HepcoMotion®
GV3
LINEAR GUIDANCE AND TRANSMISSION SYSTEM
GV3 linear guidance and transmission system

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

An unrivaled linear motion system, designed to serve a diverse range of automation and linear applications.
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INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL

ALL SLIDES (COMMON FEATURES) 28-33
- One piece construction for assured parallelism and rigidity.
- Manufactured from high quality bearing steel.
- Deep hardened V faces for maximum wear resistance.
- Soft center section allows customizing.
- Any length supplied up to 4 meters.
- Unlimited length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground faces.
- Common 70° ‘V’ allows many Bearing/Slide combinations.

BLIND HOLE BEARING 36-37
- 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 30-31
- Mounts directly to a flat surface. No spacer required.
- Can be spaced apart for high moment load capacity.
- Back face provides mounting register, or running surface for Track Roller.
- Keyway and datum edges provide means of location and alignment.
- Rack cut option provides means of driving.
- Counterbored holes, tapped holes or undrilled options available.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

DOUBLE EDGE FLAT SLIDE 32-33
- See Single Edge Flat Slide features.

SINGLE EDGE FLAT SLIDE 32-33
- 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 49
- Hardened teeth for long life.
- Stainless steel available in some sizes.
- Shaft Type Pinion available for Hepco Rack Driven Carriages. Please refer to 50.
STANDARD BEARING FIXING TYPES
- 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 24).
- 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.

TWIN BEARING (shown left)
- 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.
- Nitrile sealed version prevents ingress of liquids.
- Lubricated for life internally.

DOUBLE EDGE SPACER SLIDE
- 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 undrilled options available.

CAP SEAL
- 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.

LUBRICATOR
- Lubricates contact surfaces, increasing load capacity and life.
- Long lubrication interval.
- Lightly sprung felt wiper ensures low friction.
- Can be attached from either side of a Carriage.
- Flanged and Compact versions available.

STANDARD CARRIAGE
- 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.

SEE APPLICATION EXAMPLES SECTION FOR DESIGN IDEAS
INDIVIDUAL COMPONENTS, OR FULLY-ASSEMBLED AND ADJUSTED SYSTEMS, READY TO INSTALL

ALL SLIDES (COMMON FEATURES) 28-33
- All Hepco Slides are suitable for both Slimline and Standard Bearings. Please see features 4.

SLIMLINE CARRIAGE 26-27
- 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 BLIND HOLE BEARING 38-39
- Please see features 4.

SINGLE EDGE SPACER SLIDE 30-31
- Please see features 4.

DOUBLE EDGE SPACER SLIDE 28-29
- Please see features 5.

SLIMLINE BEARING FIXING TYPES 38-39
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.
- Two axle lengths available, long & short.

SLIMLINE BEARING 38-39
- 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.

SLIMLINE BEARING FIXING TYPES 38-39
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.
- Two axle lengths available, long & short.

SLIMLINE LUBRICATOR 42
- Please see features 5.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

CAP WIPER 41
- 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.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

CAP WIPER 41
- 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.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

CAP WIPER 41
- 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.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

CAP WIPER 41
- Lubricates contact surfaces increasing load capacity and life.
- Lubricated for life in most applications.
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- Enhances appearance of system.
- Incorporates both through hole and tapped hole fixing facility.

DOWEL PIN 29 & 31
- Easy method of location and alignment.

CAP WIPER 41
- 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.
Linear Motion System with Flat Track & Rollers

TRACK ROLLERS (COMMON FEATURES) 45-47
- 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.
- Designed to run on Flat Track or back face of Single Edge Spacer Slides.

WIDE TRACK ROLLER 46-47
- 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 46-47
- 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

FLAT TRACK 44
- 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 meters in most sizes.
- Unlimited length achieved by butting.

SINGLE EDGE SPACER SLIDE & CONCENTRIC V BEARING
- Please see 6 for features and page references.

NARROW TRACK ROLLER 45
- Concentric axle type provides datum for the system.
- Eccentric axle type provides adjustment for the system.
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 customizing.
- 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 meters.
- Widths to suit Hepco Belt Driven Carriages & Pulleys.

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

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

RACK DRIVEN CARRIAGE
- 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 Racks.
- 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
- As used in Rack-Slide assembly.
- Lengths up to 1.83 meters, longer lengths achievable by butting.

RACK-SLIDE ASSEMBLY
- Doweled Rack-Slide assembly is ready to fix to the mounting surface.
- Slides with compound Racks available up to 4 meters.
- Unlimited Rack-Slide length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground Slide faces and on Rack.

PINION
- Please see features 4.
Ancillary Components

FLOATING BEARING

- 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 § 14 & 17

VACUUM AND EXTREME TEMPERATURE BEARING

- 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 § 19

AXIAL STIFFNESS BEARING

- Developed for applications where system height needs to be stable under deflection and vibration.
- Suited to light and moderately-loaded busy systems, requiring maximum stiffness and precision under axial loading of the Bearing.
- Interchangeable with Standard Bearing sizes 25 and 34.
- Supplied with nitrile seals as standard.

MCS-GV3 CONNECTIVITY

- 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 aluminum profiles and Slide mounting combinations available, including Single Edge Slides.

See Application Examples § 17 & 18
Ancillary Components

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

**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.
- 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.

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

**BLEED LUBRICATION**
- Channels lubricant directly to the 'V' surface of Slides.
- For connection to any centralized 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.
**Application Examples**

**Mounting Slides onto Tubular Framework**

Hepco Single Edge Flat Slides ① 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 ②. 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 ① in conjunction with Slimline Bearings ② and by choosing thin section material for the Carriage and Slide support.

**Removable Type Standard Carriage ③**

This example shows how a Carriage ① incorporating Double Eccentric type Bearings ② can be taken off a Slide in any position, without running the Carriage off the end. This facility saves having to dismantle part of the machine in cases where the ends of the Slide are “blocked”.

**Carriage with Side-Access Adjustment ④**

Carriage with Side Access Adjustment ① enables progressive adjustment to the Slide ② 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 demount the attached fixture. Hepco SH Shock Absorbers ③ can significantly increase the life of a GV3 Slide System by reducing stress on components and minimizing wear on the Slide in the crucial deceleration zone.
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.

**EASE OF ALIGNMENT USING ALL ECCENTRIC BEARINGS**

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 C, which ensure better load distribution. Cap Seals will provide lubrication and maximize load capacity. Alternatively, Hepco HDS2 Heavy Duty Linear Guide and MHD Track Roller Linear Motion systems may be used for very high load.

**WIDE PLATFORM**

Rigidity of a wide platform is achieved by mounting Slides in parallel. Single Edge Slides should be considered for long platforms.
CANTILEVERED LINEAR GUIDE

Short stroke sliding movements may be supported from one end only, using Hepco long series Flange Clamps. Flange Clamps may be bolted to either side of the supporting framework and are available with either through holes or tapped holes.

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 utilizing 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 ① with the test piece mounted onto a Belt Driven Carriage ②. Lubricators ③ apply a film of oil to the ‘V’ faces of the Slide without imposing undue friction.

**ROLLED SLIDE**

Hepco Flat Slides ① 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 Bishop-Wisecarver for application advice.

Please also see the HepcoMotion PRT2 and HDRT catalogs for an unrivaled 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 ① and Rack Mounted Slide ②, available from Bishop-Wisecarver 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.
**Application Examples**

**REMOTE CONTROLLED CAMERA**

Hepco Slides are used extensively in the theatre and film industry for positioning cameras or lighting. This example shows a Hepco Slide Beam ① 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.

**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.

**Primary X axis:** Double Edge Spacer Slides ① are mounted back to back, sandwiching the support plate for the Hepco Racks ②, 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 ③ is chosen for the vertical axis to withstand the high moment forces involved.

**PULVERIZING MACHINE**

Hepco Slide Beams ① complete with Belt Driven Carriages ②, ③ 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 pulverizing combs. Hepco Cap Seals ③ 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 ① assures parallelism between teeth and ‘V’ faces of the Slide, providing smooth motion with low backlash. Hepco Floating Bearings ④ 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 ② provide a useful method for attaching the X axis Slides. Please see GV3 Technical Guide ⑦.

**Y axis:** Hepco Single Edge Spacer Slides are mounted wide apart for increased stiffness. The lower Rack Cut Slide ③ enables direct drive via a Hepco Pinion.

COMPACT RACK DRIVEN X-Z MOVEMENT

**X axis:** Outward facing Single Edge Spacer Slides ① 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 ② are used as through hole fixing is not possible. Lubricators ③ are used throughout for friction free application of oil to minimize risk of stalling the stepper motors.

TELESCOPIC LOADER

Hepco Flat Slides ① combined with Slimline Bearings ② produce a low profile Slide System enabling a compact telescopic system to be designed. Hepco Racks ④ are easily incorporated to provide an efficient means of driving via Pinions of a suitable ratio.
**MULTI AXIS ROBOTIC ARM**

A number of axes can be built up in a compact manner by using Single Edge Spacer Slides 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. 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 catalog) 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 aluminum 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 catalog.
MULTI STATION PRODUCT PICKING AND COLLATING SYSTEM

**X axis:** Hepco Single Edge Flat Slides ① 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 ② to enable drive via a Hepco Pinion. The Slide runs in a “railway” of Controlled Height Twin Type Bearings ③, ④, 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 THE 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 ⑤ are available, in addition to Hepco’s SL2 Stainless Steel Linear Guide product range.

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.
SHOWN HERE ARE FULL SIZE ILLUSTRATIONS OF ALL FLAT TRACKS AND TRACK ROLLERS, WITH ROLLERS RUNNING ON EITHER THE NARROW OR WIDE FACES OF THE TRACK.
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 4–11 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.
HepcoMotion Standard Carriages are available to suit all sizes of Double Edge Slides, in all grades of precision. Carriage Plates are precision machined from aluminum alloy and are supplied clear anodized. Carriages may be specified as Assembled Units (AU Type), either factory set to the chosen Slide, or without Slide for self-adjustment.

Removable Carriages incorporate Double Eccentric Bearings, enabling the Carriage to be removed directly from the Slide. For full information and ordering information, please refer solely to the GV3 Technical Guide.

The following types of Bearing and Lubrication Device may be specified (refer also to the availability table 25).

The Twin Bearing type which is the default choice, comprises two individual Bearings on a common axle. This offers some compliance, 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.

Example: Short Carriage with Lubricators on a Flat Slide

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>~A</th>
<th>ØB</th>
<th>C</th>
<th>E*7</th>
<th>F</th>
<th>G*2</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>M</th>
<th>N*2</th>
<th>P*3</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU 12P1/P2 13 ...</td>
<td>NMS 12</td>
<td>MS 12</td>
<td>12</td>
<td>13</td>
<td>40</td>
<td>22.0</td>
<td>30</td>
<td>19</td>
<td>19.2</td>
<td>-</td>
<td>10.1</td>
<td>5.47</td>
<td>-</td>
</tr>
<tr>
<td>AU 12P3 13 ...</td>
<td>AU 20 18 ...</td>
<td>NV 20</td>
<td>V 20</td>
<td>20</td>
<td>18</td>
<td>64</td>
<td>34.7</td>
<td>50</td>
<td>24.75</td>
<td>24.95</td>
<td>14</td>
<td>12.4</td>
<td>6.75</td>
</tr>
<tr>
<td>AU 28 18 ...</td>
<td>NV 28</td>
<td>V 28</td>
<td>28</td>
<td>18</td>
<td>72</td>
<td>42.7</td>
<td>58</td>
<td>25.75</td>
<td>25.95</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 25 25 ...</td>
<td>NS 25</td>
<td>S 25</td>
<td>25</td>
<td>80</td>
<td>46.6</td>
<td>65</td>
<td>30.5</td>
<td>30.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 35 25 ...</td>
<td>NS 35</td>
<td>S 35</td>
<td>35</td>
<td>95</td>
<td>56.6</td>
<td>80</td>
<td>31.5</td>
<td>31.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 50 25 ...</td>
<td>NS 50</td>
<td>S 50</td>
<td>50</td>
<td>112</td>
<td>71.6</td>
<td>95</td>
<td>33</td>
<td>33.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 44 34 ...</td>
<td>NM 44</td>
<td>M 44</td>
<td>44</td>
<td>34</td>
<td>116</td>
<td>72.3</td>
<td>96</td>
<td>38.5</td>
<td>38.7</td>
<td>22.5</td>
<td>21.3</td>
<td>11.5</td>
<td>132</td>
</tr>
<tr>
<td>AU 60 34 ...</td>
<td>NM 60</td>
<td>M 60</td>
<td>60</td>
<td>34</td>
<td>135</td>
<td>88.3</td>
<td>115</td>
<td>41</td>
<td>41.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 76 34 ...</td>
<td>NM 76</td>
<td>M 76</td>
<td>76</td>
<td>150</td>
<td>104.3</td>
<td>130</td>
<td>42</td>
<td>42.2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>AU 76 54 ...</td>
<td>NL 76</td>
<td>L 76</td>
<td>76</td>
<td>54</td>
<td>185</td>
<td>119.1</td>
<td>160</td>
<td>58.5</td>
<td>58.7</td>
<td>36.5</td>
<td>34.7</td>
<td>19</td>
<td>182</td>
</tr>
<tr>
<td>AU 120 54 ...</td>
<td>NL 120</td>
<td>L 120</td>
<td>120</td>
<td>54</td>
<td>240</td>
<td>163.1</td>
<td>210</td>
<td>62.5</td>
<td>62.7</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes:
1. Maximum loads quoted assume lubrication at the interface of Bearings and Slide. This can best be achieved by using Cap Seals, Lubricators or the Bleed 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 on the Bearing pages for comparison.
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, with the exception of the smallest (size 12-13). Two sizes of 12-13 Carriages are therefore required: AU 12P1/P2 13, which is suitable for Slide grades P1 & P2, and AU 12P3 13, which is suitable for Slide grade P3.
3. Carriage size AU 28 18 incorporates a recess in the underside for fixing screw clearance when used with size V28 Flat Slide. The P dimension in the table includes this recess.
4. Controlled Height (CHK) Bearings are usually selected from stock, quantities available may therefore be restricted. Please see the GV3 Technical Guide.
5. Cap Seals are not available on Short Carriages. Lubricators may be used for lubrication purposes.
6. The datum mark identifies the reference edge used in manufacture. The concentric Bearings are always mounted on this side.
7. Bearing, Cap Seal and Lubricator fixing hole sizes and positions are detailed in the GV3 Technical Guide, according to the grade of Slide used. 'E' is the optimized drilling dimension and is suitable for general purposes. Actual Bearing positions will vary slightly when eccentrically adjusted.
The Nitrile Sealed Bearing 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.

The Controlled Height Bearing option (CHK) minimizes variation between Bearings in respect of the important ‘K’ dimension. This is desirable in high precision applications.

The Cap Seal option (CS) ensures efficient lubrication of the ‘V’ contact surfaces and protects against ingress of debris. Operational safety and system appearance are also improved. Once charged with grease, no further lubrication is necessary under most 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 lower friction compared to the Cap Seal.

See Application Examples on p. 12, 14, 16, 18 & 19

Example: Medium Length Carriage with Cap Seals on a Spacer Slide

<table>
<thead>
<tr>
<th>Q x depth</th>
<th>Ø x depth</th>
<th>Short Carriage</th>
<th>Medium Carriage</th>
<th>Long Carriage</th>
<th>Max Load Capacity (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>L  D  S   T</td>
<td>L  D  S   T</td>
<td>L  D  S   T</td>
<td>DR L1  DR L2 Twin L1  Twin L2</td>
</tr>
<tr>
<td>12.5 x 4.8</td>
<td>7.34</td>
<td>50  35  17</td>
<td>4 x M4</td>
<td>4 x M4</td>
<td>4 x M4</td>
</tr>
<tr>
<td>16 x 7</td>
<td>10</td>
<td>65  43  20</td>
<td>4 x M5</td>
<td>140  95  62  6 x M5</td>
<td>760  1200  500  400</td>
</tr>
<tr>
<td>16 x 8</td>
<td>11</td>
<td>75  52  25</td>
<td>125  80  55</td>
<td>175  130  80</td>
<td>1600  3000  1280  1200</td>
</tr>
<tr>
<td>22 x 8.4</td>
<td>11.5</td>
<td>80  51  24</td>
<td>35  74  60</td>
<td>180  120  82</td>
<td>6 x M6</td>
</tr>
<tr>
<td>22 x 9.4</td>
<td>12.5</td>
<td>100  70  40</td>
<td>150  90  65</td>
<td>200  140  90</td>
<td>1600  3000  1280  1200</td>
</tr>
<tr>
<td>22 x 10.9</td>
<td>14</td>
<td>110  80  50</td>
<td>160  100  70</td>
<td>180  120  82</td>
<td>220  160  100</td>
</tr>
<tr>
<td>25 x 8.7</td>
<td>14.5</td>
<td>125  88  50</td>
<td>180  103  80</td>
<td>225  153  103</td>
<td>3600  6000  3200  2800</td>
</tr>
<tr>
<td>25 x 11</td>
<td>17</td>
<td>150  110  60</td>
<td>200  125  90</td>
<td>225  153  103</td>
<td>3600  6000  3200  2800</td>
</tr>
<tr>
<td>25 x 12.5</td>
<td>18</td>
<td>170  130  80</td>
<td>240  165  110</td>
<td>280  205  130</td>
<td>3600  6000  3200  2800</td>
</tr>
<tr>
<td>32 x 13.5</td>
<td>20</td>
<td>200  140  90</td>
<td>300  198  135</td>
<td>400  298  185</td>
<td>3600  6000  3200  2800</td>
</tr>
<tr>
<td>32 x 17.5</td>
<td>24</td>
<td>240  180  120</td>
<td>360  258  165</td>
<td>480  378  225</td>
<td>10000  10000  7200  6400</td>
</tr>
</tbody>
</table>

Ordering Details

2 x AU4434 L180 (CS) (DR) (NS) (CHK) + Slide Part Number

Number of Carriages set to specified Slide
AU... = Assembled Unit
CP... = Carriage Plate only
Carriage Length L = 180mm

Lubrication Options
CS for Cap Seals
or LB for Lubricators
Leave blank if not required

Leave blank if Slide is not required and Carriage will be supplied in a loose condition for self-adjustment

CHK = Controlled Height Bearings
Leave blank for standard tolerance

NS = Nitrile Sealed Bearings
Leave blank for metal shielded

DR = Double Row Bearings
Leave blank for Twin Bearings

Availability of Carriage Options

<table>
<thead>
<tr>
<th>Part Number</th>
<th>DR</th>
<th>CHK</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU 12... 13</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>AU 20... 18</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>AU 28... 19</td>
<td>X X X</td>
<td></td>
</tr>
<tr>
<td>Larger sizes</td>
<td>X X X</td>
<td></td>
</tr>
</tbody>
</table>
HepcoMotion Slimline Carriages incorporate compact Slimline Bearings to minimize 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 aluminum alloy and are supplied clear anodized.

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 \( \square \) 14

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

![Diagram of Short Carriage with Lubricators on a Flat Slide]

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>( \sim A )</th>
<th>( \varnothing B )</th>
<th>( C )</th>
<th>( \sim E^6 )</th>
<th>( \sim F )</th>
<th>( \sim G^2 )</th>
<th>( \sim H )</th>
<th>( J )</th>
<th>( K )</th>
<th>( M )</th>
<th>( \sim N^2 )</th>
<th>( \sim P^3 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>AU 20 195...</td>
<td>NV 20</td>
<td>V 20</td>
<td>20</td>
<td>19.5</td>
<td>64</td>
<td>35.6</td>
<td>50</td>
<td>23.7</td>
<td>23.9</td>
<td>11.2</td>
<td>9.2</td>
<td>5.7</td>
<td>59</td>
</tr>
<tr>
<td>AU 28 195...</td>
<td>NV 28</td>
<td>V 28</td>
<td>28</td>
<td>72</td>
<td>43.6</td>
<td>58</td>
<td>24.7</td>
<td>24.9</td>
<td>67</td>
<td>2.2</td>
<td>4.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AU 25 265...</td>
<td>NS 25</td>
<td>S 25</td>
<td>25</td>
<td>80</td>
<td>46.2</td>
<td>65</td>
<td>28.3</td>
<td>28.5</td>
<td>76</td>
<td>2.5</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AU 35 265...</td>
<td>NS 35</td>
<td>S 35</td>
<td>35</td>
<td>95</td>
<td>56.2</td>
<td>80</td>
<td>29.3</td>
<td>29.5</td>
<td>86</td>
<td>2.5</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AU 50 265...</td>
<td>NS 50</td>
<td>S 50</td>
<td>50</td>
<td>112</td>
<td>71.2</td>
<td>95</td>
<td>30.8</td>
<td>31</td>
<td>101</td>
<td>2.5</td>
<td>6.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AU 44 360...</td>
<td>NM 44</td>
<td>M 44</td>
<td>44</td>
<td>116</td>
<td>72.8</td>
<td>96</td>
<td>35.3</td>
<td>35.5</td>
<td>113</td>
<td>3.14</td>
<td>3.2</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>AU 60 360...</td>
<td>NM 60</td>
<td>M 60</td>
<td>60</td>
<td>135</td>
<td>88.8</td>
<td>115</td>
<td>37.8</td>
<td>38</td>
<td>129</td>
<td>3.14</td>
<td>3.2</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>AU 76 360...</td>
<td>NM 76</td>
<td>M 76</td>
<td>76</td>
<td>150</td>
<td>104.8</td>
<td>130</td>
<td>38.8</td>
<td>39</td>
<td>145</td>
<td>3.14</td>
<td>3.2</td>
<td>6.6</td>
<td></td>
</tr>
<tr>
<td>AU 76 580...</td>
<td>NL 76</td>
<td>L 76</td>
<td>76</td>
<td>195</td>
<td>123.3</td>
<td>170</td>
<td>53.8</td>
<td>54</td>
<td>186</td>
<td>4.56</td>
<td>4.7</td>
<td>9.6</td>
<td></td>
</tr>
<tr>
<td>AU 120 580...</td>
<td>NL 120</td>
<td>L 120</td>
<td>120</td>
<td>240</td>
<td>167.3</td>
<td>210</td>
<td>57.8</td>
<td>58</td>
<td>230</td>
<td>4.56</td>
<td>4.7</td>
<td>9.6</td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

1. Maximum loads quoted assume lubrication at the interface of Bearings and Slide. This can best be achieved by using Cap Wipers, Lubricators or the Bleed 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 on the Bearing pages for comparison.

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.

6. Bearing, Cap Wiper and Lubricator fixing hole sizes and positions are detailed in the GV3 Technical Guide, according to the grade of Slide used. ‘E’ is the optimized drilling dimension and is suitable for general purposes. Actual Bearing positions will vary slightly when eccentrically adjusted.
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 until 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 lower friction compared to the Cap Wiper.

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

<table>
<thead>
<tr>
<th>Q x depth</th>
<th>R</th>
<th>Short Carriage</th>
<th>Medium Carriage</th>
<th>Long Carriage</th>
<th>Max Load Capacity (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ø x depth</td>
<td>10</td>
<td>65 43 20</td>
<td>4 x M5</td>
<td>100 55 44</td>
<td>6 x M5</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>11</td>
<td>75 52 25</td>
<td>4 x M5</td>
<td>125 75 55</td>
<td>175 125 80</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>11.5</td>
<td>85 55 25</td>
<td>4 x M6</td>
<td>135 74 60</td>
<td>180 120 82</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>12.5</td>
<td>100 70 40</td>
<td>6 x M5</td>
<td>150 90 65</td>
<td>200 140 90</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>14</td>
<td>110 80 50</td>
<td>6 x M6</td>
<td>160 100 70</td>
<td>220 160 100</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>14.5</td>
<td>125 85 50</td>
<td>6 x M8</td>
<td>180 98 80</td>
<td>225 145 103</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>15</td>
<td>150 108 60</td>
<td>6 x M8</td>
<td>200 120 90</td>
<td>280 200 130</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>17</td>
<td>170 128 80</td>
<td>6 x M8</td>
<td>240 160 110</td>
<td>340 260 160</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>18</td>
<td>200 153 90</td>
<td>6 x M10</td>
<td>300 190 135</td>
<td>400 290 185</td>
</tr>
<tr>
<td>Ø x depth</td>
<td>19</td>
<td>240 185 120</td>
<td>6 x M10</td>
<td>360 240 165</td>
<td>480 360 225</td>
</tr>
</tbody>
</table>

Ordering Details

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

Number of Carriages set to specified Slide

AU... = Assembled Unit
CP... = Carriage Plate only
Carriage Length L = 180mm

Leave blank if Slide is not required and Carriage will be supplied in a loose condition for self-adjustment

NS = Nitrile Sealed Bearings*4
Leave blank for metal shielded

Lubrication Options

CW for Cap Wipers*4 or LB for Lubricators
Leave blank if not required

Availability of Carriage Options
HepcoMotion Double Edge SpacerSlides 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 customizing. Grades P1 & P2 are ground on faces as illustrated. Grade P3 is precision drawn and sufficiently accurate for many applications. See System Selector [23]. Slide fixing holes are accurately positioned, enabling customers to predrill their mounting holes. Slides without holes are also available.

Spacer 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*5.

**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 in the table above (n x hole pitch E + C + D, where n equals the number of hole pitches). In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal. The positions of the teeth on the Rack mounted versions relative to the mounting holes or Slide ends will vary. Rack mounted Slides with a regulated tooth position can be supplied on request.
2. The C and D dimensions for Rack mounted Slides are less than that for plain versions to provide support for the Rack close to its end. Slide lengths which require C and D dimensions which differ from this may require an extra hole at a non-standard pitch.
3. Where Slides longer than the maximum length are required, lengths can be matched, suitable for butting.
4. 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 [3]). Slides with the fitted Rack option are not compatible with Slimline Bearings.
5. 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 or by utilizing the central keyway. If Hepco Dowel Pins are used, these should be positioned one each end centrally between the Slide end and first hole and one located centrally between each pair of fixing holes, or as deemed necessary for the application.
6. Low head cap screws DIN 6912 are not universally stocked, so Bishop-Wisecarver offers them as a convenience to customers in a single length for each thread size (see table). The NL120 Rack Slide Assembly (and all plain Double Edged Spacer Slides) is secured with cap screws to ISO 4762 / DIN 912, which are widely stocked.
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 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.

**Racks** are doweled 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 [12 – 16, 18 & 19]

---

### Available Grades of Slide

- **P1**
- **P2**
- **P3**

✓ Indicates surfaces which are precision ground

---

### Ordering Details

Part Number: NS35 L1290 P1 (R) (T) (C15) (D15)

<table>
<thead>
<tr>
<th>L max*1,3</th>
<th>M</th>
<th>M1</th>
<th>N</th>
<th>N1</th>
<th>P</th>
<th>P1*6</th>
<th>Q</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>U</th>
<th>V</th>
<th>W</th>
<th>Dowel Pin</th>
<th>X</th>
<th>Y</th>
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<td>M7</td>
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</table>

**Rack mounted on Slide**

| Slide Length L = 1290 mm
| Precision grade: options are P1, P2 & P3
| R - Rack mounted on Slide (Not available on NMS12)
| Leave blank if standard
| Fixing hole style: T - Tapped fixing holes, N - No holes
| Leave blank for counterbored holes (Options T & N are only available with Rack option to special order)

**Ordering Example:**

1 x NM60 L480 P2 R - Double Edge Spacer Slide x 480 mm long in precision grade 2, fitted with Rack
7 x SDP10 - 10 mm Ø dowel pins (optional)
6 x FS630 - Low head socket cap screws M6 thread x 30 mm long (optional)
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 customizing.

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

Slide fixing holes are accurately positioned, enabling customers to predrill their mounting holes. Slides without holes are also available.

Spacer 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 a customer’s own key. Alternatively, where Lubrication Devices are not used, the datum edges may be located against a machined register.

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 in the table above (n x hole pitch E + C + D, where n equals the number of hole pitches). In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal. The position of the teeth on the rack cut versions relative to the mounting holes or Slide ends, will vary. Rack cut Slides with a regulated tooth position can be supplied on request.

2. Where Slides longer than the maximum length are required, lengths can be matched, 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).

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. If Hepco Dowel Pins are used, these should be positioned one each end centrally between the Slide end and first hole and one located centrally between each pair of fixing holes, or as deemed necessary for the application.

5. For the rack cut version of Slide size NVE, the counterbore diameter ‘N’ has been reduced slightly to suit cap head screws ISO 4762 / DIN 912 without knurled head. This is to maximize the strength in the critical area between the counterbore and root of the rack teeth. Due to accuracy requirements, predrilling of fixing holes is not recommended. Screws are available from Bishop-Wisecarver: Part No. PFS415 (M4 x 15 long).

### Notes:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>A – Slide Width</th>
<th>B</th>
<th>B1</th>
<th>C &amp; D*</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>H1</th>
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<td>180</td>
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<td>9.43</td>
<td>19.5</td>
</tr>
</tbody>
</table>

**Part Number**
- NMS: Imperial Coarse Thread
- NV: Imperial Fine Thread
- NS: Metric Coarse Thread
- NM: Metric Fine Thread
- NL: Metric Extra Coarse Thread

**Use With**
- A: Slide Width
- B: P1 & P2
- B1: P1 & P2
- C & D: P3
- E
- F: P2 & P3
- G
- H: P1
- H1: P2 & P3

**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 in the table above (n x hole pitch E + C + D, where n equals the number of hole pitches). In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal. The position of the teeth on the rack cut versions relative to the mounting holes or Slide ends, will vary. Rack cut Slides with a regulated tooth position can be supplied on request.

2. Where Slides longer than the maximum length are required, lengths can be matched, 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).

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. If Hepco Dowel Pins are used, these should be positioned one each end centrally between the Slide end and first hole and one located centrally between each pair of fixing holes, or as deemed necessary for the application.

5. For the rack cut version of Slide size NVE, the counterbore diameter ‘N’ has been reduced slightly to suit cap head screws ISO 4762 / DIN 912 without knurled head. This is to maximize the strength in the critical area between the counterbore and root of the rack teeth. Due to accuracy requirements, predrilling of fixing holes is not recommended. Screws are available from Bishop-Wisecarver: Part No. PFS415 (M4 x 15 long).
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 also provides room for a centrally mounted drive.

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. Please see the GV3 Technical Guide.

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 17, 18 & 19

<table>
<thead>
<tr>
<th>J</th>
<th>K</th>
<th>L max</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>Q</th>
<th>R</th>
<th>W Mod</th>
<th>Dowel Pin</th>
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<th>Y</th>
<th>Z</th>
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Ordering Details

Part Number
Slide Length L = 930 mm
Precision grade: options are P1, P2 & P3
R = Rack cut Slide (Leave blank if not required)

Ordering Example:
1 x NSE L2066 P3 N Single Edge Spacer Slide in precision grade 3, 2066 mm long with no holes
24 x SDP6 6 mm Ø head dowel pins (optional)
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 customizing.

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

Slide fixing holes are accurately positioned enabling customers to predrill their mounting holes. Slides without holes are available in the unground P3 version. The counterbored hole version accommodates low head cap screws to achieve a flush top surface.

The L120 section has 2 rows of holes

Indicates surfaces which are precision ground

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<th>Part Number</th>
<th>Use With</th>
<th>A</th>
<th>B</th>
<th>C &amp; D</th>
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**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 in the table above (n x hole pitch E + C + D, where n equals the number of hole pitches). In all cases, unless otherwise specified by the customer, C and D dimensions will be supplied equal.

2. Where Slides longer than the maximum length are required, lengths can be matched, suitable 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).

4. Slides in their free unmounted state are not necessarily absolutely straight. If important, the Slide should be bolted down to a flat surface and set straight.

5. A flush top surface is necessary where a belt is to be run on the top surface of the Slide, or in cases where there is restricted room between Slide and Carriage plate as may happen if mixing and Match between Slide and Bearing sizes. Also if using Slimline Bearings.

6. Low head socket-cap screws DIN 6912 are not universally stocked, but are available from Bishop-Wisecarver in a single length for each thread size (see table).
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.

**See Application Examples on 12, 13, 15, 16 & 17**

### Available Grades of Slide

- **G**: Indicates surfaces which are precision ground

<table>
<thead>
<tr>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L max¹,²</th>
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<td>M5</td>
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<td>M8</td>
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<td>-</td>
<td>-</td>
<td>11.5</td>
<td>M10</td>
<td>4046</td>
</tr>
</tbody>
</table>

### Ordering Details

**Part Number**

- **Slide Length**: L = 930 mm
- **Precision grade**: options are P1, P2 & P3

**Ordering Example:**

1 x LE L2156 P3 C Single Edge Flat Slide x 2156 mm long in unground grade 3 with counterbored holes

24 x FS820 Low head socket cap screws M8 thread x 20mm long (optional)
HepcoMotion Slide Beams consist of a Flat Slide mounted onto a precision, anodized aluminum extrusion to provide a rigid self supporting beam, which can form an integral part of a machine structure. See GV3 Technical Guide 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 meters, while SB L... Slide Beams can be supplied in lengths of up to 6 meters*1-3. 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 doweled to form a precision joint. Additional fixing screws are normally provided adjacent to each join. 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. For requirements in excess of L max, Slide Beams can be supplied matched ready for joining. Please contact Bishop-Wisecarver for details.
4. 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 Bearing. Please see details of “Mix & Match” possibilities in the GV3 Technical Guide.
5. Quick Fit T-Nut RTN8M6, 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 MCS Machine Construction System Slot 10 T-Nuts, Slot Blocks and T-Slot Covers.
6. 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 undrilled lengths up to 1000mm. Please specify part number TN8S followed by the required length in mm. For information on T-Nut section options for Type SB L... Slide Beams, please contact Bishop-Wisecarver.
7. 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.
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 GV3 Technical Guide *A*.

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 16

---

### Ordering Details

- **Part Number**: SBS35 L1346 P1 (L) (C) (X) (C33) (D53)
- **Beam Length**: \( L = 1346 \text{ mm} \)
- **Precision grade**: options are P1, P2 & P3
- **L** - Lightweight beam option for SB S

*Leave blank if not required*

### Ancillary Items:

See table for the part numbers relating to T-Nuts*5, T-Slot Cover *5.7 and Fixing Clamps.
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 Type (SJ/LJ)**

<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>C2</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
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<tr>
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<td>Long Axle</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SJ J 13</td>
<td>NMS &amp; MS</td>
<td>12.7</td>
<td>10.1</td>
<td>5.47</td>
<td>5.8</td>
<td>9.5</td>
<td>3</td>
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<td>3.4</td>
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<td>14.0</td>
<td>M6x0.75</td>
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<tr>
<td>SJ J 25</td>
<td>NS &amp; S</td>
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<td>16.6</td>
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<td>9.8</td>
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<td>3.8</td>
<td>13</td>
<td>3.4</td>
<td>4.9</td>
<td>20.27</td>
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</tr>
<tr>
<td>SJ J 34</td>
<td>NM &amp; M</td>
<td>34</td>
<td>21.3</td>
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<td>SJ J 54</td>
<td>NL &amp; L</td>
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<td>17.8</td>
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<td>41.76</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 Bearing axles 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 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.
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.
The Through Hole Fixing type is available in two axle lengths, with the short axle version being compatible with Standard Carriage Plates. Both versions are available as fixed position Concentric type (C), adjustable Eccentric type (E), 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 minimizes variation in the B1 dimension*4. This is desirable in high precision applications.

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 are fixed, and Eccentric type (E), which are adjustable.

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

See Application Examples on 10 – 17

Blind Hole Fixing Type (BHJ)

Drilling centers for all combinations of Slide and Bearing are given in the GV3 Technical Guide. Please note that the drilling centers for systems using Double Eccentric type Bearings are different.

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<tr>
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<th>J</th>
<th>K*1</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>P1</th>
<th>Q</th>
<th>Q1</th>
<th>Q2</th>
<th>R</th>
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<th>S</th>
<th>T</th>
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<th>V</th>
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<td>7.4</td>
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<td>89.5</td>
<td>133</td>
<td>25</td>
<td>62</td>
<td>M8</td>
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</tbody>
</table>

A range of Bearing Lubricators are available as an alternative to Cap Seals and Slide Lubricators. Please refer to the GV3 Technical Guide for more information.

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)
or DE = Double Eccentric (for disengagement purposes)

Part Number (~ Bearing Diameter in mm)
LJ 25 C (DR) (NS) (CHK)

Controlled Height*4
Leave blank if not required

Nitrile Sealed Bearing
Leave blank if metal shields are required

Double Row Bearing
Leave blank if Twin Bearing is required
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.

Slimline 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 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.

The Through Hole 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).

### Through Fixing Type (GSJ/GLJ)

<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>C2</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
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<td>3.4</td>
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<tr>
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<td>NS &amp; S</td>
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<td>9.8</td>
<td>19</td>
<td>3.8</td>
<td>13</td>
<td>3.4</td>
<td>4.9</td>
<td>19.98</td>
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<tr>
<th>Part Number</th>
<th>Max Working Load Capacity (N)</th>
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<td>... J 195 ...</td>
<td>Radial 240 Axial 100</td>
<td>Co 563 C 1366</td>
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<tr>
<td>... J 265 ...</td>
<td>Radial 575 Axial 235</td>
<td>Co 1267 C 3075</td>
</tr>
<tr>
<td>... J 360 ...</td>
<td>Radial 1200 Axial 500</td>
<td>Co 2470 C 5625</td>
</tr>
<tr>
<td>... J 580 ...</td>
<td>Radial 2600 Axial 1060</td>
<td>Co 6324 C 12915</td>
</tr>
</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 axles 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 eccentrics 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.
6. The Blind Hole Eccentric Bearings cannot be fitted with Cap Wipers, however, Lubricators may be specified instead.
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 are fixed, and **Eccentric type (E)**, which are adjustable.

All Bearings are greased 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.

**See Application Examples on pp 12 – 14 & 17**

### Blind Hole Fixing Type (GBHJ)

**Concentric (C)**

**Eccentric (E)**

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

![Diagram](image)

### Table of Dimensions

<table>
<thead>
<tr>
<th>H1</th>
<th>J</th>
<th>K*</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>P</th>
<th>P1</th>
<th>Q</th>
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<th>Q2</th>
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<td>25</td>
<td>62</td>
<td>M8</td>
<td>13</td>
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</table>

### Options Available

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Options Available</th>
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<tr>
<td>265 CS</td>
<td>NS</td>
</tr>
<tr>
<td>360 CS</td>
<td>Metal Shields</td>
</tr>
<tr>
<td>580 CS</td>
<td>Nitrile Seals</td>
</tr>
</tbody>
</table>

### Ordering Details

Fixing type. Choose from:

- **GSJ** = Short Axle
- **GLJ** = Long Axle
- **GBHJ** = Blind Hole Fixing

Part Number (~10x Bearing Diameter in mm)

**GLJ 265 C (NS)**

Nitrile Sealed Bearings

**C** = Concentric (fixed), **E** = Eccentric (adjustable)
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 machine. 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.

2 x Lub Points

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

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

2 x self tapping screws (supplied)

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 interval 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 Part No. CSHF4034 or a complete gun is available from Bishop-Wisecarver if required.
4. The fixing screw positions for the CS18 do not lie on the centerline of the nominal Bearing position, unlike all other sizes.

Ordering Details

State quantity and part number

4 x CS 34
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 machine*3. 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 Examples on 14

Through Hole Fixing
Tapped Hole Fixing

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

<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*1</th>
<th>N</th>
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<tr>
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<td>M3</td>
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<td>M5</td>
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<table>
<thead>
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<th>Suitable for Slide Sections</th>
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<tbody>
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<tr>
<td>CW 265</td>
<td>x ✔ ✔ ✔ ✔ ✔ x ✔ ✔ ✔ ✔ ✔ x ✔ ✔ ✔ ✔ ✔ x ✔ ✔ ✔ ✔ ✔ x ✔ ✔</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 secured using the blind holes ‘K’ in 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 interval 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 Part No. CSCHF4034 or complete gun is available from Bishop-Wisecarver, 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 while 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 fixing.

**See Application Examples on 12, 15, 17 & 18**

**Slide Lubricators for Standard Bearings**

![Compact type (…C)](image)

![Flanged type (…F)](image)

**Slide Lubricators for Slimline Bearings**

![Compact type (…C)](image)

![Flanged type (…F)](image)

<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>M</th>
<th>N</th>
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<td>6</td>
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<td>6.8</td>
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<td>3.2</td>
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<td>Ø3.5x12</td>
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<td>8.3</td>
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<td>4.2</td>
<td>-</td>
<td>Ø5x16</td>
<td>M4x10</td>
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<td>5.2</td>
<td>-</td>
<td>Ø6x25</td>
<td>M5x16</td>
</tr>
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</table>

**Part Number** Use With:

- **MS** = Preferred choice
- **S** = Compatible
- **V** = Not Compatible

<table>
<thead>
<tr>
<th>Suitable for Slide Sections</th>
<th>Types Available</th>
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</thead>
<tbody>
<tr>
<td>Flanged (F)</td>
<td>Compact (C)</td>
</tr>
</tbody>
</table>

**Ordering Details**

Part number

Lubricator type:

- **F** = Flanged, **C** = Compact

**Notes:**

1. Two machine screws with cross-recessed pan heads size Q (DIN7985A/ISO7045) 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.
4. Sizes LB12 and LB20 have a true ‘V’ shape to enable them to engage with Slide thicknesses larger than their G dimensions.
The HepcoMotion Bleed Lubrication facility enables a constant flow of lubricant to be channeled directly to the ‘V’ surfaces of the Slide. The lubricant is distributed along the length of the Slide by the Bearings as they run up and down. Most efficient distribution is achieved by also fitting Hepco Cap Seals/Wipers or Lubricators, which will be continuously charged with fresh lubricant and ensure an even spread over the working surfaces.

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

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 centralized lubrication system, pressure feed canister or an oil dispensing pump and controller, which can be programmed to meter a set dose of lubricant, according to the distance traveled by the Carriage.

For full information, please see the GV3 Technical Guide.

### Ordering Details

**Slide Part Number**

<table>
<thead>
<tr>
<th>Slide Part Number</th>
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<th>B *1,2</th>
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<td>NMSE &amp; NVE</td>
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<td>210</td>
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<tr>
<td>NSE &amp; NME</td>
<td></td>
<td>375 *3</td>
<td>-</td>
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<tr>
<td>NLE</td>
<td></td>
<td>390 *3</td>
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</tbody>
</table>

**Ordering Example:**

1 x NME L2336 P2 BLP A400 — Single Edge Spacer Slide, 2336mm long, P2 grade, with custom hole position A
1 x NME L2336 P2 BLP A1850 — Single Edge Spacer Slide, 2336mm long, P2 grade, with custom hole position A

**Notes:**

1. Dimensions A and B are distances from the center of the mounting hole positioned nearest to the right-hand end of the Slide.
2. Custom position bleed holes can be specified, but cannot be located more than 600mm from the end of the Slide. Mounting holes should be avoided.
3. To order a symmetrical pair of Single Edge Spacer Slides with Bleed lubrication, one of the Slides should be an opposite handed version, with an adjusted bleed hole position dimension A to reflect this. This is shown in the ordering example above.
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.

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 7

Indicates surfaces which are precision ground

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Use With</th>
<th>A</th>
<th>B</th>
<th>C*1</th>
<th>D*1</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>Screw Size</th>
<th>H*3</th>
<th>J*3</th>
<th>L*1,2</th>
<th>Note</th>
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<tr>
<td>FT 24 12</td>
<td>…R 18...</td>
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<td>24</td>
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<td>45</td>
<td>6</td>
<td>M5</td>
<td>10</td>
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<td>180</td>
<td>14</td>
<td>M12</td>
<td>20</td>
<td>12</td>
<td>4020</td>
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</table>

Ordering Details

Part Number
Track Length L = 1830 mm
Precision grade: options are P1, P2A, P2B & P3

Notes:
1. Any length of Flat Track within max length stated can be supplied, but for optimum price and delivery time, track 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 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.
3. The standard means of securing Flat Tracks to the mounting surface is via counterbored fixing holes in the positions shown. Other fixing hole possibilities are available on request. It is recommended that holes in the mounting surface are positioned by ‘spotting through’ from the Flat Track.
4. Important: Tracks in their free unmounted state are not necessarily absolutely straight, however, they may be set to the required degree of straightness during installation.
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 Examples on 10

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.

### Ordering Details

Part Number 25 denotes Roller diameter in mm

### Notes:

1. It is recommended that holes to suit Track Roller mounting axles should be reamed to tolerance F6 for a sliding fit.
2. Nuts are chemically blacked on the concentric version and bright zinc plated on the eccentric version 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. Please use the Max Working Load figures and the Load/Life Calculations on 52–54 to determine system performance.
4. Each size of Narrow Track Roller has been designated for use with a specific size of Flat Track, as shown. However, any Track Roller may be used in conjunction with any size of Flat Track, Single Edge Slide or other running surface according to practicality of design.
Wide Track Rollers

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)

<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>C2</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>G1</th>
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<td>10</td>
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<td>13</td>
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<td>4.9</td>
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<td>7.9</td>
<td>M14 x 1.5</td>
<td>28</td>
<td>6</td>
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</table>

#### Notes:

1. It is recommended that holes to suit Track Roller mounting axles should be reamed to tolerance F6 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. Please use the Max Working Load figures and the Load/Life Calculations on pages 52–54 to determine system performance.
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 Slide 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.

Blind Hole Fixing Type (BHR)

**Concentric (C)**

**Eccentric (E)**

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<th>J *1</th>
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<th>L</th>
<th>M</th>
<th>N</th>
<th>N1</th>
<th>P</th>
<th>P1</th>
<th>P2</th>
<th>Q</th>
<th>Q1</th>
<th>R</th>
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<td>7.4</td>
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<td>4</td>
<td>8</td>
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<td>54</td>
<td>500</td>
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<td>8</td>
<td>13</td>
<td>9.8</td>
<td>1.5</td>
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<td>12</td>
<td>5</td>
<td>10</td>
<td>50</td>
<td>72</td>
<td>1000</td>
<td>16</td>
<td>11</td>
<td>M5</td>
<td>8.5</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>10</td>
<td>15</td>
<td>13.8</td>
<td>2.0</td>
<td>9.5</td>
<td>8.5</td>
<td>17.5</td>
<td>6.5</td>
<td>12.5</td>
<td>60</td>
<td>90.5</td>
<td>1000</td>
<td>21</td>
<td>15.3</td>
<td>M6</td>
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<td>17</td>
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<td>133</td>
<td>1500</td>
<td>31</td>
<td>25</td>
<td>M8</td>
<td>13</td>
<td>25</td>
</tr>
</tbody>
</table>

A range of Flat Track and Roller Lubricators are available. Please refer to the GV3 Technical Guide for more information.

| Part Number Options Available |
|-------------------------------|-----------------|-----------------|
|                               | Metal Shields   | Nitrile Seals   |
| ... R 18 ...                 | x               | √               |
| ... R 25 ...                 | √               | √               |
| ... R 34 ...                 | √               | √               |
| ... R 54 ...                 | √               | √               |

**Ordering Details**

Fixing type. Choose from:

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

Part Number (Roller Diameter in mm)

- **LR 25 C (NS)**
  - **Nitrile Sealed Roller**
  - Leave blank if metal shields are required
  - C = Concentric (fixed) or E = Eccentric (adjustable)
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 predrill their mounting 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.

For best performance, the teeth should be lubricated with No.2 consistency lithium soap-based grease.

See Application Examples on 16 - 17

---

**Racks**

---

**Notes:**

1. 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.

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 give support near the join positions. When mounting such compound 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 so Bishop-Wisecarver offers them as a convenience to customers in a single length for each thread size (see table). The largest size R20 Racks are thick enough to accommodate cap head screws to ISO 4762 / DIN 912, which are widely available.

4. Racks in their free unmounted state are not necessarily absolutely straight. If straightness is important, the Rack should be set by bolting down to a flat surface with the rear face located against a register. Care should be taken to align parallel with the relevant Slide. Adjustment for the Pinion should be provided in order to achieve the desired mesh quality. For best performance, the teeth should be lubricated with No.2 consistency lithium soap-based grease.

5. The Max Rack Force is the continuous drive force that can be sustained by a well lubricated Rack used in conjunction with the appropriate Hepco Pinion.
The HepcoMotion range of Pinions is compatible with all Rack cut GV3 components. **Boss Type** Pinions are for general use. **Shaft Type** Pinions, which are detailed in the Technical Guide, are compatible with Hepco Rack Driven Carriages 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.

All Pinions have 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 **15 - 17 & 19

### Boss Type Pinion

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Material*2</th>
<th>Condition*3</th>
<th>ISO 1328-1 grade</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F*1</th>
<th>G*1</th>
<th>H</th>
<th>J mod</th>
<th>K</th>
</tr>
</thead>
<tbody>
<tr>
<td>P05 W7 T28 ...</td>
<td>ST</td>
<td>x</td>
<td>10</td>
<td>14</td>
<td>15</td>
<td>14</td>
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<td>5</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>0.5</td>
<td>7</td>
</tr>
<tr>
<td>P07 W9 T28 ...</td>
<td>ST</td>
<td>x</td>
<td>10</td>
<td>19.6</td>
<td>21</td>
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<td>5</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>0.7</td>
<td>9</td>
</tr>
<tr>
<td>P07 W5 T28 ...</td>
<td>ST</td>
<td>x</td>
<td>10</td>
<td>19.6</td>
<td>21</td>
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<td>5</td>
<td>-</td>
<td>-</td>
<td>28</td>
<td>0.7</td>
<td>5</td>
</tr>
<tr>
<td>P10 W11 T42 ...</td>
<td>ST/SS</td>
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<td>6</td>
<td>42</td>
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<td>15</td>
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<td>2.3</td>
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<tr>
<td>P10 W7 T42 ...</td>
<td>ST</td>
<td>✓</td>
<td>6</td>
<td>42</td>
<td>44</td>
<td>18.5</td>
<td>30</td>
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<td>2.3</td>
<td>42</td>
<td>1</td>
<td>7</td>
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<tr>
<td>P125 W14 T34 ...</td>
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<td>6</td>
<td>42.5</td>
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<td>15</td>
<td>5</td>
<td>2.3</td>
<td>34</td>
<td>1.25</td>
<td>14</td>
</tr>
<tr>
<td>P15 W8 T28 ...</td>
<td>ST</td>
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<td>6</td>
<td>42</td>
<td>45</td>
<td>19.8</td>
<td>30</td>
<td>15</td>
<td>5</td>
<td>2.3</td>
<td>28</td>
<td>1.5</td>
<td>8</td>
</tr>
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<td>P20 W20 T27 ...</td>
<td>ST/SS</td>
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<td>6</td>
<td>54</td>
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<td>40</td>
<td>20</td>
<td>6</td>
<td>2.8</td>
<td>27</td>
<td>2</td>
<td>20</td>
</tr>
<tr>
<td>P20 W13 T27 ...</td>
<td>ST</td>
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<td>6</td>
<td>54</td>
<td>58</td>
<td>25</td>
<td>40</td>
<td>20</td>
<td>6</td>
<td>2.8</td>
<td>27</td>
<td>2</td>
<td>13</td>
</tr>
</tbody>
</table>

### Shaft Type Pinion

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

**Ordering Details**

**SS** = Stainless Steel (see table for availability)
Leave blank for steel version

**Boss Type Pinion Part Number**

**Notes:**
1. Small “BK” type Pinions with bores below 8mm are supplied with set screw through to the bore but without keyway. It is usual practice to secure these Pinions by means of a set screw onto a flat on the shaft or by using a taper pin.
2. ST = steel, SS = stainless steel. Stainless steel Pinions are ground all over for corrosion resistance.
3. ✓ = Hardened all over. Teeth and bore ground. x = Teeth hardened only. Teeth not ground.
Rack Driven Carriages

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 adapter flange and input shaft coupling to suit other makes or types of motor, including steppers and servos, which benefit from the low backlash of the Hepco Gearbox.

Carriage Plates are precision machined from aluminum alloy and are supplied anodized.

Please refer to the Rack & Pinion Systems section of the GV3 Technical Guide for illustrations of other compatible systems using the Hepco Worm Gearbox, Drive Flange and Shaft Pinion.

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

### Ordering Details

<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>S1</th>
<th>T</th>
<th>Rack Drive Force (N)</th>
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</thead>
<tbody>
<tr>
<td>AURD 44 34 L300 CS DR</td>
<td>44</td>
<td>133</td>
<td>36</td>
<td>112</td>
<td>240</td>
<td>113</td>
<td>10</td>
<td>10</td>
<td>74.1</td>
<td>43</td>
<td>300</td>
<td>420</td>
<td>M8</td>
<td>164</td>
<td>42</td>
<td>25.25</td>
<td>71</td>
<td>11</td>
<td>1.5</td>
<td>42</td>
</tr>
<tr>
<td>AURD 44 34 L420 CS DR</td>
<td>60</td>
<td>144</td>
<td>36</td>
<td>132</td>
<td>260</td>
<td>124</td>
<td>10</td>
<td>10</td>
<td>74.1</td>
<td>43</td>
<td>320</td>
<td>440</td>
<td>M8</td>
<td>184</td>
<td>42</td>
<td>25.25</td>
<td>71</td>
<td>11</td>
<td>1.5</td>
<td>42</td>
</tr>
<tr>
<td>AURD 60 34 L320 CS DR</td>
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<td>132</td>
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<td>440</td>
<td>M8</td>
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<td>42</td>
<td>25.25</td>
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<td>11</td>
<td>1.5</td>
<td>42</td>
</tr>
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<td>AURD 60 34 L440 CS DR</td>
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<td>285</td>
<td>168</td>
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<td>15</td>
<td>100.6</td>
<td>57</td>
<td>360</td>
<td>500</td>
<td>M10</td>
<td>187</td>
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<td>37</td>
<td>72.5</td>
<td>147</td>
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<td>135</td>
<td>305</td>
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<td>367</td>
<td>58.5</td>
<td>58.75</td>
<td>72.5</td>
<td>147</td>
<td>2</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, can be supplied on request. Custom 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.
HepcoMotion Gearboxes, AC Geared Motors and Drive Flanges can be used with Rack Driven Carriages & 50, as well as with Rack Cut Single Edge Spacer Slides or separate Racks.

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, alternative single and three phase windings, special finishes and enhanced IP protection are available on request.

Please see the GV3 Technical Guide \(\triangleright\) for full details plus additional motor specifications available.

**See Application Examples on \(\square \) 15 & 17**

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.

**Ordering Details**

Please refer to the GV3 Technical Guide \(\triangleright\) and contact Bishop-Wisecarver to discuss requirements.
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.

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.

### Calculating Carriage Load Factor

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 Lᵥ should first be calculated using the equation below:

$$ Lᵥ = \frac{L₁}{L₁(\text{max})} + \frac{L₂}{L₂(\text{max})} + \frac{Mᵥ}{Mᵥ(\text{max})} + \frac{M}{M(\text{max})} $$

Lᵥ 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 Lᵥ has been determined for the application, the life is calculated as shown.

$Mᵥ(\text{max})$ and $M(\text{max})$ are determined by multiplying the figure shown in the tables below by the spacing of the Bearings, D, in meters (shown right).

### Maximum Working Load Capacity - Standard Carriages

<table>
<thead>
<tr>
<th>Carriage Part Number</th>
<th>Dry System, Twin &amp; DR Type Bearing</th>
<th>Lubricated System, Twin Type Bearing</th>
<th>Lubricated System, DR Type Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L₁(\text{max})$</td>
<td>$L₂(\text{max})$</td>
<td>$Mᵥ(\text{max})$</td>
</tr>
<tr>
<td>AU 12 13...</td>
<td>90  90  0.5  45xD</td>
<td>45xD</td>
<td>240  240  1.3  120xD</td>
</tr>
<tr>
<td>AU 20 18...</td>
<td>180 180 1.6  90xD</td>
<td>90xD</td>
<td>500  400  4.5  200xD</td>
</tr>
<tr>
<td>AU 28 18...</td>
<td>180 180 2.3  90xD</td>
<td>90xD</td>
<td>500  400  6.5  200xD</td>
</tr>
<tr>
<td>AU 25 25...</td>
<td>400 400 4.5  200xD</td>
<td>200xD</td>
<td>1280 1200 14  600xD</td>
</tr>
<tr>
<td>AU 35 25...</td>
<td>400 400 6.5  200xD</td>
<td>200xD</td>
<td>1280 1200 21  600xD</td>
</tr>
<tr>
<td>AU 50 25...</td>
<td>400 400 9.5  200xD</td>
<td>200xD</td>
<td>1280 1200 30  600xD</td>
</tr>
<tr>
<td>AU 44 34...</td>
<td>800 800 16  400xD</td>
<td>400xD</td>
<td>3200 2800 65  1400xD</td>
</tr>
<tr>
<td>AU 60 34...</td>
<td>800 800 22  400xD</td>
<td>400xD</td>
<td>3200 2800 90  1400xD</td>
</tr>
<tr>
<td>AU 76 34...</td>
<td>800 800 29  400xD</td>
<td>400xD</td>
<td>3200 2800 115 1400xD</td>
</tr>
<tr>
<td>AU 76 54...</td>
<td>1800 1800 64  900xD</td>
<td>900xD</td>
<td>7200 6400 250 3200xD</td>
</tr>
<tr>
<td>AU 120 54...</td>
<td>1800 1800 100 900xD</td>
<td>900xD</td>
<td>7200 6400 410 3200xD</td>
</tr>
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</table>

### Maximum Working Load Capacity - Slimline Carriages

<table>
<thead>
<tr>
<th>Carriage Part Number</th>
<th>Dry System, Slinline Type Bearing</th>
<th>Lubricated System, Slinline Type Bearing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$L₁(\text{max})$</td>
<td>$L₂(\text{max})$</td>
</tr>
<tr>
<td>AU 20 195...</td>
<td>180 180 1.6  90xD</td>
<td>90xD</td>
</tr>
<tr>
<td>AU 28 195...</td>
<td>180 180 2.3  90xD</td>
<td>90xD</td>
</tr>
<tr>
<td>AU 25 265...</td>
<td>400 400 4.5  200xD</td>
<td>200xD</td>
</tr>
<tr>
<td>AU 35 265...</td>
<td>400 400 6.5  200xD</td>
<td>200xD</td>
</tr>
<tr>
<td>AU 50 265...</td>
<td>400 400 9.5  200xD</td>
<td>200xD</td>
</tr>
<tr>
<td>AU 44 360...</td>
<td>800 800 16  400xD</td>
<td>400xD</td>
</tr>
<tr>
<td>AU 60 360...</td>
<td>800 800 22  400xD</td>
<td>400xD</td>
</tr>
<tr>
<td>AU 76 360...</td>
<td>800 800 29  400xD</td>
<td>400xD</td>
</tr>
<tr>
<td>AU 76 580...</td>
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<td>900xD</td>
</tr>
<tr>
<td>AU 120 580...</td>
<td>1800 1800 100 900xD</td>
<td>900xD</td>
</tr>
</tbody>
</table>
Calculating ‘V’ Bearing Load Factor\(^{1,3,4}\)

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\(_A\)) and radial (L\(_R\)) components.

The maximum L\(_A\) and L\(_R\) 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.

The load capacities stated in the table below assume that Bearings are used with Slides equal to or larger than the preferred Slide selection for that Bearing size. For details of the preferred sizes, see tables 36–39. For loading of Bearings with smaller Slides, please contact Bishop-Wisecarver.

To calculate the system life, the load factor L\(_F\) should first be calculated using the equation below: L\(_F\) should not exceed 1 for any combination of loads.

\[
L_F = \frac{L_A}{L_A^{(max)}} + \frac{L_R}{L_R^{(max)}}
\]

<table>
<thead>
<tr>
<th>Maximum Working Load Capacity - Twin Type, Double Row and Slimline Bearings (N) (^{1,4})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Twin Type Bearing</strong></td>
</tr>
<tr>
<td>Part Number</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
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<td>J25</td>
</tr>
<tr>
<td>J34</td>
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</table>

<p>| <strong>Double Row (DR) Type Bearing</strong>               |</p>
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
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<tbody>
<tr>
<td>J18 DR</td>
<td>45</td>
<td>90</td>
<td>190</td>
<td>600</td>
<td>45</td>
<td>90</td>
<td>100</td>
<td>240</td>
</tr>
<tr>
<td>J25 DR</td>
<td>100</td>
<td>200</td>
<td>400</td>
<td>1500</td>
<td>100</td>
<td>200</td>
<td>235</td>
<td>575</td>
</tr>
<tr>
<td>J34 DR</td>
<td>200</td>
<td>400</td>
<td>900</td>
<td>3000</td>
<td>200</td>
<td>400</td>
<td>500</td>
<td>1200</td>
</tr>
<tr>
<td>J54 DR</td>
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<td>900</td>
<td>2500</td>
<td>5000</td>
<td>450</td>
<td>900</td>
<td>1060</td>
<td>2600</td>
</tr>
</tbody>
</table>

<p>| <strong>Slimline Type Bearing</strong>                      |</p>
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
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</thead>
<tbody>
<tr>
<td>J195</td>
<td>45</td>
<td>90</td>
<td>100</td>
<td>240</td>
<td>45</td>
<td>90</td>
<td>100</td>
<td>240</td>
</tr>
<tr>
<td>J265</td>
<td>100</td>
<td>200</td>
<td>235</td>
<td>575</td>
<td>100</td>
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<tr>
<td>J580</td>
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<td>1060</td>
<td>2600</td>
<td>450</td>
<td>900</td>
<td>1060</td>
<td>2600</td>
</tr>
</tbody>
</table>

Once L\(_F\) has been determined for each Bearing, the life can be calculated as follows:

**Calculating Carriage or Individual ‘V’ Bearing Life**\(^{2,3,5,6}\)

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.

\[
\text{Dry System} \quad \text{Life (km)} = \frac{\text{Basic Life}}{0.03 + 0.97L_F^2}
\]

\[
\text{Lubricated System} \quad \text{Life (km)} = \frac{\text{Basic Life}}{0.03 + 0.97L_F^3}
\]

<table>
<thead>
<tr>
<th>Basic Life (^{1,4})</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Twin Type Bearing</strong></td>
</tr>
<tr>
<td>Part Number</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>J13</td>
</tr>
<tr>
<td>J18</td>
</tr>
<tr>
<td>J25</td>
</tr>
<tr>
<td>J34</td>
</tr>
<tr>
<td>J54</td>
</tr>
</tbody>
</table>

<p>| <strong>Double Row (DR) Type Bearing</strong>               |</p>
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Dry System</th>
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<th>Dry System</th>
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<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
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<tbody>
<tr>
<td>J18 DR</td>
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<td>70</td>
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<td>-</td>
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<td>-</td>
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<tr>
<td>J25 DR</td>
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<td>250</td>
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<td>250</td>
<td>-</td>
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<td>J34 DR</td>
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<td>500</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>J54 DR</td>
<td>150</td>
<td>200</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

<p>| <strong>Slimline Type Bearing</strong>                      |</p>
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
<th>Dry System</th>
<th>Lubricated</th>
</tr>
</thead>
<tbody>
<tr>
<td>J195</td>
<td>50</td>
<td>100</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>J265</td>
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<td>J360</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>J580</td>
<td>150</td>
<td>200</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Notes:
1. The maximum values of L\(_A\) and L\(_R\), 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) 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. The calculations within this section assume that the linear 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. Systems operating at speeds in excess of 8 m/s may require additional calculation. Please contact Bishop-Wisecarver for assistance.
3. For the purposes of the Load/Life Calculations on this page, the axial load L\(_A\) 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, quoted on 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 best be achieved using Hepco Cap Seals, Cap Wipers, Lubricators or Bleed Lubrication facility. 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 13 & 19), it cannot always be guaranteed that the load will share equally between all Bearings. In such cases, it is recommended that Controlled Height Bearings are specified (where available) and that the system is derated to allow for the life of the most heavily laden Bearing.
6. For some sizes of DR Bearing, the actual life for applications with mainly L\(_R\)/radial loads may be higher than the calculations indicate. This is because the calculations are simplified for easy use. Please contact Bishop-Wisecarver 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:

$$L_F = \frac{L_R}{L_R^{(\text{max})}}$$

$L_F$ should not exceed 1.

The maximum radial load capacity $L_R^{(\text{max})}$ for the Hepco range of Track Rollers is stated below:

<table>
<thead>
<tr>
<th>Narrow Roller Type</th>
<th>$L_R^{(\text{max})}$ (N)</th>
<th>Wide Roller Type</th>
<th>$L_R^{(\text{max})}$ (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LRN 18...</td>
<td>400</td>
<td>...R 18...</td>
<td>600</td>
</tr>
<tr>
<td>LRN 25...</td>
<td>1000</td>
<td>...R 25...</td>
<td>1600</td>
</tr>
<tr>
<td>LRN 34...</td>
<td>2000</td>
<td>...R 34...</td>
<td>3200</td>
</tr>
<tr>
<td>LRN 54...</td>
<td>5000</td>
<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.

$$\text{Life (km)} = \frac{1000}{L_F^3}$$

**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, $C_0$, of the bearings (see Track Roller pages 45–47) are possible without damage.

For softer running faces, 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 Maximum Load Capacities (N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description of Track Roller Running Surface</td>
</tr>
<tr>
<td>Hepco Flat Tracks FT...</td>
</tr>
<tr>
<td>Rear of Hepco Single Edge Slide</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<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 ($C$ and $C_0$) of the bearing. Values of $C$ and $C_0$ 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 traveled 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 Bishop-Wisecarver for assistance.
'V' Slides
Material and finish: High carbon bearing steel AISI 52100, 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
Raceways & balls: Carbon-chromium bearing steel AISI 52100, hardened and tempered.
Shields: Steel with bright zinc plated finish.
Seals: Nitrile rubber
Cage: Plastic
Axles: High tensile steel with tensile strength = 695 N/mm². Chemical black finish.
BH...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 anodized to 15µm thickness.

Carriage Plate & Slide Counterbore Plugs
Material: Plastic

Cap Seals
Material: Body: Thermoplastic elastomer
Inserts: Impact resistant plastic
Wipers: Felt
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
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
CS18 or CW195 = 4 N, CS25 or CW265 = 7 N,
CS34 or CW360 = 15 N, CS54 or CW580 = 28 N
Two Lubricators per Carriage
LB12 = 1 N, LB20 & LB195 = 1.5 N,
LB25 & LB265 = 2.5 N, LB44 & LB360 = 3 N,
LB54 & LB580 = 4 N

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. Speed depends upon stroke, duty and environmental conditions.

Material specifications may change for reasons of technical advantage or availability.
Components & Accessories
- DualVee®
- MadeWell®
- GV3
- SL2
- PRT2
- HDS2
- HDRT
- MCS
- Motor Mounts
- Gantry Brackets
- Wrenches

Manual Linear Guide Systems
- DualVee®
- UtiliTrak®
- MinVee®
- GV3
- Simple Select®
- SL2
- HDS2
- MHD
- HTS

Actuated Linear Guide Systems
- LoPro®
- XLA™
- ECO60™
- SlickStick™
- SteadyRail™
- HDLS
- HDCS
- PDU2
- DAPDU2
- SBD
- PSD
- SDM
- DLS

Rotary Guide Systems
- PRT2
- DTS2
- DTS
- ALR
- HDRT
- 1-Trak
- GFX

Robot Transfer Units
- LoPro® RTU
- DualVee® RTU

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- Extruded Profile Guides
- Custom Bearings
- Custom Subassemblies
- Engineering Services
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