
P75 Series – Mechanical Trackball, Panel Mount, Protocol Output

**1. DESCRIPTION**

The P75 Series mechanical trackballs are rugged pointing devices ideal for use in the most demanding of applications. The device incorporates the same proven technology found in the already well-established Cursor Controls Ltd trackball range, providing the user with the same high specification trackball operation. The high ball exposure provides the user with excellent control, while the high-grade stainless steel shafts and bearings ensure a solid and precise pointer control. The unit has been designed to be back of panel mounted as part of OEM keyboards and consoles.

2. FEATURES

- Sealing options up to IP51 (BS EN 60529)
- Outputs: USB, PS/2 (auto-select) or SUN Systems
- High mass ball for precise control
- Smooth operation in rugged environments
- High grade stainless steel shafts and bearings
- Various top plate configurations providing sealing and tracking force options
- Custom connector options
- Custom ball colours

3. APPLICATIONS

- Control systems
- Navigation systems
- Sound and lighting desks
- Industrial consoles
- OEM custom solutions available

4. SPECIFICATIONS

4.1 Mechanical

Weight	~600grams
Ball size	76.15 mm (3")
Ball material	Phenolic/polyester
Tracking force	30 grams – no seal (IP40) - see section 8 for ordering code details 50-100 grams – felt seal (IP51) - see section 8 for ordering code details
Ball load	200N (20Kg) maximum downward pressure for 2 minutes @ 20°C
Mounting position	Horizontal to 30°
Tracking engine	Dual channel photo-interrupters
Housing material	Glass filled ABS

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	20mA typical, 25mA maximum
Resolution	265 pulses per ball revolution (1060 counts per ball revolution)
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
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

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% RH, 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
Impact	10 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	Up to IP51 (BS EN 60529)

4.4 Electrical Compatibility

The P75 Series trackballs have 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 P75 Series trackball by means of two latching 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:

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	X1	X1
2	X2	X2
3	Y1	Y1
4	Y2	Y2
5	EARTH	EARTH
6	SEE NOTE 1	SEE NOTE 1
7	+5V D.C.	Vcc
8	D-, PS/2 Data	Data (1200 BAUD)*
9	D+, PS/2 Clock	SEE NOTE 1
10	0V	0V

Table 1 Output Connections

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

* Optional BAUD rates available on request.

5.2 Switch Input Connector:

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

Manufacturer: JST (or equivalent)

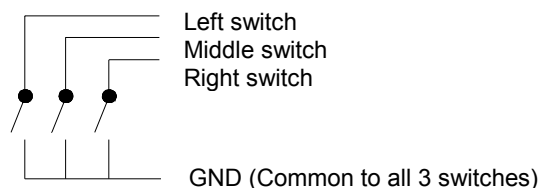
Part No: S4B-PH-SM3-TB

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



6. TRACKERBALL CONFIGURATION

The P75 Series trackballs provide 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

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 ⁽¹⁾	Feature disabled	Feature enabled
4	Smart Feature	Feature disabled	Feature enabled
5	Tracking Mode	Ballistic tracking	Linear tracking
6 ⁽²⁾	Protocol Select	USB/PS/2 auto select	SUN
7	N/A	N/A	N/A
8	N/A	N/A	N/A

Table.3 DIP Switch Functions

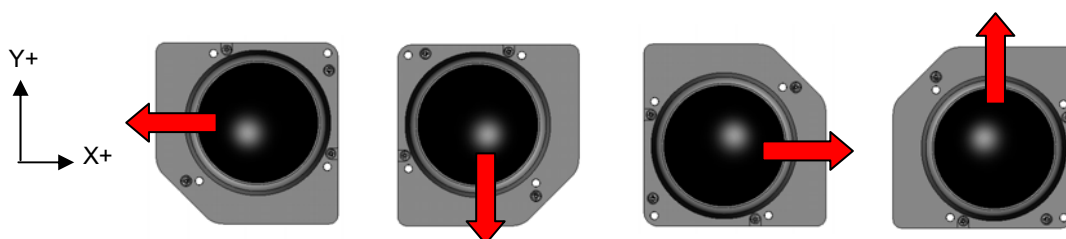
NOTES:

- Feature not available with SUN Systems protocol
- DIP switch 6 is used only on devices with SUN protocol option (please refer to product ordering code system for further details)

Factory default setting: All DIP switches OFF

6.2 Orientation

The orientation function allows the user to mount the P75 Series trackball 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 indicated by the arrow. The Trackerball 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 Orientation Settings

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. 1060 counts per ball revolution maintained at all tracking speeds

Technical drawing of the M10000 module, showing three views: top, side, and bottom views.

Top View:

- Overall dimensions: 106 mm (width) x 106 mm (height).
- Central circular feature with a diameter of $\phi 60.2$ mm.
- Four mounting holes, each with a diameter of $\phi 4.5$ mm, spaced at 45° intervals.
- Dimensions for mounting holes: 25.7 mm (horizontal) and 40.7 mm (vertical) from the center.
- Corner radii: R5 (outer corners), R8 (inner corners), and R15 (fillets).
- Internal dimensions: 40.5 mm (horizontal) and 40.7 mm (vertical) from the center to the mounting holes.
- Coordinate system: X+ (horizontal) and Y+ (vertical).

Side View:

- Overall height: 41 ± 1 mm.
- Top flange diameter: $\phi 85 \pm 0.25$ mm.
- Top flange thickness: 2 mm.
- Bottom flange thickness: 12 mm.
- Bottom flange diameter: $\phi 76.1$ mm (BALL).
- Internal dimensions: 32 mm (height) and 26 mm (height) from the bottom flange.
- Overall width: 106 mm.

Bottom View:

- Labels: DIP SWITCH, PIN 1, OUTPUT CONNECTOR, SWITCH CONNECTOR.
- Dimensions: 41 ± 1 mm (height), 32 mm (height), 26 mm (height).
- Internal dimensions: 40.5 mm (horizontal) and 40.7 mm (vertical) from the center to the mounting holes.

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:

P	75	-	X	X	0	2	4	X
Product Range P = Panel			Ball size (Nominal mm)					
Sealing Capabilities 1 = No seal – IP40 3 = Felt seal – IP51								
Electrical Output 6 = USB/, PS/2 (auto-select) 8 = SUN Systems C = USB, PS/2 & SUN Systems								
Integrated Switches 0 = No external Switches								
Mounting Option 2 = Mount to back of panel								
Top Plate & Body Style 4 = Black top plate & body								
Ball Colour* 0 = Black 4 = Yellow								

8.1 Ordering Example

P75-160240: P75 Series, no seal (IP40), USB, PS/2 output, no external switches, mount to back of panel, black top plate & body, black ball.

9. DOCUMENT HISTORY

Issue	Date	Author	Remarks
A	11.08.09	N.S	Document released

Whilst the information provided herein is to the best of our knowledge true and accurate, it should be used for guidance only and may be subject to change. You are therefore advised to ensure all information provided herein is current and up to date and suitable for your application. Use of Cursor Controls Ltd products in life support systems is only permitted with prior written consent of the Company.