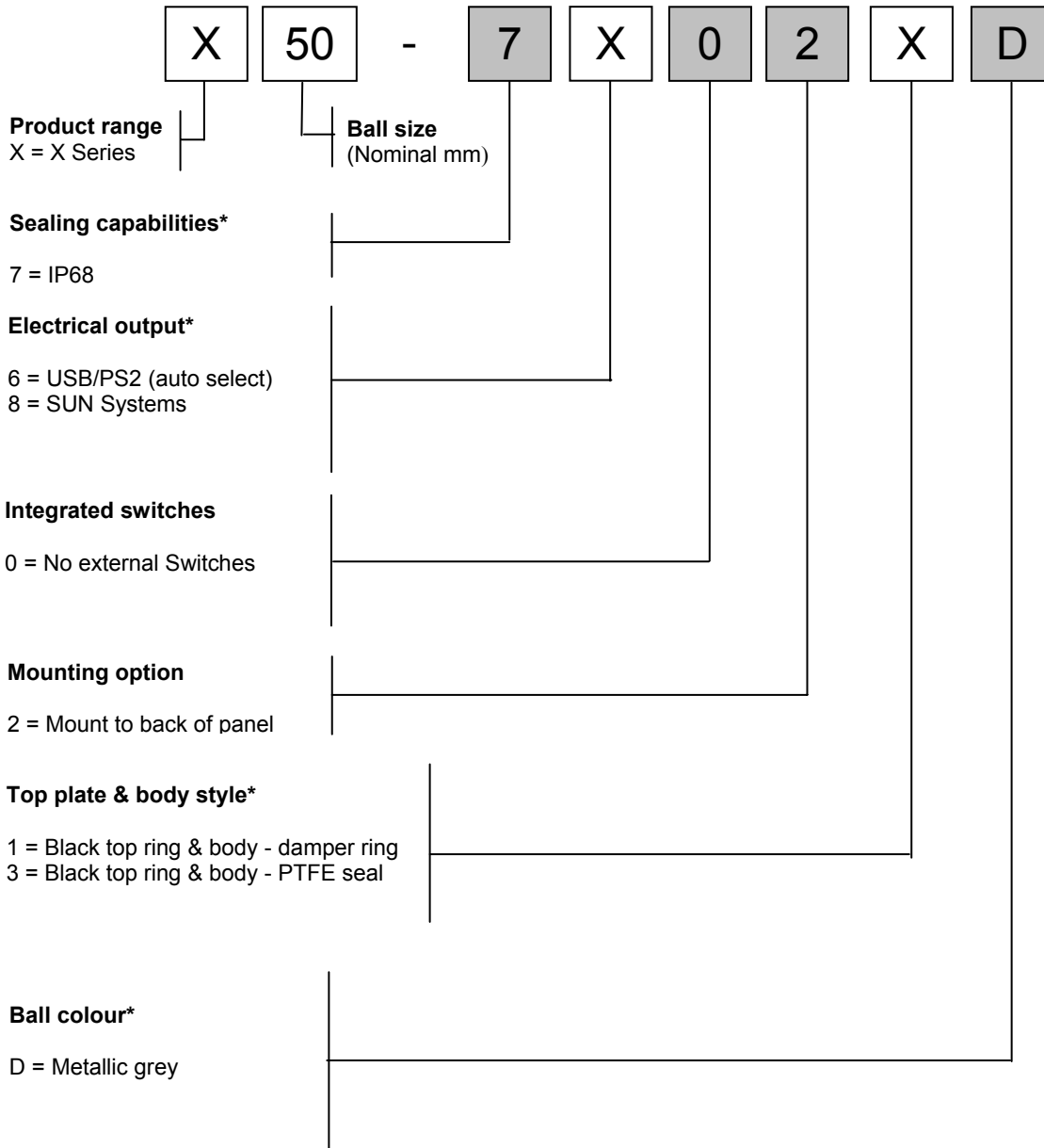
7. DIMENSION DRAWING
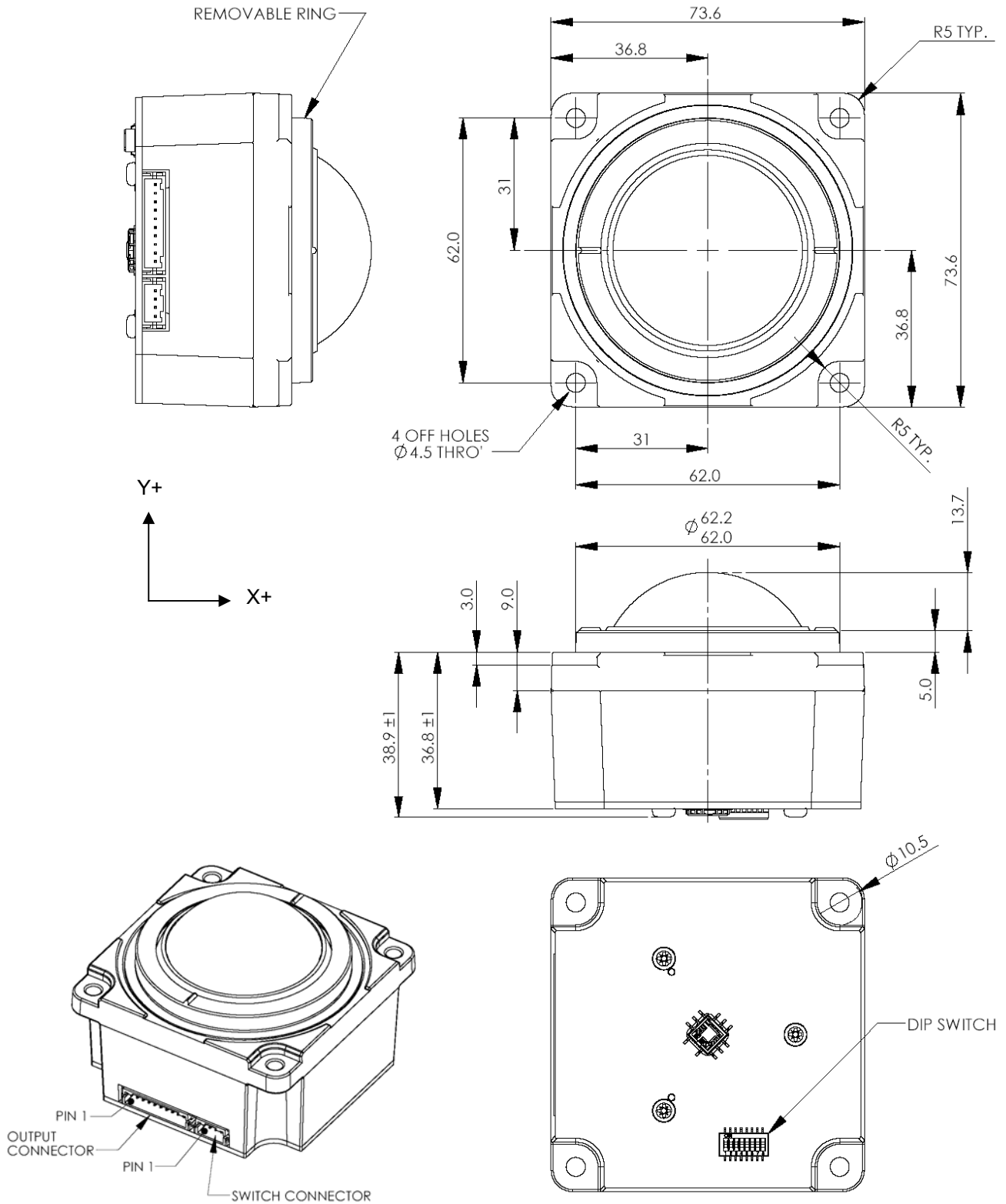
Dimensional drawing specifies factory default orientation.
All dimensions are in mm unless otherwise stated.
Tolerances +/- 0.2mm unless otherwise stated
Please note that an IGES model is available on request. Please contact your local sales office for more information.

8. PRODUCT ORDERING CODE SYSTEM

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

| X | 50 | - | 7 | X | 0 | 2 | X | D |

Product range
X = X Series

Ball size
(Nominal mm)

Sealing capabilities*

7 = IP68

Electrical output*

6 = USB/PS2 (auto select)
8 = SUN Systems

Integrated switches

0 = No external Switches

Mounting option

2 = Mount to back of panel

Top plate & body style*

1 = Black top ring & body - damper ring
3 = Black top ring & body - PTFE seal

Ball colour*

D = Metallic grey

*For further options please contact your local sales representative

8.1 Ordering Example

X50-76021D: X50, IP68, USB/PS/2, no switches, mount to back of panel, black top ring & body - damper ring, metallic grey ball.

X38-78023D: X50, IP68, SUN systems, no switches, mount to back of panel, black top ring & body – PTFE seal, metallic grey ball.

9. DOCUMENT HISTORY

Issue	Date	Author	Remarks
A	25.09.09	N.S	Document released