X50

- Solid state sensing technology - infrared optical tracking engine (generation II)
- Sealing to IP68
- Output: PS/2 & USB or Quadrature
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options
- VX3™ integrated zoom feature for scroll wheel functionality

50 MM INFRARED OPTICAL TRACKBALLMODULE

Utilizing the latest and most advanced infrared optical tracking technology, the X50 Series optical Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications. The 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). The X50 trackballs are available with a variety of electrical outputs and sealing to IP68. The solid state design allows the device to be subjected to extreme conditions and provides the user with the ability to wash down, decontaminate, and sterilise, making it the ideal trackball for a wide range of demanding applications and environments. The unit has been designed to be back of panel mounted as part of OEM keyboards and consoles.

GENERAL TECHNICAL SPECIFICATIONS

Mechanical

|	
Weight	150 grams
Ball	PROX Resin, 50,8 mm
Tracking Force	20 grams nominal - damper ring / 30 - 80 grams - PTFE seal
Ball Load	200N Maximum downward pressure (20 Kg) for 2 mins @ 20°C.
Resolvable Ball Speed	30 Inches/sec.
Housing material / colour	Polycarbonate / ABS / Black
Transducer	Infrared optical Navigation Technology (solid state sensing)
Mounting Position	All angles
Sealing gasket	Cellular silicone (supplied)

Electrical

|	
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% (Quadrature protocol)
	2400 counts per ball revolution @ 5 IPS (inches per second) +/- 10% (USB, PS/2 protocol)
Output connector	10 Way JST, right-angled header, part no. S10B-PH-SM4-TB (or equivalent)
Mating output connector	10 Way JST connector, part no. PH, CR or KR types (e.g. PHR-10)
Switch Inputs (USB, PS/2)	3 switches: left, middle, right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM4-TB
Mating switch connector	4 Way JST connector, part no: PH, CR or KR types (e.g. PHR-4) for USB & PS/2 version

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	2g, 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 250,000 hrs @ 25°C, Ground, Benign (MIL-HDBK-217F2)
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)

DIMENSIONAL DRAWING
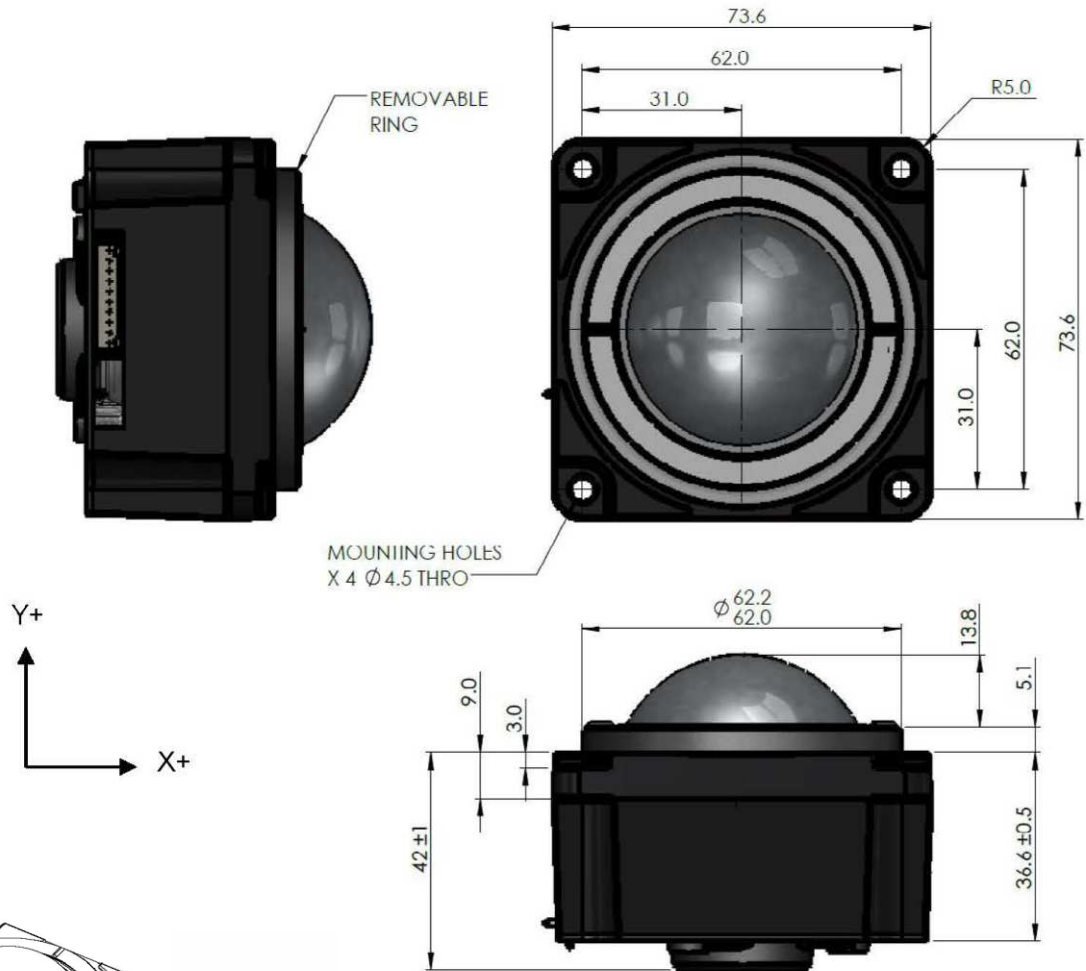
Quadrature output
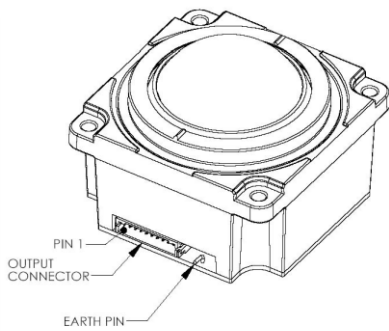
PS/2 & USB output
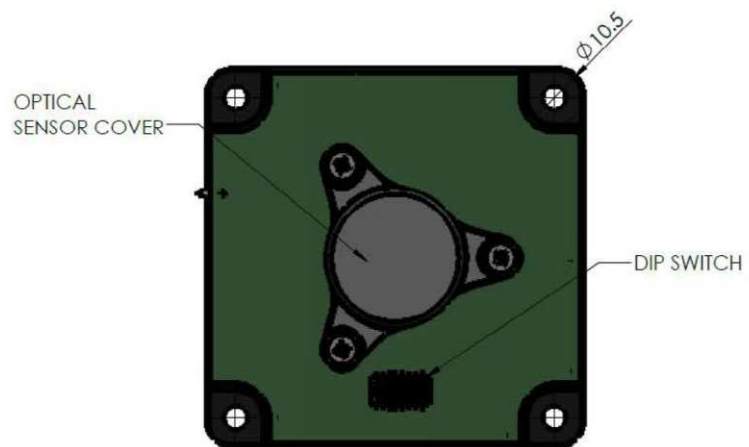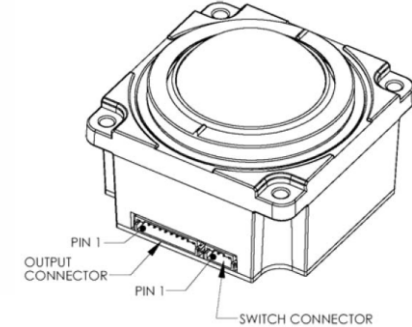
Dimensional drawing specifies factory default orientation.
All dimensions are in mm unless otherwise stated.
Tolerances +/- 0.25mm unless otherwise stated
Please note that an IGES model is available on request. Please contact your local sales office for more information.

The company reserves the right to alter without prior knowledge the specification or design of any standard product or service.

CONNECTION DETAILS QUADRATURE OUTPUT

Output Connector : P1

Description: 10 Way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S10B-PH-SM4-TB
Mating connector: PH, CR or KR types (e.g. PHR-8)

Pin Number	Quadrature
1	X1
2	X2
3	Y1
4	Y2
5 and 6	EARTH
7	5V D.C
8 and 9	See Note 1
10	0V

Note 1 : Pin to be left floating (unconnected)

CONNECTION DETAILS PS/2 - USB OUTPUT

Output Connector : P1

Description: 10 Way JST, right-angled header.
Manufacturer: JST (or equivalent)
Part No: S10B-PH-SM4-TB
Mating connector: PH, CR or KR types (e.g. PHR-10)

Pin Number	PS/2 & USB
1, 2, 3, 4 and 6	See note 1
5	EARTH
7	5V D.C
8	PS/2 Data, D-
9	PS/2 Clock, D+
10	0V

Note 1 : Pin to be left floating (unconnected)

Switch Input Connector : P2

Description: 4-way JST, right-angled header.
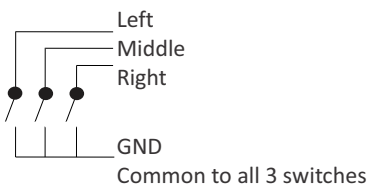Manufacturer: JST (or equivalent)
Part No: S4B-PH-SM4-TB
Mating connector: PH, CR or KR types (e.g. PHR-4)

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

Switch Schematic

Left
Middle
Right

GND
Common to all 3 switches

OPTIONAL LEAD ASSEMBLIES

Standard Lead assemblies for connection to the X50 unit are available. Other lead assemblies can also be supplied to customer specifications.

Part Number	Leads / Adapters	Description
OC6010160	Output cable PS/2	1,6 m shielded cable with 6 pin mini DIN plug
OC5010160	Output cable USB	1,6 m shielded cable with USB type A plug
IC040035	Switch Input	4 way JST style - bare wires, 35 cm long
IC101035	Interconnection	Interconnection cable, 35 cm long

CONFIGURATION

The X50 trackball provides features that may be selected using the DIP switch located on the printed circuit board. This table details the assigned function of each switch.

DIP Switch Functions **quadrature** Trackballs

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	Not used	N/A	N/A
4	Tracking Resolution	* CPR = 1200	*CPR = 600
5	Not used	N/A	N/A
6	Factory setting	Switch must be set in the OFF position	
7	Not used	N/A	N/A
8	Not used	N/A	N/A

Factory default setting: All DIP switches OFF

* CPR = Counts per revolution

DIP switch 4 allows the user to choose between two trackball resolution settings. The trackball resolution is a measurement of how far the ball moves on the monitor/screen for one revolution of the ball.
• DIP switch 4 OFF provides the default resolution of 900 counts (pixels) per ball revolution.
• DIP switch 4 ON provides the user with a resolution of 450 counts (pixels) per ball revolution.

DIP Switch Functions **PS/2 - USB** Trackballs

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	Switch must be set in the OFF position	
7	Factory setting	Switch must be set in the OFF position	
8	N/A	N/A	N/A

Factory default setting: All DIP switches OFF

Orientation

The orientation function allows the user to mount the X50 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 trackball orientation can be selected to accommodate customer requirements for connector location and wiring.
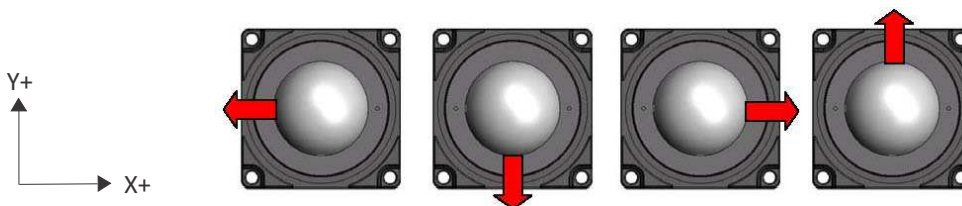
Switch 1 Orientation 1	Off	On	Off	On
Switch 2 Orientation 2	Off	Off	On	On

Figure.1 Mounting Orientations

CONFIGURATION

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

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;

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.

ORDER INFO

OUTPUT	DAMPER RING	PTFE SEAL
Quadrature	**X50-70021D-G**	**X50-70023D-G**
PS/2 & USB	**X50-76021D-G**	**X50-76023D-G**

damper ring   PTFE seal

Please add corresponding output cable to the X50 trackball module see page 3

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