

Trackball Modules

Utilizing the latest and most advanced laser tracking technology, the X13 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). The design incorporates a removable top ring as standard to allow for easy cleaning, decontamination, sterilization and maintenance - ensuring continued optimum performance and operation under the harshest of conditions.

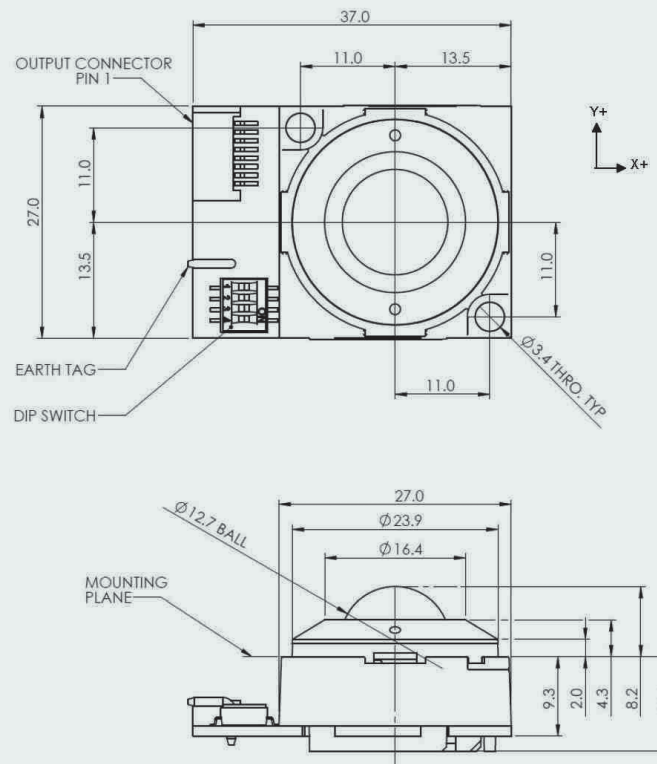
The X13 trackballs are available with a variety of electrical outputs, tracking force options, and sealing capabilities up to IP68.

The trackball has been designed to be back of panel mounted as part of OEM keyboards and consoles.

Features

- Solid state sensing technology - Laser tracking engine
- Sealing IP68
- Output: PS/2 & USB or Quadrature
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options

**13 mm Waterproof Laser Trackball Module
IP68 sealed
X13**



*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.*

Specifications: see next page

Mechanical	
Weight	15 grams
Ball	Epoxy Resin, 12.7 mm
Tracking Force	10 grams Nominal - damper ring. 10 - 30 grams - rubber seal
Ball load	50N Maximum downward pressure (5 Kg) for 2 mins.
Resolvable Ball Speed	40 Inches/sec.
Housing Material	Polycarbonate (Lexan®LS2 lens grade) / ABS
Transducer	Optical Navigation Technology (solid state sensing)
Mounting Position	All angles (Dependant on top plate arrangement)
Electrical	
Supply voltage	4.4V to 5.25V DC
Supply current	23mA typical, 25mA maximum
Resolution	300 counts per ball revolution @ 1 IPS (inches per second) +/- 10% 600 counts per ball revolution @ 5 IPS (inches per second) +/- 10%
Output connector	8 Way, right-angled JST film connector, part no: 08FM-1.0SP-1.9-TF
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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)
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)

Damper Ring	Rubber Seal	Output
X13-70021D	X13-70022D	Quadrature
X13-76021D	X13-76022D	PS/2 & USB

Specifications are subject to change without notice.

• Monitors

Desktop Monitors
Large screen Monitors
Custom-made Monitors
19" Rack Mount Monitors
Rear Mount Monitors
Monitors for Panel Mount
Monitors for VESA Mount
Kiosks
Accessories

• Monitors – Specific applications

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Cables & Connectors
Custom made Keyboards



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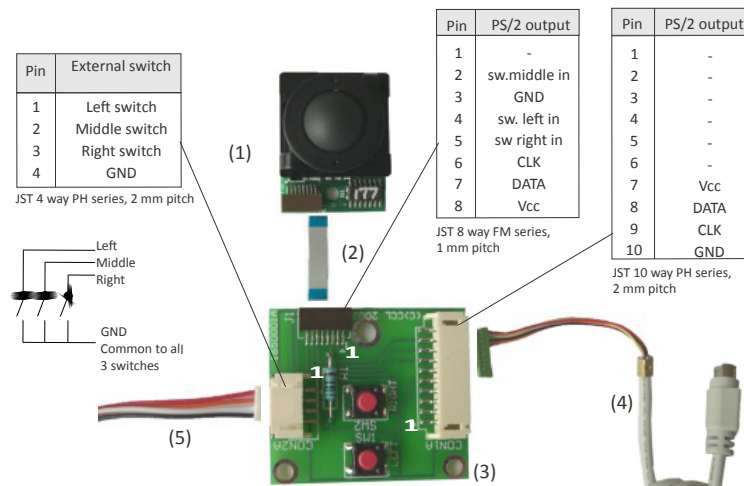
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The GK16-1502 is a high specification keyboard or panel mounted trackball. This trackball features ABS construction, has a phenolic ball with metal core, quality shafts and bearings to ensure precision movement. The top ring / ball is removable. A removal tool is part of the supply. Compact dimensions and back of panel mounting make the GK16 ideal for compact keyboard, mobile or remote control applications.

Specifications	
Sealing	IP40
Casing material	ABS
Top Plate material	ABS
Ball material	Phenolic resin (metal core)
Ball colour	Black
Ball diameter	16 mm
Weight	20 grams
Shaft diameter	3 mm
Tracking force	10 grams nominal
Resolution	117 pulses per ball revolution
Mounting angle	Max. 30° to horizontal plane
Lifetime - Ball revolutions	>= 1 million
Operating temperature	0°C to +60°C
Storage temperature	-20°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane
Part numbers	
GK16-1502	Output: PS/2
GK16-1602	Output: USB
Trackball Kit consisting of:	
P16-140210	Trackballmodule only PS/2 output (1) OR
P16-150210	Trackballmodule only USB output (1)
1151-00	Flexlead interconnection cable (2)
T1601126	Interconnection PCB (3)
OC6010160	Shielded cable 1,6 m. long with PS/2 plug (4) OR
OC5010160	Shielded cable 1,6 m. long with USB plug (4)
IC040035	Cable (4 wires), 35 cm long to connect up to 3 external switches (5)

Specifications are subject to change without notice.



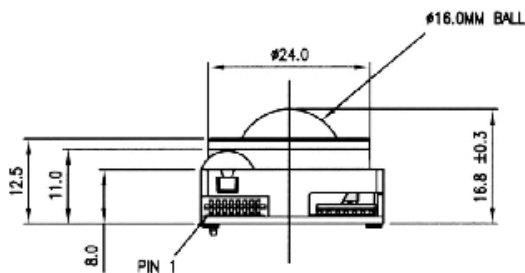
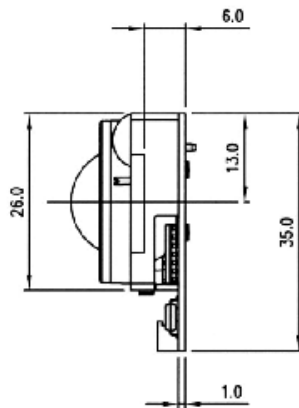
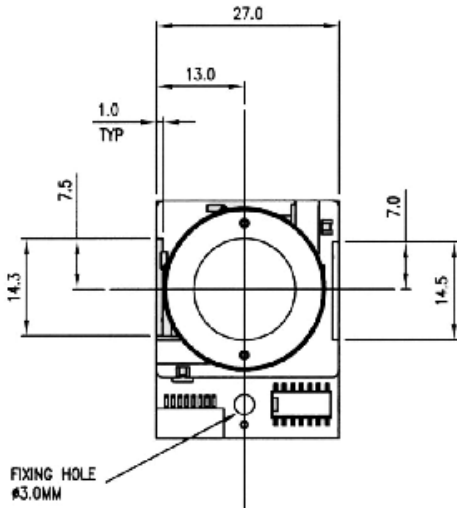
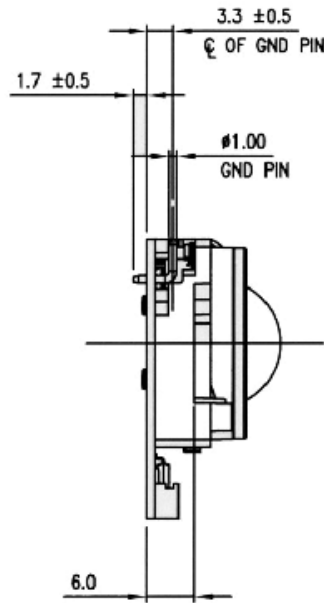
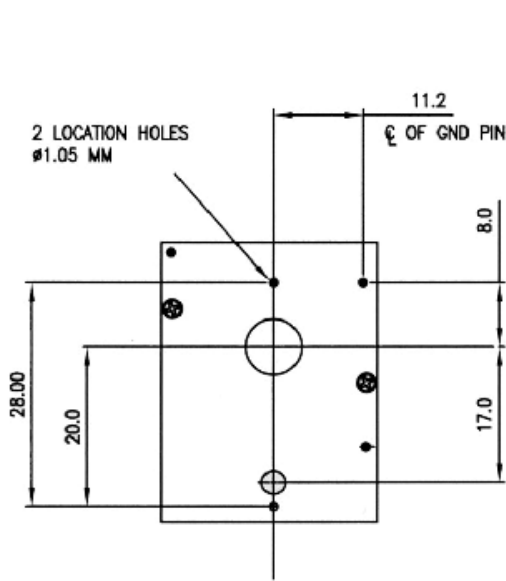
16 mm Trackball Module GK16



Connectivity

The trackball is PS/2 or USB compatible and is supplied with an interconnection PCB and all relevant cables. No special device driver is required.

* Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.



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Utilizing the latest and most advanced laser tracking technology, the X19 laser Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications.

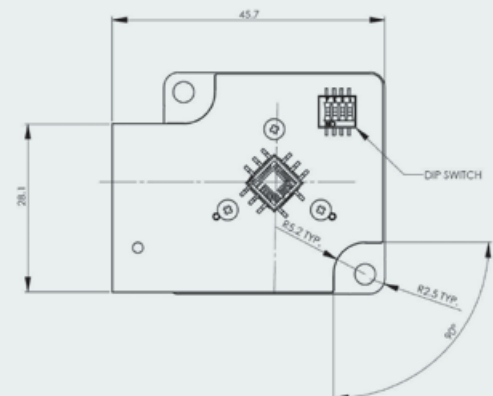
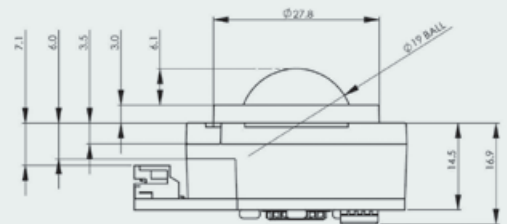
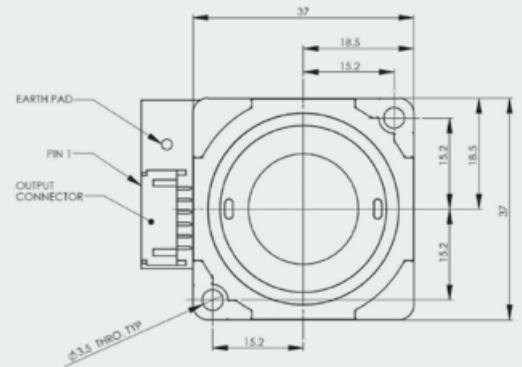
The laser tracking engine provides accurate cursor motion at all speeds and on virtually any ball, combining the benefits of solid state sensing (no moving parts except the ball). The X19 trackballs are available with a variety of electrical outputs and sealing to IP68. The solid state design allows the device to be subjected to extreme conditions and provides the user with the ability to wash down, decontaminate, and sterilize, 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.

Features

- Solid state sensing technology - Laser tracking engine
- Sealing IP68
- Output: PS/2 & USB or Quadrature
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options

*19 mm Waterproof Laser Trackball Module
IP68 sealed
X19*



*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.*

Specifications: see next page

Mechanical	
Weight	30 grams
Ball	Epoxy Resin, 19 mm
Tracking Force	10 grams Nominal - damper ring. 10 - 30 grams - rubber seal
Ball load	100N Maximum downward pressure (10 Kg) for 2 mins.
Ball Rotation	Continuous and reversible any direction
Resolvable Ball Speed	40 Inches/sec.
Housing Material	Polycarbonate (Lexan®LS2 lens grade) / ABS
Transducer	Optical Navigation Technology (solid state sensing)
Mounting Position	All angles (Dependant on top plate arrangement)
Sealing gasket	Cellular silicone
Electrical	
Supply voltage	4.4V to 5.25V DC
Supply current	23mA typical, 25mA maximum
Resolution	425 counts per ball revolution @ 1 IPS (inches per second) +/- 10% (Quadrature protocol) 850 counts per ball revolution @ 5 IPS (inches per second) +/- 10% (USB, PS/2 protocol)
Output connector	6 Way JST, right-angled header, part no. S6B-PH-SM3-TB
Switch Inputs (USB, PS/2)	3 switches: left, middle, right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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)

Damper Ring	Rubber Seal	Output
X19-70021D	X19-70022D	Quadrature
X19-76021D	X19-76022D	PS/2 & USB

Specifications are subject to change without notice.

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The GK25 features a phenolic ball with metal core, stainless steel shafts and bearings for a smooth and precise cursor control. The PTFE seal ring ensures a IP65 static sealing grade. The unit has been designed to be back of panel mounted as part of OEM keyboards and consoles with restricted mounting space.

Specifications	
Sealing	IP65 (static)
Casing material	Polycarbonate
Top Plate material	Polycarbonate
Ball material	Phenolic resin with metal core
Ball colour	Black
Ball diameter	25 mm
Weight	80 grams
Seal material	PTFE composite
Shaft diameter	4.5 mm
Tracking force	50 grams nominal
Mounting angle	Max. 90° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	6 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GK25-5002	Quadrature	P25-5002AO Trackball module only IC060635 : 35 cm interconnection cable to CON 1
GK25-5502	PS/2	P25-5602AO : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GK25-5602	USB	P25-5602AO : Trackball module only OC5006160 : 1,6 m shielded cable with USB type A plug IC040035 : 35 cm switch cable (4 wires) to CON2

Specifications are subject to change without notice.

25 mm Trackball Module IP65 sealed GK25



Connectivity

The GK25-5502 is PS/2 compatible. The GK25-5602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GK25-5002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. It is supplied with a 6-wire connection cable of 35 cm.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off, for factory use

6 way connector (CON1)

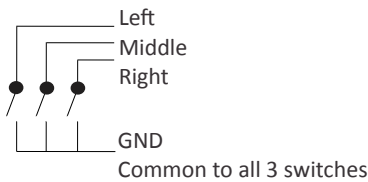
Pin	Quadrature	PS/2 & USB
1	X1	N.C
2	X2	N.C
3	+5VDC	+5VDC
4	Y1	D-/Data
5	Y2	D+/Clock
6	GND	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.

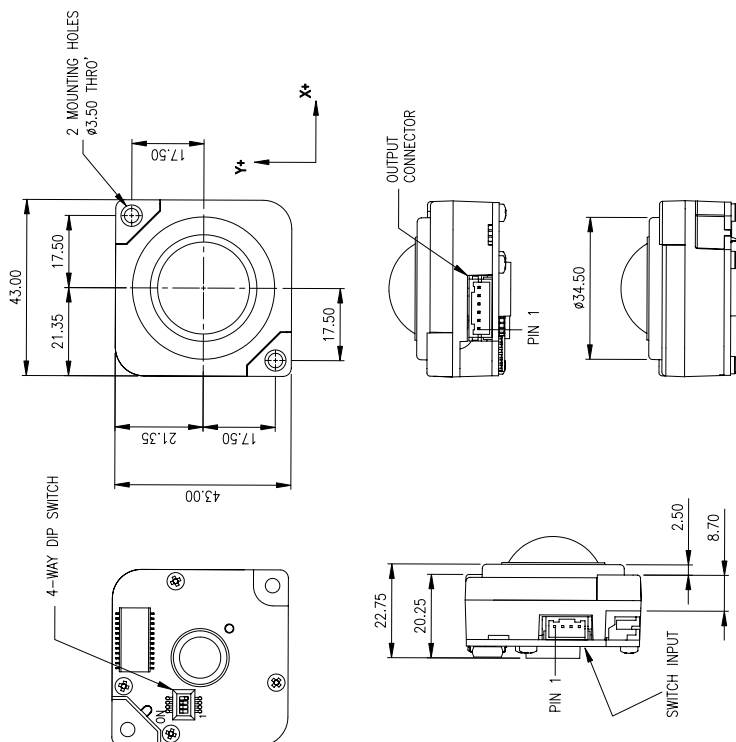
4 way connector (CON2)

Pin	Switch
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



* important note : the mounting depth will increase from typical 23,2 mm to 28,0 mm when the antivandal/ESD kit is mounted.



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The GS25 series are ruggedized professional trackballs. The ball and the trim are made of quality stainless steel. The double-sided seal ring provides sealing to IP65 static (ball in rest). 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. The GS25 is an ideal pointing device for applications with restricted mounting space.

25 mm Stainless Steel Trackball Module IP65 sealed GS25



Specifications	
Sealing	IP65 (static)
Casing material	Polycarbonate
Ball & Trim material	Stainless steel
Ball colour	Blank
Ball diameter	25 mm
Weight	100 grams
Seal material	PTFE composite
Shaft diameter	4.5 mm
Tracking force	65 grams nominal
Mounting angle	Max. 60° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	6 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GS25-5002	Quadrature	P25-5002CC Trackball module only IC060635 : 35 cm interconnection cable to CON 1
GS25-5502	PS/2	P25-5602CC : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GS25-5602	USB	P25-5602CC : Trackball module only OC5006160 : 1,6 m shielded cable with U5B type A plug IC040035 : 35 cm switch cable (4 wires) to CON2

Specifications are subject to change without notice.

Connectivity

The GS25-5502 is PS/2 compatible. The GS25-5602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GS25-5002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. It is supplied with a 6-wire connection cable of 35 cm.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off, for factory use

6 way connector (CON1)

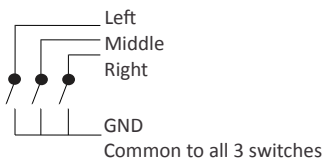
Pin	Quadrature	PS/2 & USB
1	X1	N.C
2	X2	N.C
3	+5VDC	+5VDC
4	Y1	D-/Data
5	Y2	D+/Clock
6	GND	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.

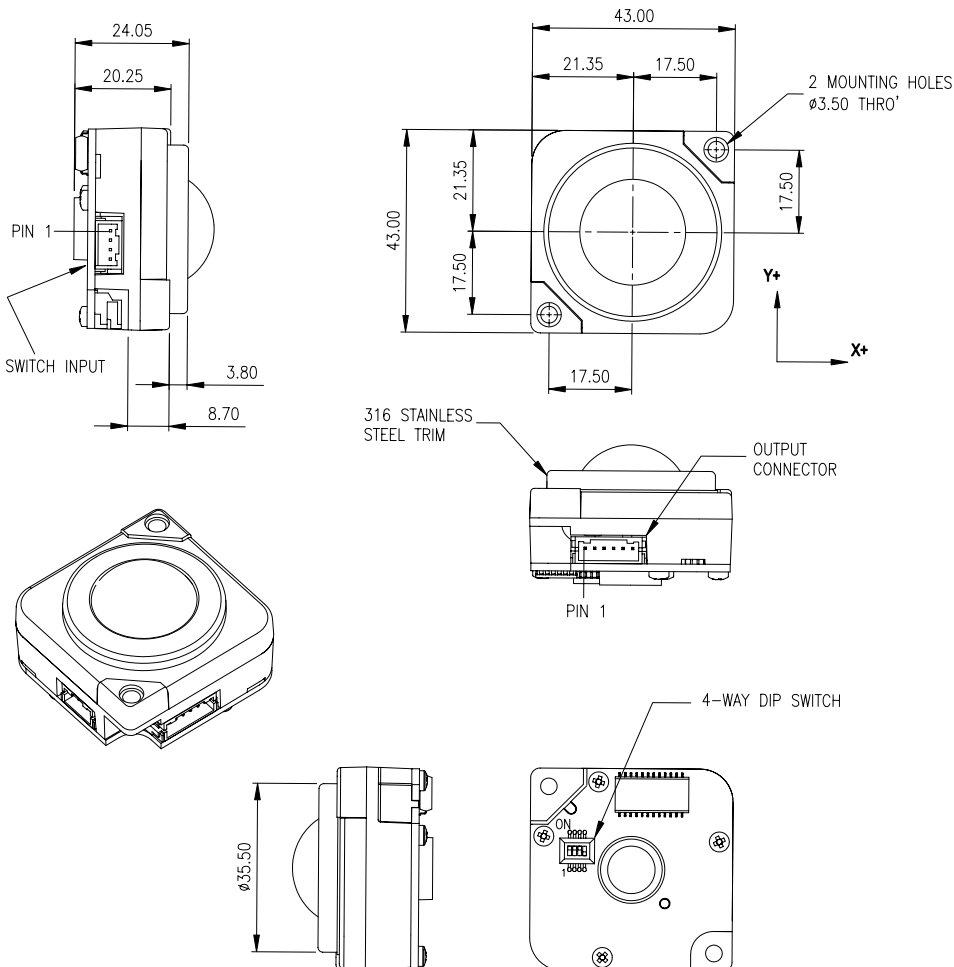
4 way connector (CON2)

Pin	Switch
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



* important note : the mounting depth will increase from typical 23,2 mm to 28,0 mm when the antivandal/ESD kit is mounted.



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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.

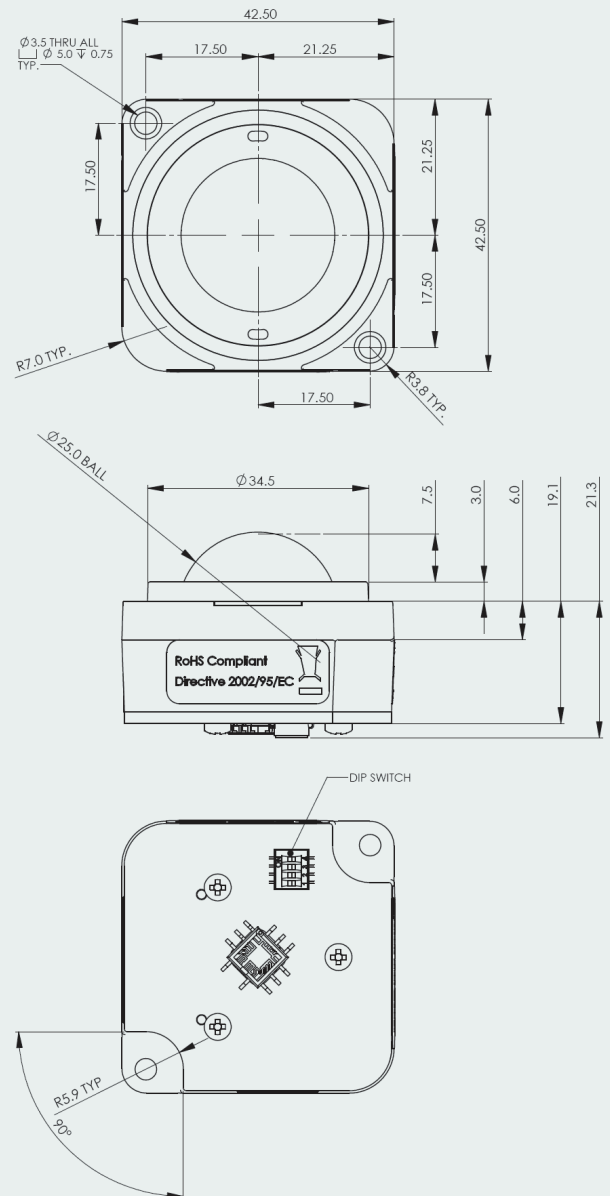
The laser tracking engine provides accurate cursor motion at all speeds and on virtually any ball, combining the benefits of solid state sensing (no moving parts except the ball). The X25 trackballs are available with a variety of electrical outputs and sealing to IP68. The solid state design allows the device to be subjected to extreme conditions and provides the user with the ability to wash down, decontaminate, and sterilize, 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.

Features

- Solid state sensing technology - Laser tracking engine
- Sealing IP68
- Output: PS/2 & USB or Quadrature
- Smooth operation in rugged environments
- Various top plate configurations
- Custom connector options

*25 mm Waterproof Laser Trackball Module
IP68 sealed
X25*



*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.*

Specifications: see next page

Mechanical	
Weight	40 grams
Ball	Epoxy Resin, 25 mm
Tracking Force	20 grams Nominal - damper ring. 20 - 40 grams - rubber seal
Ball load	100N Maximum downward pressure (10 Kg) for 2 mins.
Ball Rotation	Continuous and reversible any direction
Resolvable Ball Speed	40 Inches/sec.
Housing Material	Polycarbonate / ABS
Transducer	Optical Navigation Technology (solid state sensing)
Mounting Position	All angles
Sealing gasket	Cellular silicone
Electrical	
Supply voltage	4.4V to 5.25V DC
Supply current	23mA typical, 25mA maximum
Resolution	650 counts per ball revolution @ 1 IPS (inches per second) +/- 10% (Quadrature protocol) 1300 counts per ball revolution @ 5 IPS (inches per second) +/- 10% (USB, PS/2 protocol)
Output connector	6 Way JST, right-angled header, part no. S6B-PH-SM3-TB
Switch Inputs (USB, PS/2)	3 switches: left, middle, right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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)

Damper Ring	Rubber Seal	Output
X25-70021D	X25-70022D	Quadrature
X25-76021D	X25-76022D	PS/2 & USB

Specifications are subject to change without notice.

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19" Rack Mount Monitors
Rear Mount Monitors
Monitors for Panel Mount
Monitors for VESA Mount
Kiosks
Accessories

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• Pointing devices

Accessories
Touchpads
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Trackball Modules
Joysticks
Custom made Pointing Devices

• Keyboards

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Built-in Keyboards with or without pointer
Cables & Connectors
Custom made Keyboards



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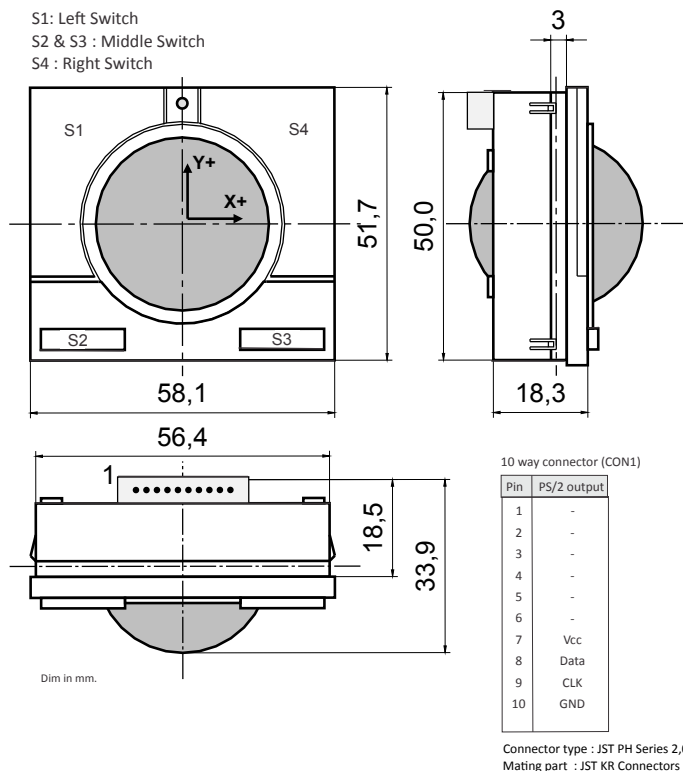
Germany
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Tel.: +49 6192 - 97 91 85
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The KB34-1542 is a high specification keyboard or panel mounted trackball with direct PS/2 output.

This trackball features ABS construction and high quality shafts and bearings to ensure precision movement. Compact dimensions, four switches and front of panel mounting make the KB34 ideal for keyboard, console or process control applications.

Specifications	
Sealing	IP40
Casing material	ABS, light-grey colour
Top Plate material	ABS, light-grey colour
Ball material	Polyester
Ball colour	Mid-grey colour
Ball diameter	34 mm
Weight	60 grams
Shaft diameter	3 mm
Tracking force	7 grams nominal
Mounting angle	Max. 30° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	6 mA typ
Storage temperature	-20°C to +66°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane
Part numbers	
KB34-1542	PS/2
KB34-1642	USB

Specifications are subject to change without notice.



34 mm Trackball Module KB34



Connectivity

The KB34-1542 is PS/2 compatible and is supplied with a 1,6 meter long shielded cable with PS/2 plug. No special device driver is required.

* Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.

The GK38 series are ruggedised professional trackballs for harsh industrial environments. The double-sided seal ring provides a sealing to IP65 static (ball in rest). Stainless steel shafts and bearings ensure a solid and precise pointer control. The unit can be used for frontpanel mounting (remove the mounting bracket) or for backpanel mounting.

Optional Anti-Vandal Backplate

This additional backplate and mounting spacers enable the unit to absorb a very high level of abuse or impacts. When mounted properly by the end-user, this backplate will limit the hostile impacts on the ball to an acceptable level and protect shafts, bearings and other components of the unit.



*38 mm Trackball Module
IP65 sealed
GK38*



Specifications	
Sealing	IP65 (static)
Casing material	ABS / Polycarbonate
Ball material	Phenolic resin
Ball colour	Black
Ball diameter	38.1 mm
Weight	100 grams
Seal material	PTFE
Shaft diameter	3 mm
Tracking force	50 grams nominal
Mounting angle	Max. 90° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	10 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GK38-4002	Quadrature	P38-500420 Trackball module only IC060635 : 35 cm interconnection cable to CON 1
GK38-4502	PS/2	P38-560420 : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GK38-4602	USB	P38-560420 : Trackball module only OC5006160 : 1,6 m shielded cable with USB type A plug IC040035 : 35 cm switch cable (4 wires) to CON2
Optional AP38-1	Anti-Vandal Backplate	Incl, spacers, washers and screws

Specifications are subject to change without notice.

Connectivity

The GK38-4502 is PS/2 compatible. The GK38-4602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GK38-4002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. No device driver is supplied with the unit. Please use standard available drivers in your operating system. It is supplied with a 10-way connection cable of 35 cm.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off, for factory use only.

10 way connector (CON1)

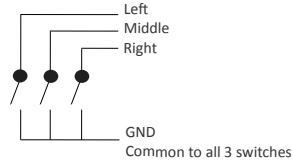
Pin	Quadrature	PS/2 or USB
1	X1	X1
2	X2	X2
3	Y1	Y1
4	Y2	Y2
5	-	-
6	-	-
7	Vcc	Vcc
8	-	Data/D-
9	-	CLK/D+
10	GND	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.

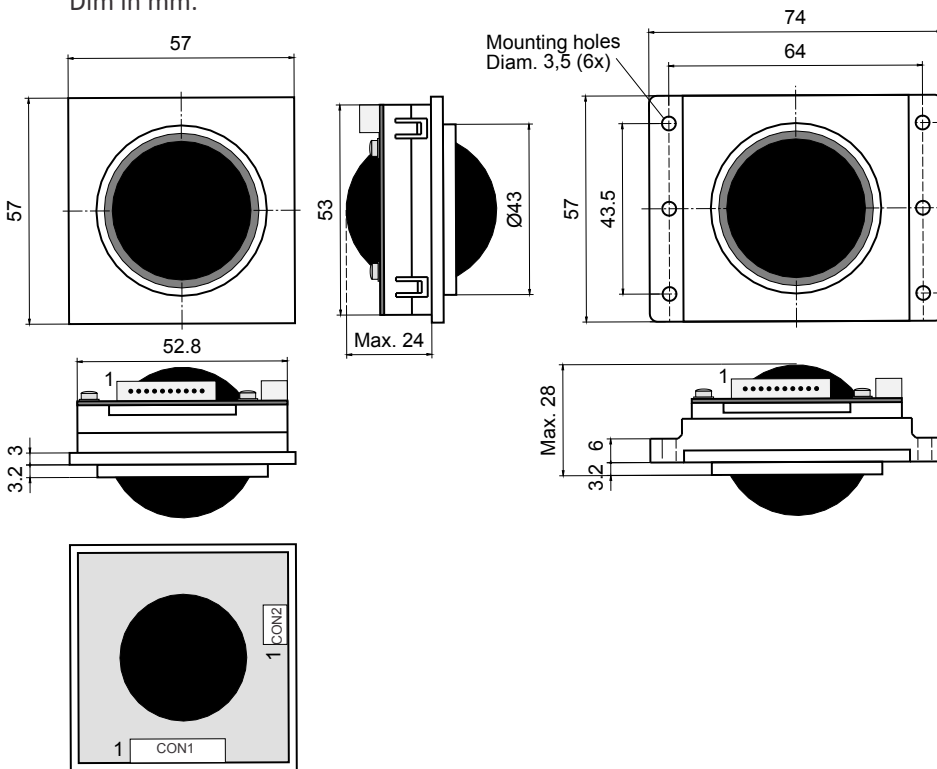
4 way connector (CON2) for PS/2 & USB only

Pin	Switch input
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



Dim in mm.



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- Military Monitors
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The GS38 series are ruggedized professional trackballs for vandal proof applications. The ball and the trim are made of quality stainless steel. The double-sided seal ring provides a sealing to IP65 static (ball in rest). Stainless steel shafts and bearings ensure a solid and precise pointer control. The unit can be used for front panel mounting (remove the mounting bracket) or for back panel mounting.

Optional Anti-Vandal Backplate

This additional backplate and mounting spacers enable the unit to absorb a very high level of abuse or impacts. When mounted properly by the end-user, this backplate will limit the hostile impacts on the ball to an acceptable level and protect shafts, bearings and other components of the unit.



38 mm Trackball Module
IP65 sealed
GS38



Specifications	
Sealing	IP65 (static)
Casing material	ABS / Polycarbonate
Ball & Trim material	Stainless Steel
Ball colour	Blank
Ball diameter	38.1 mm
Weight	300 grams
Seal material	PTFE
Shaft diameter	3 mm
Tracking force	65 grams nominal
Mounting angle	Max. 60° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	10 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GS38-4002	Quadrature	P38-50048C Trackball module only IC060635 : 35 cm interconnection cable to CON 1
GS38-4502	PS/2	P38-56048C : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GS38-4602	USB	P38-56048C : Trackball module only OC5006160 : 1,6 m shielded cable with USB type A plug IC040035 : 35 cm switch cable (4 wires) to CON2
Optional AP38-1	Anti-Vandal Backplate	Incl, spacers, washers and screws

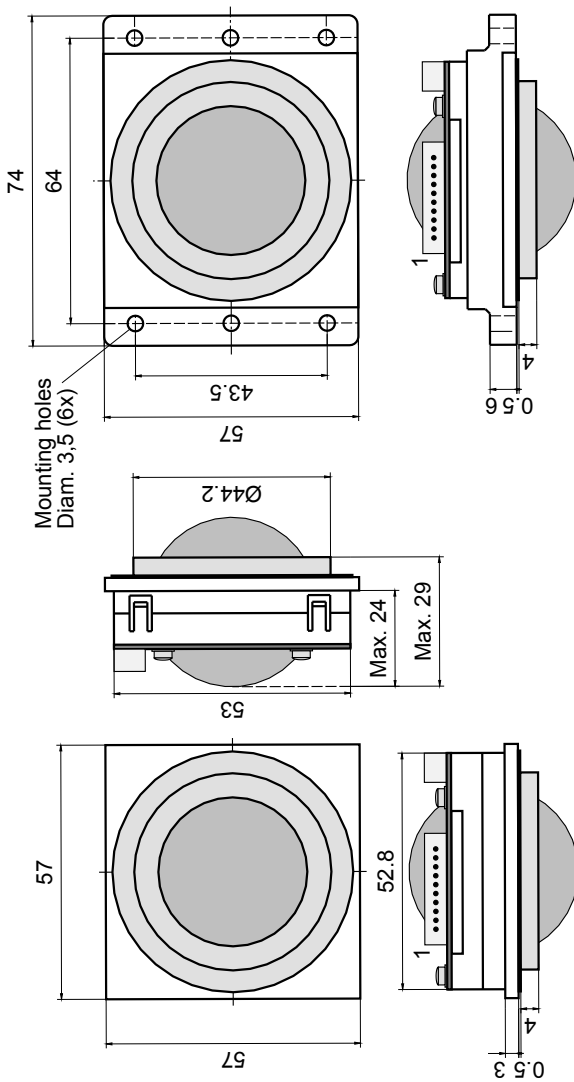
Specifications are subject to change without notice.

Connectivity

The GS38-4502 is PS/2 compatible. The GS38-4602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GS38-4002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. No device driver is supplied with the unit. Please use standard available drivers in your operating system. It is supplied with a 10-way connection cable of 35 cm.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*



Dip switches : leave off, for factory use only.

10 way connector (CON1)

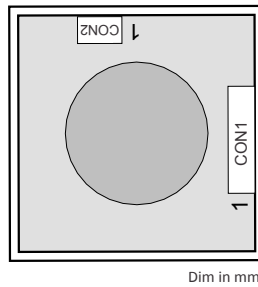
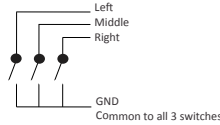
Pin	Quadrature	PS/2 or USB
1	X1	X1
2	X2	X2
3	Y1	Y1
4	Y2	Y2
5	-	-
6	-	-
7	Vcc	Vcc
8	-	Data/D-
9	-	CLK/D+
10	GND	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.

4 way connector (CON2) for PS/2 & USB only

Pin	Switch input
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



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Utilizing the latest and most advanced laser tracking technology, the X38 Series laser Trackerball™ is an extremely high specification, contact-less device, ideal for the most demanding of cursor control applications.

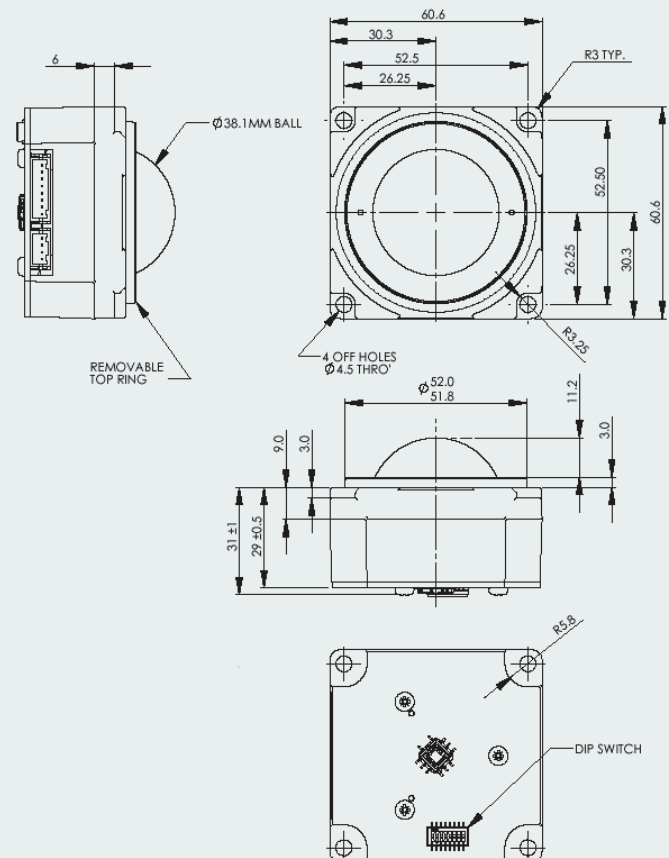
The laser tracking engine provides accurate cursor motion at all speeds and on virtually any ball, combining the benefits of solid state sensing (no moving parts except the ball). The X38 trackballs are available with a variety of electrical outputs and sealing to IP68. The solid state design allows the device to be subjected to extreme conditions and provides the user with the ability to wash down, decontaminate, and sterilize, 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.

Features

- Solid state sensing technology Laser tracking engine
- 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

*38 mm Waterproof Laser Trackball Module
IP68 sealed
X38*



*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.*

Specifications: see next page

Mechanical	
Weight	90 grams
Ball	Epoxy Resin, 38 mm
Tracking Force	20 grams Nominal - damper ring. 30 - 80 grams - rubber seal
Ball load	100N Maximum downward pressure (10 Kg) for 2 mins.
Ball Rotation	Continuous and reversible any direction
Resolvable Ball Speed	40 Inches/sec.
Housing Material	Polycarbonate / ABS
Transducer	Optical Navigation Technology (solid state sensing)
Mounting Position	All angles
Sealing gasket	Cellular silicone
Electrical	
Supply voltage	4.4V to 5.25V DC
Supply current	23mA typical, 25mA maximum
Resolution	900 counts per ball revolution @ 1 IPS (inches per second) +/- 10% (Quadrature protocol) 1800 counts per ball revolution @ 5 IPS (inches per second) +/- 10% (USB, PS/2 protocol)
Output connector	8 Way JST, right-angled header, part no. S8B-PH-SM3-TB
Switch Inputs (USB, PS/2)	3 switches: left, middle, right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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)

Damper Ring	Rubber Seal	Output
X38-70021D	X38-70022D	Quadrature
X38-76021D	X38-76022D	PS/2 & USB

Specifications are subject to change without notice.

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The GK50 is a high specification keyboard or panel mounted trackball. It is constructed from a glass loaded PBT chassis and benefits from its large diameter shafts for smooth running.

The GK50 is sealed to IP65 static (ball in rest). Designed to be panel mounted as part of OEM systems, the GK50 is ideal for demanding applications such as medical equipment, process control, air traffic control and ruggedized keyboards.

50 mm Trackball Module IP65 sealed GK50



Specifications	
Sealing	IP65 (static)
Casing material	Glass loaded PBT
Top Plate material	ABS
Ball material	Phenolic resin
Ball colour	Black
Ball diameter	50.8 mm
Weight	270 grams
Seal material	PTFE
Shaft diameter	9.5 mm
Tracking force	50 grams nominal
Mounting angle	Max. 90° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	6 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GK50-4002	Quadrature	P50-500230 Trackball module only IC101035 : 35 cm interconnection cable to CON 1
GK50-4502	PS/2	P50-560230 : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GK50-4602	USB	P50-560230 : Trackball module only OC5006160 : 1,6 m shielded cable with USB type A plug IC040035 : 35 cm switch cable (4 wires) to CON2

Specifications are subject to change without notice.

Connectivity

The GK50-4502 is PS/2 compatible. The GK50-4602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GK50-4002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. No device driver is supplied with the unit. Please use standard available drivers in your operating system. It is supplied with a 10-way connection cable of 35 cm.

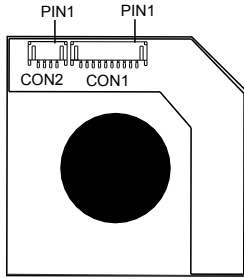
** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off, for factory use only.

10 way connector (CON1)

Pin	Quadrature	PS/2 or USB
1	X1	X1
2	X2	X2
3	Y1	Y1
4	Y2	Y2
5	-	-
6	-	-
7	Vcc	Vcc
8	-	Data/D-
9	-	CLK/D+
10	GND	GND

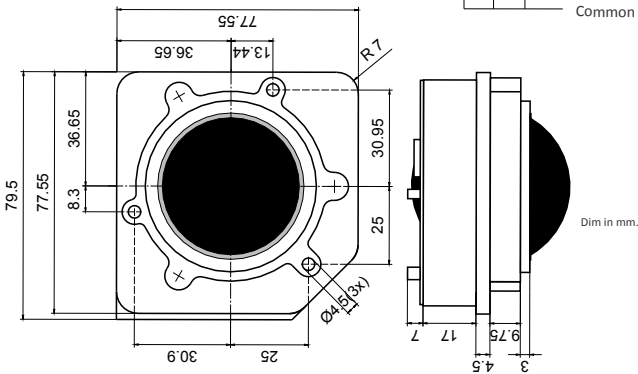
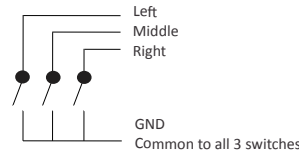
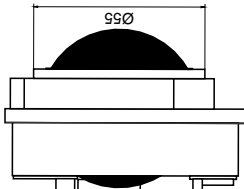
Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



4 way connector (CON2) for PS/2 & USB only

Pin	Switch input
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



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• **Monitors – Specific applications**

- Stainless Steel Monitors
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- Train Monitors

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info_de@m-h.biz

The GS50 series are ruggedized professional trackballs. The ball and the trim are made of quality stainless steel giving the unit a stylish all metal look. The double-sided seal ring provides a sealing to IP54. Stainless steel shafts and bearings ensure a solid and precise pointer control.

50 mm Stainless Steel Trackball Module IP54 sealed GS50



Specifications	
Sealing	IP54
Casing material	ABS/Polycarbonate
Ball & Trim material	Stainless Steel
Ball colour	Blank
Ball diameter	50.8 mm
Weight	700 grams
Seal material	PTFE composite
Shaft diameter	9.5 mm
Tracking force	60 grams nominal
Mounting angle	Max. 60° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Supply voltage (quadrature)	5 Vdc +/- 5%
Supply current (quadrature)	6 mA typ
Storage temperature	-25°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Output	Consisting of
GS50-4002	Quadrature	P50-50028C Trackball module only IC101035 : 35 cm interconnection cable to CON 1
GS50-4502	PS/2	P50-56028C : Trackball module only OC6006160 : 1,6 m shielded PS/2 cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GS50-4602	USB	P50-56028C : Trackball module only OC5006160 : 1,6 m shielded cable with USB type A plug IC040035 : 35 cm switch cable (4 wires) to CON2

Specifications are subject to change without notice.

Connectivity

The GS50-4502 is PS/2 compatible. The GS50-4602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables.

The GS50-4002 has phase quadrature output: X1(Y1) leads X2(Y2) when motion of ball in positive X(Y) direction. No device driver is supplied with the unit. Please use standard available drivers in your operating system. It is supplied with a 10-way connection cable of 35 cm.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off, for factory use only.

10 way connector (CON1)

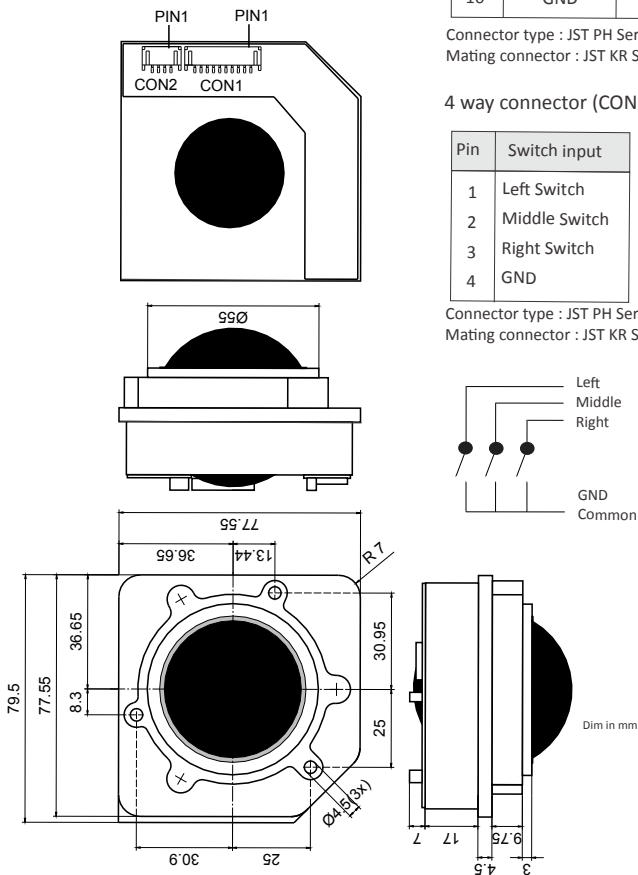
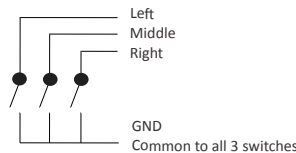
Pin	Quadrature	PS/2 or USB
1	X1	X1
2	X2	X2
3	Y1	Y1
4	Y2	Y2
5	-	-
6	-	-
7	Vcc	Vcc
8	-	Data/D-
9	-	CLK/D+
10	GND	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.

4 way connector (CON2) for PS/2 & USB only

Pin	Switch input
1	Left Switch
2	Middle Switch
3	Right Switch
4	GND

Connector type : JST PH Series 2,0mm pitch.
Mating connector : JST KR Series 2,0mm pitch.



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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.

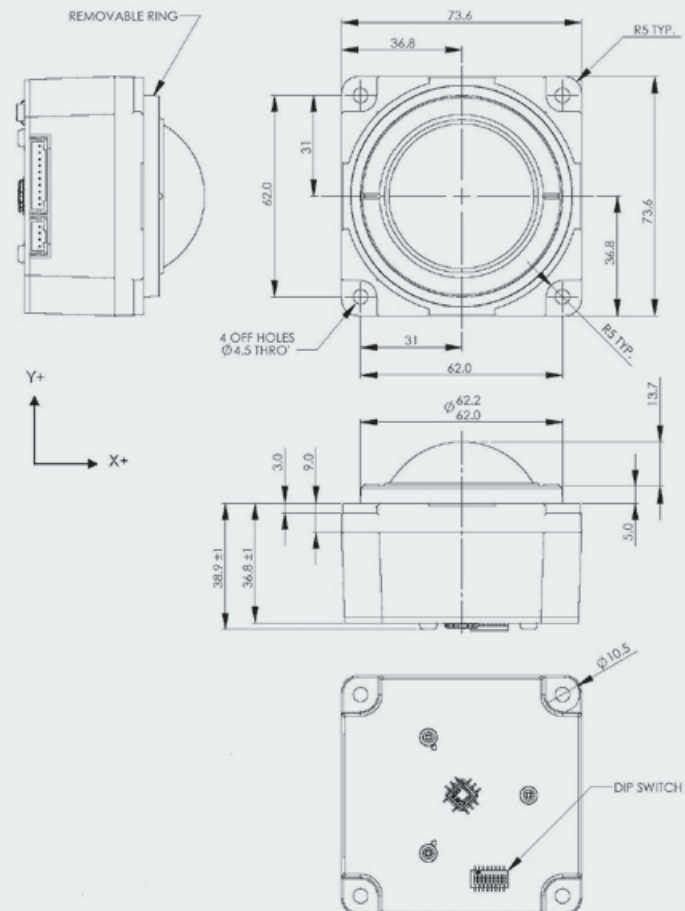
The laser tracking engine provides accurate cursor motion at all speeds and on virtually any ball, combining the benefits of solid state sensing (no moving parts except the ball). The X50 trackballs are available with a variety of electrical outputs and sealing to IP68. The solid state design allows the device to be subjected to extreme conditions and provides the user with the ability to wash down, decontaminate, and sterilize, 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.

Features

- Solid state sensing technology - Laser tracking engine
- 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 Waterproof Laser Trackball Module
IP68 sealed
X50*



*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.*

Specifications: see next page

Mechanical	
Weight	150 grams
Ball	Epoxy 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.
Resolvable Ball Speed	40 Inches/sec.
Housing Material	Polycarbonate / ABS
Transducer	Optical Navigation Technology (solid state sensing)
Mounting Position	All angles
Sealing gasket	Cellular silicone
Electrical	
Supply voltage	4.4V to 5.25V DC
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-SM3-TB
Switch Inputs (USB, PS/2)	3 switches: left, middle, right. Connection through 4-way JST, right-angled header, part no: S4B-PH-SM3-TB
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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)

Damper Ring	Rubber Seal	Output
X50-70021D	X50-70022D	Quadrature
X50-76021D	X50-76022D	PS/2 & USB

Specifications are subject to change without notice.

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The GK75 is a very high specification, back of panel mounted trackball with large 75 mm ball diameter. It is constructed from PPS and benefits from its large diameter shafts and bearings for smooth running. It is designed to be rear-panel mounted as part of OEM systems, where reliability, robustness and an extensive life span are essential. The large ball provides the perfect solution for high performance, high resolution applications.

75 mm Trackball Module GK75



Specifications	
Sealing	IP40
Casing material	PPS polypropylene-disulphide
Top Plate material	PPS polypropylene-disulphide
Ball material	Phenolic resin
Ball colour	Yellow or Black
Ball diameter	76.2 mm
Weight	650 grams
Shaft diameter	9.5 mm
Tracking force	15 grams nominal
Mounting angle	Max. 30° to horizontal plane
Lifetime - Ball revolutions	> 2 million
Storage temperature	-20°C to +80°C
Operating temperature	-10°C to +60°C
Relative humidity	95% non-condensing
Vibration	5G, 5-2KHz any plane

Part numbers	Out-put	Ball colour	Consisting of
GK75-1502 GK75-1502B	PS/2 PS/2	Yellow Black	P75-160244 : Trackball module only, yellow ball OR P75-160240 : Trackball module only, black ball OC6010160 : 1,6 m shielded cable with 6 pin mini DIN plug IC040035 : 35 cm switch cable (4 wires) to CON2
GK75-1602 GK75-1602B	USB USB	Yellow Black	P75-160244 : Tradball module only, yellow ball OR P75-160240 : Trackball module only, black ball OCSOI0160 : 1,6 m shielded cable with USB type A plug ICO40035 : 35 cm switch cable (4 wires) to CON2

Specifications are subject to change without notice.

Connectivity

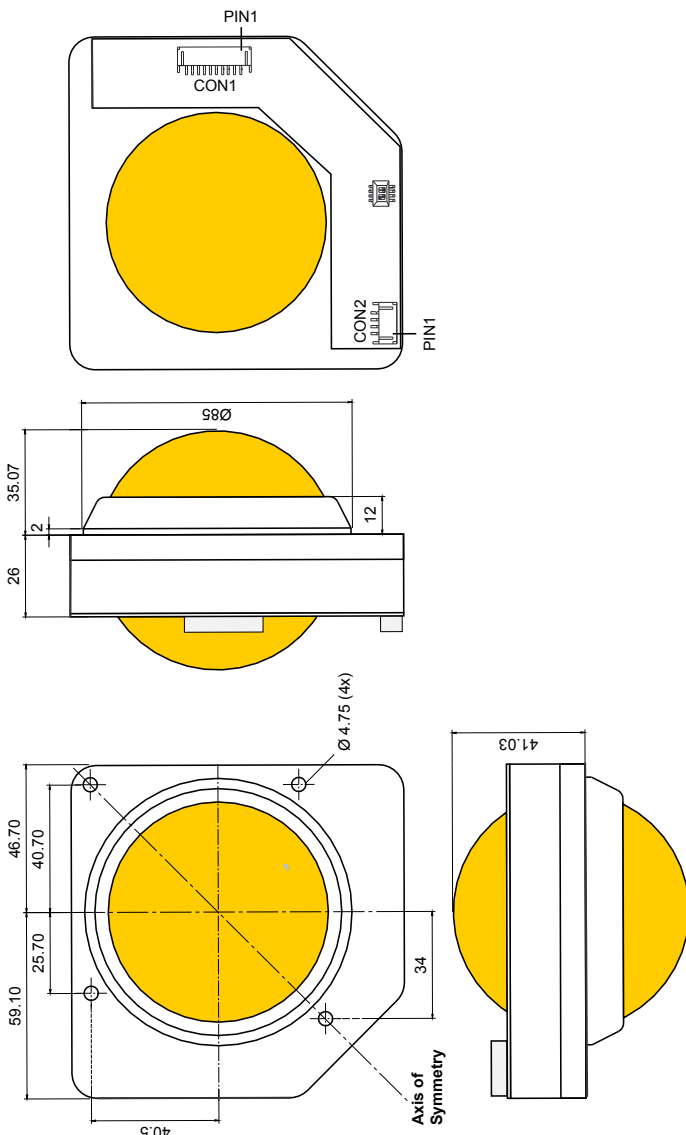
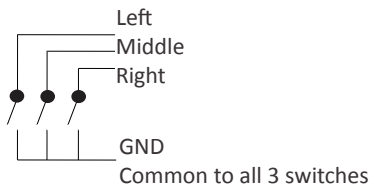
The GK75-1502 is PS/2 compatible. The GK75-1602 can be plugged into any USB port or hub. Both types are supplied with 1,6m long shielded straight cables and external switch cables. No device driver is supplied with the unit. Please use standard available drivers in your operating system.

** Due to the increasing differences of the mouse port specifications of the various PC manufacturers, we do recommend that this unit should be tested on the final PC configuration and operating system prior to installing it in series.*

Dip switches : leave off,
for factory use only.

CON1		CON2	
Pin	PS/2 or USB	Pin	Connector 2 Switch input
1	-	1	Left switch
2	-	2	Middle switch
3	-	3	Right switch
4	-	4	GND (common)
5	-		
6	-		
7	Vcc		
8	Data/D-		

Connector type CON1, CON2 : JST PH Series 2,0mm pitch.
Mating part to connector CON1, CON2: JST KR Series 2,0mm pitch.
Type numbers: 04KR-8M (CON2), 10KR-8M(CON1)



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Halo Backlit Ring Option

Available on X25, X38 and X50 laser trackballs

Utilizing the latest and most advanced laser tracking technology, the HALO Series laser Trackerball™ is an extremely high specification, contact-less device, ideal for use in low level light environments where accurate cursor control is critical.

The trackball incorporates an illuminated ring around the ball to enable the user to locate the trackball in low light environments and offers an ideal solution for applications where a backlit ball would be too obtrusive. The HALO feature can also be used to compliment other backlit features incorporated within a user interface panel and is available in a wide range of colours. 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) The design also 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 trackball has been designed to be back of panel mounted as part of OEM keyboards and consoles.

Features

- Available with X25, X38 and X50
- Sealing up to IP68
- Smooth operation in rugged environments
- Various colours and top plate configurations

Halo Light Feature

The X50 Series HALO trackball provides all the features of the standard X50 trackball module with the inclusion of an illuminated ring surrounding the ball. The light ring provides an excellent means of locating the trackball in low level light environments and also serves as an aesthetic feature to compliment other illuminated components incorporated within a user interface panel. The figures show the HALO feature in its powered and non-powered state.

Halo Backlit Ring X-Range



Specifications: see next page

Specifications

The Halo trackballs are no NSI stock item. Longer lead times can apply. See details on datasheets of the X25, X38 or X50 laser trackballs. No cables are supplied with the optical trackball modules. They can be ordered separately.

Order info Halo Backlit Ring

Trackball	Output	Damper Ring	Rubber Seal	PTFE Seal
25 mm ball	Quadrature PS/2 & USB	X25-70021D-H00z X25-76021D-H00z	X25-70022D-H00z X25-76022D-H00z	
38 mm ball	Quadrature PS/2 & USB	X38-70021D-H00z X38-76021D-H00z		X38-70023D-H00z X38-76023D-H00z
50 mm ball	Quadrature PS/2 & USB	X50-70021D-H00z X50-76021D-H00z		X50-70023D-H00z X50-76023D-H00z

Order info Anti-Vibration Option

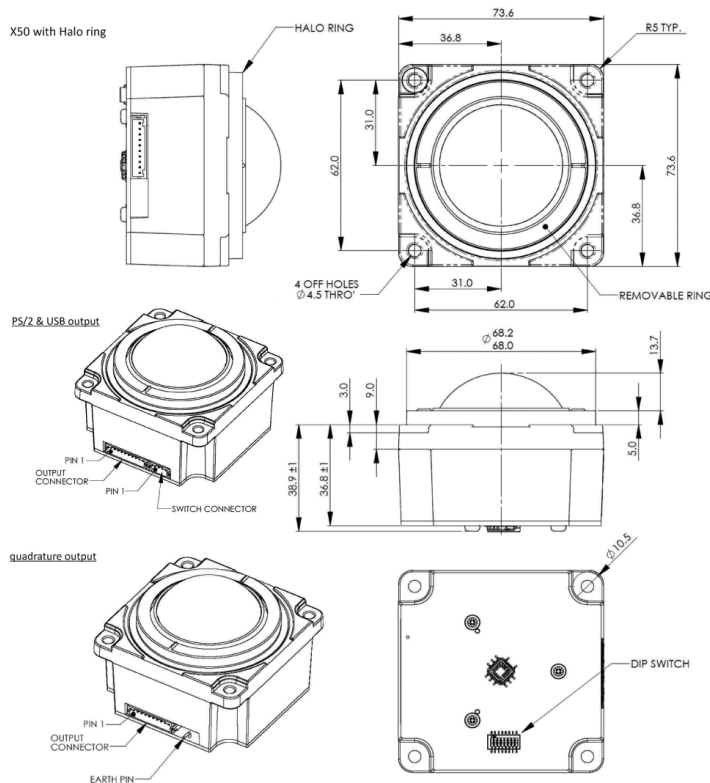
Trackball	Output	Damper Ring	Rubber Seal	PTFE Seal
38 mm ball	Quadrature PS/2 & USB	X38-70021D-V X38-76021D-V		X38-70023D-V X38-76023D-V
50 mm ball	Quadrature PS/2 & USB	X50-70021D-V X50-76021D-V		X50-70023D-V X50-76023D-V

Order info Halo Backlit Ring & Anti-Vibration Option

Trackball	Output	Damper Ring	Rubber Seal	PTFE Seal
38 mm ball	Quadrature PS/2 & USB	X38-70021D-HV0z X38-76021D-HV0z		X38-70023D-HV0z X38-76023D-HV0z
50 mm ball	Quadrature PS/2 & USB	X50-70021D-HV0z X50-76021D-HV0z		X50-70023D-HV0z X50-76023D-HV0z

z = Backlit colour: B = Blue, G = Green, R = Red, W = White, Y = Yellow
 Example : X50-76023D-HV0W = 50 mm trackball, PTFE seal, PS/2 & USB output, white backlit Halo & anti vibration option

Specifications are subject to change without notice.



dimensional drawings of the X25 and X38 with Halo on request

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Utilizing the latest and most advanced laser tracking technology, the ZSeries Laser Trackerballs™ are extremely high specification, contact-less devices, ideal for the most demanding of cursor control applications. The device provides both conventional X and Y-axis cursor movement with an additional Z-axis control wheel surrounding the ball. 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).

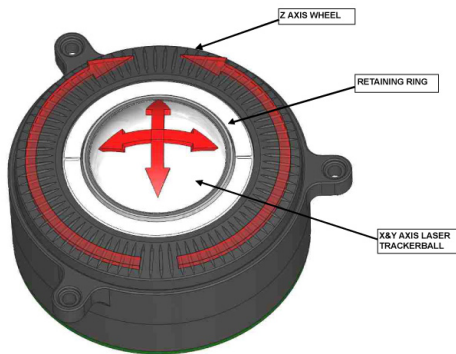
The unit has been designed to be back of panel mounted as part of OEM keyboards and consoles.

Features

- Solid state sensing technology – laser tracking engine
- Z-axis control wheel for scroll/zoom capability
- Removable Ball
- 25mm (Q2/2011), 38mm or 50 mm ball
- Output: PS/2 & USB or Quadrature
- Smooth operation in rugged environments
- Various top plate configurations available
- Custom connector options available
- Various ball colours

Z-Axis Control Wheel

The Z- laser trackball provides conventional X and Y axis cursor movement with an additional Z-axis control wheel surrounding the ball. The Z-axis control wheel provides scroll/zoom capabilities for more effective navigation in complex user interfaces and operating systems (please note the function of the control wheel is software dependent). The control wheel incorporates a high quality roller bearing providing smooth and reliable motion throughout the trackball lifetime.

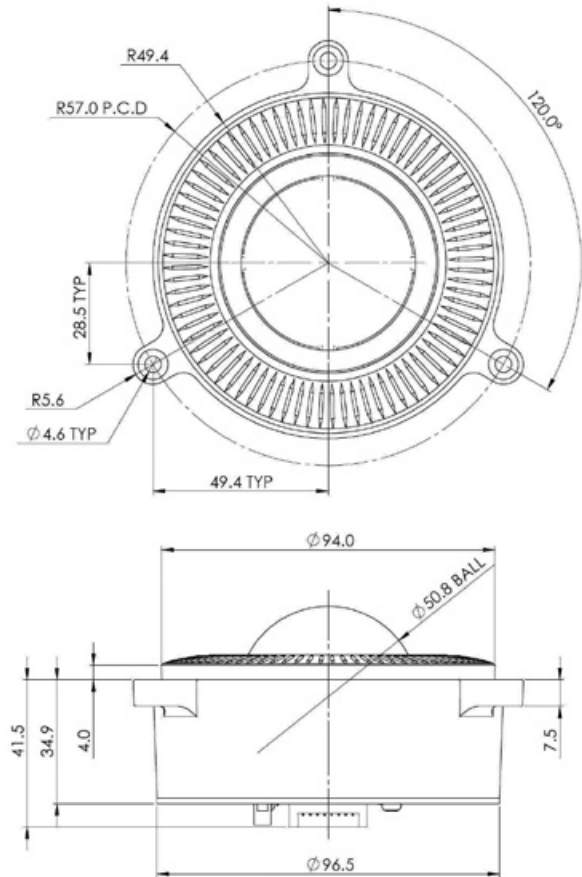
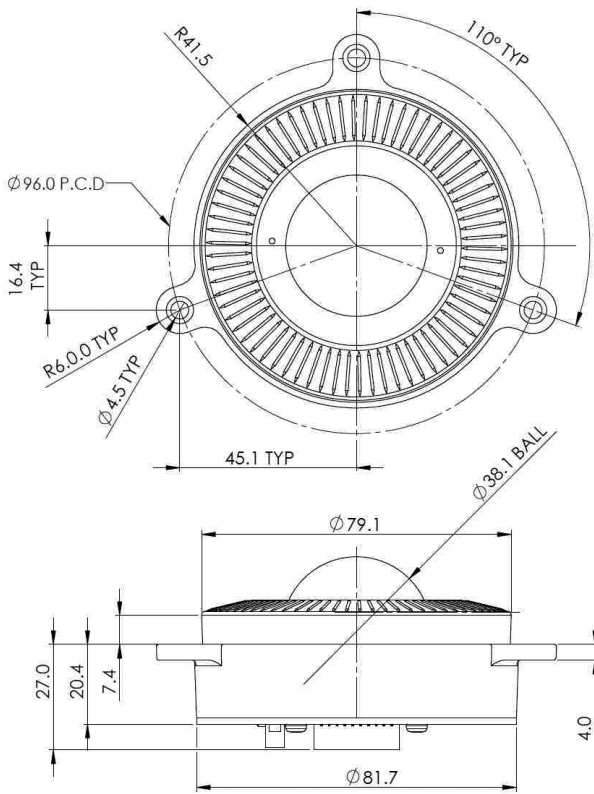


The trackball also features a removable retention ring enabling the user to remove the ball for servicing and maintenance purposes.

3rd Axis Laser Trackball Module
38 mm or 50 mm ball
Z38 & Z50



Specifications: see next page



Dimensional drawing specifies factory default orientation.
 All dimensions are in mm unless otherwise stated.
 Tolerances +/- 0.2mm unless otherwise stated

Specifications: see next page

Mechanical	
Weight	200 grams (Z38) / 350 grams (Z50)
Ball	Epoxy Resin, 38 mm
Tracking Force	20 grams Nominal - damper ring 30 - 80 grams - dust seal PTFE or silicone rubber
Z-axis wheel tracking force	5 - 15 grams
Ball load	100N max. downward pressure (10 Kg) for 2 mins.
Resolvable Ball Speed	40 Inches/sec.
Resolvable Z-axis wheel speed	1 revolution per second
Mounting Position	All angles
Tracking engine	Laser Navigation Technology (solid state sensing)
Housing Material	PC/ABS - black
Z-axis wheel material/finish	PC/ABS with soft touch coating - black
Electrical	
Supply voltage	4.4V to 5.25V DC
Supply current	28mA typical, 35mA maximum
Resolution	900 counts per ball revolution @ 1 IPS (inches per second) +/- 10% (Quadrature protocol) 1800 counts per ball revolution @ 5 IPS (inches per second) +/- 10% (USB, PS/2 protocol)
Resolution - Z-axis wheel	200 counts (Z38) / 300 counts (Z50) per revolution
Mating Output connector	10 Way JST connector, part no. PH, CR or KR types (e.g. PHR-10)
Switch connector	4 Way JST, vertical header, part no B4B-PH-SM4-TB
Mating switch connector	4 Way JST connector, part no: PH, CR or KR types (e.g. PHR-4)
Switch Inputs (USB, PS/2)	3 switches: left, middle, and right.
Laser safety class	Embedded class 1M laser safety, IEC 60825-1
Environmental	
Operating temp.	0°C to +55°C (IEC 60068-2-1, IEC60068-2-2)
Storage temp.	-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
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)

Damper Ring	PTFE Seal	Output
38 mm Trackball: Z38-10021D-D Z38-16021D-D	Z38-10023D-D Z38-16023D-D	Quadrature PS/2 & USB
50 mm Trackball: Z50-10021D-D Z50-16021D-D	Z50-10023D-D Z50-16023D-D	Quadrature PS/2 & USB

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