

O50 Series – 50mm Trackball, Panel Mount, Protocol Output, Removable Ball**1. DESCRIPTION**

Utilizing the latest and most advanced optical tracking technology, the O50 Series Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications.

The optical 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.

O50 Series trackballs are available with a variety of electrical outputs, tracking force options, and sealing capabilities up to IP68.

The solid state design, in conjunction with the removable top plate and ball, 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 that are located in aggressive environments where cleaning and servicing are required on a regular basis.

2. FEATURES

- Solid state sensing technology – optical tracking engine
- Sealing up to IP68
- Outputs: USB & PS/2 (auto-select) or SUN Systems
- Removable top plate and ball
- Smooth operation in rugged environments
- Variable friction control providing sealing and tracking force options
- Custom connector options available
- Self draining and back flushing features (optional)
- 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	~210 grams
Ball	Ø50.8mm (2"), removable ball
Ball material	Epoxy resin
Tracking force	10-160 grams variable friction control – 5 friction settings available
Ball load	200N (20Kg) maximum downward pressure for 2 minutes @ 20°C
Resolvable ball speed	20 IPS (inches per second)
Mounting position	All angles
Tracking engine	Optical navigation technology (solid state sensing technology)
Chassis material	Lens grade polycarbonate
Top plate material	PC/ABS
Sealing material	PTFE composite
Sealing gasket	Cellular silicone (supplied)

4.2 Electrical

Protocols	USB, PS/2 (auto-select) or SUN Systems (see section 8 for ordering code details)
Supply voltage	4.4V to 5.25V DC
Supply current	125mA typical, 130mA maximum
Resolution	1200 counts per ball revolution +/- 10% (linear tracking mode)
Output connector	10 Way, right-angled JST 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, right-angled JST 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)

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	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)
Mechanical lifetime	1 million ball revolutions
Impact	20 Joules
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 O50 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
• Windows 7
• Redhat Linux
• Sun Sparc
• Fully compliant with USB 1.1 framework (chapter 9) and HID specifications

5. CONNECTION DETAILS

Connection is made to the O50 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: 10 way, 2mm pitch, right-angled connector

Manufacturer: JST (or equivalent)

Part No: S10B-PH-SM3-TB

Mating connector: PH, CR or KR types

Pin Number	USB & PS/2	SUN Systems
1	SEE NOTE 1	SEE NOTE 1
2		
3		
4		
5	EARTH	EARTH
6	EARTH	EARTH
7	5V D.C	5V D.C
8	PS/2 Data, D-	Data (1200 BAUD)*
9	PS/2 Clock, D+	SEE NOTE 1
10	0V	0V

Table 1 Output connections

* Optional BAUD rates available on request.

NOTE 1: Pin to be left floating (unconnected)

5.2 Switch Input Connector: CN2

Description: 4 way, 2mm pitch, right-angled connector

Manufacturer: JST (or equivalent)

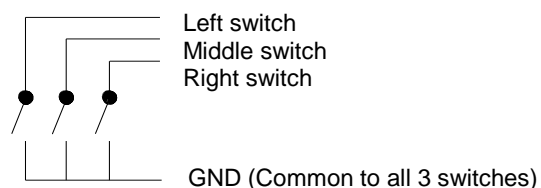
Part No: S4B-PH-SM3-TB

Mating connector: PH, CR or KR types

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 O50 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	Switch must be set in the OFF position	
7	Inverted Y-axis	Feature disabled	Feature enabled
8	Factory Setting	Switch must be set in the OFF position	

Table 3 – DIP switch functions

Factory default setting: DIP switches all OFF

6.2 Orientation

The orientation function allows the user to mount the O50 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 connector is indicated by the arrow.

The Trackerball orientation can be selected to accommodate customer requirements for connector location and wiring.

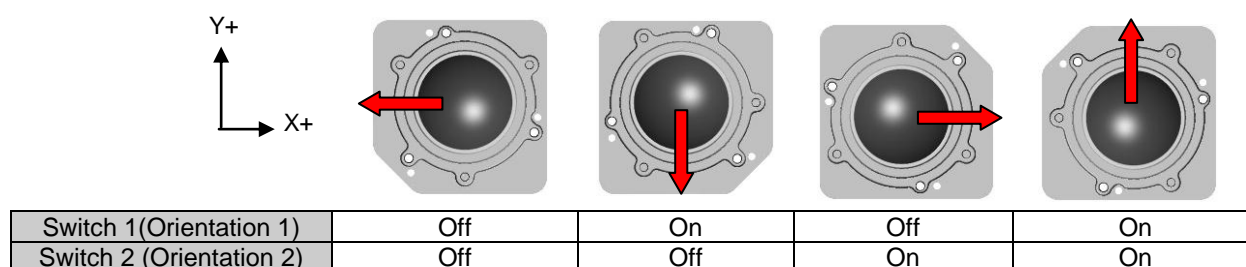


Figure 1 – Mounting Orientations

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;

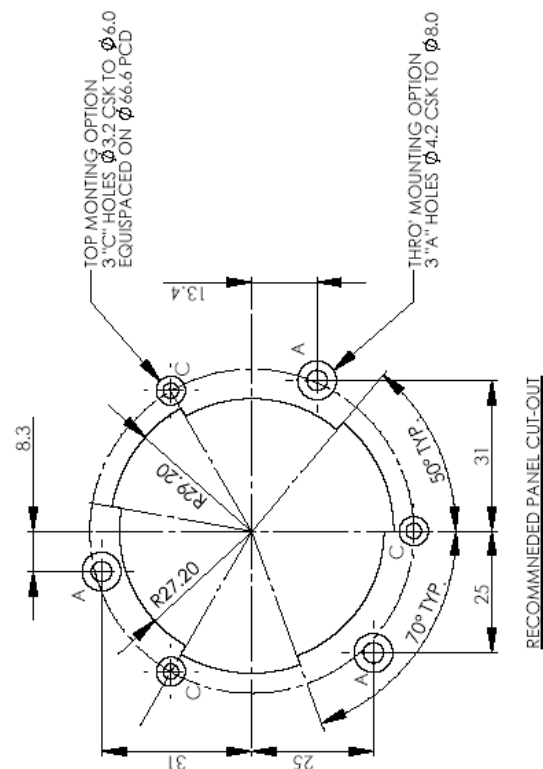
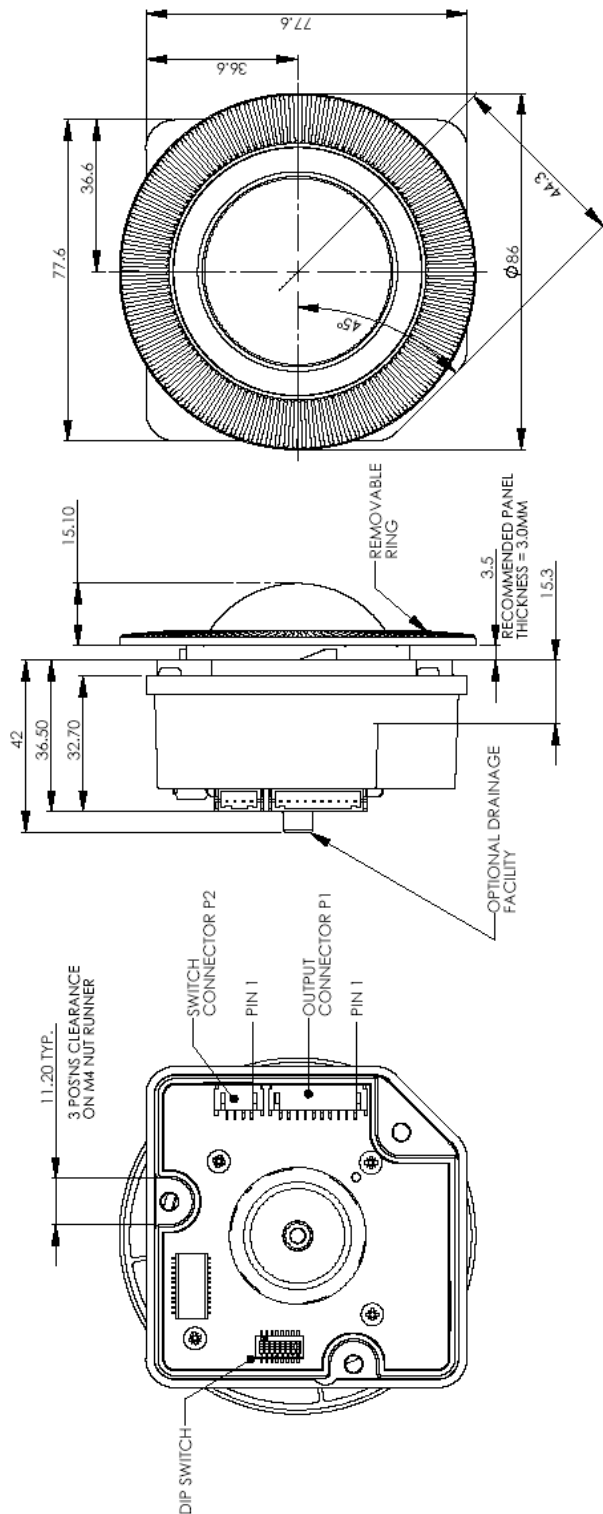
6.5 Tracking Mode

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.

6.4 Inverted Y-axis

Y-axis inverted for overhead operation.



8. PRODUCT ORDERING CODE SYSTEM

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

O	50	-	7	X	0	2	X	X
Product Range O = O 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 4 = Variable friction ring/removable ball 7 = Variable friction ring/removable ball, self-draining								
Ball Colour* D = Metallic Grey F = Metallic Red K = Metallic Yellow L = Metallic White								

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

8.1 Ordering Example

O50-76024D: O-Series 50mm Trackball, IP68, USB & PS/2, no integrated switches, mount to back of panel, variable friction ring/removable ball, metallic grey ball.

9. DOCUMENT HISTORY

Issue	Date	Author	Remarks
A	03.09.07	N.S	Document released
B	01.06.08	N.S	ECN 1072
C	06.08.09	N.S	CN 1334

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