GV3 linear guidance and transmission system

Smooth – Fast – Accurate – Quiet
Durable – Simple – Versatile – Economic

An unrivalled linear motion system, designed to serve a diverse range of automation and linear applications.
STANDARD BEARING FIXING TYPES [34-35]
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.
- Two axle lengths available, long & short.
- Controlled Height option improves system height accuracy.
- Blind Hole Fixing types (see 2).
- Double eccentric axle version available to enable direct removal of Carriage from a Slide. Useable only with Removable Type Carriage, due to hole positions. Please refer to the GV3 Technical Guide.

BLIND HOLE BEARING [34-35]
- For mounting into thick plates or where access to opposite side is restricted.
- Eccentric version adjusted from operating side for ease of access.
- Concentric version (shown on opposite side of the Slide) has threaded axle and locates into tapped hole in the mounting surface.

SINGLE EDGE SPACER SLIDE [28-29]
- Mounts directly to a flat surface. No spacer required.
- Keyway and datum edges provide means of location and alignment.
- Back cut option provides means of driving.
- Counterbored holes, tapped holes or un-drilled options available.

SINGLE EDGE FLAT SLIDE [30-31]
- Lower weight for less inertia where Slide is the moving component.
- Lower cost in cases where spacer is part of customer’s construction.
- Plain hole, or counterbored fixing option for flush top surface.
- Single Edge Flat Slides can be spaced apart for high moment load capacity.

PINION [47]
- Hardened teeth for long life.
- Stainless steel available in some sizes.
- Shaft Type Pinion available for Hepco Rack Driven Carriages. Please refer to [48].

Double Edge Flat Slide [30-31]
- See Single Edge Flat Slide features.

DOWEL PIN [27 & 29]
- Easy method of location and alignment.

CAP SEAL [38]
- Lubricates contact surfaces, increasing load capacity and life.
- Lubricated for life in most applications.
- Seals against ingress of debris.
- Improves operational safety.
- Incorporates both through hole and tapped hole fixing facility.

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- Lower cost in cases where spacer is part of customer’s construction.
- Plain hole, or counterbored fixing option for flush top surface.
- Single Edge Flat Slides can be spaced apart for high moment load capacity.

DOUBLE EDGE SPACER SLIDE [26-27]
- Mounts directly to a flat surface. No spacer required.
- Keyway and datum edges provide means of location and alignment.
- Can be supplied with Rack mounted on top surface.
- Counterbored hole fixing, tapped hole fixing or un-drilled options available.

DOUBLE EDGE FLAT SLIDE [30-31]
- See Single Edge Flat Slide features.

LUBRICATOR [40]
- Lubricates contact surfaces, increasing load capacity and life.
- Lubricated for life in most applications.
- Seals against ingress of debris.
- Improves operational safety.
- Incorporates both through hole and tapped hole fixing facility.

TWIN BEARING (shown left) & DOUBLE ROW BEARING (shown right) [34-35]
- Twin Bearing for tolerance of misalignment and smooth running.
- Double Row Bearing for debris tolerance and higher load capacity.
- Special raceway conformity and low radial clearance.
- Metal shields for exclusion of particulates and low friction running.
- Nitride sealed version prevents ingress of liquids.
- Lubricated for life internally.

STANDARD CARRIAGE [22-23]
- Factory adjusted to chosen Slide, if required.
- Carriage Plate available as an individual item, for self assembly.
- Useful size platform with flush surface and tapped holes for mounting purposes.
- Available with Bearings only, or with the addition of Cap Seals or Lubricators.
- Controlled height option for special accuracy requirements.
- Removable option for direct disengagement from Slide.

Controlled Height option improves system height accuracy.
Blind Hole Fixing types (see 2).
**System Composition**

**Linear Motion System with Slimline Bearings**

**INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL**

**ALL SLIDES (COMMON FEATURES) [26-31]**
- All Hepco Slides are suitable for both Slimline and Standard Bearings. Please see features [2].

**SLIMLINE CARRIAGE [24-25]**
- Factory adjusted to chosen Slide, if required.
- Carriage Plate available as an individual item, for self assembly.
- Useful size platform with flush surface and tapped holes for mounting purposes.
- Available with Bearings only, or with the addition of Cap Wipers or Lubricators.

**SLIMLINE LUBRICATOR [20]**
- Please see features [3].

**SLIMLINE BLIND HOLE BEARING [36-37]**
- Please see features [2].

**SINGLE EDGE SPACER SLIDE [28-29]**
- Please see features [2].

**DOWEL PIN [27 & 29]**
- Easy method of location and alignment.

**CAP WIPER [39]**
- Lubricates contact surfaces increasing load capacity and life.
- Lubricated for life in most applications.
- Inhibits against ingress of debris.
- Improves operational safety.
- Enhances appearance of system.
- Incorporates both through hole and tapped hole fixing facility.

**PINION [47]**
- Please see features [2].

**SINGLE EDGE FLAT SLIDE [30-31]**
- Please see features [2].

**DOUBLE EDGE SPACER SLIDE [26-27]**

**SLIMLINE BEARING FIXING TYPES [36-37]**
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.
- Two axle lengths available, long & short.

**SLIMLINE BEARING [36-37]**
- Special raceway conformity and low radial clearance, for Slide applications.
- Narrow profile for compact system height.
- Low cost system, especially if combined with P3 grade (unground) Slides.
- Load capacity adequate for many applications.
- Single piece Bearing for tolerance of debris.
- Metal shields for exclusion of particulates and low friction running.
- Nitrile sealed version prevents ingress of liquids.

**NARROW TRACK ROLLER [43]**
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.

**TRACK ROLLERS (COMMON FEATURES) [43-45]**
- Size and load capacity equivalent to Hepco ‘V’ Bearings.
- Special raceway conformity with low radial clearance.
- Crowned running face for tolerance of misalignment.
- Metal shields for exclusion of particulates and low friction running.
- Nitrile sealed version prevents ingress of liquids.

**WIDE TRACK ROLLER [44-45]**
- Concentric axle type (shown above Flat Track) provides datum for the system.
- Eccentric axle type (shown below Flat Track) provides adjustment for the system.
- Two axle lengths available, long & short.

**BLIND HOLE WIDE TRACK ROLLER [44-45]**
- For mounting into thick plates or where access to opposite side is restricted.
- Adjustable from operating side, for ease of access.
- Concentric axle type
- Eccentric axle (adjustable) type
- Two axle lengths available, long & short.

**SINGLE EDGE SPACER SLIDE & CONCENTRIC V BEARING**
- Please see [4] for features and page references.

**FLAT TRACK [42]**
- Choose from ground all over, ground on opposing faces, or unground.
- Deep hardened faces for maximum wear resistance.
- Manufactured from high quality carbon steel.
- Offset fixing holes for versatility of mounting.
- Four useful sizes compatible with Hepco ‘V’ Slides.
- Any length supplied up to 4 metres in most sizes.
- Unlimited length achieved by butting.

**SLIMLINE CARRIAGE**
- Please see [2] for features and page references.

**SEE APPLICATION EXAMPLES SECTION FOR DESIGN IDEAS**

HepcoMotion.com

CAD

INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL

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- Load capacity adequate for many applications.
- Single piece Bearing for tolerance of debris.
- Metal shields for exclusion of particulates and low friction running.
- Nitrile sealed version prevents ingress of liquids.
System Composition

Linear Motion System with Drive Facility / Support Structure

INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL

BELT DRIVEN CARRIAGE

- Use with Flat Slides, Spacer Slides or Slide Beams in all grades of precision.
- Integral belt tensioners for ease of adjustment.
- Removable mounting platform for ease of customising.
- Tapped holes for convenience of attaching components.
- Available with most Hepco Standard Bearing variants and Lubrication Devices.

TIMING BELT

- High strength, steel reinforced AT profile open length belt.
- Cut to length, up to 50 metres.
- Widths to suit Hepco Belt Driven Carriages & Pulleys.

SLIDE BEAM 32-33

- Can be used as a machine construction member.
- Strong section, spans wide gaps.
- Countertapped Slide version for belt support.
- Hollow centre for belt, cable or chain return.
- T-Slots for attaching components.
- Plastic T-Slot covers, T-Nuts and fixing clamps available.

TIMING PULLEY

- Low backlash profile for high positional accuracy.
- Width to suit Belt Driven Carriages.
- Diameter enables belt return through Slide Beam.

RACK DRIVEN CARRIAGE 48

- Complete carriage assembly available to include Drive Flange, Pinion and AC Geared Motor, or Gearbox only. Items available separately for use in conjunction with Rack Cut Single Edge Spacer Slides or separate Shafts.
- Fine adjustment facility for Pinion assures low backlash.
- Various drive positions and motor orientations available.
- Carriages available with all Standard Bearing types and Lubrication Devices.

SEPARATE RACK 46

- As used in Rack-Slide assembly.
- Lengths up to 1.83 metres, longer lengths achievable by butting.

RACK-SLIDE ASSEMBLY 26-27

- Dowelled Rack-Slide assembly ready to fix to the mounting surface.
- Slides with compound Shafts available up to 4 metres.
- Unlimited Rack-Slide length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground Slide faces and on Rack.

PINION 47

- Please see features 2.

Ancillary Components

FLOATING BEARING

- GV3 Technical Guide
- Provides axial movement (float) of the "V" position to compensate for parallelism error when two Slides are mounted in parallel.
- Caged needle roller bearing for high speed operation.
- Nitrile seals to prevent ingress of debris.
- Lubricated for life internally.
- See Application Examples 12 & 15

VACUUM AND EXTREME TEMPERATURE BEARING

- GV3 Technical Guide
- All stainless steel construction.
- Grease types for either extreme high temperature or extreme low temperature applications.
- Available in most GV3 sizes including Blind Hole Fixing versions.
- Also available in Track Roller format.
- See Application Examples 17

TWIN TAPER ROLLER BEARING

- GV3 Technical Guide
- High strength Bearing with exceptional rigidity, for load capacity and life exceeding standard GV3.
- Available in size 54 for use in conjunction with Side Adjusting Carriage.
- See Application Examples 11

MCS-GV3 CONNECTIVITY

- GV3 Technical Guide
- GV3 Spacer Slides and Flat Slides can be mounted to Hepco MCS (Machine Construction System) profiles.
- Can be supplied factory-assembled, ready for installation.
- Hepco T-Nut Strip provides a location for Spacer Slides and retains fastener positions in the event of disassembly.
- Comprehensive range of aluminium profiles and Slide mounting combinations available, including Single Edge Slides.
- See Application Examples 15 & 16

See Application Examples Section for Design Ideas
Ancillary Components

**INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL**

**FLANGE CLAMP**
- Enables Slide to become a self supporting beam.
- Two mounting possibilities, face fixing or base fixing.
- Available in long or short type, to support a Slide at one or both ends.

**REMovable CARRIAGE**
- Incorporates Double Eccentric Bearings to enable complete removal of the Carriage. Please see Side Access Adjustment below and in the GV3 Technical Guide for an alternative method of removal without having to first disassemble mounted components.

**CARRIAGE WITH SIDE-ACCESS ADJUSTMENT**
- Alternative method of Bearing adjustment, allowing fine and controlled setting.
- Available with sizes Ø25, Ø34 and Ø54 Standard Bearings, and for Ø54 Twin Taper Roller Bearing.
- No necessity to remove customer components from the Carriage Plate when adjusting.
- Adjustment is sufficient to remove Carriage directly from the Slide.
- Secure setting. Will not alter under abnormal service conditions.
- Advantageous in applications where access required to adjust Standard Eccentric or Double Eccentric Bearings is limited.

**BLEED LUBRICATION**
- Channels lubricant directly to the ‘V’ surface of Slides.
- For connection to any centralised lubrication system, dispensing pump and controller or pressure feed canister.

**END STOP**
- Provides a physical stop to the linear movement and impact protection should a system overrun.
- Conical buffer provides a controlled deceleration to the Carriage to protect the system and payload.
- May be positioned anywhere along the length of a Slide for maximum flexibility.

**CARRIAGE LOCKING DEVICE**
- Provides a safe and simple method of manually locking a Standard Carriage in position to facilitate processes where a secure, stationary platform is required.

**MOment LOAD CARRIAGE**
- Provides extra support and rigidity in applications where high downwards or offset loads are anticipated, typically at work stations.
- Two sizes of Carriage/Slide combinations available.
- Available with two types of work station support - static roller type and dynamic roller type (shown) - both designed to connect to a track system support beam.
- Single-roller or twin-roller configurations.
- Carriage locking system available for precise positioning of Carriage when stationary.

**SHOCK ABSORBER**
- Increases life of the Slide System by reducing stress on internal elements and reducing wear on the Slide in crucial deceleration zones.
- Permits higher operating speeds and reduces maintenance costs and noise levels.
- Enhances safety in the event of control system failure.
- Compatible with Standard and Slimline Carriages.
- Top mounting, end mounting or clamp mounting types available, according to Slide size and type.

**SEe APPLICATION EXAMPLES SECTION FOR DESIGN IDEAS**
Hepco Single Edge Flat Slides can be mounted to the edges of many sizes of square or rectangular tube with sufficient protrusion of the Slide 'V' running face to provide clearance for Hepco Bearings and Lubrication Devices. The fixing hole positions allow attachment by means of standard sizes of hexagon bar. Alternatively, Slides can be attached by "flowdrilling" or by welding.

LOW HEIGHT SYSTEM
A very compact Slide System can be achieved by using Hepco Flat Slides in conjunction with Slimline Bearings and by choosing thinner section material for the Carriage and Slide support.

MOUNTING SLIDES ONTO TUBULAR FRAMEWORK
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EASE OF ALIGNMENT USING ALL ECCENTRIC BEARINGS
This example shows the possibility to adjust the Hepco GV3 Slide System in one plane, thus avoiding the necessity for precision drilling and fitting.

LIGHT LOADS
Where very light loads are anticipated, three Bearings may be used instead of the usual configuration of four. This saves on component cost and assembly time.

HEAVY LOAD REQUIREMENTS
For increased load capacity, additional Eccentric Bearings 'E' may be installed in between the outermost ones. Multiple Bearing installations benefit from the use of Controlled Height Bearings, which ensure better load distribution. Cap Seals will provide lubrication and maximise load capacity. Alternatively, Twin Taper Roller Bearings or HDS2 Heavy Duty Linear Guide and MHD Track Roller Linear Motion systems may be used for very high load.

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CARRIAGE WITH SIDE-ACCESS ADJUSTMENT
Carriage with Side Access Adjustment enables progressive adjustment to the Slide and positive setting which will not alter in abnormal service conditions. There is sufficient adjustment for direct removal or attachment of the Carriage, which can be achieved without having to dismantle the attached fixture. Hepco SH Shock Absorbers can significantly increase the life of a GV3 Slide System by reducing stress on components and minimising wear on the Slide in the crucial deceleration zone.

Application Examples
HepcoMotion.com CAD

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Hepco Flange Clamps can be used to support a Double Edge Spacer Slide in a number of positions by utilising the base mounting facility. No oil is permitted in this example so Bearings are used without Cap Seals or Lubricators. The GV3 system is well suited to run “dry”, especially in lighter duty applications.

**SIMPLE TWO AXIS CONNECTION**

Hepco short series Flange Clamps are an ideal method of connecting opposing Carriages and creating a second axis which can be easily installed or removed. To overcome the necessity to set opposing Slides parallel, Hepco Floating Bearings are used on one side. The left-hand Carriage is shown with a Carriage Locking Device, which enables it to be secured and locked into position.

**MULTI-LANE ROW DIVIDER**

Hepco Flange Clamps can be used to support a Double Edge Spacer Slide in a number of positions by utilising the base mounting facility. No oil is permitted in this example so Bearings are used without Cap Seals or Lubricators. The GV3 system is well suited to run “dry”, especially in lighter duty applications.

**HIGH SPEED AIR FLOW TESTING**

Hepco Slide Systems are capable of continuous operation at extremely high speeds. The factor which limits speed is the build up of heat in the Bearings. Intermittent use as in the application allows the heat to disperse and hence makes even higher speeds possible. Acceleration and deceleration should be controlled in order to avoid Bearings skidding on the Slide. This application shows a very long system using Hepco Double Edge Flat Slides with the test piece mounted onto a Belt Driven Carriage. Lubricators apply a film of oil to the “V” faces of the Slide without imposing undue friction.

**ROLLED SLIDE**

Hepco Flat Slides can be rolled to any diameter above 600mm depending on the section and whether hardened or not (unhardened Slides available to special order). Also, Slides in an unrolled condition may be bolted to a gently curved surface. Bearing mounting faces on the Carriage should be machined so that each pair of Bearings is perpendicular to the Slide. Please contact Hepco for application advice. Please also see the HepcoMotion PRT2 and HDRT catalogues for an unrivalled choice of ground Rings and curved Segments.

**DIPPING SYSTEM**

A basket of parts is lowered into a vat by means of a Rack Driven Carriage and Rack Mounted Slide, available from Hepco as a complete unit. The system includes AC Motor, Gearbox and Pinion with micro adjustment for correct tooth engagement. The system is able to withstand high transmission forces and provides a low cost reliable solution capable of working in a hostile environment.
The telescopic beam can travel alternately either side of the support column, between production lines, enabling components to be moved from one line to the other. The beam retracts out of the paths of adjacent production lines, enabling components to be moved from one line to another without interrupting flow.

**Primary X axis:** Double Edge Spacer Slides are mounted back to back, sandwiching the support plate for the Hepco Racks, providing a compact design and a rigid beam.

**Secondary X axis:** The gripper mechanism is driven end-to-end along the beam by motor and Pinion engaged in the secondary Rack.

**Z axis:** A Hepco 120mm wide Spacer Slide with Rack is chosen for the vertical axis to withstand the high moment forces involved.

---

**Hepco Motion**

Hepco Slides are used extensively in the theatre and film industry for positioning cameras or lighting. This example shows a Hepco Slide Beam with flush Slide surface for engagement with a friction drive roller. The Slide Beam which is attached to the ceiling members, provides a rigid foundation and absorbs vibration.

**Application Examples**

**REMOTE CONTROLLED CAMERA**

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**TELESCOPIC PICK AND PLACE GANTRY**

The telescopic beam can travel alternately either side of the support column, between production lines, enabling components to be moved from one line to the other. The beam retracts out of the paths of adjacent production lines, enabling components to be moved from one line to another without interrupting flow.

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---

**PULVERISING MACHINE**

Hepco Slide Beams complete with Belt Driven Carriages enable a simple contra-reciprocating motion to be achieved. The high stiffness of the Slide Beams contribute to the rigidity of the structure and absorb vibration. The unique belt tensioning device within the Carriage enables easy adjustment and positioning of the pulsing combs. Hepco Cap Seals ensure long life without further re-lubrication in this application and prevent debris entering the Bearings.

---

**HIGH SPEED MARKING MACHINE**

**X axis:** The Hepco Double Edge Spacer Slide with Rack assures parallelism between teeth and “V” faces of the Slide, providing smooth motion with low backlash. Hepco Floating Bearings, mounted on one side, allow for imperfection of parallelism between the opposing X axis Slides to be accommodated. Hepco MCS Machine Construction System profiles with T-Nut fixing facility provide a useful method for attaching the X axis Slides. Please see OVS Technical Guide.

**Y axis:** Hepco Single Edge Spacer Slides are mounted wide apart for increased stiffness. The lower Rack Cut Slide enables direct drive via a Hepco Pinion.

**Z axis:** Inward facing Single Edge Spacer Slides allow the motor and drive Pinion to be accommodated adjacent to the gripper housing. Blind Hole Fixing Bearings are used as through hole fixing is not possible. Lubricators are used throughout for friction free application of oil to minimise risk of stalling the stepper motors.

---

**COMPACT RACK DRIVEN X-Z MOVEMENT**

**X axis:** Outward facing Single Edge Spacer Slides are mounted sufficiently far apart to provide the required rigidity and to accommodate the drive Pinion. A compact design is achieved by mounting the Bearings on a common plate, which also supports the Slides for the Z axis.

**Z axis:** Inward facing Single Edge Spacer Slides allow the motor and drive Pinion to be accommodated adjacent to the gripper housing. Blind Hole Fixing Bearings are used as through hole fixing is not possible. Lubricators are used throughout for friction free application of oil to minimise risk of stalling the stepper motors.

---

**TELESCOPIC LOADER**

Hepco Flat Slides combined with Slimline Bearings produce a low profile Slide System enabling a compact telescopic system to be designed. Hepco Racks are easily incorporated to provide an efficient means of driving via Pins of a suitable ratio.
Application Examples

MULTI AXIS ROBOTIC ARM

A number of axes can be built up in a compact manner by using Single Edge Spacer Slides to spaced apart to accommodate platforms sufficiently large to support the adjacent axis. The rotary turn-table is also easy to construct by using components selected from Hepco's PRT2 Precision Ring & Track System product range.

The vertical axis supporting the robotic arm is fixed to the rotary table by a Hepco long series Flange Clamp.

INCORPORATING TURNTABLES

The unique ability of Hepco GV3 Carriages to traverse from one Slide to another makes it possible to incorporate turntables into a system. This can enable a Carriage to be re-directed to a station point, or its orientation reversed on the Slide. This example illustrates the use of Hepco's PRT2 Ring Disc (see separate PRT2 catalogue) to provide the rotary movement and platform for the turntable. Various drive methods are possible, including friction belts and pusher mechanisms.

CEREAL BAR COLLATOR

X axis: Hepco Spacer Slides attach to Hepco MCS Machine Construction System aluminium profiles by means of Hepco T-section location strip. Hepco Belt Driven Carriages incorporate an easy means of tensioning as well as providing support for the Y-axis.

Y axis: Comprises a Hepco DLS Driven Linear System unit, which is a complete linear motion element with pulleys, switch components and motor gearbox, if required. Please see separate DLS catalogue.

MULTI STATION PRODUCT PICKING AND COLLATING SYSTEM

X axis: Hepco Single Edge Flat Slides bolt direct to the machine frame to achieve a simple low cost design. Hepco Bearings are fixed to the carriage structure, which spans the collation conveyor and provides room for the drive. Three Bearings are fitted each side to support the load, due to the height restriction preventing the usual configuration of two larger size Bearings per side.

Y axis: Guidance for the product picking device is provided by Hepco Double Edge Spacer Slide with Fitted Rack to enable drive via a Hepco Pinion. The Slide runs in a "railway" of Controlled Height Twin Type Bearings, which ensure alignment and compliance as the Slide engages. All Eccentric type Bearings are used except the two outermost on one side, which are the Concentric type in order to provide a datum for the system.

TRACING GAP

In this example, a special Six Bearing Carriage moves in and out of a chamber, traversing a gap between two Slides to provide room for a sealing door to close. The Slides have a special tapered lead-in profile for smooth transition.

For vacuum applications, Hepco Extreme Temperature & Vacuum Bearings are available, in addition to Hepco's SL2 Stainless Steel Linear Guide product range.

TRACING A GAP

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TRANSPORT SYSTEM

A unique feature of the Hepco GV3 system is the ability of a Slide to be moved into near perfect alignment with another Slide for smooth transfer of Carriages. It is therefore possible to switch lanes and change direction. This example shows Carriages being driven by friction belt onto a Slide, which is then elevated to another level. Carriages are cycled around the system, maintaining the same orientation. Customers requiring high speed operation with orientation in the direction of travel, should consider Hepco's PRT2 Precision Ring and Track System product range.
SHOWN HERE ARE FULL SIZE ILLUSTRATIONS OF ALL SLIDES AND ALL BEARINGS PLUS SOME OF THE MORE POPULAR ASSEMBLED CARRIAGES.
The customer has a wide choice of HepcoMotion GV3 components in order to satisfy most linear motion requirements. To facilitate the selection process, the most commonly used components for a basic Slide System have been tabulated to show comparative benefits when used within a complete system. The benefits in the table are the important ones, which can be shown in comparative form and are by no means exhaustive. Please see the System Composition section & 2–9 and pages relating to the individual components for other features, benefits and variants.

*The Hepco "V" Bearing principle has a natural wiping action which tends to expel debris.

The above information is a general guide intended for preliminary selection purposes only.
Removable Carriages

The following types of Bearing and Lubrication Device may be specified (refer also to the availability table above).

**Notes:**
1. Maximum loads quoted assume lubrication at the interface of Bearings and Slide. This can be learnt by using Cap Seals, Lubricators or the HepcoMotion Bearing Lubrication Design Software.
2. All Carriages are approved to BS EN 13824-1, a Major change in the [] application is reflected in the Carriage grades shown in Table and Appendix A of the Technical Guide.
3. For full information and ordering information, please refer solely to the GV3 Technical Guide.
4. Load/Life calculations can be performed using the Load/Life Calculations section.

**Example:** Short Carriage with Lubricators on a Flat Slide

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>M</th>
<th>N</th>
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<td>AU 12P3...13</td>
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**Table:**

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<th>Component</th>
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<tr>
<td>Cap Seals</td>
<td>Not available on Short Carriages. Lubricators may be used for lubrication purposes.</td>
</tr>
<tr>
<td>Lubricators</td>
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**Ordering Details:**

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<tr>
<th>Carriage Type</th>
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<tr>
<td>AS</td>
<td>AS = Assembled Unit</td>
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<tr>
<td>CP</td>
<td>CP = Cap Plate only</td>
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<tr>
<td>CS</td>
<td>CS = Cap Seal</td>
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<tr>
<td>DR</td>
<td>DR = Double Row Bearings</td>
</tr>
<tr>
<td>CHK</td>
<td>CHK = Controlled Height Bearings</td>
</tr>
<tr>
<td>CS</td>
<td>CS = Cap Seal</td>
</tr>
</tbody>
</table>

**Note:** Leave blank if not required.
**Slimline Carriages**

HepcoMotion Slimline Carriages incorporate compact Slimline Bearings to minimise system height. They are of lower load capacity compared with Standard Bearings, but are lower in cost. Slimline Carriages are available to suit all sizes of Double Edge Slides, in all grades of precision. Carriage Plates are precision machined from aluminium alloy and are supplied clear anodised. Carriages may be specified as Assembled Units (AU Type), either factory set to the chosen Slide, or without Slide for self-adjustment.

See Application Example on 12

---

### Example: Short Carriage with Lubricators on a Flat Slide

---

### Example: Medium Length Carriage with Cap Wipers on a Spacer Slide

---

The following types of Bearing and Lubrication Device may be specified (refer also to availability table below right).

**The Nitrile Sealed Bearing option (NS)** provides a higher degree of protection against ingress of water or debris than the default metal shielded type. A small increase in friction may result.

**The Cap Wiper option (CW)** ensures efficient lubrication of the ‘V’ contact surfaces and inhibits ingress of debris. Operational safety and system appearance are also improved. Once charged with grease, a very long interval between re-lubrication may be expected, subject to operating conditions. Lubrication vastly increases load capacity and life.

**The Lubricator option (LB)** applies oil to the ‘V’ contact surfaces by means of lightly sprung felt pads, which are charged with oil to give long intervals between re-lubrication. The Lubricator option is useful where the advantages of increased load and life are required, but with fewer friction compared to the Cap Wiper.

---

### Part Number Use With

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Use With</th>
<th>A</th>
<th>ØB</th>
<th>C</th>
<th>E*6</th>
<th>F</th>
<th>G*3</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>M</th>
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Notes:
1. Maximum loads quoted assume lubrication at the interface of Bearings and Slide. This can be achieved by using Cap Wipers, Lubricators or the Head Lubrication facility. It is strongly recommended that load and life are determined using the methods shown in the Load/Life Calculations section. The bearing static and dynamic load capacities (C & Co) often quoted by manufacturers are not the best basis for practical life calculations. C & Co figures are included optimised drilling dimension and is suitable for general purposes. Actual Bearing positions will vary slightly when eccentrically adjusted.
2. Some dimensions will vary by the amount of the grinding allowance according to which grade of Slide is selected. All Carriages are compatible with all grades of Slide.
3. All Carriages except sizes AU 76 580 & AU 120 580 incorporate a recess in the underside for fixing screw clearance when used with Flat Slides. The P dimension in the table includes this recess.
4. Cap Wipers are not available on Short Slimline Carriages. Lubricators may be used for lubrication purposes. Metal shields are not available for Slimline Carriages AU 20 195 & AU 28 195.
5. The datum mark identifies the reference edge used in manufacture. The concentric Bearings are always mounted on this side.

### Ordering Details

1 x AU44360 L180 (CW) (NS) + Slide Part Number

- Leave blank if Slide is not required and Carriage will be supplied in a loose condition for self-adjustment.
- **NS** = Nitrile Sealed Bearings
- Leave blank if metal shielded
- **CW** for Cap Wipers
- **LB** for Lubricators

---

### Availability of Carriage Options

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<tr>
<th>Part Number</th>
<th>NS</th>
<th>CW</th>
<th>LB</th>
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<td>AU 28 195</td>
<td>X</td>
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</table>
HepcoMotion Double Edge Spacer Slides are available in three precision grades and manufactured from high quality bearing steel, hardened on the ‘V’ running faces to provide an extremely hard wearing surface. Other areas remain soft for customising.

Grades P1 & P2 are ground on faces as illustrated. Grade P3 is precision drawn and sufficiently accurate for many applications. See System Selector (Li. 21). Slide fixing holes are accurately positioned, enabling customers to pre-drill their mounting holes. Slides without holes are also available.

Spacers Slides bolt directly to the mounting surface of a machine, allowing running clearance for Bearings and Lubrication Devices. A central keyway is provided for simple location by means of Hepco Dowel Pins or customer’s own key. Alternatively, where Lubrication Devices are not used, the datum edges may be located against a machined register*4.

The rigidity of the Spacer Slide enables it to be used as a self supporting element or construction member in a machine. See the GV3 Technical Guide (Li. 21) for Slide deflection calculations.

All Double Edge Spacer Slides, with the exception of the smallest, are available with a precision machined Rack for driving purposes in conjunction with HepcoMotion Pinions, Motors and Rack Driven Carriages*4. Racks are dovetailed to the Slide and become a fully serviceable element when bolted to the mounting surface. Racks may comprise of a number of lengths, precision mounted to a single Slide.

See Application Examples on Li. 19, 20, 21, 22, 23.
Single Edge Spacer Slides

HepcoMotion Single Edge Spacer Slides are available in three precision grades and are manufactured from high quality bearing steel, hardened on the ‘V’ running faces to provide an extremely hard wearing surface. Other areas remain soft for customising.

Grades P1 & P2 are ground on faces as illustrated. Grade P3 is precision drawn and sufficiently accurate for many applications. See System Selector (Li 23).

Hepco Motion Single Edge Spacers are available with a precision rack machined into the back face, providing a convenient and strong means of driving. Corresponding Pinions are available, including Shaft type versions which are for use in conjunction with the Hepco Drive Flange, Motors and Gearboxes. See the GV3 Technical Guide (Li 21).

The large rear face of the Single Edge Spacer Slide, although unhardened, is sufficiently durable to act as a track on which to run Hepco Track Rollers.

See Application Examples on 15, 16 & 17.

Notes:
1. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.
2. Where Slides longer than the maximum length are required, lengths can be machined, suitable for butting. Some sizes of Rack Cut Slides are not always stocked in maximum lengths. In such cases the customer will be offered matched lengths for butting.
3. In the table, the preferred choices of Bearings to use with each Slide are quoted. However, other combinations are possible (please see Mix & Match Component Compatibility in the GV3 Technical Guide (Li 21)).
4. Slides in their free unmounted state are not necessarily absolutely straight. If straightness is important, the Slide may be set by bolting down against a register.
5. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.

Available Grades of Slide
- Single Edge Spacer Slides are available with a precision rack machined into the back face, providing a convenient and strong means of driving. Corresponding Pinions are available, including Shaft type versions which are for use in conjunction with the Hepco Drive Flange, Motors and Gearboxes. See the GV3 Technical Guide (Li 21).

The large rear face of the Single Edge Spacer Slide, although unhardened, is sufficiently durable to act as a track on which to run Hepco Track Rollers.

See Application Examples on 15, 16 & 17.

Notes:
1. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.
2. Where Slides longer than the maximum length are required, lengths can be machined, suitable for butting. Some sizes of Rack Cut Slides are not always stocked in maximum lengths. In such cases the customer will be offered matched lengths for butting.
3. In the table, the preferred choices of Bearings to use with each Slide are quoted. However, other combinations are possible (please see Mix & Match Component Compatibility in the GV3 Technical Guide (Li 21)).
4. Slides in their free unmounted state are not necessarily absolutely straight. If straightness is important, the Slide may be set by bolting down against a register.
5. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.

Available Grades of Slide
- Single Edge Spacer Slides are available with a precision rack machined into the back face, providing a convenient and strong means of driving. Corresponding Pinions are available, including Shaft type versions which are for use in conjunction with the Hepco Drive Flange, Motors and Gearboxes. See the GV3 Technical Guide (Li 21).

The large rear face of the Single Edge Spacer Slide, although unhardened, is sufficiently durable to act as a track on which to run Hepco Track Rollers.

See Application Examples on 15, 16 & 17.

Notes:
1. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.
2. Where Slides longer than the maximum length are required, lengths can be machined, suitable for butting. Some sizes of Rack Cut Slides are not always stocked in maximum lengths. In such cases the customer will be offered matched lengths for butting.
3. In the table, the preferred choices of Bearings to use with each Slide are quoted. However, other combinations are possible (please see Mix & Match Component Compatibility in the GV3 Technical Guide (Li 21)).
4. Slides in their free unmounted state are not necessarily absolutely straight. If straightness is important, the Slide may be set by bolting down against a register.
5. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.

Available Grades of Slide
- Single Edge Spacer Slides are available with a precision rack machined into the back face, providing a convenient and strong means of driving. Corresponding Pinions are available, including Shaft type versions which are for use in conjunction with the Hepco Drive Flange, Motors and Gearboxes. See the GV3 Technical Guide (Li 21).

The large rear face of the Single Edge Spacer Slide, although unhardened, is sufficiently durable to act as a track on which to run Hepco Track Rollers.

See Application Examples on 15, 16 & 17.

Notes:
1. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.
2. Where Slides longer than the maximum length are required, lengths can be machined, suitable for butting. Some sizes of Rack Cut Slides are not always stocked in maximum lengths. In such cases the customer will be offered matched lengths for butting.
3. In the table, the preferred choices of Bearings to use with each Slide are quoted. However, other combinations are possible (please see Mix & Match Component Compatibility in the GV3 Technical Guide (Li 21)).
4. Slides in their free unmounted state are not necessarily absolutely straight. If straightness is important, the Slide may be set by bolting down against a register.
5. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the P1, P2 & P3, P1 & P2 & P3 grades.

Available Grades of Slide
- Single Edge Spacer Slides are available with a precision rack machined into the back face, providing a convenient and strong means of driving. Corresponding Pinions are available, including Shaft type versions which are for use in conjunction with the Hepco Drive Flange, Motors and Gearboxes. See the GV3 Technical Guide (Li 21).

The large rear face of the Single Edge Spacer Slide, although unhardened, is sufficiently durable to act as a track on which to run Hepco Track Rollers.

See Application Examples on 15, 16 & 17.
Flat Slides

HepcoMotion Double Edge Flat Slides and Single Edge Flat Slides are available in three precision grades*. They are manufactured from high quality bearing steel and hardened on the "V" running faces to provide an extremely hard wearing surface. Other areas remain soft for customising.

Grades P1 & P2 are ground on faces as illustrated. Grade P3 is precision drawn and is sufficiently accurate for many applications. See System Selector (1) [2].

See Application Examples on L 10, 11, 13, 14 & 15

Flat Slides are useful if weight saving or minimum inertia is required, where the Slide is the moving component, and also where it is practical and cost advantageous to design a support profile integral with the machine, to provide running clearance for the Bearings and Lubrication Devices.

The Single Edge format allows two Slide "V's" to be mounted wide apart resulting in a considerable increase in moment load capacity, stiffness and stability. Spacing Slides apart can also allow room for a centrally mounted drive.

Notes:
1. Any length of Slide within L max dimension can be supplied, but for optimum price and delivery time, Slide lengths should be specified which maintain the C and D dimensions equal.
2. Where Slides longer than the maximum length are required, lengths can be matched, suitable for butting.
3. Component Compatibility in the GV3 Technical Guide
4. Available in the unground P3 version. The counterbored hole version accommodates low head cap screws to achieve a flush top surface*5.
5. Fixing hole style:
   - No holes (P3 grade only) Leave blank for plain holes
   - 2 positions
   - Chamfer min. 0.4 x 45°
6. Available Grades of Slide
    - P1
    - P2
    - P3
   [ ] Indicates surfaces which are precision ground

Part Number Use With
- Slide Width P1 & P2 P3 ±0.2 P1 P2 & P3 ±0.2
- Screw Size P1 & P2 P3 Ø 3.5 M3

Ordering Details

Part Number
Slide Length L = 930 mm

Precision grade: options are P1, P2 & P3

Fixing hole style: Countered holes (Not available on M312 & ASE)

Ordering Example:
1 x LE 12150 P1 C Single Edge Flat Slide x 2156 mm long in unground grade 3 with counterbored holes
24 x F6820 Low head socket cap screws M8 thread x 20mm long (optional)
HepcoMotion Slide Beams consist of a flat slide mounted onto a precision, anodised aluminium extrusion to provide a rigid self-supporting beam, which can form an integral part of a machine structure. See GVS Technical Guide J for Slide & Slide Beam deflection calculations. There are three basic sizes of beam, each available with a number of Slide widths. The smaller size beam is also available as a lightweight version. SB S... and SB M... Slide Beams can be supplied in lengths of up to 8 metres, while SB L... Slide Beams can be supplied in lengths of up to 6 metres*. Slides are available in a choice of three precision grades, as illustrated.

### Notes:
1. Beams longer than 4046mm are supplied with two or more lengths of matched slide, each mounted and dowelled to form a precision joint. Additional fixing screws are normally provided adjacent to each joint. Slide Beams with shorter slides fixed in any position, can be supplied upon request.
2. For optimum price and delivery time, Slide Beam lengths should be specified which maintain the C and D dimensions in the table above. In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal.
3. In the table, the available choices of Carriage to use with each Slide Beam are quoted. However, it is possible to use a customer made carriage incorporating other sizes of bearings. Please see details of “Mix & Match” possibilities in the GVS Technical Guide J.
4. Quick Fit T-Nut TN8M6*, Heavy Duty T-Nut TN8M6 and T-Slot Cover TC8 are compatible with SB S... and SB M... types only. Type SB L... Slide Beams are compatible with all MCO Machine Construction System Slot 10 T-Nuts, Slot Blocks and T-Slot Covers.
5. The Heavy Duty T-Nut TN8M6 is recommended for the lightweight beam and where greater security of fixing is required. T-Nut section is also available for Type SB S... and Type SB M... Slide Beams, in unfilled lengths up to 1000mm. Please specify part number TN85 followed by the required length in mm. For information on T-Nut section options for Type SB L... Slide Beams, please contact Hepco.
6. T-Slot Cover TC8 is made from black UPVC and is available in lengths up to 8000mm. Please specify part number TC8 followed by the required length in mm.
7. The counterbored slide option is necessary if Slide Beams are to be used in conjunction with Belt Driven Carriages. This is to provide an uninterrupted path for the belt. Please see the GVS Technical Guide J.
8. Customers requiring a complete ready-to-install belt driven unit with pulleys and optional motor may wish to consider the HepcoMotion Driven Linear System product range.

### See Application Examples on 14
### Standard Bearings

HepcoMotion Standard Bearings are designed to be used with particular sizes of Slide but may be “Mix & Matched” in many instances*.

The following Bearing formats and fixing methods are available:

- The Twin Bearing type, which is the default choice, comprises of two individual deep groove ball bearings on a single axle. This construction offers some compliance, allowing smoother running, easy adjustment and greater tolerance of misalignment.
- The Double Row Bearing type (DR) incorporates a one-piece bearing with two ball tracks. This offers higher load capacity, especially in the radial direction and is less susceptible to entrapment of debris.
- Both types of Bearing have been designed specially for Slide System applications and their performance confirmed by rigorous testing. External dimensions are identical.
- The Nitrile Sealed option (NS) provides a higher degree of protection against ingress of water or debris in comparison to the default metal shielded type. A small increase in friction may result.

### Through Fixing (SJ/LJ)

#### Eccentrics (E & DE)

Adjusting Wrench

*For part no. & tightening torques see System Assembly & Adjustment section in the GV3 Technical Guide.

**Socket Tool**

**Notes:**

- It is recommended that holes to suit Bearing mounting axles should be reamed to tolerance F6 for a sliding fit.
- All Bearings are greased for life internally. Customers are strongly recommended to provide lubrication to the interface or where adjustment from the front is preferred. They are available in Concentric type (C) and Double Eccentric type (DE), which allows a Removable Carriage to be disengaged from a Slide.
- All Bearings are available in a Controlled Height version (CHK) which minimises variation in the B1 dimension**.
- The Blind Hole Fixing type (BH) allows mounting into a solid machine base where through mounting is not possible, or where adjustment from the front is preferred. They are available in Concentric type (C), which is fixed, and Eccentric type (E), which are adjustable.

#### Bearing Lubricators

Back to the section on the GV3 Technical Guide.

### Through Fixing Type (SJ/LJ)

**Part Number (~ Bearing Diameter in mm)**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With*</th>
<th>A</th>
<th>B</th>
<th>B1</th>
<th>C</th>
<th>C1 max</th>
<th>D</th>
<th>E</th>
<th>Metric Fine</th>
<th>F</th>
<th>G</th>
<th>H</th>
</tr>
</thead>
<tbody>
<tr>
<td>J 13</td>
<td>NS &amp; M</td>
<td>12.7</td>
<td>10.1</td>
<td>5.47</td>
<td>5.8</td>
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<tr>
<td>J 19</td>
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<td>6.75</td>
<td>7.4</td>
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<td>10</td>
<td>3.4</td>
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<td>14.0</td>
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<td>10</td>
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<tr>
<td>J 25</td>
<td>NS &amp; S</td>
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#### Part Number

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max Working Load Capacity (N)</th>
<th>Bearing Static (Co) and Dynamic (C) Load Capacity (N)*2</th>
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<tr>
<td>J 54</td>
<td>5000</td>
<td>2500</td>
<td>3200</td>
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</tbody>
</table>

#### Notes:

1. It is recommended that holes to suit Bearing mounting axles should be reamed to tolerance F6 for a sliding fit.
2. All eccentric Through Fixing type Bearings are supplied with sockets for adjustment as shown, with the exception of size 13.
3. Nuts for the Through Fixing type Bearings are chemically blacked on the concentric version and bright zinc plated on the eccentrics for identification purposes.
4. Controlled Height (CHK) Bearings are usually selected from stock, quantities available may therefore be restricted. Please see the GV3 Technical Guide.
5. The quoted static and dynamic load capacities are based on industry standard calculations. These do not necessarily reflect system performance, and are only provided for comparison with other systems. Please use the Max Working Load figures and the Load/Life Calculations section to determine system performance.
6. The preferred choices of Slide to use with each Bearing are quoted. Other Slides may be used, as shown in the ‘Mix & Match’ Component Compatibility section of the GV3 Technical Guide.
7. The Blind Hole Eccentric Bearings cannot be fitted with Cap Seals, however Slide Lubricators may be specified instead.

### Blind Hole Fixing Type (BHJ)

**Part Number (~ Bearing Diameter in mm)**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With (SJ)</th>
<th>A</th>
<th>B</th>
<th>B1</th>
<th>C</th>
<th>C1 max</th>
<th>D</th>
<th>E</th>
<th>Metric Fine</th>
<th>F</th>
<th>G</th>
<th>H</th>
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<tr>
<td>J 13</td>
<td>NS &amp; M</td>
<td>12.7</td>
<td>10.1</td>
<td>5.47</td>
<td>5.8</td>
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<td>2.2</td>
<td>2.4</td>
<td>9.5</td>
<td>M6x0.5</td>
<td>8</td>
</tr>
<tr>
<td>J 19</td>
<td>NV &amp; Y</td>
<td>18</td>
<td>12.4</td>
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<tr>
<td>J 25</td>
<td>NS &amp; S</td>
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<td>9.8</td>
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<td>4.9</td>
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<td>M8x1</td>
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<td>NL &amp; L</td>
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<td>41.76</td>
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</table>

#### Notes:

1. It is recommended that holes to suit Bearing mounting axles should be reamed to tolerance F6 for a sliding fit.
2. All eccentric Through Fixing type Bearings are supplied with sockets for adjustment as shown, with the exception of size 13.
3. Nuts for the Through Fixing type Bearings are chemically blacked on the concentric version and bright zinc plated on the eccentrics for identification purposes.
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5. The quoted static and dynamic load capacities are based on industry standard calculations. These do not necessarily reflect system performance, and are only provided for comparison with other systems. Please use the Max Working Load figures and the Load/Life Calculations section to determine system performance.
6. The preferred choices of Slide to use with each Bearing are quoted. Other Slides may be used, as shown in the ‘Mix & Match’ Component Compatibility section of the GV3 Technical Guide.
7. The Blind Hole Eccentric Bearings cannot be fitted with Cap Seals, however Slide Lubricators may be specified instead.

### Ordering Details

**Fixing type. Choose from:**

- **SJ** = Short Axle
- **LJ** = Long Axle
- **BHJ** = Blind Hole Fixing

**Part Number (~ Bearing Diameter in mm)**

- **C** = Concentric (fixed), **E** = Eccentric (adjustable)
- **DE** = Double Eccentric (for disengagement purposes)

**Options Available**

- **NS** = Nitrile Sealed Bearing
- **SM** = Standard Bearing
- **CH** = Controlled Height Bearing

**Part Number**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With (SJ)</th>
<th>A</th>
<th>B</th>
<th>B1</th>
<th>C</th>
<th>C1 max</th>
<th>D</th>
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<tr>
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<tr>
<td>J 54</td>
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<td>178</td>
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<td>7.9</td>
<td>41.76</td>
<td>M14x1.5</td>
<td>28</td>
</tr>
</tbody>
</table>
**Slimline Bearings**

HepcoMotion Slimline Bearings are very compact due to the single ball track design. Good rigidity is maintained by a combination of ball to raceway conformity and low radial clearance, resulting in a low cost Bearing ideally suited to many Slide System applications. Performance of these Bearings has been confirmed by rigorous testing.

**Through Fixing Type (GSJ/GLJ)**

The Through Fixing type is available in two axle lengths, with the short axle version being compatible with GV3 Slimline Carriage Plates. Both versions are available in the fixed position Concentric type (C) and adjustable Eccentric type (E).

**Blind Hole Fixing Type (GBHJ)**

The Blind Hole Fixing type (BH) allows mounting into a solid machine base where through mounting is not possible, or where adjustment from the front is preferred. They are available in Concentric type (C), which is fixed, and Eccentric type (E), which is adjustable.

All Bearings are grease for life internally. Customers are strongly recommended to provide lubrication to the interface between Bearings and Slide by specifying Hepco Cap Wipers*, which fit over the Bearings, or by using Hepco Slimline Slide Lubricators. Lubrication greatly increases load capacity and life.

**Notes:**

1. It is recommended that holes to suit Bearing mounting axles should be reamed to tolerance F6 for a sliding fit.
2. All eccentric Through Fixing type Bearings are supplied with sockets for adjustment as shown.
3. Nuts for the Through Fixing type Bearings are chemically blacked on the concentric version and bright zinc plated on the eccentric for identification purposes.
4. The quoted static and dynamic load capacities are based on industry standard calculations. These do not accurately reflect system performance, and are only provided for comparison with other systems. Please use the Max Working Load figures and the Load/Life Calculations section to determine system performance.
5. The preferred choices of Slide to use with each Bearing are quoted. Other Slides may be used, as shown in the Mix & Match Component Compatibility section of the GV3 Technical Guide.

**Mix & Match**

**System Assembly**

For Bearing and Lubrication Device drilling centres, see GV3 Technical Guide.

**Options Available**

- N5
- Nitrile Sealed Bearings

Leave blank if metal shields are required.

**Ordering Details**

**Fixing type** Choose from:

- GLU – Short Axle
- GLJ – Long Axle
- GBHJ – Blind Hole Fixing

**Part Number** [-10x Bearing Diameter in mm]
Cap Seals

HepcoMotion flexible plastic Cap Seals fit over Standard Bearings, providing effective sealing and protection, as well as wiping of debris from the Slide profile. Lubrication of the ‘V’ surface is provided by means of oil impregnated felt wipers. The internal cavity is filled with grease via the lubrication points, further improving lubrication and recharging the felt wipers as the grease releases oil under operation. Most systems require no further lubrication during the lifetime of the machine⁴. The fitting of these seals increases life and load capacity, and linear speed capability, as well as improving operator safety. Cap Seals are not available for use with Blind Hole Eccentric type Bearings and J13 Bearings.

See Application Examples on 11 - 14 & 16

Through Hole Fixing

Tapped Hole Fixing

Both types of insert supplied.

Insert has hole ØU for self tapping screw. Moves in main moulding to provide adjustment.

For all Bearing and Lubrication Device drilling centres, see GV3 Technical Guide Δ

Part Number Use With
* A B C D E F G H J K M* screw length N P Q max S T U

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>M* screw length</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>max</th>
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<td>6</td>
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<td>34</td>
<td>8</td>
<td>2</td>
</tr>
</tbody>
</table>

2 x self tapping screws (supplied)*¹

2 x Lub Points*²

Ordering Details

State quantity and part number 4 x CS 34

Notes:
1. Two self tapping screws for plastic are supplied with each Cap Seal. These have a cross-recessed pan head and use the PT thread form.
2. Two machine screws with cross-recessed pan heads DIN 7985A (ISO 7045) and two flat washers DIN 125A are supplied.
3. Lubrication internal depends on length of stroke, duty and environmental factors. Replenish lubricant as necessary using a No.2 consistency lithium soap based grease. A male grease connector Port No. CSCHF4034 or complete gun is available from Hepco, if required.
4. The fixing screw positions for the CS18 do not lie on the centreline of the nominal Bearing position, unlike all other sizes.

Cap Wipers

HepcoMotion rigid plastic Cap Wipers fit over Slimline Bearings, providing effective protection, plus wiping of debris from the Slide profile. Lubrication of the ‘V’ surface is provided by means of oil impregnated felt wipers. The internal cavity is filled with grease via the lubrication points, further improving lubrication and recharging the felt wipers as the grease releases oil under operation. Most systems require no further lubrication during the lifetime of the machine⁴. Fitting of Cap Wipers increases life and load capacity, and linear speed capability, as well as improving operator safety. Cap Wipers are not available for use with Blind Hole Eccentric type Bearings.

See Application Example on 12

Through Hole Fixing

Tapped Hole Fixing

For all Bearing and Lubrication Device drilling centres, see GV3 Technical Guide Δ

Part Number Use With
* A B C D E F G H J K M* Screw Length N P

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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<td>18</td>
<td>4.8</td>
<td>M5</td>
<td>25</td>
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</tbody>
</table>

Ordering Details

State quantity and part number 4 x CW 360

Notes:
1. Two cross-recessed pan head screws to DIN 7985A/ISO 7045 and washers (DIN 433) are supplied with each Cap Wiper.
2. Cap Wipers may be used with the blind holes ‘K’ on the underside. These may be tapped thread form ‘M’ to take a machine screw, or will accept a self tapping screw. The mounting holes will require slotting to provide adjustment.
3. Lubrication internal depends on length of stroke, duty and environmental factors. Replenish lubricant as necessary using a No.2 consistency lithium soap based grease. A male grease connector Port No. CSCHF4034 or complete gun is available from Hepco, if required.
HepcoMotion plastic Slide Lubricators normally fit one each side of the Slide, between pairs of Bearings. However, any number may be fitted in any position according to requirements. Lubricators provide lubrication to the working surface of the Slide by means of spring loaded oil impregnated felt wipers. System load capacity and life are greatly increased whilst retaining the low friction characteristics of dry running. Lubricators may be specified as part of any Hepco GV3 Carriage assembly or used within the customers' own design. Lubricators are available to suit both Standard and Slimline Bearings. Both types are supplied with fasteners and can be attached with either a blind or through hole fixings.

**See Application Examples on** 10, 13, 15 & 16

### Slide Lubricators for Standard Bearings

![Image](image1.png)

### Slide Lubricators for Slimline Bearings

![Image](image2.png)

**Part Number**<br>

**Slide Part Number**

**For Use With**

**B**

**For Use With**

**B**

**Notes:**

1. Two machine screws with cross-recessed pan heads size Q (DIN 7985A / ISO 7045) are supplied with each flanged type and slimline Lubricator.

2. Two self tapping screws for plastic (size P) are supplied with each compact type Lubricator. These have a cross-recessed pan head and PT thread form.

3. Dimensions A and B are distances from the centre of the mounting hole positioned nearest to the right-hand end of the Slide. Mounting holes should be avoided.

4. Lubrication interval depends on length of stroke, duty and environmental factors. Repack lubricant as necessary using a 40ml viscous SF instead of fresh lubricant and ensure an even spread over the working surfaces.

5. Bleed Lubrication is the best method of lubrication for continuous duty systems requiring long life.

6. The Bleed Lubrication facility is available with either an M5 screw fitting insert or an O-ring seal insert. Connection can be made to a centralised lubrication system, pressure feed caster or an oil dispensing pump and controller, which can be programmed to meter a set dose of lubricant, according to the distance travelled by the Carriage.

7. For full information, please see the GV3 Technical Guide.
Technical Guide

Flat Track Rollers

HepcoMotion GV3 Flat Tracks are made from high quality carbon steel and are hardened on all four faces to provide an extremely durable running surface. They have been designed to be used with the Hepco range of Track Rollers. Flat Tracks are often used in conjunction with Hepco “V” Slides in large systems where the design can eliminate the requirement to set Slides accurately parallel. They are available with various precision ground faces (as shown below), as well as unground P3 grade, which has a commercial finish suitable for many applications*4. It is recommended that running surfaces should be kept lightly oiled. HepcoMotion GV3 Flat Track and Roller Lubricators are available for this purpose. Please see the GV3 Technical Guide for more information.

See Application Examples on 

Narrow Track Rollers

HepcoMotion Narrow Track Rollers complement the other GV3 ranges of Bearings. They are available in through hole fixing format, in a single axle length, in both fixed position Concentric Type (C) and adjustable Eccentric Type (E). Narrow Track Rollers consist of a high capacity single row deep groove ball bearing with a thick wall crowned outer ring. They are fitted with metal shields as standard, or with nitrile seals for better protection against liquids at the expense of a small increase in friction. They are suitable for running on any flat surface and as a retaining roller on the rear face of the Single Edge Spacer Slide. Rollers are greased for life internally, however, it is recommended to oil the running surface. HepcoMotion GV3 Flat Track Lubricators are available for this purpose. Please see the GV3 Technical Guide for more information.

See Application Example on 

CONTENTS

BACK

Technical Track Rollers

Component

Flat Track

26-31 & 43-45 Systems Slides

Mass kg

CAD

BACK

B are available for this purpose. Please see the GV3 Technical Guide P3 grade, which has a commercial finish suitable for many applications*4. Tracks in their free unmounted state are not necessarily absolutely straight, however, they may be set to the required degree of straightness by torques see System Assembly & Adjustment section in the GV3 Technical Guide.

Important. Tracks in their free unmounted state are not necessarily absolutely straight, however, they may be set to the required degree of straightness by re-assembly. Assembled Tracks are extremely durable running surface. They have been designed to be used with the Hepco range of Track Rollers. Flat Tracks Narrow Track Rollers are available on request. It is recommended that holes in the mounting surface are positioned by ‘spotting through’ from the Flat Track.

Where Tracks longer than maximum length are required, two or more lengths in grades P1, P2A & P2B can be matched, suitable for butting, on request. In these cases the mating ends will be ground square.

The standard means of securing Flat Tracks to the mounting surface is via counterbored fixing holes in the positions shown. Other fixing hole possibilities only provided for comparison with other systems. Please use the Max Working Load figures and the Load/Life Calculations on page 50-52 to determine system performance, and are not accurately reflected system performance, and are only provided for comparison with other systems. Please see the Max Working Load figures and the Load/Life Calculations on page 50-52 to determine system performance.
HepcoMotion Wide Track Rollers can be used with Hepco Flat Tracks, the back face of Single Edge Spacer Slides and on any other type of running surface. Rollers comprise of a high capacity double row deep groove ball bearing, with a substantial section outer ring and crowned profile.

The Through Hole Fixing type is available in two axle lengths covering most thicknesses of mounting plate.

The Blind Hole Fixing type can be used where through holes are not possible, or where adjustment from the front is preferred.

Both versions are available in fixed position Concentric type (C) and adjustable Eccentric type (E).

### Through Fixing Type (SR/LR)

**Part Number**

- **A**
- **B1**
- **C1**
- **C1 max**
- **C2**
- **D**
- **E**
- **F**
- **G**
- **G1**

**Use With**

- **FT 24 12**
- **FT 32 16**
- **FT 40 20**
- **FT 66 33**

**Load Capacity**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max Working Load Capacity</th>
<th>Roller Static (Co) and Dynamic (C) Load Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N)</td>
<td>Co (N)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C (N)</td>
</tr>
<tr>
<td>R 18</td>
<td>600</td>
<td>1168</td>
</tr>
<tr>
<td>R 25</td>
<td>1600</td>
<td>2646</td>
</tr>
<tr>
<td>R 34</td>
<td>3200</td>
<td>5162</td>
</tr>
<tr>
<td>R 54</td>
<td>8000</td>
<td>13271</td>
</tr>
</tbody>
</table>

**Notes:**

1. It is recommended that holes to suit Track Roller mounting axles should be reamed to tolerance H6 for a sliding fit.
2. Nuts are chemically blacked on the Concentric version and bright zinc plated on the Eccentrics for identification purposes.
3. The quoted static and dynamic load capacities are based on industry standard calculations. These do not accurately reflect system performance, and are only provided for comparison with other systems.
4. The preferred choice of Flat Track for each size of Roller is listed. However, any Track Roller may be used with any size of Flat Track or Single Edge Spacer Slides according to practicality of design.

### Blind Hole Fixing Type (BHR)

**Part Number**

- **B1**
- **C1**
- **C2**
- **D**
- **E**
- **F**
- **G**
- **G1**

**Use With**

- **FT 24 12**
- **FT 32 16**
- **FT 40 20**
- **FT 66 33**

**Load Capacity**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Max Working Load Capacity</th>
<th>Roller Static (Co) and Dynamic (C) Load Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N)</td>
<td>Co (N)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C (N)</td>
</tr>
<tr>
<td>R 18</td>
<td>600</td>
<td>1168</td>
</tr>
<tr>
<td>R 25</td>
<td>1600</td>
<td>2646</td>
</tr>
<tr>
<td>R 34</td>
<td>3200</td>
<td>5162</td>
</tr>
<tr>
<td>R 54</td>
<td>8000</td>
<td>13271</td>
</tr>
</tbody>
</table>

**Notes:**

1. It is recommended that holes to suit Track Roller mounting axles should be reamed to tolerance H6 for a sliding fit.
2. Nuts are chemically blacked on the Concentric version and bright zinc plated on the Eccentrics for identification purposes.
3. The quoted static and dynamic load capacities are based on industry standard calculations. These do not accurately reflect system performance, and are only provided for comparison with other systems.
4. The preferred choice of Flat Track for each size of Roller is listed. However, any Track Roller may be used with any size of Flat Track or Single Edge Spacer Slides according to practicality of design.

Rollers are available with either standard metal shields, or nitrile seals (NS), for a higher degree of protection against ingress of water or debris. A slight increase in friction may result.

Wide Track Rollers are available in the same basic sizes as Hepco ‘V’ Bearings and are well matched for functionality and performance in systems comprising both types of Bearing.

Rollers are greased for life internally, however, it is recommended to oil the running surface. HepcoMotion GV3 Flat Track and Roller Lubricators are available for this purpose. Please see the GV3 Technical Guide for more information.

See Application Example on page 5.

### Ordering Details

Fixing type: Choose from:

- **SR** = Short Axle
- **LR** = Long Axle
- **BHR** = Blind Hole Fixing

Part Number (Roller Diameter in mm)

**Options Available**

- **Metal Shields**
- **Nitrile Seals**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Options Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>R 18</td>
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<tr>
<td>R 25</td>
<td>✓</td>
</tr>
<tr>
<td>R 34</td>
<td>✓</td>
</tr>
<tr>
<td>R 54</td>
<td>✓</td>
</tr>
</tbody>
</table>

**Nitrile Sealed Roller**

Leaves blank if metal shields are required.
**Racks**

HepcoMotion GV3 Racks provide a durable and powerful linear drive when used in conjunction with Hepco or other good quality, hardened Pinions.

Racks are made from high quality carbon steel, ground on all faces prior to tooth cutting. Teeth are metric module with 20° pressure angle and are machined to a high degree of precision.

Racks are supplied with fixing hole types as shown or without holes if preferred. All holes are accurately positioned to enable customers to pre-drill their machining holes.

The back face of the Rack is controlled parallel to the tooth pitch line, enabling it to be used as a register for setting of other components. For best performance, the teeth should be lubricated with No.2 consistency lithium soap-based grease.

**See Application Examples on 14 – 15**

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**Pinions**

The HepcoMotion range of Pinions is compatible with all Rack cut GV3 components. **Boss Type** Pinions are for general use with **Shaft Type** Pinions, which are detailed in the Technical Guide, are compatible with Hepco Rack Drive Carriages and other designs benefitting from the Hepco Drive Flange and hollow shaft motor driven worm Gearbox. Examples of these designs may be found in the Rack & Pinion Systems section of the GV3 Technical Guide.

All Pinions are hardened teeth and are metric module with 20° pressure angle conforming to ISO 1328-1 grades. Pinions smaller than 1 module conform to ISO 1328-1 grade 10 and are supplied with a plain bore (B type), or with set screw (BK type)*. Pinions with modules of 1 and above have hardened and ground teeth, conform to ISO grade 6 and are available in steel as well as stainless steel in some sizes (see table). These Pinions are supplied with a plain bore (B type) or with keyway and set screw (BK type).

**See Application Examples on 13 – 15 & 17**

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**Ordering Details**

**Part Number** (Number relates to the tooth module)

**Rack Length L** = 485 mm

**Notes:**
1. Any length of Rack unfit L max dimension can be supplied, but for optimum price and delivery time, lengths should be specified which maintain the C and D dimensions in the table above. In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal.
2. Where longer Racks are required, standard lengths suitably matched for mounting end-to-end, will be supplied. In these cases, additional holes may be inserted to allow support near the join positions. When mounting such composed Racks, care must be taken to match accurately the pitch line and tooth spacing across the join. A rack matching tool, which is a short length of Rack to engage in the two pieces to be mounted, will be supplied with such orders.
3. The standard counterbored holes on the three smallest sizes suit low head hex socket cap screws (to DIN 6912). These screws are not universally stocked and other designs benefiting from the Hepco Drive Flange and hollow shaft motor driven worm Gearbox. Examples of these designs may be found in the Rack & Pinion Systems section of the GV3 Technical Guide.
4. Any length of Rack within L max dimension can be supplied, but for optimum price and delivery time, lengths should be specified which maintain the C and D dimensions in the table above. In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal.

---

**Shaft Type Pinion**

For dimensions of the Shaft Type Pinion and ordering details, please see the GV3 Technical Guide.

**Ordering Details**

**Part Number**

**Boss Type Pinion**

**For Use With**

Leaves blank for steel version

**Shaft Type Pinion**

**SS = Stainless Steel (see table for availability)**

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HepcoMotion Rack Driven Carriages are an economic means of achieving a powerful and controlled linear drive via the Hepco Worm Gearbox, Drive Flange and Shaft Pinion.

The Gearbox can be supplied with an integral AC Motor, which is the most economical means of achieving point to point linear motion and which may be controlled via the Hepco AC Speed Controller. The Gearbox can also be supplied with an adaptor flange and input shaft coupling to suit other makes or types of motor, including stepers and servos, which benefit from the low backlash of the Hepco Gearbox.

Our Technical Department will be pleased to assist with all aspects of specification and ordering.

### Double Edge Spacer

**Slide Rack Assembly**

<table>
<thead>
<tr>
<th>Part Number*</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>Rack Drive Force (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AURD 60 34 L440 CS DR</td>
<td>44</td>
<td>130</td>
<td>34</td>
<td>132</td>
<td>240</td>
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<td>42</td>
<td>42.25</td>
<td>71</td>
<td>118</td>
<td>1.3</td>
<td>42</td>
<td>18</td>
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<td>71</td>
<td>118</td>
<td>1.3</td>
<td>42</td>
<td>18</td>
</tr>
</tbody>
</table>

Notes:
1. Gearbox ratios and all details of Shaft Pinions, Motors, Gearboxes and Drive Flanges can be found in the GV3 Technical Guide.
2. Standard Rack Driven Carriages are supplied with Double Row Bearings and Cap Seals. However, all variants, as available for Standard Carriages & 22–25, can be supplied on request. Bespoke size Carriages can also be supplied. Please refer to the GV3 Technical Guide.
3. The quoted Rack Drive Force is determined by Rack and Pinion size, gearbox bearings and gears, and the duty. Please refer to the GV3 Technical Guide.

See Application Examples on 13 & 15

**Section of Assembled Gearbox, Flange & Pinion**

**Ordering Details**

For correct mesh

The AC Geared Motor and Worm Gearbox may be mounted onto a Rack Driven Carriage in any one of the eight configurations shown below. The terminal box may take one of four positions (A to D) and the cable exits also have four possible positions (1 to 4). Please use the diagram below as a guide to selection.

The high-duty yet lightweight Hepco Gearboxes with low backlash and low noise, make them particularly suitable for dynamic applications, whether driven by AC motor, stepper or servo. When sold separately, the input flange and shaft coupling of the Gearbox will be tailored to suit the customer's own motor. Gearboxes may be specified with an adjustable torque limiting clutch, if required.

The Drive Flange, which connects the Gearbox to the Carriage, incorporates a unique micro-adjustment facility for achieving correct engagement of Pinion with the Rack.

The AC Geared Motor can be combined with an AC Speed Controller to provide a complete drive control system. Motors are rated at 400/230V, protected to IP54, and finished in blue epoxy paint. Fitted disc brakes, alternating single and three phase windings, special finishes and enhanced IP protection are available on request.

Please see the GV3 Technical Guide for full details plus additional motor specifications available.
Load/Life Calculations - Carriages and Individual ‘V’ Bearings

The load capacity and life of HepcoMotion ‘V’ Slide Systems will be determined by several factors. The key issues are the size and type of Bearing and Slide, the presence or absence of lubrication and the magnitude and direction of loads.

Other factors including operational speed, length of stroke and environmental conditions may also have an effect.1,2 When calculating the system load and life, one of two approaches should be taken: if the system uses a conventional four-bearing Carriage (such as any of the Hepco Carriages), then this may be treated as a single item, and the load and life be determined as per the Calculating Carriage Load Factor section below, alternatively, each ‘V’ Bearing can be treated separately according to the method shown in the Calculating ‘V’ Bearing Load Factor section L2 31.

Calculating Carriage Load Factor1,4

When calculating the life of a ‘V’ Slide System using a four-bearing Carriage, the loading on the system should be resolved into the direct load components, L1 and L2, and the moment load components, Mv and Mv (see diagram on right).

To calculate the system life, the load factor Lf should first be calculated using the equation below:

\[ Lf = \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}} + \frac{M_v}{M_{v(max)}} + \frac{M_v}{M_{v(max)}} \]

Lf should not exceed 1 for any combination of loads.

The maximum direct and moment load capacities are given in the following tables for Standard and Slimline Carriages. Capacities are included for both dry and lubricated conditions. This refers to the ‘V’ contact, since all Bearings are greased internally for life. Values are based on shock-free duty. Once Lf has been determined for the application, the life of the system is calculated as shown L2 31.

Calculating ‘V’ Bearing Load Factor1,3,4

Many systems do not use a standard four-bearing Carriage. In such cases it is necessary to use conventional statics calculations to determine the loading on each Bearing in the system, by resolving loads into axial (L) and radial (R) components.

The Maximum Lf and load capacities for all types of Hepco ‘V’ Bearing are given in the table below. Capacities are included for both dry and ‘lubricated’ conditions. This refers to the ‘V’ contact, since all Bearings are greased internally for life. Values are based on shock-free duty.

Ll should not exceed 1 for any combination of loads.

The load capacities stated in the table below assume that Bearings are used with Slides equal or larger than the preferred Slide selection for that Bearing size. For details of the preferred sizes, see tables L2 34–37. For loading of Bearings with smaller Slides, please contact Hepco.

To calculate the system life, the load factor Lf should first be calculated using the equation below:

\[ Lf = \frac{L_r}{L_{r(max)}} + \frac{L_l}{L_{l(max)}} \]

Once Lf has been determined for each Bearing, the life can be calculated as follows:

Calculating Carriage or Individual ‘V’ Bearing Life1,3,5,6

Life in km can be calculated using one of the two equations below. In these equations, the Basic Life is taken from the table below in respect of the Bearing type and the lubrication condition applicable.

**Dry System**

\[ L = \frac{L_n}{B_{Basic}} \times (0.03 + 0.97L)^2 \]

**Lubricated System**

\[ L = \frac{L_n}{B_{Basic}} \times (0.03 + 0.97L)^2 \]

**Notes:**

1. The maximum values of Ll and Ll, and the magnitudes of the system basic Life for each Bearing type relate to the performance of complete systems. Tests have shown these figures to be more reliable than working from the theoretical static and dynamic load capacities (C and Co) and Ll of the Bearings. Values of C and Co have been included in tabulated data on the relevant Bearing pages as a means of comparison with other systems.

2. In the calculations below the assumption that the slide stroke involves a number of complete Bearing revolutions. If the stroke of any application is less than five times the Bearing outside diameter, calculate the distance traveled as if it moves five Bearing diameters per stroke. System operating at speeds in excess of 8 m/s may require additional calculation. Please contact Hepco for assistance.

3. For the purpose of the load/Life Calculations on this page, the axial load Ll is the load in the axial direction that the Bearing can accept from a ‘V’ Slide engaged in its outer ring. Since the line of force is some distance removed from the axis of the Bearing, this value is much less than the theoretical axial load capacity. (for which see the relevant Bearing page).

4. In the above calculations, the term ‘lubricated’ refers to the contact between the Slide and Bearing ‘V’s. This lubrication may be achieved using Hepco Cap Seals, Cap Wipers, Lubricators or the equivalent. However, other methods that ensure the presence of suitable lubrication are acceptable.

5. When a system consists of more than four Bearings per Carriage (see Application Examples L2 11 & 17), it cannot always be guaranteed that the load will be shared equally between all Bearings. In such cases, it is recommended that Controlled Height Bearings are specified (where available) and that the system is designed to allow for the life of the most heavily laden Bearing.

6. For systems where Ll is the actual stress for applications with nearly Ll radial loads may be higher than the calculations indicate. This is because the calculations are simplified for ease of use. Please contact Hepco for details in instances where a higher system life is required.
Load/Life Calculations - Track Rollers

Systems incorporating Track Rollers running on Flat Tracks or the flat faces of Single Edge Spacer Slides will require a different calculation to determine the load and life.

Track Rollers only have a radial load capacity stated, as they are not usually loaded axially. Their pure rolling contact with the Track means that they do not need to be de-rated for use in unlubricated applications (although it is recommended that the Tracks and Rollers be lightly oiled for best performance).

Calculating the System Load Factor**

To calculate the Roller life, the load factor \( L_f \) should first be calculated using the equation below:

\[
L_f = \frac{L}{L_{fn}}
\]

The maximum radial load capacity \( L_{fn} \) for the Hepco range of Track Rollers is stated below:

<table>
<thead>
<tr>
<th>Narrow Roller Type</th>
<th>LR (N)</th>
<th>Wide Roller Type</th>
<th>LR (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRN 18</td>
<td>400</td>
<td>R 18</td>
<td>600</td>
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<tr>
<td>LRN 25</td>
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<tr>
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<td>2000</td>
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</tr>
<tr>
<td>LRN 54</td>
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<td>R 54</td>
<td>8000</td>
</tr>
</tbody>
</table>

Calculating Track Roller Life**

With \( L_f \) determined for each Roller, the life in km can be calculated using the equation below. Please note that the ‘Basic Life’ for all Track Rollers is 1000 km, so a lookup table is not required.

\[
L_f = \frac{1000}{L^2}
\]

Load Capacity of the Track Roller Running Surface

In a system using a Track Roller running on a flat surface, it may be necessary to reduce the maximum loads applied if the track is not sufficiently hard. All Hepco Flat Tracks are hardened, and these can be used in conjunction with Hepco Track Rollers up to the maximum load capacities stated in the table above. Even higher loads up to the static load capacity, \( C_o \), of the bearings [see Track Roller Section 43-45] are possible without damage.

For softer running surfaces, such as the rear face of the Hepco Single Edge Spacer Slides, the maximum Track Roller loads are reduced as stated in the table below:

<table>
<thead>
<tr>
<th>Track Roller Running Surface</th>
<th>Used with Track Roller Type</th>
<th>Track Roller Maximum Load Capacities (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRN18 &amp; R18</td>
<td>HP Hepco Flat Tracks FT</td>
<td>HP Hepco Single Edge Slide</td>
</tr>
<tr>
<td>LRN25 &amp; R25</td>
<td></td>
<td>Rear of HP Hepco Single Edge Slide</td>
</tr>
<tr>
<td>LRN34 &amp; R34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LRN54 &amp; R54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It should be noted that while a softer running face will limit the maximum load that can be exerted by a Track Roller, the life of the Track Roller at any given load is not affected.

Notes:

1. The values of \( L_f \) and the system Basic Life for each Track Roller relate to the performance of complete systems. Tests have proven these figures to be more reliable than working from the theoretical static and dynamic load capacities \( C_f \) and \( C_o \) of the bearings. Values of \( C_f \) and \( C_o \) have been included in tabulated data on the relevant Track Roller pages as a means of comparison with other systems.

2. The calculations within this section assume that the linear stroke involves a number of complete Track Roller revolutions. If the stroke of any application is less than five times the Track Roller outside diameter, then please calculate the distance travelled as if it moves five Track Roller diameters per stroke. Systems operating at speeds in excess of 8 m/s may require additional calculation. Please contact Hepco for assistance.

Technical Specifications

**V** Slides

Material and finish: High carbon bearing steel AISI S2100, hardened on “V” faces to typically 58-62 Rockwell “C” scale. Those areas which are ground have N5 surface finish. Other areas have a chemical black finish.

Flat Tracks

Material and finish: Carbon or alloy steel, hardened on all faces to typically 58-62 Rockwell “C” scale. Areas which are ground have N5 surface finish. Other areas have a chemical black finish.

Bearings & Track Rollers


Seals: Nitride rubber

Cage: Plastic

Axles: High tensile steel with tensile strength = 695 N/mm². Chemical black finish.

BHT: “E” base plate: Steel with chemical black finish. Temperature range: -20°C to +120°C

Carriage Plates, Slide Beams, End Stops, Shock Absorber Fixing Blocks & Flange Clamps

Material: High strength aluminum alloy. Finish: Clear anodised to 15µm thickness.

Carriage Plate & Slide Counterbore Plugs

Material: Plastic

Cap Seals


Temperature range: -20°C to +60°C

Cap Wipers & Lubricators

Material: Impact resistant plastic with felt wiper.

Temperature range: -20°C to +60°C

Racks & Pinions

Material and finish: Carbon steel with chemical black finish.

Pinions


Frictional Resistance for **V** Slide Systems

Coefficient of friction (without Cap Seals, Cap Wipers or Lubricators) = 0.02

Cap Seals and lubricators add friction as follows:

Four Cap Seals or Wipers per Carriage

<table>
<thead>
<tr>
<th>Material</th>
<th>Coefficient of friction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS18 or CW195</td>
<td>4 N</td>
</tr>
<tr>
<td>CS34 or CW360</td>
<td>5 N</td>
</tr>
<tr>
<td>LB12 = 1 N</td>
<td>LB20 &amp; LB195 = 1.5 N</td>
</tr>
<tr>
<td>LB25 &amp; LB265 = 2.5 N</td>
<td>LB44 &amp; LB360 = 3 N</td>
</tr>
<tr>
<td>LB54 &amp; LB580 = 4 N</td>
<td></td>
</tr>
</tbody>
</table>

Two Lubricators per Carriage

<table>
<thead>
<tr>
<th>Material</th>
<th>Coefficient of friction</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS18 or CW195</td>
<td>4 N</td>
</tr>
<tr>
<td>CS34 or CW360</td>
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</tr>
<tr>
<td>LB54 &amp; LB580 = 4 N</td>
<td></td>
</tr>
</tbody>
</table>

External Lubrication

Cap Seals and Cap Wipers should be lubricated with grease NLGI consistency No. 2. Lubricators should be oiled using 68 cSt viscosity or similar oil. Food compatible lubricants can also be used.

Maximum Linear Speeds for **V** Slides & Bearings and Flat Tracks & Rollers

Unlubricated **V** Slides = 2 m/s. Lubricated **V** Slides and all Flat Track applications = 8 m/s. Higher speeds are possible. Speeds depend upon stroke, duty and environmental conditions.

Material specifications may change for reasons of technical advantage or availability.

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