



HepcoMotion® GV3

Linear Guidance and
Transmission System

Introducing the HepcoMotion® GV3

linear guidance and transmission system

The GV3 linear guidance and transmission system has been designed to provide the customer with an unrivalled choice of sizes and options to cater for virtually every linear motion requirement.

In devising GV3, HepcoMotion has retained the best features of their highly successful Generation 2 and CM Slide systems in a greatly expanded range. Many new components have been added including single edge slides, flat tracks and drive options.

Customers may now choose slides from three grades of precision and combine them with either twin bearings, double row bearings or low cost slimline bearings. This enables the ideal system to be specified for optimum performance within the budget available.

The reliability of the all steel slideway and V bearing concept has been proved conclusively over nearly fifty years. Improvements are continually being made to this fundamentally sound design resulting in a truly evolutionary system for the 21st century.

By choosing GV3, customers can be assured of a quality and performance which surpasses all expectations.



GV3 Benefits

- SMOOTH:**
- High accuracy and fine finish of components >>>> allows constant driving force without vibration.
 - Friction free motion >>>> allows smaller, lower cost motors to be selected.
- FAST:**
- Optimized bearing and slide interface design >>>> enables very high speeds with low wear.
 - Low stick friction and low inertia of bearing rotation >>>> allows fast acceleration for shortest stroke.
- ACCURATE:**
- High degree of slide parallelism and minimum bearing clearance >>>> results in virtually zero play.
 - Important dimensions accurately controlled >>>> for reliable system height and positional accuracy.
- QUIET:**
- Specially designed bearing and slide geometry >>>> results in one of the quietest slide systems available.
- DURABLE:**
- All steel slideway >>>> three times stiffer than composite aluminum slide systems.
 - Rugged construction >>>> suits high duty applications and harsh environments.
 - Lubrication devices available >>>> maximizes life with no relubrication necessary in most instances.
 - Unique wiping action >>>> expels debris in environments where other systems fail.
 - Compliant bearing design >>>> for tolerance of misalignment.
 - Reliable performance confirmed by testing >>>> specify GV3 with confidence.
- SIMPLE:**
- Easily understood proven technology >>>> little to go wrong and simple to maintain.
- VERSATILE:**
- Huge range of sizes, types and ancillary components available >>>> provides solution to most design problems.
 - Long lengths available up to 4 m in most sizes >>>> saves on assembly time.
 - Available as assembled unit or in component form >>>> provides maximum flexibility of design.
 - Works in any plane and orientation >>>> unrestricted use in machine construction.
 - Operates without lubrication >>>> ideal for food machinery and clean applications.
 - Driven systems available >>>> complete solutions from a single source saves design and administration time.
- ECONOMIC:**
- Choice of slide precision and bearing design >>>> to match cost/performance requirements.
 - Designed for minimum installation time >>>> significantly reduces cost.

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System Composition

Linear Motion System with Standard Bearing Program

Pages 2-7 provide an overview of the comprehensive GV3 linear motion system. Below is shown the basic range of slides and components available with standard twin and double row bearings. A similar range is available with slimline bearings, details of which are shown on the following page. Components are available factory assembled where possible or as individual parts

ALL SLIDES (COMMON FEATURES) 20-25

- 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.
- Wide range of sizes to choose from.
- 3 grades of precision to suit cost/performance requirements.
- Any length supplied up to 4 meters, unground grade to 6 meters.
- Unlimited length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground faces.
- Common 70° 'V' allows many bearing/slide combinations.

LUBRICATORS 34

- Lubricates contact surfaces increasing load capacity and life.
- Can be attached from either side of a carriage.
- Lightly sprung felt wiper ensures low friction.
- Long lubrication interval.

SINGLE EDGE FLAT SLIDE/DOUBLE EDGE FLAT SLIDE 24-25

- 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.
- A number of widths for each basic section gives 11 sections to choose from.
- Can be spaced apart for high moment load capacity.

CAP SEAL 32

- Lubricates contact surfaces increasing load capacity and life.
- "Lubricated for life" in most applications.
- Seals against ingress of debris.
- Improves operational safety.
- Enhances appearance of system.
- Incorporates both through hole and tapped hole fixing facility.

PINIONS 41

- Bored type and integral shaft type available.
- Hardened teeth for long life.
- Keyway provided in bored type pinion.
- Shaft type pinion compatible with rack driven carriage.
- Shaft type pinion compatible with motor gearboxes.

SINGLE EDGE SPACER SLIDE 22-23

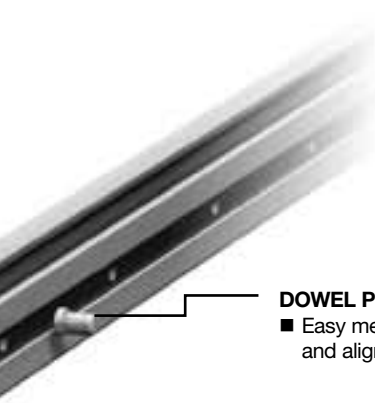
- Mounts directly to a flat surface. No spacer required.
- Can be spaced apart for high moment load capacity.
- Keyway and datum edges provide means of location and alignment.
- Counterbored hole fixing, tapped hole fixing or undrilled options available.
- Plastic hole plugs provided to avoid debris traps.
- Rack cut option provides means of driving.
- Back face provides mounting register, or running surface for track roller.
- 5 sections to choose from.

DOUBLE EDGE SPACER SLIDE 20-21

- Mounts directly to a flat surface. No spacer required.
- Keyway and datum edges provide means of location and alignment.
- Counterbored hole fixing, tapped hole fixing or undrilled options available.
- Plastic hole plugs provided to avoid debris traps.
- A number of widths for each basic section gives 11 sections to choose from.

if preferred. Many sizes and types of components can be interchanged to achieve an unrivalled combination of space and performance possibilities.

The GV3 philosophy is to provide a solution to every linear motion problem



DOWEL PINS ☐21&23
 ■ Easy method of location and alignment.

ALL BEARINGS (COMMON FEATURES & OPTIONS) ☐28-31

- Special raceway conformity and low radial clearance, for slide applications.
- Twin bearing for tolerance of misalignment and smooth running.
- Double row bearing for tolerance of debris and higher load capacity.
- Range of 5 useful sizes to choose from.
- Metal shields for exclusion of particulates and low friction running.
- Nitrile sealed version prevents ingress of liquids.

CONCENTRIC BEARING ☐28-29

- Provides datum reference for the system.
- Short fixing stud for thin carriage plate.
- Long fixing stud for thick carriage plate.
- Controlled height option improves system height accuracy.



ECCENTRIC BEARING ☐28-29

- Provides simple means of adjustment via center hexagon or socket each end.
- Short fixing stud for thin carriage plate.
- Long fixing stud for thick carriage plate.
- Controlled height option improves system height accuracy.



DOUBLE ECCENTRIC BEARING ☐28-29

- Eccentric throw sufficient for direct removal of carriage from slide.
- All attributes of the standard eccentric version apply.



CARRIAGE/CARRIAGE PLATE ☐14-15

- Factory adjusted to chosen slide, or supplied as a kit of parts.
- Available with bearings only, or with the addition of cap seals or lubricators.
- Useful size platform with flush surface for mounting purposes.
- Tapped holes in convenient positions for attachment purposes.
- Groove along sides to provide register for switch brackets etc.
- Carriages available for all 11 slide sections in all grades.
- 3 lengths available in each size and most types.
- Tamper proof option.
- Removable option for direct disengagement from slide.
- Controlled height option for special accuracy requirements.



BLIND HOLE CONCENTRIC BEARING
BLIND HOLE ECCENTRIC BEARING } ☐28-29

- For mounting into thick plates or where access to opposite side restricted.
- Adjustable from operating side for ease of access.

TWIN BEARING/DOUBLE ROW BEARING ☐28-29

- Twin bearing for tolerance of misalignment and smooth running.
- Double row bearing for tolerance of debris and higher load capacity.
- Special raceway conformity and low radial clearance, for slide applications.
- General quality to ISO Class 4. Aspects to Class 2.
- Factory has the following accreditation: - ISO 9001 Aerospace Sector Certification TS 157



System Composition

Linear Motion System with Slimline Bearing Program

Pages 2-7 provide an overview of the comprehensive GV3 linear motion system. Below is shown the basic range of slides and components available with slimline bearings. An identical range of slides is available with standard bearings, details of which are shown on the previous page. Components are available factory assembled where possible or as individual parts if preferred.

ALL SLIDES (COMMON FEATURES) 20-25

- All slides suitable for both slimline and standard bearings. Please see previous page for specific features.
- 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.
- Wide range of sizes to choose from.
- 3 grades of precision to suit cost/performance requirements.
- Any length supplied up to 4 meters, unground grade to 6 meters.
- Unlimited length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground faces.
- Common 70° 'V' allows many bearing/slide combinations.

DOUBLE EDGE FLAT SLIDE 24

- Please see previous page for features.

DOUBLE EDGE SPACER SLIDE 20-21

- Please see previous page for features.

PINIONS 41

- Bored type and integral shaft type available.
- Hardened teeth for long life.
- Keyway provided in bored type pinion.
- Shaft type pinion compatible with rack driven carriage.
- Shaft type pinion compatible with motor gearboxes.

SINGLE EDGE SPACER SLIDE 22-23

- Please see previous page for features.

SINGLE EDGE FLAT SLIDE 25

- Please see previous page for features.

BEARING ATTRIBUTES 26-27

- Special raceway conformity and low radial clearance, for slide applications.
- General quality to ISO Class 4. Aspects to Class 2.
- Made in the factory which has the following accreditation: - ISO 9001 Aerospace Sector Certification TS 157.

LUBRICATOR 34

- Lubricates contact surfaces increasing load capacity and life.
- Lightly sprung felt wiper ensures low friction.
- Can be attached from either side of the carriage/mounting surface.
- Long lubrication interval.

CAP WIPER 33

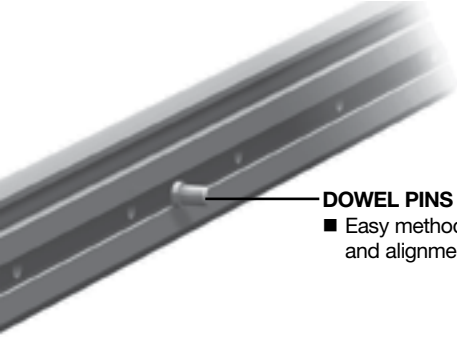
- Lubricates contact surfaces increasing load capacity and life.
- "Lubricated for life" in most applications.
- Seals against ingress of debris.
- Improves operational safety.
- Enhances appearance of system.
- Incorporates both through hole and tapped hole fixing facility.

BLIND HOLE ECCENTRIC BEARING 30-31

- For mounting into thick plates or where access to opposite side is restricted.
- Adjustable from operating side for ease of access.

Many sizes and types of components can be interchanged to achieve an unrivalled combination of space and performance possibilities.

The GV3 philosophy is to provide a solution to every linear motion problem.



DOWEL PINS 21&23

- Easy method of location and alignment.

SLIMLINE BEARINGS (COMMON FEATURES & OPTIONS) 30-31

- 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.
- Range of 4 useful sizes to choose from.
- Metal shields for exclusion of particulates and low friction running.
- Nitrile sealed version prevents ingress of liquids.

ECCENTRIC BEARING 30-31

- Provides simple means of adjustment via center hexagon.
- Short fixing stud for thin carriage plate.
- Long fixing stud for thick carriage plate.



CONCENTRIC BEARING 30-31

- Provides datum reference for the system.
- Short fixing stud for thin carriage plate.
- Long fixing stud for thick carriage plate.

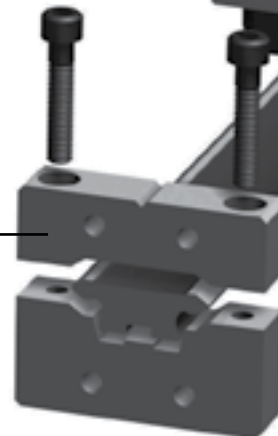


BLIND HOLE CONCENTRIC BEARING 30-31

- For mounting into thick plates or where access to opposite side is restricted.

FLANGE CLAMP 35

- 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.



CARRIAGE/CARRIAGE PLATE 18-19

- Factory adjusted to chosen slide, or supplied as a kit of parts.
- Available with bearings only, or with the addition of cap wipers or lubricators.
- Useful size platform with flush surface for mounting components.
- Tapped holes in convenient positions for attachment purposes.
- Groove along sides to provide register for switch brackets, etc.
- Carriages available for most slide sections in all grades.
- 3 lengths available in each size and most types.
- Tamper proof option.



System Composition

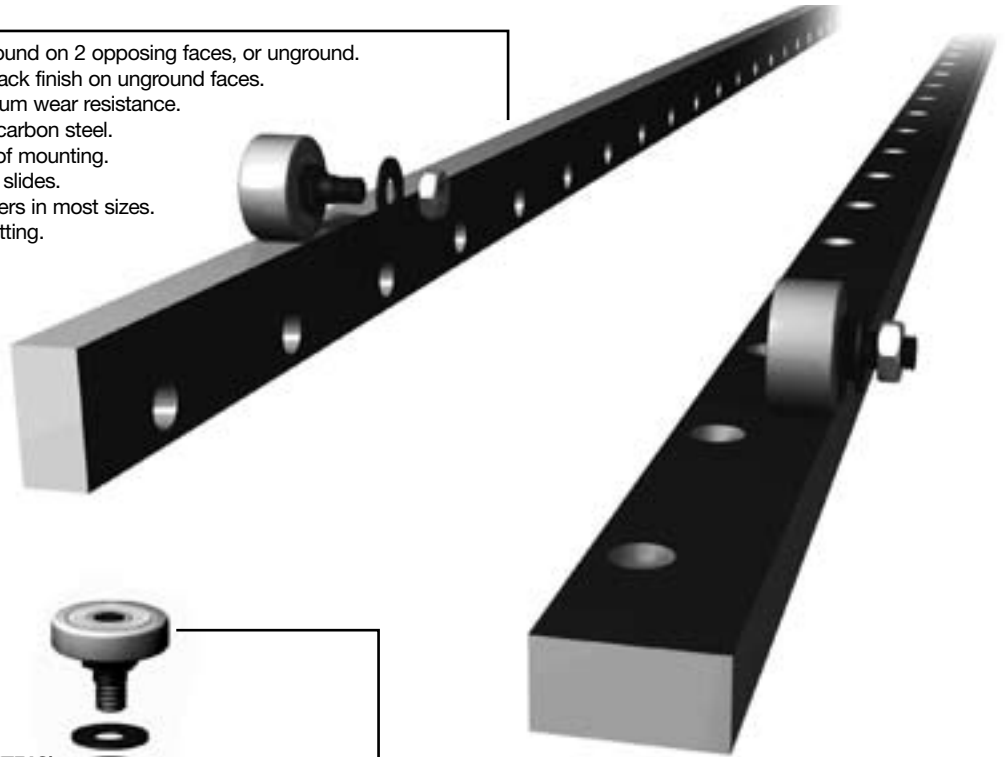
Linear Motion System Incorporating Flat Tracks & Rollers

Pages 2-7 provide an overview of the comprehensive GV3 linear motion program. Below is shown the extensive range of flat tracks and track rollers compatible with linear motion systems.

The GV3 philosophy is to provide a solution to every linear motion problem.

FLAT TRACK 36

- Choose from ground all over, ground on 2 opposing faces, or unground.
- Attractive, corrosion inhibiting black finish on unground faces.
- Deep hardened faces for maximum wear resistance.
- Manufactured from high quality carbon steel.
- Offset fixing holes for versatility of mounting.
- 4 useful sizes compatible with V slides.
- Any length supplied up to 4 meters in most sizes.
- Unlimited length achieved by butting.



SLIMLINE ROLLER (CONCENTRIC) WIDE ROLLER (CONCENTRIC) 37-39

- Provides datum reference for the system.



SLIMLINE ROLLER (ECCENTRIC) WIDE ROLLER (ECCENTRIC) 37-39

- Provides simple means of adjustment.



BLIND HOLE, WIDE, CONCENTRIC ROLLER BLIND HOLE, WIDE, ECCENTRIC ROLLER 37-39

- For mounting into thick plates or where access to opposite side restricted.
- Adjustable from operating side for ease of access.
- Provides datum reference for the system.



TRACK ROLLERS (COMMON FEATURES) 37-39

- Size and load capacity equivalent to V bearing.
- Special raceway conformity with low radial clearance.
- Range of 4 useful sizes to choose from.
- 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 track or back face of single edge spacer slides.
- General quality to ISO Class 4. Aspects to Class 2.
- Made in the factory which has the following accreditation:
ISO 9001 - Aerospace Sector Certification TS 157.



Linear Motion System with Drive Facility / Support Structure

Pages 2-7 provide an overview of the comprehensive GV3 linear motion program. Below is shown the range of GV3 products available with enhanced features to provide a complete engineering package.

The GV3 philosophy is to provide a solution to every linear motion problem.

BELT DRIVEN CARRIAGE 42-43

- Use with flat slides, spacer slides or slide beams in all grades of precision.
- Choice of 5 sizes each available in two useful lengths.
- Integral belt tensioners for ease of adjustment.
- Removable mounting platform for ease of customizing.
- Tapped holes for convenience of attaching components.
- Available with most standard bearing variants and lubrication devices.

TIMING PULLEYS 42-43

- Low backlash profile for high positional accuracy.
- Width to suit belt driven carriages.
- Diameter enables belt return through slide beam.

TIMING BELT 42-43

- High strength, steel reinforced AT profile open length belt.
- Cut to length, up to 50 m.
- Widths to suit belt driven carriages & pulleys.

SLIDE BEAMS 26-27

- Can be used as machine construction member.
- Strong section, spans wide gaps.
- Available up to 8 meters in one piece.
- Choice of 2 beam sections and 5 slide widths.
- Slides available in 3 grades of precision.
- 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.

SEPARATE RACK 36

- As used in rack-slide assembly.
- 4 sizes available.
- Lengths up to 1.83 m, longer lengths achievable by butting.

PINIONS 40

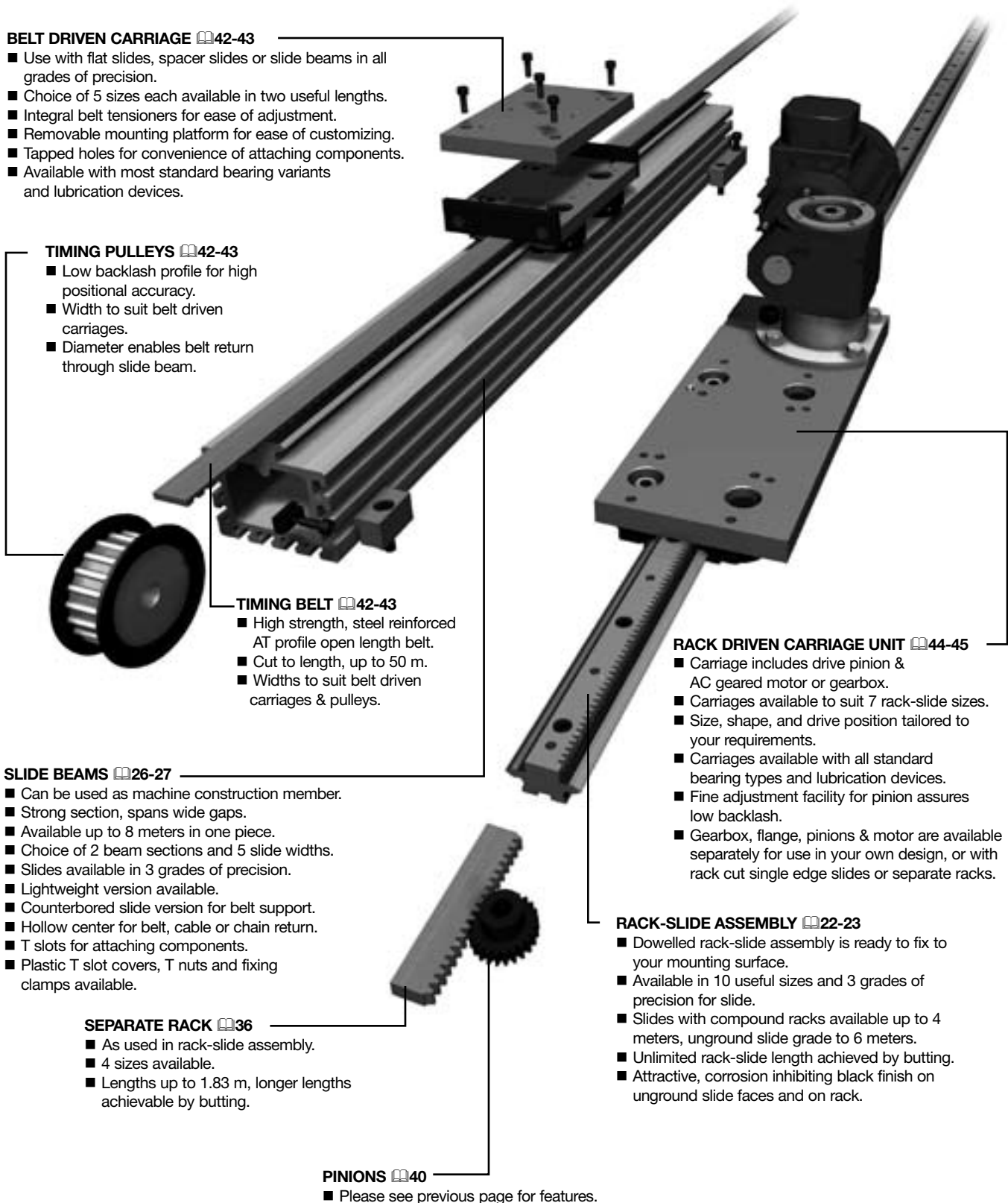
- Please see previous page for features.

RACK DRIVEN CARRIAGE UNIT 44-45

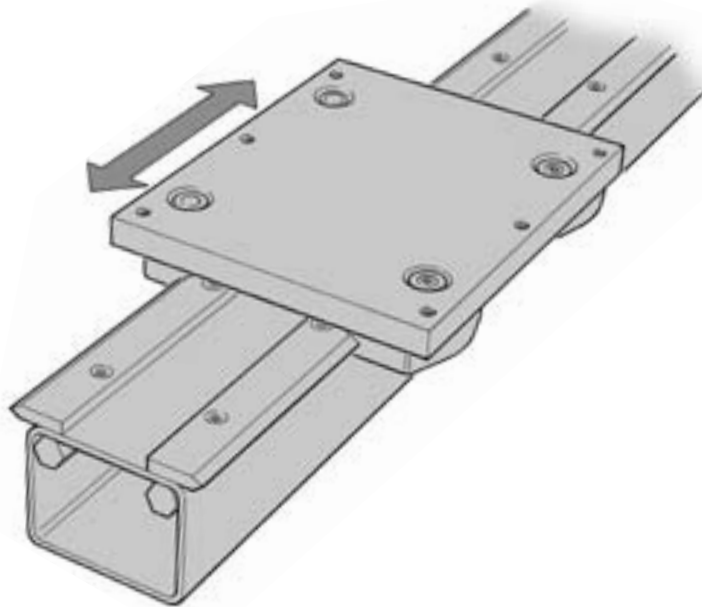
- Carriage includes drive pinion & AC geared motor or gearbox.
- Carriages available to suit 7 rack-slide sizes.
- Size, shape, and drive position tailored to your requirements.
- Carriages available with all standard bearing types and lubrication devices.
- Fine adjustment facility for pinion assures low backlash.
- Gearbox, flange, pinions & motor are available separately for use in your own design, or with rack cut single edge slides or separate racks.

RACK-SLIDE ASSEMBLY 22-23

- Dowelled rack-slide assembly is ready to fix to your mounting surface.
- Available in 10 useful sizes and 3 grades of precision for slide.
- Slides with compound racks available up to 4 meters, unground slide grade to 6 meters.
- Unlimited rack-slide length achieved by butting.
- Attractive, corrosion inhibiting black finish on unground slide faces and on rack.



Application Examples

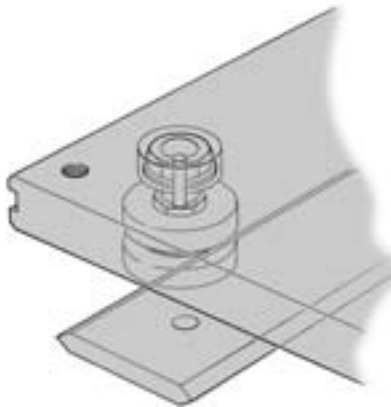
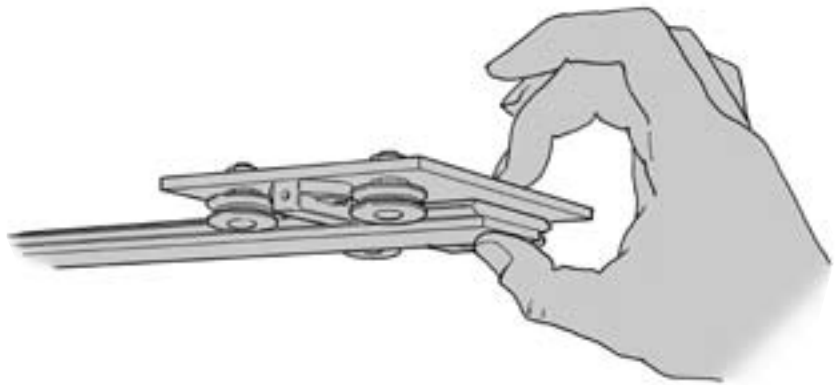


Fixing Slides to Tubular Framework

Single edge flat slides have been designed to attach to the edges of many sizes of square or rectangular tube with sufficient protrusion of the slide V running face to provide clearance for bearings and lubrication devices. The fixing hole positions have been regulated to clear the external corner radius of the tube and to allow attachment by means of standard sizes of hexagon bar. Alternatively, slides can be attached by "flowdrilling" or by welding.

Low Height System

A very compact slide system can be achieved by using flat slides in conjunction with slimline bearings and by choosing thin section material for the carriage and slide support.

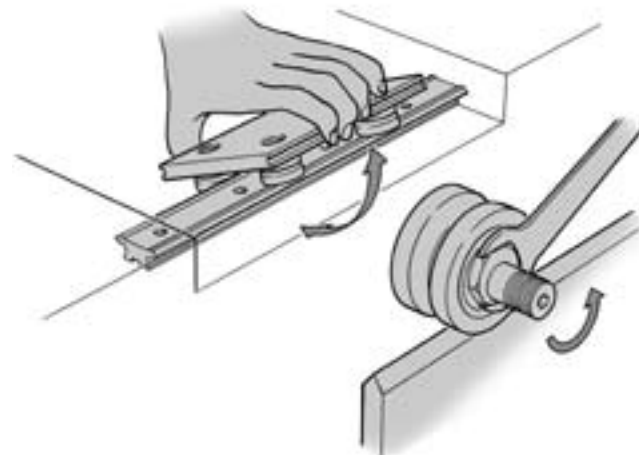


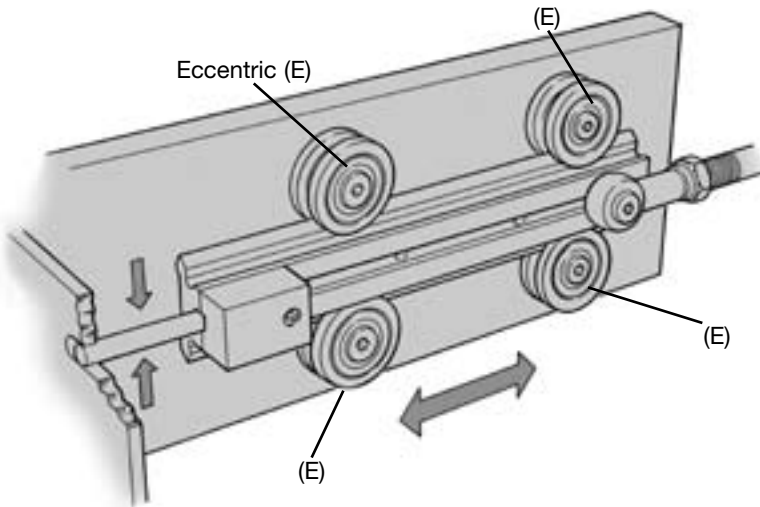
Tamper Proof Carriage

Carrriages can be supplied "tamper-proof" by pinning the bearing studs once they have been factory adjusted to the slide. After pinning, the counterbores are filled with resin.

Removable Carriage

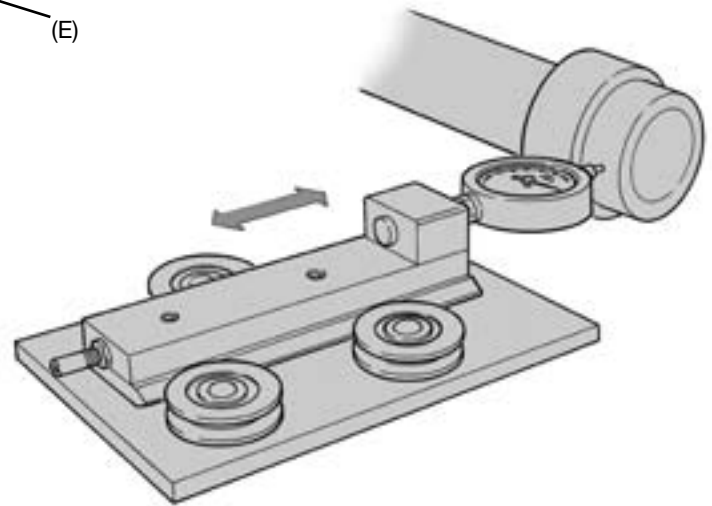
This example shows how a carriage incorporating double eccentric type bearings can be taken off a slide in any position without running the carriage off the end. This facility saves having to dismantle part of the machine in cases where the ends of the slide are "blocked".





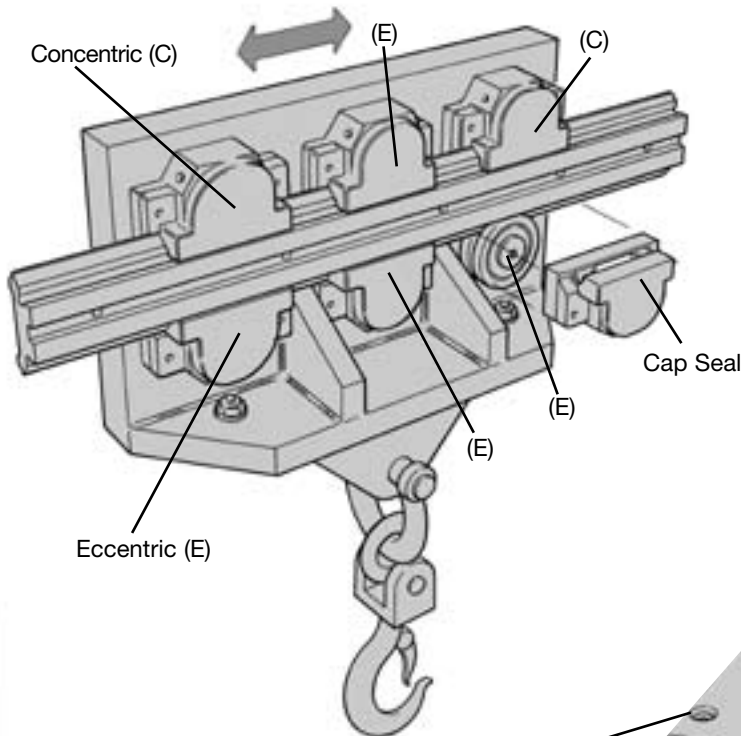
Ease of Alignment Using all Eccentric Bearings

Example shows the possibility to adjust the HepcoMotion GV3 slide system in one plane, thus avoiding the necessity for precision drilling and fitting.



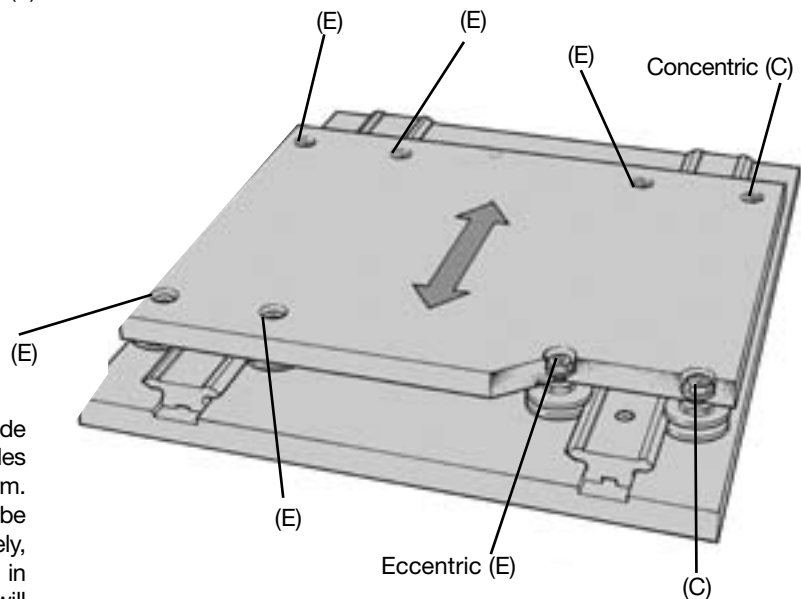
Light Applications

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



Heavy Load Requirements

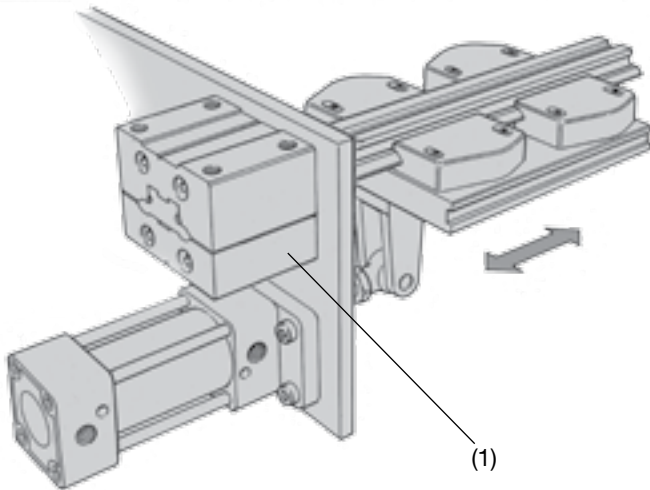
For increased load capacity, additional eccentric bearings may be installed in between the outermost ones. Multiple bearing installations benefit from the use of controlled height bearings which ensure better load distribution. Cap seals will also maximize load capacity (see load/life section). Please consult Bishop-Wisecarver Corporation's Heavy Duty Slide System catalog where very high loads are anticipated.



Wide Platform

Rigidity is achieved at the extremities of a wide platform by mounting slides in parallel; this provides maximum support for a wide but short platform. Single edge slides (see pages 22-23) should be considered for a wide but long platform. Alternatively, flat track with track rollers (see pages 36-39) in conjunction with an opposing double edge slide, will obviate the need to set slides parallel.

Application Examples

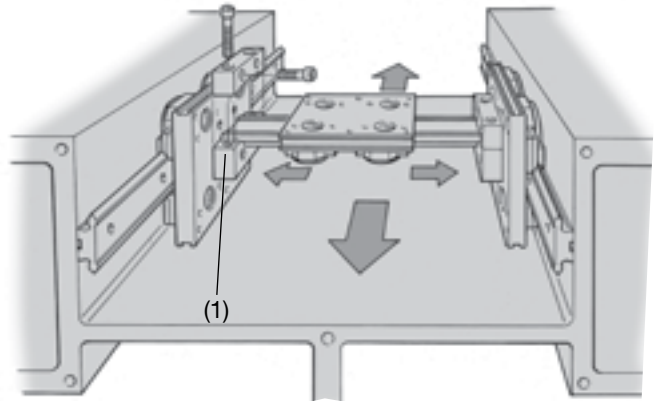


Cantilevered Linear Guide

Short stroke sliding movements may be supported from one end only, using long series flange clamps (1). Flange clamps may be bolted to either side of the supporting framework and are available with either through holes or tapped holes.

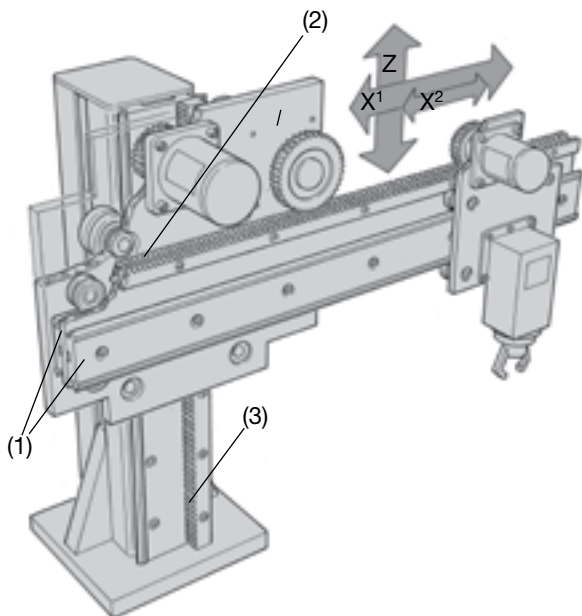
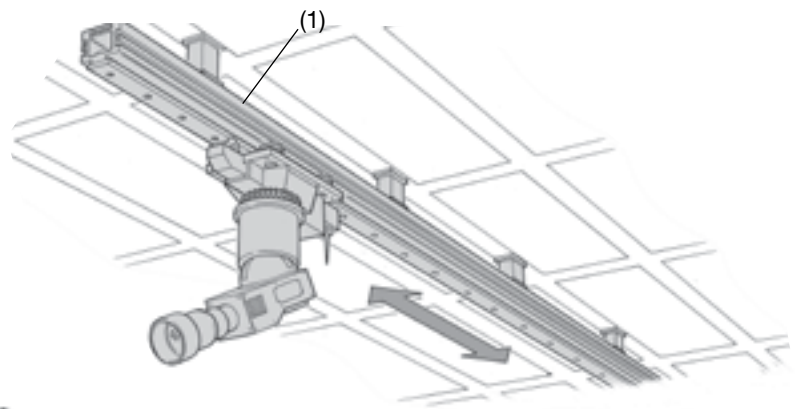
Simple Two Axis Connection

Short series flange clamps (1) are an ideal method of connecting opposing carriages and creating a second axis which can be easily installed or removed. Care should be taken to ensure parallelism between slides. Using flat track and track rollers in place of one of the slides will overcome necessity to set parallel (see page 13).



Remote Controlled Camera

Slides are used extensively in theater and filming for positioning cameras or lighting. This example shows a 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 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 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.

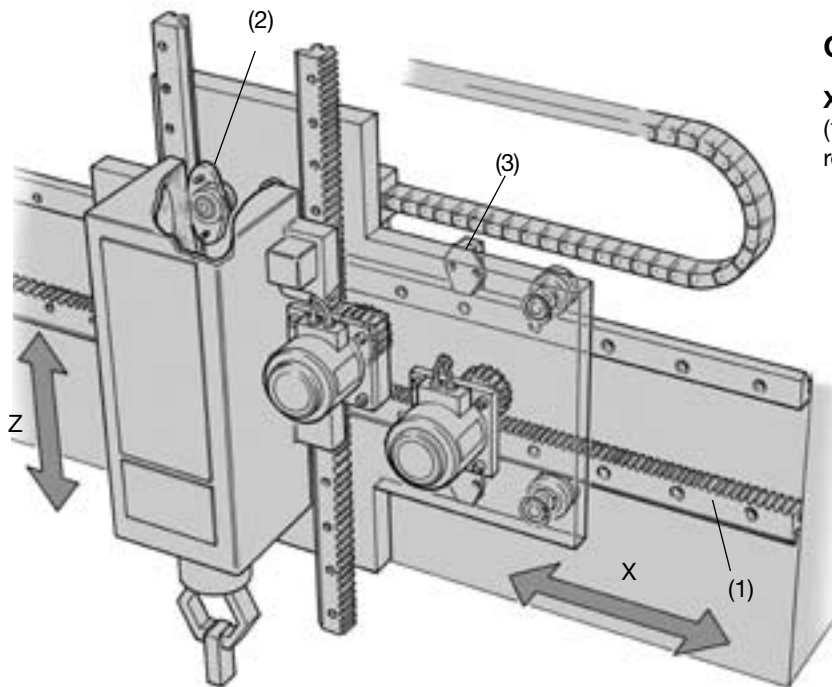
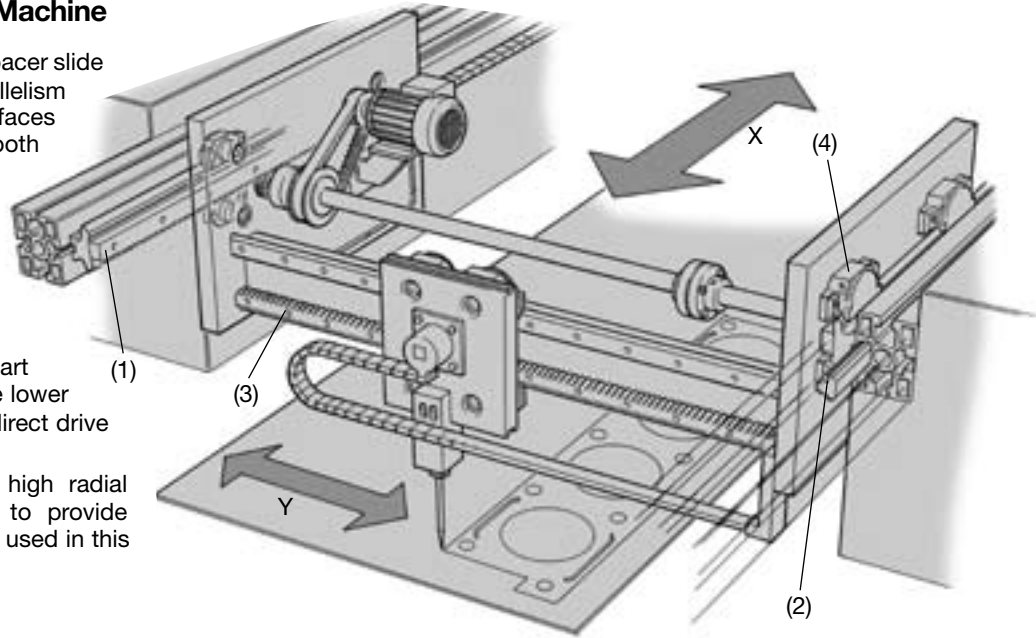
Z axis: A 120 mm wide spacer slide with rack (3) is chosen for the vertical axis to withstand the high moment forces involved.

High Speed Marking Machine

X axis: The double edge spacer slide with rack (1), assures parallelism between teeth and 'V' faces of the slide, providing smooth motion with low backlash. Slides are attached to proprietary frame building systems using a T section location strip (2).

Y axis: Single edge spacer slides are mounted wide apart for increased stiffness. The lower rack cut slide (3) enables direct drive via pinion.

Double row bearings for high radial loads and cap seals (4) to provide lubrication for long life, are used in this high speed application.



Compact Rack Driven X-Z Movement

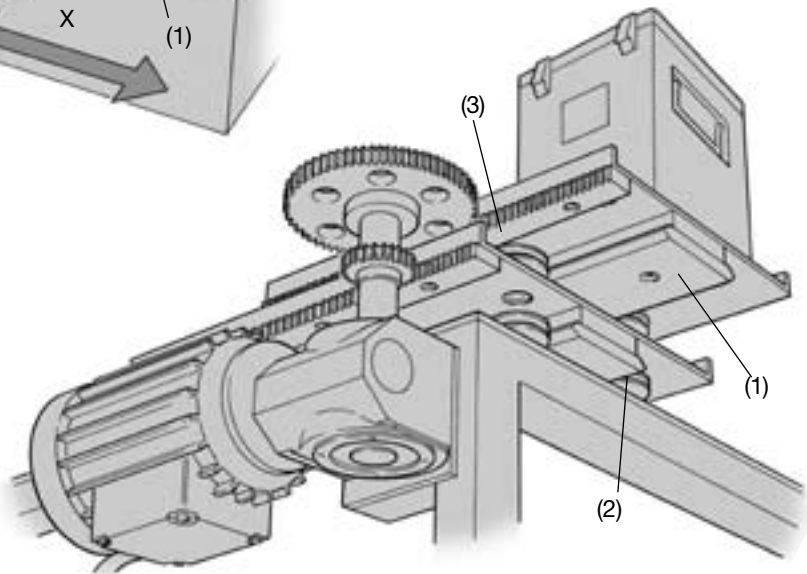
X axis: Outward facing single edge spacer slides (1) are mounted sufficiently far apart to provide the required rigidity and to accommodate the drive pinion. A compact design is achieved by mounting the bearings on a common plate which also supports the slides for the Z axis.

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

Flat slides (1) combined with slimline bearings (2) produce a low profile slide system enabling a compact telescopic system to be designed. Racks (3) are easily incorporated to provide an efficient means of driving via pinions of suitable ratio.

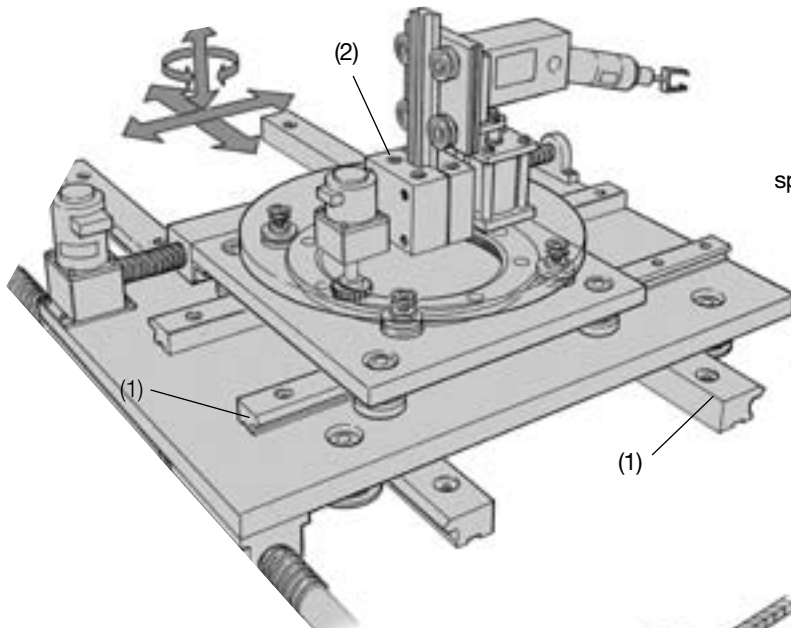
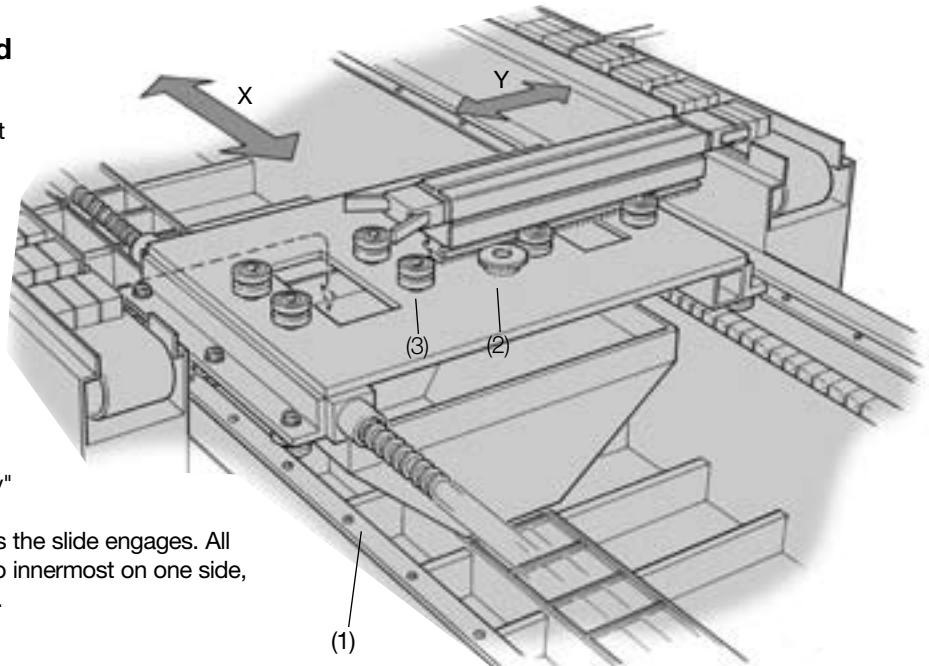


Application Examples

Multi Station Product Picking and Collating System

X axis: Single edge flat slides (1) bolt direct to machine frame to achieve a simple low cost design. Bearings are fixed to the carriage structure which spans the collation conveyor and provides room for the drive. Lubrication is not permitted, therefore three bearings are fitted each side to compensate for reduced load associated with dry running.

Y axis: Guidance for the product picking device is provided by a double edge spacer slide with fitted rack (2) to enable drive via pinion. The slide runs in a "railway" of controlled height, twin type bearings (3) which ensure alignment and compliance as the slide engages. All eccentric bearings are used except the two innermost on one side, which are concentric to provide the datum.



Multi Axis Robotic Arm

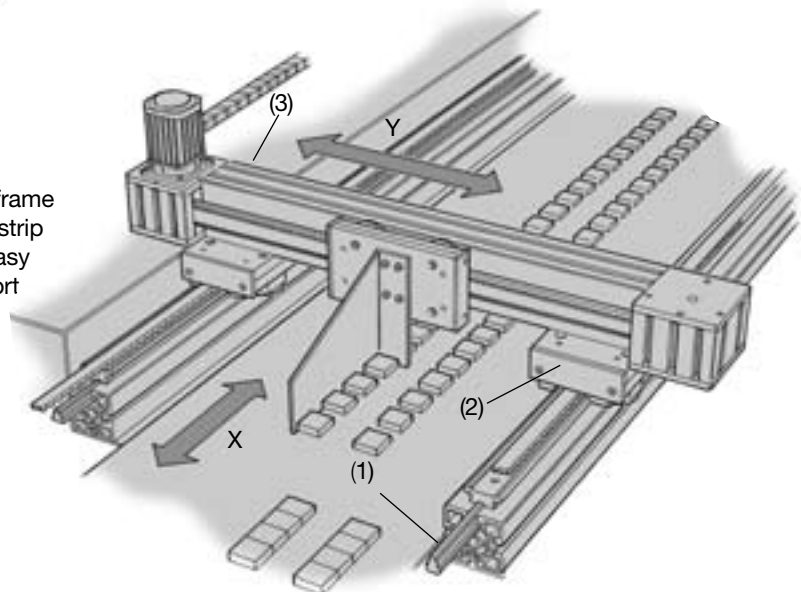
A number of axes can be built up in a compact manner by using single edge spacer slides (1) spaced apart to accommodate platforms sufficiently large to support the adjacent axis. The rotary turn-table is also easy to construct by using components selected from the Ring Slide and Track System catalog.

The vertical axis supporting the robotic arm is fixed to the rotary table by a long series flange clamp (2).

Cereal Bar Collator

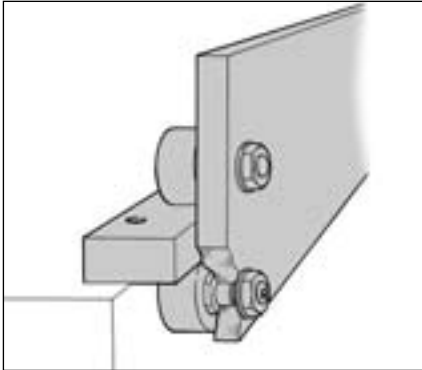
X Axis: Spacer slides attach to most makes of frame building system by means of T section location strip (1). Belt driven carriages (2) incorporate an easy means of tensioning as well as providing support for the Y axis.

Y axis: Comprises a HepcoMotion® DLS unit (3) which is a complete linear motion element with pulleys, switch components and motor-gearbox, if required. Please send for the DLS catalog.

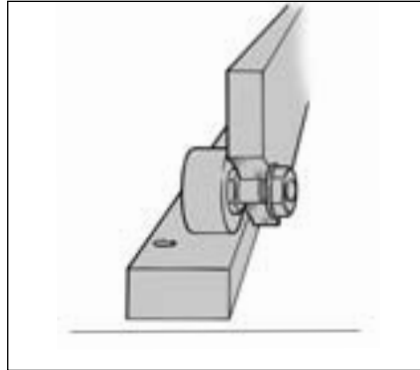


Flat Track and Track Roller Applications

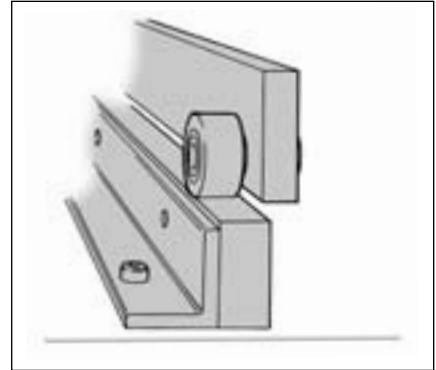
The examples below, demonstrate the many and versatile ways flat track and track rollers can be used in a linear system. They are especially useful as the opposing element in a system where two guides are mounted apart. This overcomes the necessity to set parallel in both planes, as would be required for two opposing V slides.



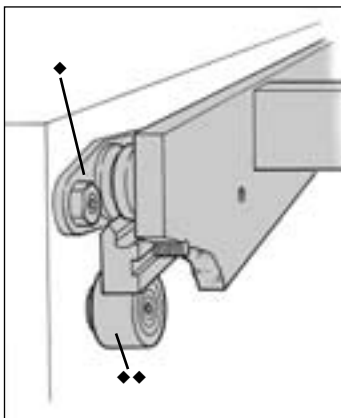
**Bearings & Rollers Fixed,
Slide Moving**



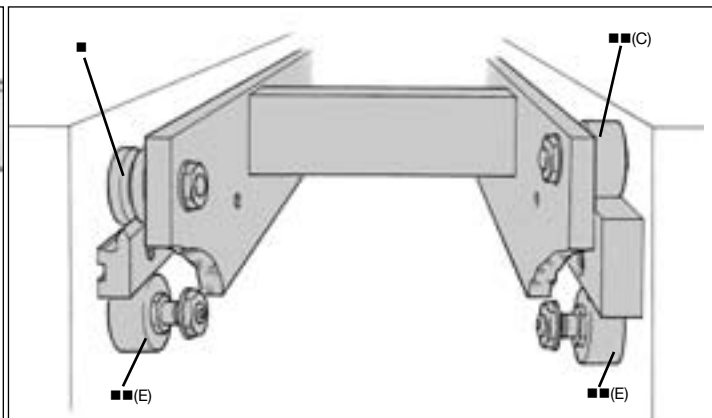
**Bearings & Rollers Moving,
Slide & Track Fixed**



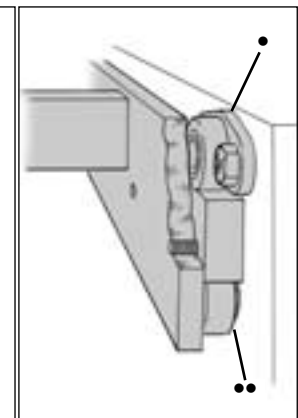
**Rollers Fixed,
Track Moving**



◆ Blind Hole Fixing Standard Bearing (Eccentric)
◆◆ Blind Hole Fixing Wide Roller (Concentric)

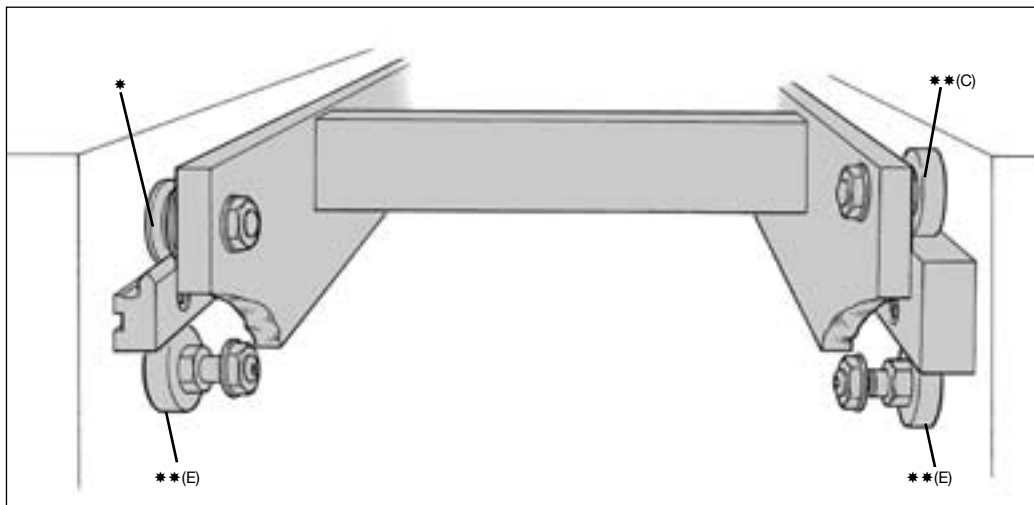


■ Through Hole Fixing Standard Bearing (Concentric)
■ ■ (C) Through Hole Fixing Wide Roller (Concentric 'C' & Eccentric 'E')



Blind Hole Fixing Wide Roller
● Eccentric ●● Concentric

Slimline Bearings & Rollers Moving, Slide & Track Fixed



* Through Hole Fixing Slimline Bearing (Concentric)
** Narrow Track Roller (Concentric 'C' and Eccentric 'E')

Standard Carriages

Standard carriages are available to suit all sizes and types of double edge slide in all grades of precision. Each carriage comes complete with 4 standard bearings and is available in 3 useful lengths to cater for customers' component size and offset load requirements. The carriage plates are fully machined from aluminum alloy and are supplied anodized. Tapped holes are provided in convenient positions to enable components to be attached.

Carriages may be specified as **Assembled Units (AU type)** which are factory assembled and set to the slide. Alternatively, the carriage may be specified as a **Kit of components (K type)** for customers wishing to carry out their own assembly.

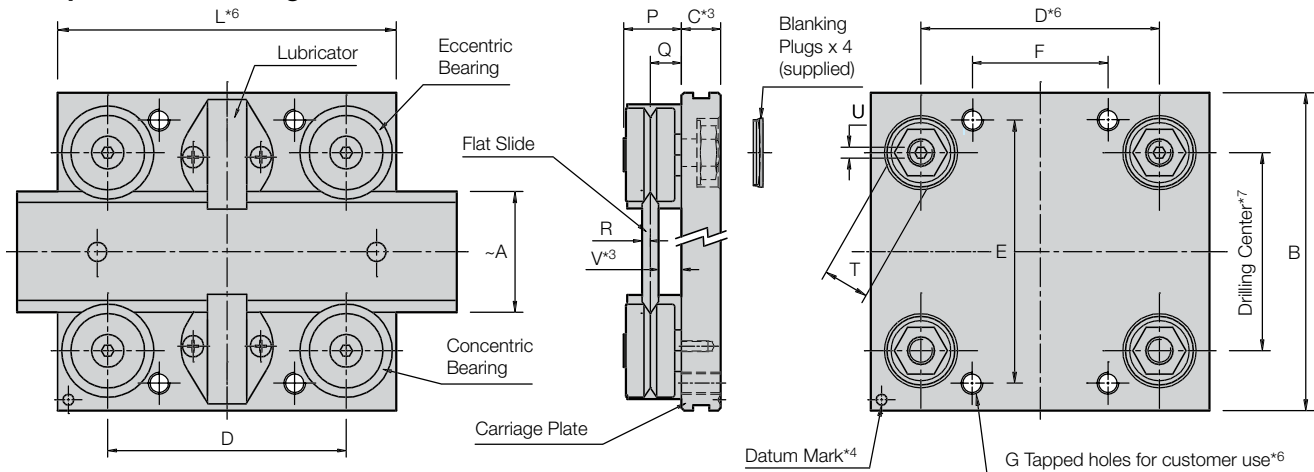
The following types or options of bearing and lubrication device may be specified (refer also to availability table below right).

The twin bearing type which is the default choice, comprises two individual bearings on a common stud. This offers some compliance, with 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.

See Application Examples on page 10

Example: Short Carriage with Lubricators on a Flat Slide



Part Number	For Use With Slides	Bear- ing Ø	A	B	C	D ⁶	E	F ⁶	G ⁶ No of Holes x Thread	H	J ²							
											P1	P2 & P3						
AU 12P1/P2 13...	MS 12 & NMS 12	13	12	40	7.34	35	60	85	30	17	25	50	4xM4	4xM4	4xM4	-	19	19.2
AU 12P3 13...	MS 12 & NMS 12	13	12	40	7.34	35	60	85	30	17	25	50	4xM4	4xM4	4xM4	-	19	19.2
AU 20 18...	V 20 & NV 20	18	20	64	10	43	55	95	50	20	44	62	4xM5	6xM5	6xM5	57	24.75	24.95
AU 28 18...	V 28 & NV 28	18	28	72	11	52	80	130	58	25	55	80	4xM5	6xM5	6xM5	65	25.75	25.95
AU 25 25...	S 25 & NS 25	25	25	80	11.5	51	74	120	65	24	60	82	4xM6	6xM6	6xM6	78.5	30.5	30.7
AU 35 25...	S 35 & NS 35	25	35	95	12.5	70	90	140	80	40	65	90	4xM6	6xM6	6xM6	88.5	31.5	31.7
AU 50 25...	S 50 & NS 50	25	50	112	14	80	100	160	95	50	70	100	4xM6	6xM6	6xM6	103.5	33	33.2
AU 44 34...	M 44 & NM 44	34	44	116	14.5	88	103	153	96	50	80	103	4xM8	6xM8	6xM8	116	38.5	38.7
AU 60 34...	M 60 & NM 60	34	60	135	17	110	125	205	115	60	90	130	4xM8	6xM8	6xM8	132	41	41.2
AU 76 34...	M 76 & NM 76	34	76	150	18	130	165	265	130	80	110	160	4xM8	6xM8	6xM8	148	42	42.2
AU 76 54...	L 76 & NL 76	54	76	185	20	140	198	298	160	90	135	185	4xM10	6xM10	6xM10	182	58.5	58.7
AU 120 54...	L 120 & NL 120	54	120	240	24	180	258	378	210	120	165	225	4xM10	6xM10	6xM10	226	62.5	62.7

* Notes:

- Maximum loads quoted assume lubrication at the interface of bearings and slide. This can best be achieved by using cap seals or lubricators. It is strongly recommended that load and life are determined using the methods shown in the 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.
- 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.
- Carriage size AU 28 18 incorporates a recess in the underside for fixing screw clearance when used with size V28 flat slide. The V dimension in the table includes for this recess.
- The datum mark identifies the reference edge used in manufacture. The concentric bearings are always mounted on this side.
- CH (Controlled Height) bearings are selected to be within ±0.005 mm in respect of 'B1' dimension on pages 28-29 compared to standard bearings which are within ±0.025 mm. Customers requiring CH bearings with the same tolerance band in respect of a number of carriages should state this on their order.
- Carriages are available in 3 standard lengths, therefore bearing centers 'D' and the number and position of component mounting centers 'G' will vary accordingly. Bishop-Wisecarver Corporation can provide carriages to your special length requirement on request.
- The carriage plate bearing centers are optimized for use with any precision grade of slide. Customers making their own carriage should calculate their bearing & lubricator/cap seal mounting centers for the particular slide grade selected. Please see assembled systems or individual component pages for details of calculations.

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

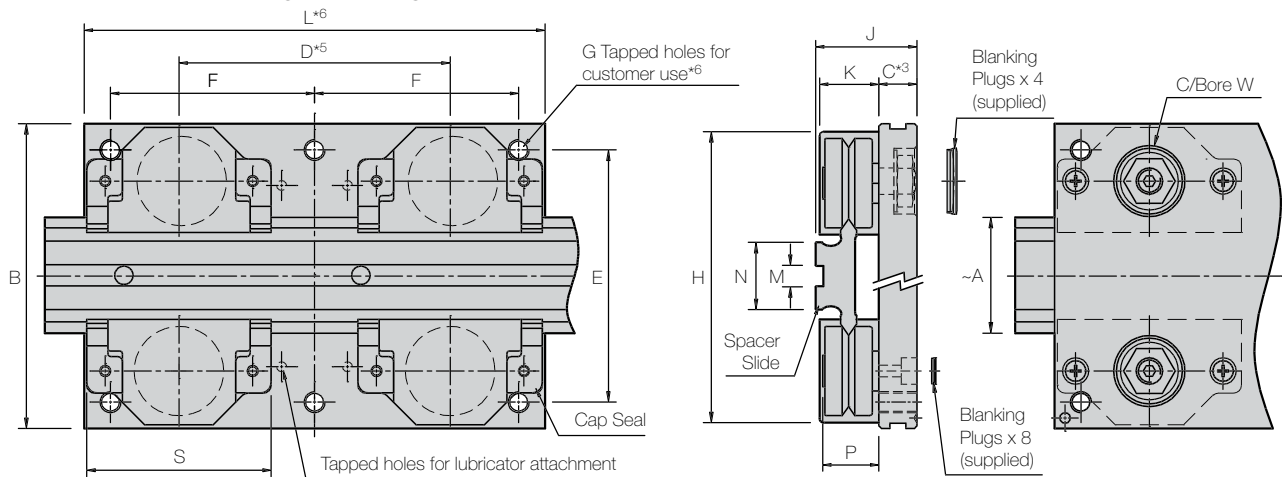
The Controlled Height bearing option (CH) minimizes variation between bearings in respect of the important 'Q' dimension. This may be desirable in some high precision applications*5.

The Tamper proof option (T) which prevents any adjustment or removal of the bearing assemblies, may be desirable if equipment is to be maintained by untrained personnel.

The Cap Seal option (CS) ensures best possible lubrication of the V contact surfaces and protects against ingress of debris. Operational safety and system appearance are also improved. Lubrication vastly increases load capacity and life. Depending on stroke, duty and environmental factors, no further lubrication is required. Access to cap seal fixing screws is from the top of the carriage for ease of adjustment.

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.

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



K	L ⁵			M	N ²			P	Q	R ²			S	T	U	V ^{2,3}	W Ø x depth	~Weight (kg)			Max Load Capacity (N) ¹			
	P1 & P2	P3	P1		P2 & P3	P1	P2			P3	DRL _A	DRL _R						L _A	L _R					
-	50	75	100	4 x 1.8	8.5	8.9	10.1	5.46	1.49	1.6	-	7	-	3.8	12.5 x 4.8	0.07	0.09	0.11	-	-	240	240		
-	50	75	100	4 x 1.8	8.5	8.9	10.1	5.46	1.49	1.6	-	7	-	3.8	12.5 x 4.8	0.07	0.09	0.11	-	-	240	240		
14	65	100	140	5 x 2	12	12.4	12.4	6.75	2.1	2.2	42	11	2.5	4.5	16 x 7	0.21	0.27	0.34	760	1200	500	400		
14	75	125	175	6 x 2.5	20	20.4	12.4	6.75	2.1	2.2	42	11	2.5	5.5	16 x 8	0.25	0.36	0.47	760	1200	500	400		
18	85	135	180	6 x 2.5	15	15.4	16.6	9	2.36	2.5	55	13	3	6.5	22 x 8.4	0.41	0.54	0.66	1600	3000	1280	1200		
18	100	150	200	8 x 3	25	25.4	16.6	9	2.36	2.5	55	13	3	6.5	22 x 9.4	0.53	0.7	0.86	1600	3000	1280	1200		
18	110	160	220	10 x 3.5	40	40.4	16.6	9	2.34	2.5	55	13	3	6.5	22 x 10.9	0.67	0.89	1.2	1600	3000	1280	1200		
22.5	125	180	225	8 x 3	26	26.4	21.3	11.5	3.08	3.2	70	15	4	8.3	25 x 8.7	1.1	1.4	1.6	3600	6000	3200	2800		
22.5	150	200	280	10 x 3.5	42	42.4	21.3	11.5	3.05	3.2	70	15	4	8.3	25 x 11	1.5	1.8	2.3	3600	6000	3200	2800		
22.5	170	240	340	12 x 4	58	58.4	21.3	11.5	3.05	3.2	70	15	4	8.3	25 x 12.5	1.8	2.3	3.1	3600	6000	3200	2800		
36.5	200	300	400	15 x 5	50	50.4	34.7	19	4.56	4.7	98	27	6	14.3	32 x 13.5	3.8	4.8	5.8	10000	10000	7200	6400		
36.5	240	360	480	45 x 9.5	94	94.4	34.7	19	4.56	4.7	98	27	6	14.3	32 x 17.5	5.5	7.4	9.3	10000	10000	7200	6400		

Ordering Details

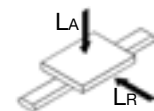
AU4434 L180 (CS) (DR) (NS) (CH) (T) + Slide Part Number

Part Number **AU**... = Assembled carriage
K... = Kit of parts
CP... = Carriage Plate only
 Carriage Length 'L' = 180mm
 Lubrication options:
CS for Cap Seals* or **LB** for Lubricators
 Leave blank if not required

T = Tamper proof option
 Leave blank if not required
CH = Controlled Height bearings*5
 Leave blank if not required
NS = Nitrile Sealed bearings
 Leave blank if not required
DR = Double Row bearings
 Leave blank if not required

Assembled carriages will be adjusted to the slide to make a system.
 Simply state the number of systems with the number of carriages per slide:

Example: 2 x (3 x AU6034 L200 CS DR + NM60 L3056 P1) (2 systems each with 3 carriages per slide)



Availability of Carriage Options

Part Number	Twin Bearings	Double Row	Metal Shields	Nitrile Seals	Cap Seals*	Lubricators	Controlled Height	Tamper Proof
AU 12 13...	✓	x	x	✓	x	✓	✓	x
AU 20 18...	✓	✓	x	✓	✓	✓	✓	✓
AU 28 18...	✓	✓	x	✓	✓	✓	✓	✓
Larger sizes	✓	✓	✓	✓	✓	✓	✓	✓

*Not available on short carriages.

Removable Carriages

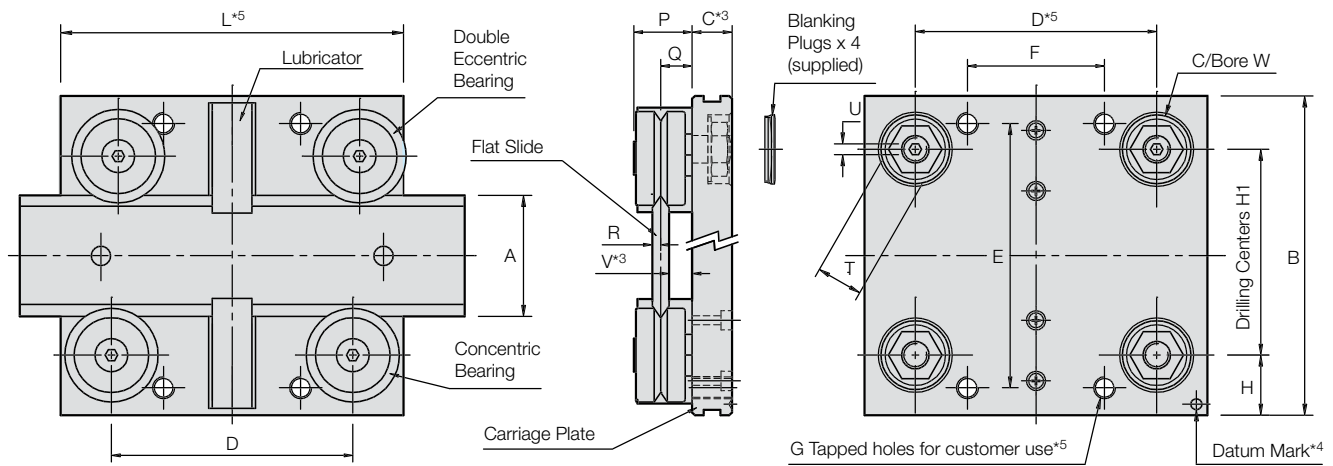
Removable carriages are available to suit all sizes and types of double edge slide in all grades of precision. Each carriage comes complete with 4 standard bearings and is available in 3 useful lengths to cater for customers' component size and offset load requirements. The carriage plates are fully machined from aluminum alloy and are supplied anodized. Tapped holes are provided in convenient positions to enable components to be attached.

The key feature of removable carriages is the incorporation of double eccentric bearings. By slackening the bearing stud fixing nuts and rotating the eccentric using the adjusting spanner, the carriage can be disengaged from the slide (see diagram on page 8). This can be a considerable advantage over standard and slimline carriages, which must either be run off the end of the slide, or be disassembled to allow removal.

Carriages may be specified as **Assembled Units (AU type)** which are factory assembled and set to the slide. Alternatively, the carriage may be specified as a **Kit of components (K type)** for customers wishing to carry out their own assembly.

See Application Examples on page 10

Example: Short Carriage with Lubricators on a Flat Slide



Part Number	For Use With Slides	Bearing Ø	A	B	C	D*5	E	F*5	G*5 No of Holes x Thread	H	H1	J*2	
												P1	P2 & P3
AU 12 13R...	MS 12 & NMS 12	13	12	40	7.34	35 60 85	30	17 25 50	4 x M4	9	23.3	19	19.2
AU 20 18R...	V 20 & NV 20	18	20	64	10	43 55 95	50	20 88 124	4 x M5	14.7	35.9	24.75	24.95
AU 28 18R...	V 28 & NV 28	18	28	72	11	52 80 130	58	25 110 160	4 x M5	14.7	43.9	25.75	25.95
AU 25 25R...	S 25 & NS 25	25	25	80	11.5	51 74 120	65	24 120 164	4 x M6	16.7	48.3	30.5	30.7
AU 35 25R...	S 35 & NS 35	25	35	95	12.5	70 90 140	80	40 130 180	4 x M6	19.2	58.3	31.5	31.7
AU 50 25R...	S 50 & NS 50	25	50	112	14	80 100 160	95	50 140 200	4 x M6	20.2	73.3	33	33.2
AU 44 34R...	M 44 & NM 44	34	44	116	14.5	88 103 153	96	50 160 206	4 x M8	21.9	74.8	38.5	38.7
AU 60 34R...	M 60 & NM 60	34	60	135	17	110 125 205	115	60 180 260	4 x M8	23.4	90.8	41	41.2
AU 76 34R...	M 76 & NM 76	34	76	150	18	130 165 265	130	80 220 320	4 x M8	22.9	106.8	42	42.2
AU 76 54R...	L 76 & NL 76	54	76	185	20	140 198 298	160	90 270 370	4 x M10	33	123	58.5	58.7
AU 120 54R...	L 120 & NL 120	54	120	240	24	180 258 378	210	120 330 450	4 x M10	38.5	167	62.5	62.7

* Notes:

- Maximum loads quoted assume lubrication at the interface of bearings and slide. This can best be achieved by using lubricators. It is strongly recommended that load and life are determined using the methods shown in the 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.
- 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.
- Carriage size AU 28 18 R incorporates a recess in the underside for fixing screw clearance when used with size V28 flat slide. The V dimension in the table includes for this recess.
- The datum mark identifies the reference edge used in manufacture. The concentric bearings are always mounted on this side.
- Carriages are available in 3 standard lengths, therefore bearing centers 'D' and the position of component mounting holes 'G' will vary accordingly. Bishop-Wisecarver Corporation can provide carriages to your special length requirement on request.

The following types or options of bearing and lubrication device may be specified (refer also to availability table below right).

The twin bearing type which is the default choice, comprises two individual bearings on a common stud. This offers some compliance, with smoother running, easy adjustment and greater tolerance of misalignment.

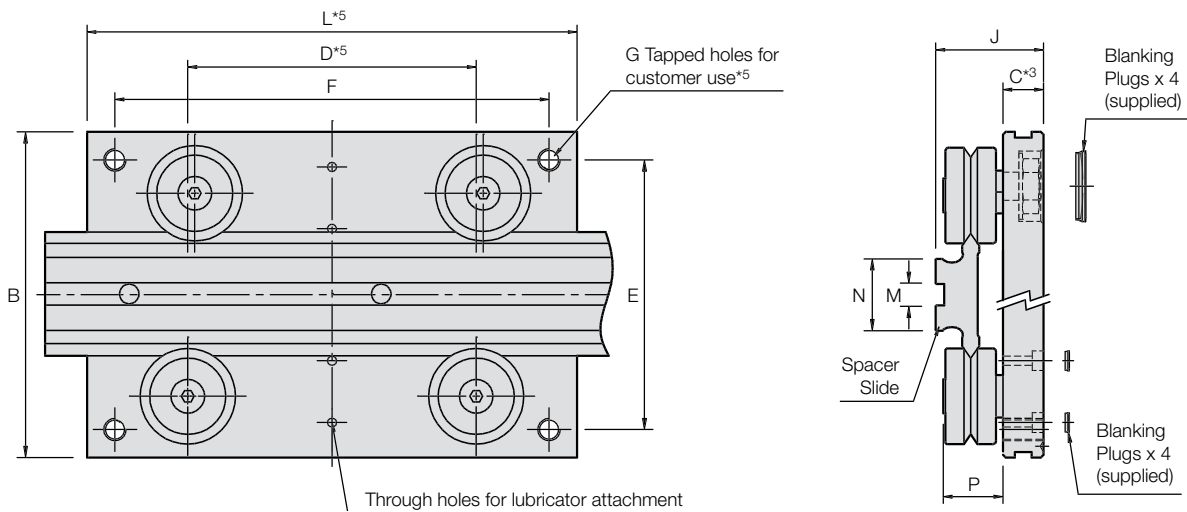
The Double Row bearing type (DR) incorporates a one-piece bearing with two ball tracks. This offers higher load capacity, especially in the radial direction and is less susceptible to entrapment of debris.

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

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 in conjunction with low friction.

Lubricators are fixed with screws through the carriage, so that they can be detached easily in the event of carriage removal from the slide.

Example: Medium Length Carriage on a Spacer Slide



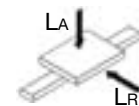
L*5			M	N*2		P	Q	R*2		T	U	V*2,3	W	~Weight (kg)			Max Load Capacity (N)*1			
				P1 & P2	P3			P1	P2 & P3				Ø x depth				DRL _A	DRL _R	L _A	L _R
50	75	100	4 x 1.8	8.5	8.9	10.1	5.46	1.49	1.6	7	-	3.8	12.5 x 4.8	0.07	0.09	0.11	-	-	240	240
65	100	140	5 x 2	12	12.4	12.4	6.75	2.1	2.2	11	2.5	4.5	16 x 7	0.21	0.27	0.34	760	1200	500	400
75	125	175	6 x 2.5	20	20.4	12.4	6.75	2.1	2.2	11	2.5	5.5	16 x 8	0.25	0.36	0.47	760	1200	500	400
80	135	180	6 x 2.5	15	15.4	16.6	9	2.36	2.5	13	3	6.5	22 x 8.4	0.41	0.54	0.66	1600	3000	1280	1200
100	150	200	8 x 3	25	25.4	16.6	9	2.36	2.5	13	3	6.5	22 x 9.4	0.53	0.7	0.86	1600	3000	1280	1200
110	160	220	10 x 3.5	40	40.4	16.6	9	2.34	2.5	13	3	6.5	22 x 10.9	0.67	0.89	1.2	1600	3000	1280	1200
125	180	225	8 x 3	26	26.4	21.3	11.5	3.08	3.2	15	4	8.3	25 x 8.7	1.1	1.4	1.6	3600	6000	3200	2800
150	200	280	10 x 3.5	42	42.4	21.3	11.5	3.05	3.2	15	4	8.3	25 x 11	1.5	1.8	2.3	3600	6000	3200	2800
170	240	340	12 x 4	58	58.4	21.3	11.5	3.05	3.2	15	4	8.3	25 x 12.5	1.8	2.3	3.1	3600	6000	3200	2800
200	300	400	15 x 5	50	50.4	34.7	19	4.56	4.7	27	6	14.3	32 x 13.5	3.8	4.8	5.8	10000	10000	7200	6400
240	360	480	45 x 9.5	94	94.4	34.7	19	4.56	4.7	27	6	14.3	32 x 17.5	5.5	7.4	9.3	10000	10000	7200	6400

Ordering Details

AU4434 L180 R (LB) (DR) (NS) + Slide Part Number

- Part Number _____
- AU**... = Assembled carriage
- K**... = Kit of parts
- CP**... = Carriage Plate only
- Carriage Length 'L' = 180mm
- R** = Removable type carriage

- NS** = Nitrile Sealed bearings
Leave blank if not required
- DR** = Double Row bearings
Leave blank if not required
- Lubrication Option: **LB** for Lubricators
Leave blank if not required



Availability of Carriage Options

Part Number	Twin Bearings	DR	Metal Shields	NS	LB
AU 12 13R...	✓	x	x	✓	✓
AU 20 18R...	✓	✓	x	✓	✓
AU 28 18R...	✓	✓	x	✓	✓
Larger sizes	✓	✓	✓	✓	✓

Assembled carriages will be adjusted to the slide to make a system. Simply state the number of systems with the number of carriages per slide:

Example: 2 x (3 x AU4434 L180 R LB NS + NM44 L3146 P2) (2 systems each with 3 carriages per slide)

Slimline Carriages

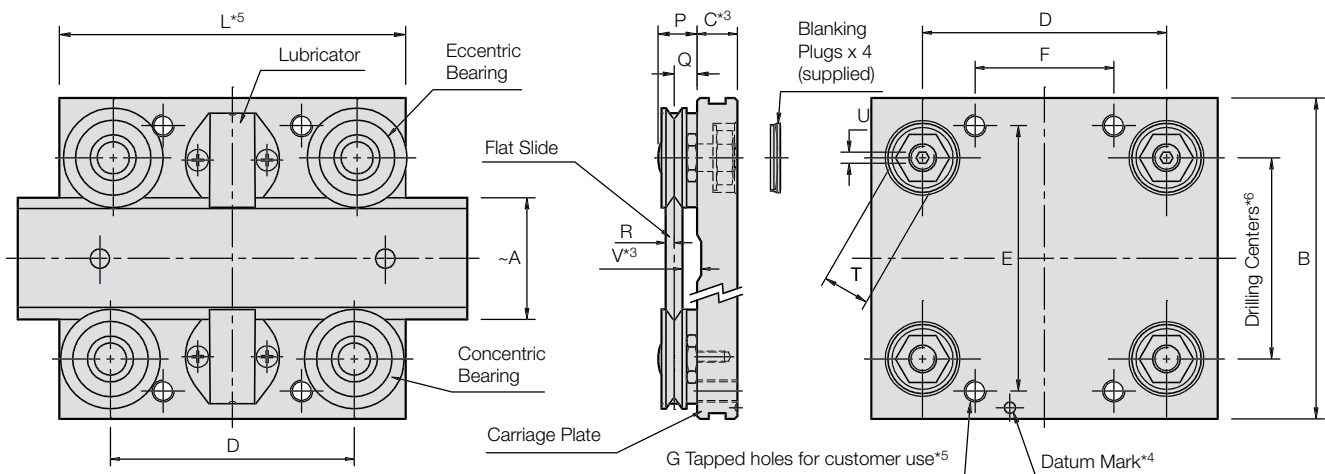
Slimline carriages are available to suit all sizes and types of double edge slide in all grades of precision. Each carriage comes complete with 4 slimline bearings which ensure that the overall system height is minimized. Slimline carriages have a lower load capacity than corresponding sizes of standard carriage, but benefit from being lower in cost. All sizes are available in 3 useful lengths to cater for customers' component size and offset load requirements. The carriage plates are fully machined from aluminum alloy and are supplied anodized. Tapped holes are provided in convenient positions to enable components to be attached.

Carriages may be specified as **Assembled Units (AU type)** which are factory assembled and set to the slide. Alternatively, the carriage may be specified as a **Kit of components (K type)** for customers wishing to carry out their own assembly.

The following types or options of bearing and lubrication device may be specified (refer also to availability table below right).

See Application Examples on page 10

Example: Short Carriage with Lubricators on a Flat Slide



Part Number	For Use With Slides	Bearing Ø	A	B	C	D ⁵		E	F ⁵			G ⁵ No of Holes x Thread			H	J ²		
						~										P1	P2 & P3	
AU 20 195...	V 20 & NV 20	19.5	20	64	10	43	55	90	50	20	44	62	4 x M5	6 x M5	6 x M5	59	23.7	23.9
AU 28 195...	V 28 & NV 28	19.5	28	72	11	52	75	125	58	25	55	80	4 x M5	6 x M5	6 x M5	67	24.7	24.9
AU 25 265...	S 25 & NS 25	26.5	25	80	11.5	55	74	120	65	25	60	82	4 x M6	6 x M6	6 x M6	76	28.3	28.5
AU 35 265...	S 35 & NS 35	26.5	35	95	12.5	70	90	140	80	40	65	90	4 x M6	6 x M6	6 x M6	86	29.3	29.5
AU 50 265...	S 50 & NS 50	26.5	50	112	14	80	100	160	95	50	70	100	4 x M6	6 x M6	6 x M6	101	30.8	31
AU 44 360...	M 44 & NM 44	36	44	116	14.5	85	98	145	96	50	80	103	4 x M8	6 x M8	6 x M8	113	35.3	35.5
AU 60 360...	M 60 & NM 60	36	60	135	17	108	120	200	115	60	90	130	4 x M8	6 x M8	6 x M8	129	37.8	38
AU 76 360...	M 76 & NM 76	36	76	150	18	128	160	260	130	80	110	160	4 x M8	6 x M8	6 x M8	145	38.8	39
AU 76 580...	L 76 & NL 76	58	76	195	20	135	190	290	170	90	135	185	4 x M10	6 x M10	6 x M10	186	53.3	53.5
AU 120 580...	L 120 & NL 120	58	120	240	24	185	240	360	210	120	165	225	4 x M10	6 x M10	6 x M10	230	57.8	58

* Notes:

- Maximum loads quoted assume lubrication at the interface of bearings and slide. This can best be achieved by using cap wipers or lubricators. It is strongly recommended that load and life are determined using the methods shown in the 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.
- 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.
- 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 V dimension in the table includes for this recess.
- The datum mark identifies the reference edge used in manufacture. The concentric bearings are always mounted on this side.
- Carriages are available in 3 standard lengths, therefore bearing centers 'D' and the number and position of component mounting holes 'G' will vary accordingly. Bishop-Wisecarver Corporation can provide carriages to your special length requirement on request.
- The carriage plate bearing centers are optimized for use with any precision grade of slide. Customers making their own carriage should calculate their bearing and lubricator/cap wiper mounting centers for the particular slide grade selected. Please see assembled systems or individual component pages for details of calculations.

Beam-Mounted System Varieties

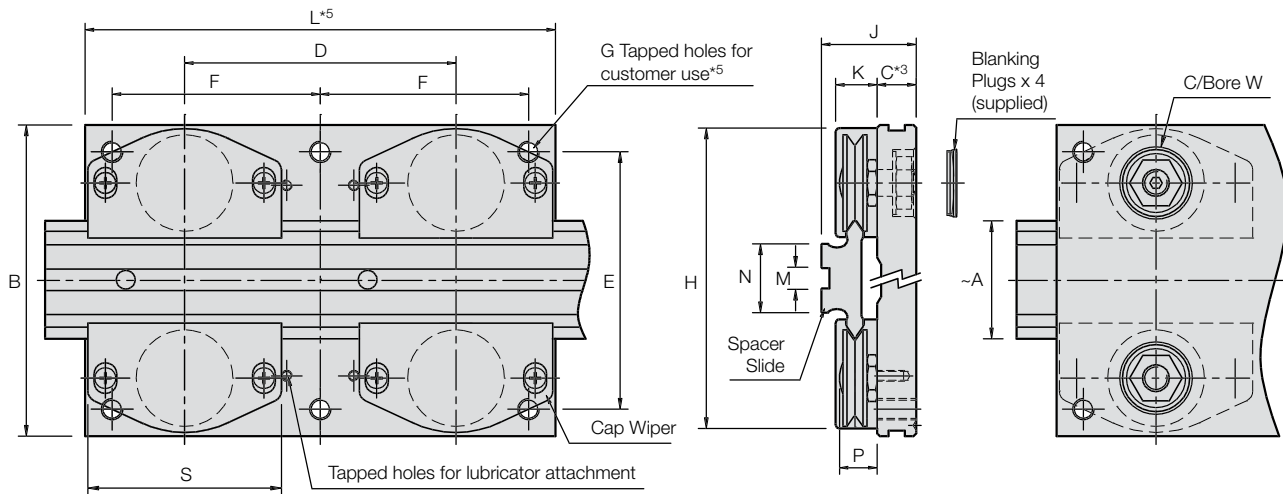
The Nitrile Sealed bearing option (NS) provides a higher degree of sealing against ingress of water or debris than does the default metal shielded type. A small increase in friction may result.

The Tamper proof option (T) which prevents any adjustment or removal of the bearing assemblies, may be desirable if equipment is to be maintained by untrained personnel.

The Cap Wiper option (CW) ensures best possible lubrication of the V contact surfaces and protects against ingress of debris. Operational safety and system appearance are also improved. Lubrication vastly increases load capacity and life. Depending on stroke, duty and environmental factors, no further lubrication is required. Access to cap wiper fixing screws is from the underside of the carriage.

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



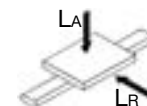
K	L*5			M	N*2			P	Q	R*2			S	T	U	V	W Ø x depth	~Weight (kg)			Max Load Capacity (N) ¹	
	P1 & P2	P3	P		P1	P2 & P3	LA			LR												
11.2	65	100	140	5 x 2	12	12.4	9.2	5.7	2.1	2.2	43	11	2.5	4.5	16 x 7	0.21	0.27	0.34	400	480		
11.2	75	125	175	6 x 2.5	20	20.4	9.2	5.7	2.1	2.2	43	11	2.5	4.5	16 x 8	0.25	0.36	0.47	400	480		
13	85	135	180	6 x 2.5	15	15.4	11.3	6.8	2.36	2.5	54	13	3	6.5	22 x 8.4	0.37	0.51	0.63	940	1150		
13	100	150	200	8 x 3	25	25.4	11.3	6.8	2.36	2.5	54	13	3	6.5	22 x 9.4	0.5	0.66	0.83	940	1150		
13	110	160	220	10 x 3.5	40	40.4	11.3	6.8	2.34	2.5	54	13	3	6.5	22 x 10.9	0.64	0.86	1.1	940	1150		
15.5	125	180	225	8 x 3	26	26.4	14	8.3	3.08	3.2	72	15	4	7.3	25 x 8.7	0.95	1.2	1.4	2000	2400		
15.5	150	200	280	10 x 3.5	42	42.4	14	8.3	3.05	3.2	72	15	4	7.9	25 x 11	1.3	1.6	2.2	2000	2400		
15.5	170	240	340	12 x 4	58	58.4	14	8.3	3.05	3.2	72	15	4	7.9	25 x 12.5	1.7	2.2	3	2000	2400		
25	200	300	400	15 x 5	50	50.4	22.8	14.3	4.56	4.7	106	27	6	9.6	32 x 13.5	3.8	3.5	4.5	4240	5200		
25	240	360	480	45 x 9.5	94	94.4	22.8	14.3	4.56	4.7	106	27	6	9.6	32 x 17.5	5.3	7.2	9.1	4240	5200		

Ordering Details

AU44360 L180 (CW) (NS) (T) + Slide Part Number

Part Number _____
AU... = Assembled carriage
K... = Kit of parts
CP... = Carriage Plate only
 Carriage Length 'L' = 180mm

T = Tamper proof option
 Leave blank if not required
NS = Nitrile Sealed bearings
 Leave blank if not required
Lubrication Options:
CW for Cap Wipers* or **LB** for Lubricators
 Leave blank if not required



Availability of Carriage Options

Part Number	Metal Shields	Nitrile Seals	Cap Wipers *	Lubricators	Tamper Proof
AU 20 195...	x	✓	✓	✓	✓
AU 28 195...	x	✓	✓	✓	✓
Larger sizes	✓	✓	✓	✓	✓

*Not available on short carriages.

Assembled carriages will be adjusted to the slide to make a system.
 Simply state the number of systems with the number of carriages per slide:

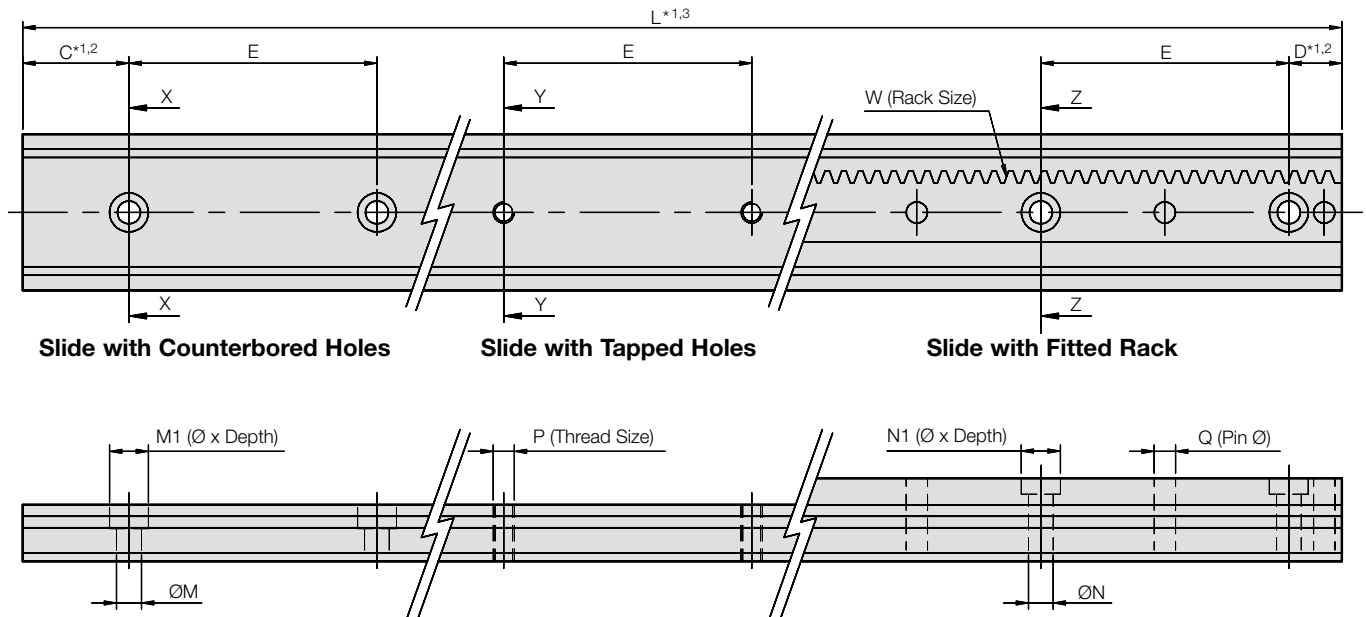
Example: 2 x (2 x AU35265 L200 CW + S35 L3146 P3) (2 systems each with 2 carriages per slide)

Double Edge Spacer Slides

Double edge spacer slides are available in 11 sizes and three precision grades to meet exactly the requirements of almost any linear motion application. They are zone hardened on the 'V' edges to provide an extremely hard wearing surface. Grades P1 & P2 are precision ground on the V running faces to a high degree of accuracy and parallelism, with P1 being ground on the mounting surface as well. The unground version P3 is also sufficiently accurate for many applications. Please see system selector for comparative data.

In addition to the fixing hole options shown below, slides are also available without holes if preferred. Slide fixing holes are accurately positioned, allowing customers to pre-drill their mounting holes. All slides are left 'soft' in the center portion to allow for subsequent machining if required.

The one piece construction of the spacer slide bolts directly to the mounting surface of the machine, providing the required running clearance for bearings and lubrication devices. A central keyway is provided for simple location by means of dowel pins or customer's own key. In cases where cap seals or lubricators are not being used, the precision datum edges on the spacer portion of the slide may be used for location against a machined register^{*5}.



Part Number	For Use With Bearings ^{*4}		A ~Slide Width	B		C & D ^{*1,2}		E ±0.2	F		G		H	H1	J		K Ø	L Max ^{*1,3}	
	Standard	Slimline		P1 & P2	P3	Slide Only	With Rack		P1	P2 & P3	P1	P2 & P3			P1 & P2	P3		P1 & P2	P3
NMS 12...	...J13...	-	12	12.37	13.25	20.5	-	45	3.0	3.2	6.2	6.4	4	1.8	8.5	8.9	1.7	1976	1976
NV 20...	...J18...	...J195...	20	20.37	21.01	43	15	90	4.21	4.42	8	8.2	5	2	12	12.4	1.75	4020	4020
NV 28...	...J18...	...J195...	28	28.37	29.01	43	15	90	4.21	4.42	8	8.2	6	2.5	20	20.4	1.75	4020	4020
NS 25...	...J25...	...J265...	25	25.74	26.58	43	15	90	4.71	4.93	10	10.2	6	2.5	15	15.4	2.6	4020	4020
NS 35...	...J25...	...J265...	35	35.74	36.38	43	15	90	4.71	4.93	10	10.2	8	3	25	25.4	2.6	4020	4020
NS 50...	...J25...	...J265...	50	50.74	51.38	43	15	90	4.71	4.93	10	10.2	10	3.5	40	40.4	2.6	4020	4020
NM 44...	...J34...	...J360...	44	44.74	45.58	43	15	90	6.21	6.42	12.5	12.7	8	3	26	26.4	2.3	4020	6000
NM 60...	...J34...	...J360...	60	60.74	61.38	43	15	90	6.21	6.42	12.5	12.7	10	3.5	42	42.4	2.3	4020	6000
NM 76...	...J34...	...J360...	76	76.74	77.38	43	15	90	6.21	6.42	12.5	12.7	12	4	58	58.4	2.3	4020	6000
NL 76...	...J54...	...J580...	76	76.74	77.58	88	30	180	9.21	9.43	19.5	19.7	15	5	50	50.4	4.8	4020	6000
NL 120...	...J54...	...J580...	120	120.74	121.38	88	30	180	9.21	9.43	19.5	19.7	45	9.5	94	94.4	4.8	4020	6000

*** Notes:**

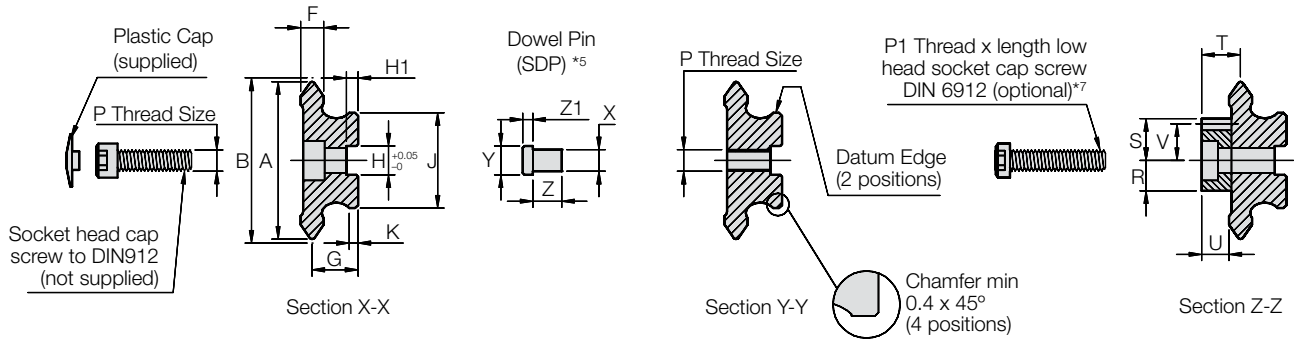
- Any length of slide within L max dimension can be supplied, but for optimum price and delivery time, slide lengths should be specified which maintain the C and D dimensions in the table above. In all cases unless otherwise specified by the customer, C and D dimensions will be supplied equal. The positions 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.
- The C & 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 & D dimensions which differ from this may require an extra hole at a non-standard pitch.
- Where slides longer than the maximum length are required, lengths can be matched suitable for butting.
- In the table, the preferred choices of bearings to use with each slide are quoted. However, other combinations are possible (please see mix and match tables at www.bwc.com/products/gv3.html).
- 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 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.
- The NL120 section recess has a wider tolerance than keyways in other sections. One side only should be used as a register face if precise straightness is important.
- Low head cap screws DIN 6912 are not universally stocked, so Bishop-Wisecarver Corporation 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 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 of the machine, when used in conjunction with flange clamps. Slide deflection is covered in the calculations section.

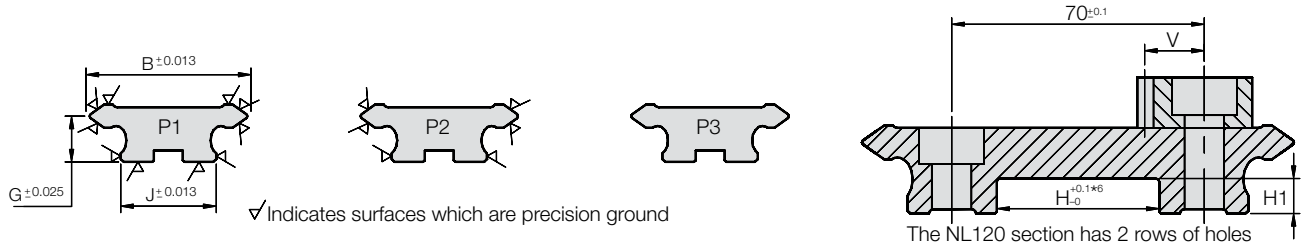
All double edge spacer slides with the exception of the smallest are available with a rack attached by dowels to the top surface. This becomes a fully serviceable element when bolted down to the mounting surface, providing a convenient means to power the linear movement. Rack teeth are machined to a high degree of precision and conform to ISO 1328 grade 8. Racks may comprise a number of lengths, precision mounted to a single slide. Pinions which mate with these racks are included in the GV3 range as are rack driven carriages which mount directly to the slide and may be specified with optional AC motor, to provide a complete drive solution.

Note that double edge spacer slides with the fitted rack option are not compatible with carriages using the slimline bearings, as there is no clearance for the rack.

See Application Examples on pages 9 - 12

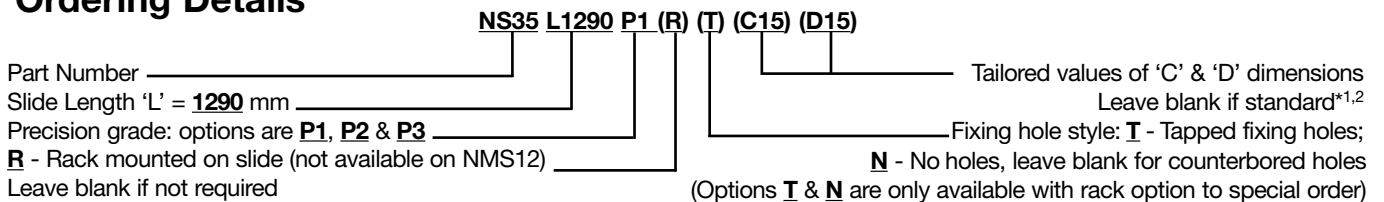


Available Grades of Slide



M	M1	N	N1	P	P1*7		Q	R	S	T	U	V	W Mod	Dowel Pin	X K6	Y m6	Z	Z1	Weight - kg/m	
					Screw	Part No.													Slide Only	Slide + Rack
3.5	6.2 x 3.1	-	-	M3	-	-	-	-	-	-	-	-	-	SDP4	4	4	6.75	-	0.5	-
4.5	8 x 4.1	4.5	7.6 x 2.9	M4	M4 x 20	FS420	4	6.35	6.35	6.2	4	5.65	0.7	SDP5	4	5	6	1.75	1.0	1.4
5.5	10 x 5.1	4.5	7.6 x 2.9	M5	M4 x 20	FS420	4	6.35	6.35	6.2	4	5.65	0.7	SDP6	4	6	6	2.25	1.6	2.0
5.5	10 x 5.1	5.5	9.6 x 4	M5	M5 x 25	FS525	5	7.8	7.85	8.5	6	6.85	1	SDP6	4	6	6	2.25	1.5	2.3
7	11 x 6.1	5.5	9.6 x 4	M6	M5 x 25	FS525	5	7.8	7.85	8.5	6	6.85	1	SDP8	6	8	8	2.75	2.3	3.0
7	11 x 6.1	5.5	9.6 x 4	M6	M5 x 25	FS525	5	7.8	7.85	8.5	6	6.85	1	SDP10	8	10	12	3.25	3.2	4.0
7	11 x 6.1	6.5	11 x 4.5	M6	M6 x 30	FS630	6	8.3	11.7	10.8	7.5	10.2	1.5	SDP8	6	8	8	2.75	3.5	4.7
9	15 x 8.1	6.5	11 x 4.5	M8	M6 x 30	FS630	6	8.3	11.7	10.8	7.5	10.2	1.5	SDP10	8	10	12	3.25	5.5	5.7
9	15 x 8.1	6.5	11 x 4.5	M8	M6 x 30	FS630	6	8.3	11.7	10.8	7.5	10.2	1.5	SDP12	10	12	15	3.75	7	8.2
14	20 x 12	14	20 x 8	M12	M12 x 50	FS1250	8	13.2	18.6	18	13.3	16.6	2	SDP15	10	15	15	4.75	10	13
11	18 x 10	11	18 x 10	M10	-	-	8	13.2	18.6	18	13.3	16.6	2	-	-	-	-	-	15	18

Ordering Details



Example:

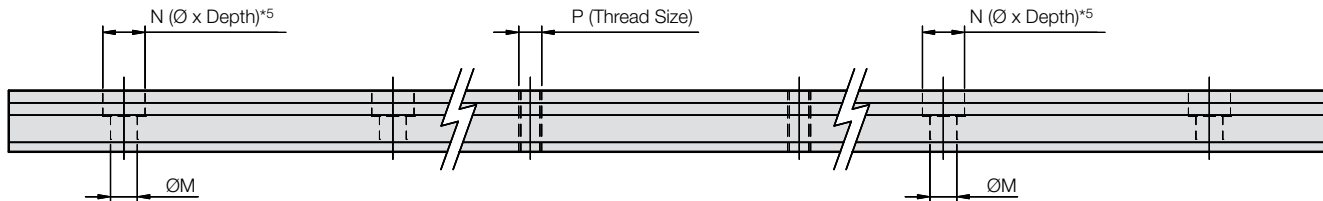
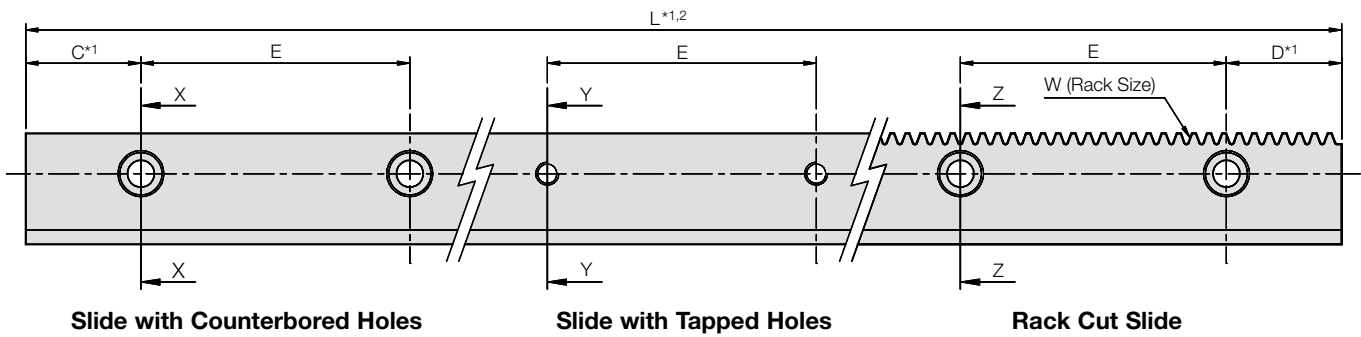
1 x NM60 L480 P2 R _____ Double edge spacer slide x 480 mm long in precision grade 2, fitted with rack
 7 x SDP10 _____ 10 mm Ø dowel pins (optional)
 6 x FS630 _____ Low head socket cap screws M6 thread x 30 mm long (optional)

Single Edge Spacer Slides

Single edge spacer slides are available in 5 sizes and three precision grades. They are zone hardened on the 'V' edge to provide an extremely hard wearing surface. Grades P1 & P2 are precision ground on the V faces and datum edges to a high degree of accuracy and parallelism, with P1 being ground on the top and bottom faces as well. The unground version P3 is also sufficiently accurate for many applications (please see system selector for comparative data).

In addition to the fixing hole options shown below, slides are available without holes if preferred. Slide fixing holes are accurately positioned, allowing customers to pre-drill their mounting holes*5. All slides are left 'soft' in the center portion to allow subsequent machining if required.

The one piece construction of the spacer slide bolts directly to the mounting surface of the machine, providing the required running clearance for bearings and lubrication devices. A central keyway is provided for simple location by means of dowel pins or customer's own key. In cases where cap seals or lubricators are not being used, the precision datum edge on the spacer portion of the slide



Part Number	For Use With Bearings ^{*3}		A ~Slide Width	B		B1		C ^{*1}	D ^{*1}	E ± 0.2	F		G		H
	Standard	Slimline		P1 & P2	P3	P1 & P2	P3				P1	P2 & P3	P1	P2 & P3	
NMS E...	...J13...	-	11	11.19	11.71	5	5.3	20.5	20.5	45	3	3.2	6.2	6.4	4
NV E...	...J18...	...J195...	16	16.19	16.72	6.5	6.7	43	43	90	4.21	4.42	8	8.2	4
NS E...	...J25...	...J265...	21	21.37	21.89	8.5	8.7	43	43	90	4.71	4.93	10	10.2	6
NM E...	...J34...	...J360...	29	29.37	29.89	10.5	10.7	43	43	90	6.21	6.42	12.5	12.7	8
NL E...	...J54...	...J580...	43	43.37	43.89	16	16.2	88	88	180	9.21	9.43	19.5	19.7	12

Notes:

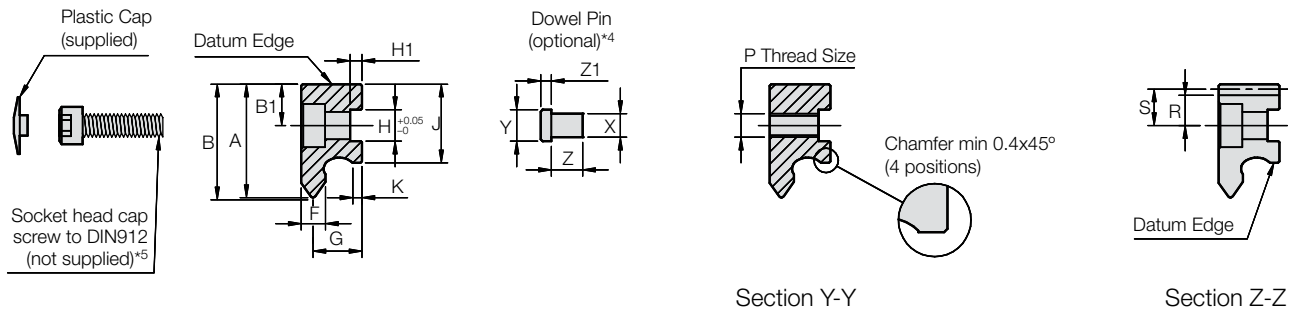
- Any length of slide within L max dimension can be supplied, but for optimum price and delivery time, slide lengths should be specified which maintain the C and D dimensions in the table above. In all cases unless otherwise specified by the customer, C and D dimensions will be supplied equal. The position 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.
- 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.
- In the table, the preferred choices of bearings to use with each slide are quoted. However, other combinations are possible (please see mix and match tables at www.bwc.com/products/gv3.html).
- 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 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.
- For slide size NVE, the counterbore diameter 'N' for the rack cut grade has been regulated to suit socket head cap screws DIN 912 with a plain head which has a slightly smaller diameter than those with a knurled finish. This is to maximize the strength between the counterbore and the root of the rack teeth. Suitable screws are available from Bishop-Wisecarver if required: Part No. **PFS415** (M4 x 15 long). Customers are advised not to pre-drill fixing holes for these unless they have the means to control their hole positions very accurately.
- The max rack force quoted is that continuous drive force which can be sustained by a well lubricated rack used in conjunction with the appropriate pinion.

may be used for location against a machined register*4.

The single edge format allows two slide V's to be mounted wide apart, thus providing a considerable increase in moment load capacity, stiffness and stability. The space between the two slides can be made sufficient to allow central positioning of the drive, whether by means of ball screw, air cylinder or other type of actuator.

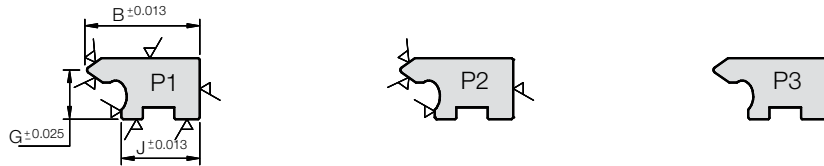
Single edge spacer slides are available with a rack cut into the back face, providing a convenient means of driving. Rack teeth are machined to a high degree of precision and conform to ISO 1328 grade 8. The large face width of the racks makes these the best choice for applications which require high driving forces (see drive calculations). Pinions which suit the racks are also available. Shaft type pinions can be coupled directly to the geared motor or gearbox, which can be mounted using the drive flange to the customer's own carriage plate. Although not hardened, the rear face of the slide is sufficiently durable to act as track for track rollers.

See Application Examples on pages 11 - 13



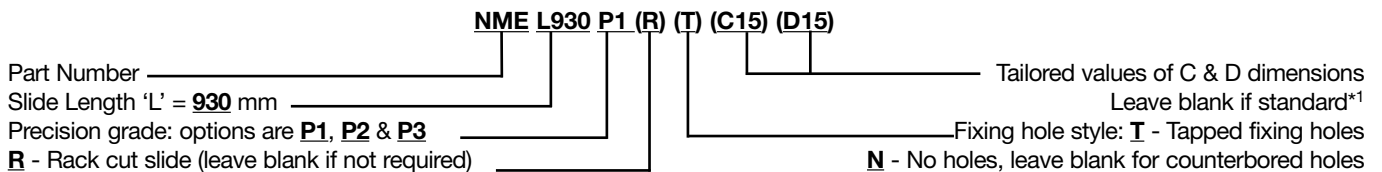
Available Grades of Slide

✓ Indicates surfaces which are precision ground



H1	J		K	L Max ^{1,2}		M	N ⁵	P	R	S	W Mod	Dowel Pin	X K6	Y m6	Z	Z1	Weight kg/m	Max Rack Force (N) ⁶	Part Number
	P1 & P2	P3		P1 & P2	P3														
1.8	9.25	9.65	1.7	1976	4020	3.5	6.2 x 3.1	M3	3.80	4.5	0.5	SDP4	4	4	6.75	-	0.55	180	NMS E...
1.5	12	12.4	1.75	4020	4020	4.5	8 x 4.1	M4	4.82	5.8	0.7	SDP4	4	4	6.75	-	1.0	300	NV E...
2.5	16	16.4	2.6	4020	4020	5.5	10 x 5.1	M5	6.15	7.4	1	SDP6	4	6	6	2.25	1.6	500	NS E...
3	20	20.4	2.3	4020	6000	7	11 x 6.1	M6	7.69	9.25	1.25	SDP8	6	8	8	2.75	2.6	1000	NM E...
4	30	30.4	4.8	4020	6000	11	18 x 10	M10	11.6	14.1	2	SDP12	10	12	15	3.75	6.0	1600	NL E...

Ordering Details



Example:

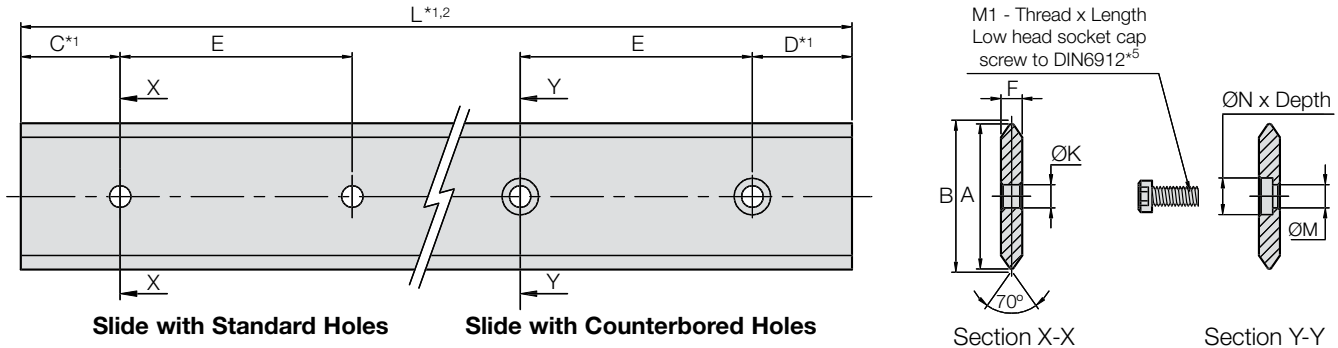
1 x N S E L2066 P3 N _____ Single edge spacer slide in precision grade 3, 2066 mm long with no holes
 24 x SDP6 _____ 6 mm Ø head dowel pins (optional)

Double Edge Flat Slides

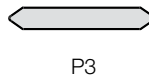
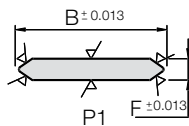
Double edge flat slides are available in a range of 11 sizes corresponding to those of the double edge spacer slides. Single edge flat slides are also available in 5 complementary sections. All flat slides come in 3 grades of precision and are zone hardened on the 'V' edges to provide an extremely hard wearing surface. Grades P1 and P2 are precision ground on V and opposing faces to a high degree of accuracy and parallelism with P1 being ground on the mounting surfaces as well⁴. The unground version P3 is also sufficiently accurate for many applications (please see system selector for comparative data).

Flat slides are supplied with plain fixing holes as standard and with counterbored holes to suit low head cap screws as an option. Unground grade P3 slides are available without holes if preferred. The counterbored option is necessary if the double edge flat slides are used in conjunction with belt driven carriages in order to provide an uninterrupted path for the belt. Also, where there is insufficient room between slide and carriage plate for a conventional screw head (possible in "mix and match" situations or where customer's own flat carriage plates are used in conjunction with slimline bearings).

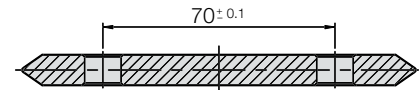
The slide fixing holes are accurately positioned, allowing customers to pre-drill their mounting holes. All flat slides are left 'soft' outside



Available Grades of Slide



✓ Indicates surfaces which are precision ground



The L120 section has 2 rows of holes

Part Number		For Use With Bearings ³		A ~Slide Width	B		C	D	E ±0.2	F	
Double Edge	Single Edge	Standard	Slimline		P1 & P2	P3				P1	P2 & P3
MS	12...	...J13...	-	12	12.55	13.13	13	13	30	3.05	3.2
	MS E...	...J13...	-	-	-	-	20.5	20.5	45	3.05	3.2
V	20...	...J18...	...J195...	20	20.37	21.01	43	43	90	4.27	4.42
V	28...	...J18...	...J195...	28	28.37	29.01	43	43	90	4.27	4.42
	VE...	...J18...	...J195...	-	-	-	43	43	90	4.27	4.42
S	25...	...J25...	...J265...	25	25.81	26.58	43	43	90	4.78	4.93
S	35...	...J25...	...J265...	35	35.81	36.58	43	43	90	4.78	4.93
S	50...	...J25...	...J265...	50	50.82	51.58	43	43	90	4.78	4.93
	SE...	...J25...	...J265...	-	-	-	43	43	90	4.78	4.93
M	44...	...J34...	...J360...	44	44.81	45.58	43	43	90	6.28	6.42
M	60...	...J34...	...J360...	60	60.81	61.58	43	43	90	6.28	6.42
M	76...	...J34...	...J360...	76	76.81	77.58	43	43	90	6.12	6.42
	ME...	...J34...	...J360...	-	-	-	43	43	90	6.28	6.42
L	76...	...J54...	...J580...	76	76.81	77.58	43	43	90	9.12	9.43
L	120...	...J54...	...J580...	120	120.81	121.58	88	88	180	9.12	9.43
	LE...	...J54...	...J580...	-	-	-	43	43	90	9.12	9.43

*Notes:

- 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. In all cases unless otherwise specified by the customer, C and D dimensions will be supplied equal.
- Where slides longer than the maximum length are required, lengths can be matched suitable for butting.
- In the table, the preferred choices of bearings to use with each slide are quoted. However, other combinations are possible (please see mix and match tables at www.bwc.com/products/gv3.html).
- Slides in their free unmounted state are not necessarily absolutely straight. If important, the slide should be set straight by bolting down to a register.
- Counterbored holes for flat slides are designed to suit socket cap head screws 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).

Single Edge Flat Slides

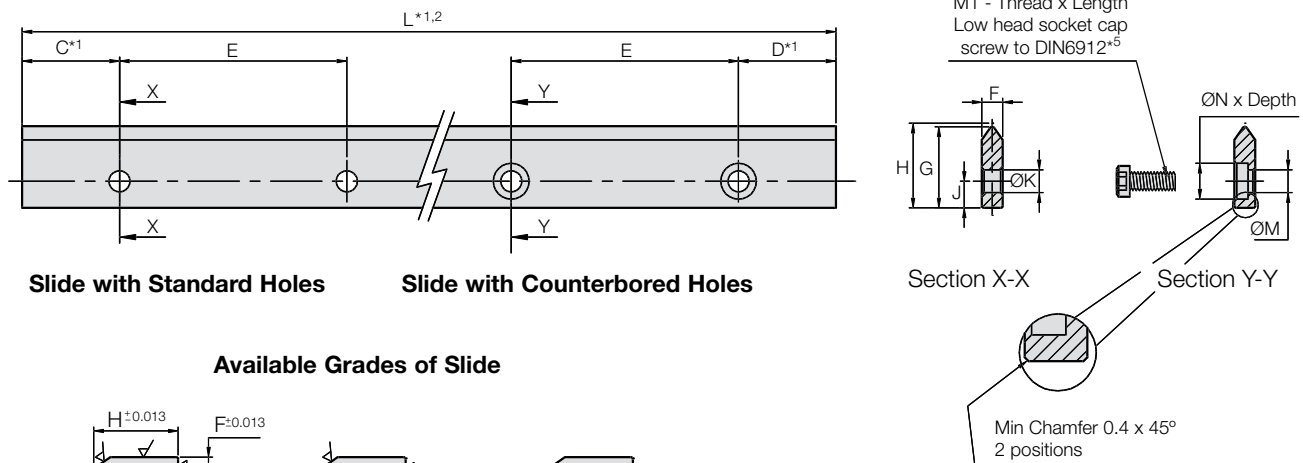
the area of the V's to allow subsequent machining if required.

Flat slides are useful where weight saving or minimum inertia is required in cases where the slide is the moving component. Also, where it is practical to design a support profile as an integral part of the machine to provide running clearance for the bearings and lubrication devices.

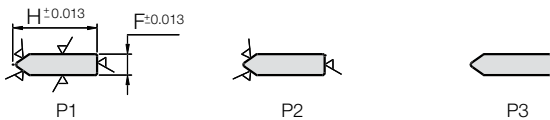
The single edged format allows two slide V's to be mounted wide apart, thus providing a considerable increase in moment load capacity, stiffness and stability. The space between the two slides can be made sufficient to allow central positioning of the drive whether by means of ball screw, air cylinder or other types of actuator.

Single edge flat slides can be attached to commonly available square and rectangular hollow section material by means of tapped hexagonal bar to achieve a low cost, high strength structure complete with linear guide (see page 8).

See Application Examples on pages 8-9, 11 and 12



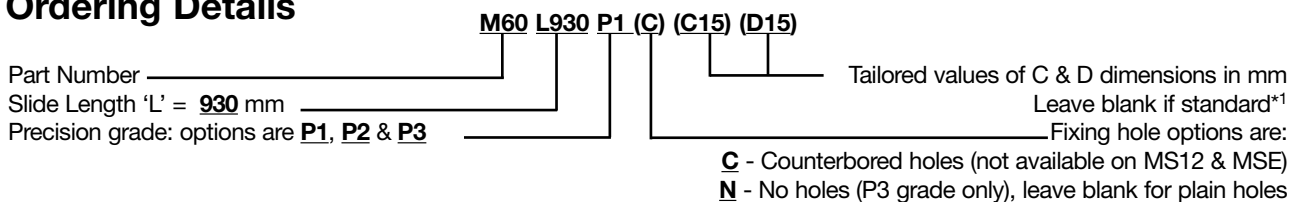
Available Grades of Slide



✓ Indicates surfaces which are precision ground

G ~Slide Width	H		J		K		L Max		M	M1*5		N Ø x Depth	Weight kg/m	
	P1 & P2	P3	P1 & P2	P3	Ø	Screw Size	P1 & P2	P3		Screw Size	Part No.		Double Edge	Single Edge
-	-	-	-	-	3.5	M3	1000	1976	-	-	-	-	0.23	-
11	11.37	11.8	4.5	4.7	3.5	M3	1000	1976	-	-	-	-	-	0.22
-	-	-	-	-	4.5	M4	4020	4020	4.5	M4 x 10	FS410	8 x 2.8	0.6	-
-	-	-	-	-	5.5	M5	4020	4020	4.5	M4 x 10	FS410	8 x 2.8	0.9	-
16	16.37	16.8	6	6.2	4.5	M4	4020	5500	4.5	M4 x 10	FS410	8 x 2.8	-	0.5
-	-	-	-	-	7	M6	4020	6000	5.5	M5 x 10	FS510	10 x 3.5	0.8	-
-	-	-	-	-	7	M6	4020	6000	5.5	M5 x 10	FS510	10 x 3.5	1.3	-
-	-	-	-	-	7	M6	4020	6000	5.5	M5 x 10	FS510	10 x 3.5	1.7	-
19	19.46	20.0	6.5	6.7	5.5	M5	4020	5500	5.5	M5 x 10	FS510	10 x 3.5	-	0.7
-	-	-	-	-	7	M6	4020	6000	7	M6 x 12	FS612	11 x 4	1.9	-
-	-	-	-	-	9	M8	4020	6000	7	M6 x 12	FS612	11 x 4	2.7	-
-	-	-	-	-	9	M8	4020	6000	7	M6 x 12	FS612	11 x 4	3.4	-
25	25.46	26.0	8	8.2	7	M6	4020	6000	7	M6 x 12	FS612	11 x 4	-	1.2
-	-	-	-	-	11.5	M10	4020	6000	11.5	M10 x 20	FS1020	18 x 6	5	-
-	-	-	-	-	11.5	M10	4020	6000	11.5	M10 x 20	FS1020	18 x 6	8.5	-
32	32.46	33.0	10	10.2	9	M8	4020	6000	9	M8 x 20	FS820	15 x 6	-	2.2

Ordering Details



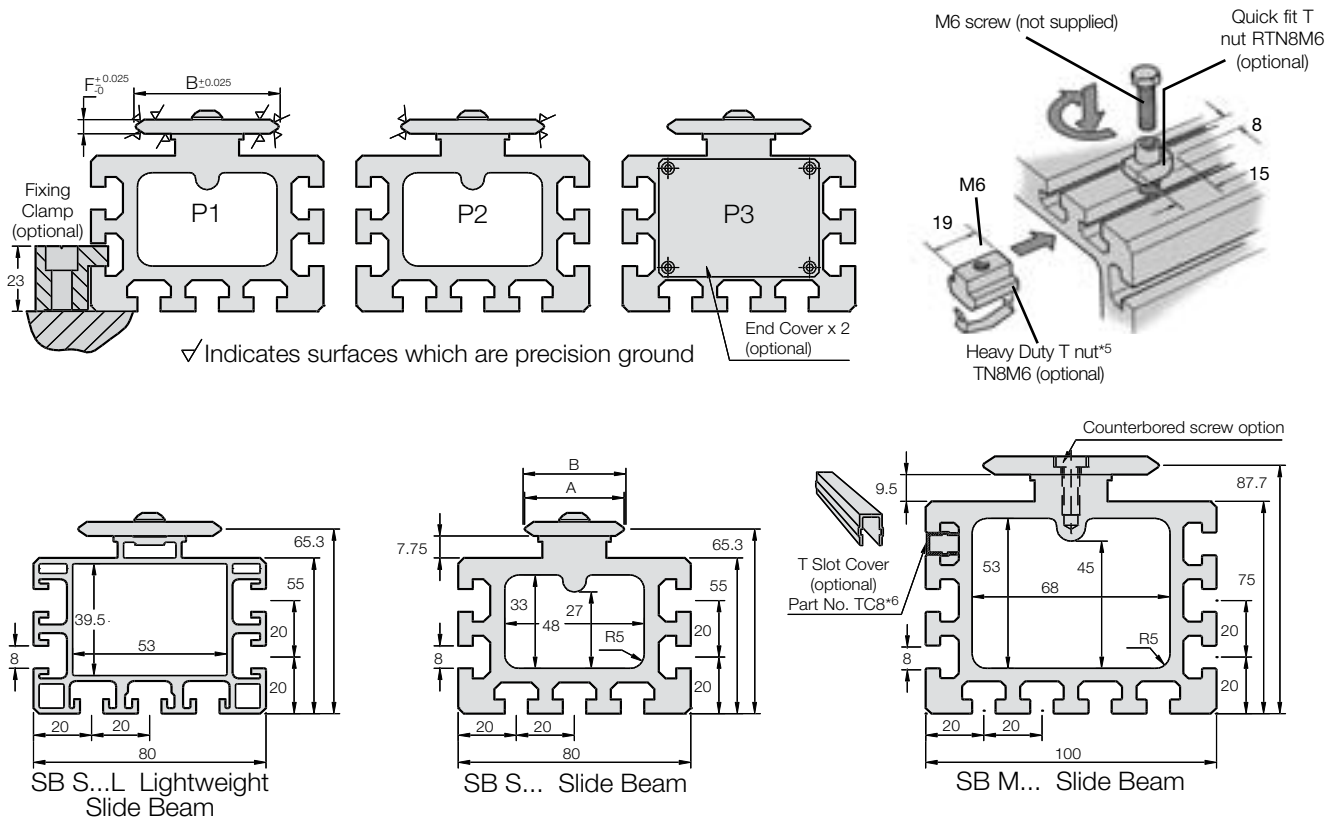
Example:

1 x LE 2156 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 20 mm long (optional)

Slide Beams

The slide beam consists 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 (refer to slide deflection calculations). There are two basic sizes of beam, each available with a number of different slide widths to cater for customer's space and moment load requirements. The smaller size beam is available as a lightweight version, this reduces inertia where the slide beam is to be used dynamically. All slide beams can be supplied in lengths of up to 8 meters in one piece*^{1,3} and are compatible with all bearings, carriages and lubrication devices. Slides can be specified in any of the three grades of precision available depending upon the requirements for cost, accuracy and performance (see system selector).

Customers contemplating driving by means of a belt, steel band, cable or chain, will benefit from the large hollow center which can be used for routing the return. If drive by timing belt is required, please consider the belt driven carriage which has been



Part Number	For Use With Cartridges ⁴			A ~Slide Width	B		C ²	D ²	E	F	
	Standard	Slimline	Belt Drive		P1 & P2	P3				P1	P2 & P3
SB S 35...	AU 35 25...	AU 35 265...	AU BD 35 25...	35	35.81	36.58	43	43	90	4.77	5
SB S 50...	AU 50 25...	AU 50 265...	AU BD 50 25...	50	50.81	51.58	43	43	90	4.77	5
SB M 44...	AU 44 34...	AU 44 360...	AU BD 44 34...	44	44.81	45.58	43	43	90	6.27	6.5
SB M 60...	AU 60 34...	AU 60 360...	AU BD 60 34...	60	60.81	61.58	43	43	90	6.27	6.5
SB M 76...	AU 76 34...	AU 76 360...	AU BD 76 34...	76	76.81	77.58	43	43	90	6.10	6.5

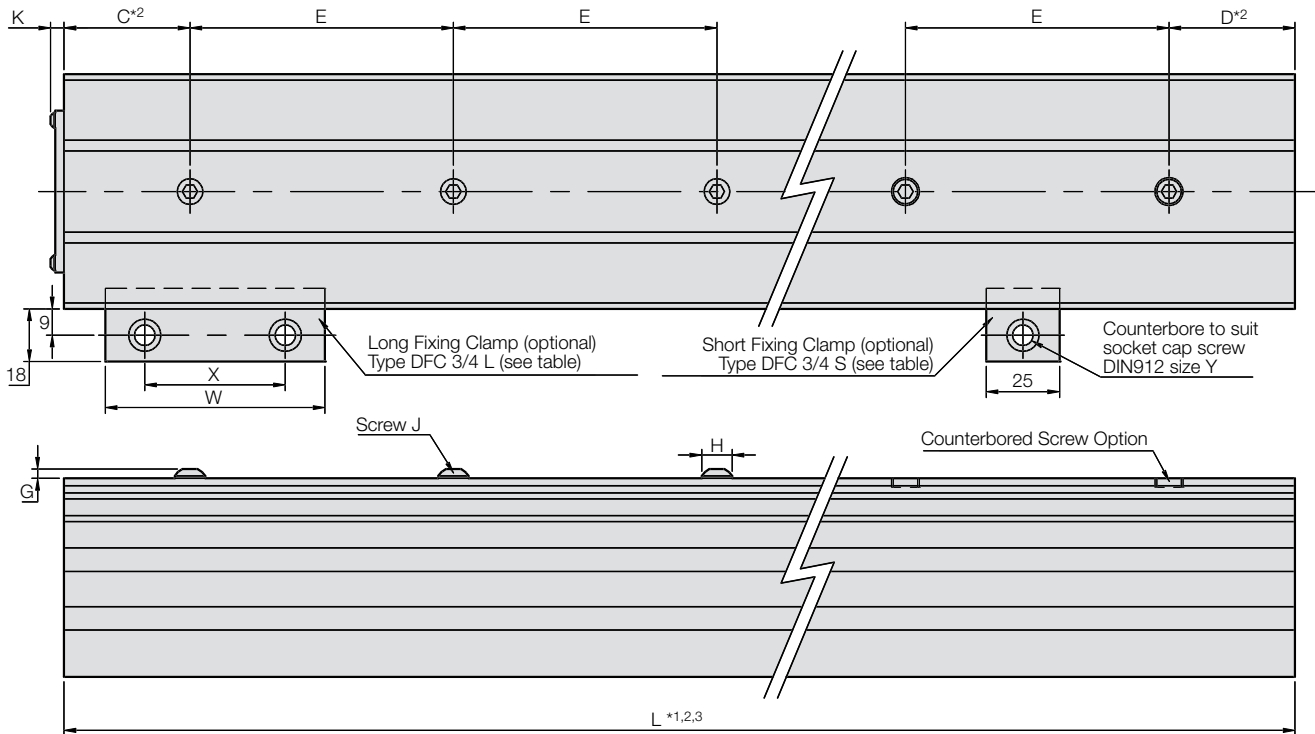
*Notes:

- Beams longer than 4020 mm (6000 mm for P3 grade) will be supplied with two or more lengths of matched slide each mounted and doweled to form a precision joint. Additional fixing screws will normally be provided adjacent to each joint. Slide beams with shorter slides fixed in any position, can be supplied upon request.
- 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.
- For requirements in excess of 8 m, slide beams can be supplied matched ready for joining. Please contact Bishop-Wisecarver for details.
- In the table, the available choices of carriage to use with each slide beam are quoted. However, it is possible to use a customer made carriage incorporating other sizes of bearings (please see details of "mix and match" possibilities at www.bwc.com/products/gv3.html).
- The heavy duty T nut is recommended for the lightweight beam and where greater security of fixing is required. T nut section is also available in undrilled lengths up to 3000 mm. Please specify part number **TN8S** followed by the required length in mm.
- The T slot cover is made from black UPVC and is available in lengths up to 8000 mm. Please specify part number **TC8** followed by the required length in mm.

specifically designed for such application. This will require the counterbored screw fixing option to be specified for the slide in order to provide a flush running surface for the belt. The counterbored screw fixing option will also be required where there is insufficient room between slide and carriage plate for screw heads (possible in "mix and match" situations or where customer's own flat carriage plates are used in conjunction with slimline bearings).

For customers requiring a belt driven system complete with end pulley units, Bishop-Wisecarver recommends their standard range of Driven Linear Systems, details of which may be found in the comprehensive HepcoMotion DLS catalog. Also included in the DLS catalog are compatible motors, gearboxes and switching equipment, all of which may be suitable for customers carrying out their own designs using the slide beam.

See Application Examples on page 10



G	H	J		K	L Max *1, 2, 3	Fixing Clamps		W	X	Y	Weight kg/m		Part Number
		Standard	C/Bored			Short	Long				Std Beam	Light Beam	
3.3	10.5	M6	M5	5.5	8000	DFC3S	DFC3L	75	48	M6	6	4.3	SB S 35...
3.3	10.5	M6	M5	5.5	8000	DFC3S	DFC3L	75	48	M6	6.5	4.7	SB S 50...
3.3	10.5	M6	M6	5.5	8000	DFC4S	DFC4L	100	65	M8	10	-	SB M 44...
4.4	14	M8	M6	5.5	8000	DFC4S	DFC4L	100	65	M8	11	-	SB M 60...
4.4	14	M8	M6	5.5	8000	DFC4S	DFC4L	100	65	M8	11.5	-	SB M 76...

Ordering Details

SBS35 L1346 P1 (L) (C) (X) (C33) (D53)

Part Number _____

Beam Length 'L' = **1346** mm _____

Precision grade: options are **P1, P2 & P3** _____

L - Lightweight beam option (leave blank if not required) _____

Tailored values of C & D dimensions in mm - Leave blank if standard*2 _____

X - End cover option (leave blank if not required) _____


C - Counterbored screw fixing option (leave blank if not required) _____


Ancillary Items:

See drawing for the part numbers relating to T nuts*5, T slot cover*6 and fixing clamps.

Standard Bearings

All standard bearings are compatible with all grades of slide and although designed to be used with particular sizes of slide, may be "mixed and matched" in many instances. The following bearing formats and fixing methods may be chosen to cater for most design requirements.

The twin bearing type  which is the default choice, comprises two individual deep groove ball bearings on a single stud. This construction offers some compliance allowing smoother running, easy adjustment and greater tolerance of misalignment.

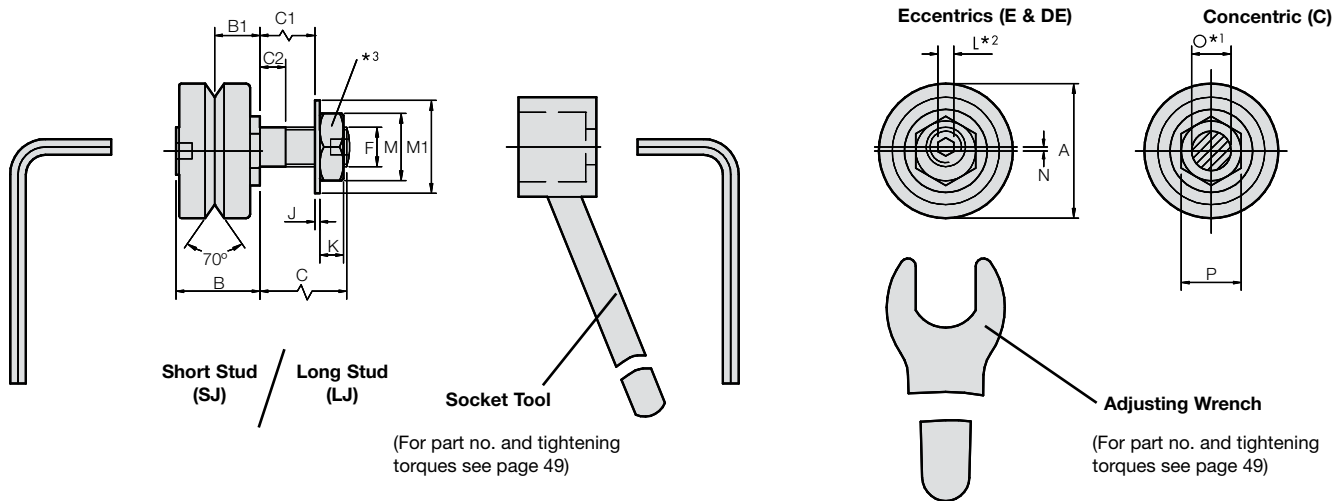
The Double Row bearing type (DR)  incorporates a one-piece bearing with two ball tracks. This offers higher load capacity, especially in the radial direction and is less susceptible to entrapment of debris.

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) available for both bearing formats, provides a higher degree of sealing against ingress of water or debris than does the default metal shielded type. A small increase in friction may result.

The through hole fixing type is available in two stud lengths covering most thicknesses of carriage or mounting plate, the short stud version being compatible with the carriage plates. Both versions are available in **Concentric type (C)** which are fixed,

Through Fixing Type (SJ/LJ)



Part Number	For Use With Slide Section ⁹	A	B	±0.025 B1	C		C1		C2		±0.025 D	D1
					Short Stud	Long Stud	Short Stud	Long Stud	Short Stud	Long Stud		
...J 13...	MS & NMS	12.7	10.1	5.47	5.8	9.5	3	6.7	2.2	2.4	9.51	4.76
...J 18...	V & NV	18	12.4	6.75	7.4	14	3.4	10	2.4	2.5	14.0	7.0
...J 25...	S & NS	25	16.6	9	9.8	19	3.8	13	3.4	4.9	20.27	10.13
...J 34...	M & NM	34	21.3	11.5	13.8	22	6.6	14.8	5.2	5.9	27.13	13.56
...J 54...	L & NL	54	34.7	19	17.8	30	8.2	20.4	5.7	7.9	41.76	20.88

S1	T	T1	T2	± 0.1 U	U1	V	W	X	Y	Z	Weight ~g			
											SJ...	LJ...	BHJ...C	BHJ...E
6.6	8.5	3.75	6.75	30	47.5	8	20	M3	5.5	8	8	8	7	27
10.5	10	4	8	38	54	11	24.5	M4	7	7	19	20	18	45
9	12	5	10	50	72	14	32	M5	8.5	10	48	51	43	105
8.5	17.5	6.5	12.5	60	90.5	17	42	M6	10	14	115	120	105	235
16.4	23.5	10.5	18.5	89.5	133	25	62	M8	13	20	415	425	390	800

***Notes:**

1. It is recommended that holes to suit bearing mounting studs should be reamed to tolerance F6 for a sliding fit.
2. All eccentric through fixing type bearing studs are supplied with sockets for adjustment as shown, with the exception of size 13.
3. Nuts for the through fixing type bearings are chemically blackened on the concentric version and bright zinc plated on the eccentrics for identification purposes.
4. 'R' dimension is both the eccentric offset of the adjusting nut and the total adjustment available at the bearing centers.
5. Double eccentric bearings require different mounting hole centers.
6. The blind hole eccentric bearings cannot be fitted with cap seals, however lubricators may be specified instead.
7. Controlled height bearings are selected within ±0.005 mm in respect of B1 dimension compared to the normal tolerance of ±0.025 mm. They are supplied in sets of up to eight bearings within the same tolerance band. Larger quantities of bearings within the same tolerance band are available on request.
8. 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.
9. The preferred slide choices for each bearing are listed. Other slides may be used as shown in the "mix & match" tables available at www.bwc.com/products/gv3.html.

Eccentric type (E), adjustable and **Double Eccentric type (DE)**^{*5} which have sufficient adjustment to enable a carriage to be disengaged from the slide (see application drawing on page 8).

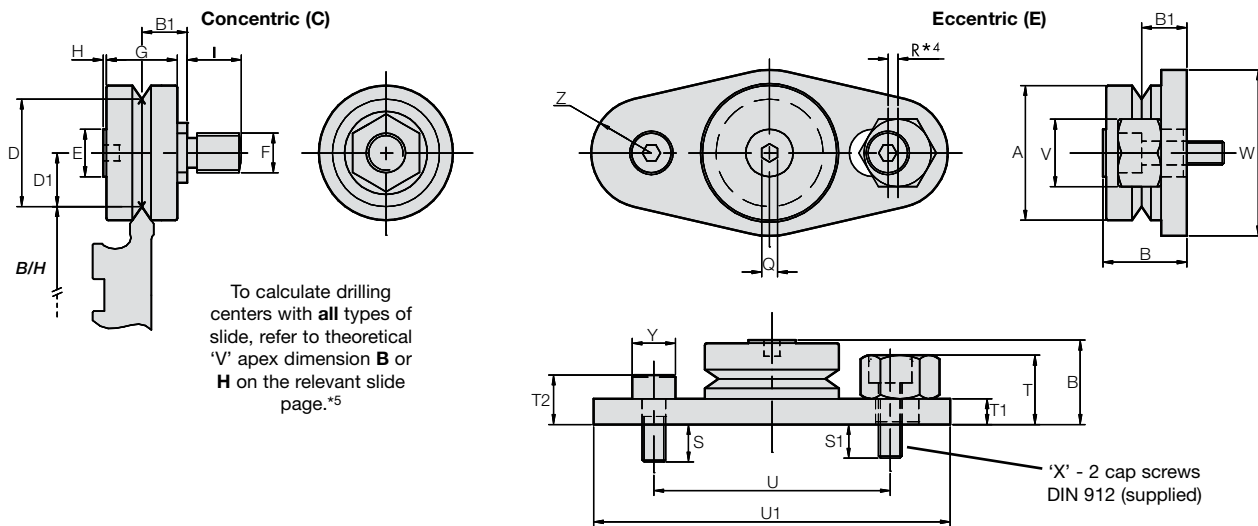
All through hole fixing types are available in a **Controlled Height version (CH)**^{*7} which minimizes variation between bearings in respect of the important 'B1' dimension. This may be desirable in some high precision applications.

The Blind Hole fixing type (BHJ) allows mounting into a solid machine base where through mounting holes are not possible, or where the thickness of the mounting plate is too great. The blind hole fixing type is also useful where adjustment from the front is preferred or where access to the opposite side of the mounting hole is restricted. They are available in **Concentric type (C)** which are fixed, or **Eccentric type (E)**^{*6} 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 cap seals which fit over the bearings, or by using lubricators. Lubrication greatly increases load capacity and life.

See Application Examples on pages 8-13

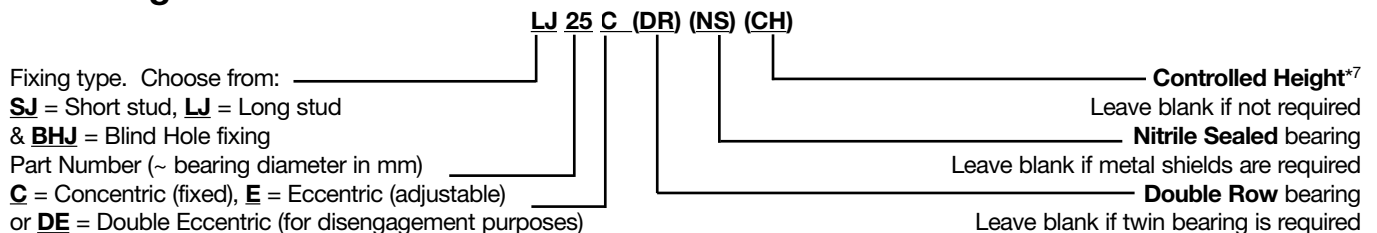
Blind Hole Fixing Type (BHJ)



E	F Metric Fine	G	H	I	J	K	L ^{*2}	M	M1	N		+0 -0.03 O ^{*1}	P	Q	R ^{*4}	S
										...E...	...DE... ^{*5}					
5	M4 x 0.5	8	0.5	5.8	0.8	2.2	-	7	9	0.5	1.9	4	7	1.5	1.0	6.25
7	M6 x 0.75	10	0.6	7.4	0.8	3.2	2.5	10	13	0.7	2.6	6	11	2	1.2	8
10	M8 x 1	14	0.5	9.8	1	5	3	13	17	0.75	2.75	8	13	3	1.5	7
12	M10 x 1.25	18	0.7	13.8	1.25	6	4	17	21	1	3.6	10	15	4	2.0	9.5
25	M14 x 1.5	28	1.6	17.8	1.6	8	6	22	28	1.5	5.5	14	27	8	3.0	14.5

Max Working Load Capacities (N)				Bearing Static (Co) and Dynamic (C) Load Capacities (N) ^{*8}								Options Available					
Double Row Bearings		Twin Bearings		For Double Row Bearings				For each of two Twin Bearings				Part Number	-	NS	-	DR	CH
Radial	Axial	Radial	Axial	Radial Loads		Axial Loads		Radial Loads		Axial Loads			Metal Shields	Nitrile Seals	Twin Bearings	Double Row Bearings	Controlled Height
				Co	C	Co	C	Co	C	Co	C						
-	-	120	60	-	-	-	-	265	695	74	194	...J 13...	✓	✓	✓	✓	✓
600	190	200	125	1168	2301	435	857	593	1438	173	419	...J 18...	✓	✓	✓	✓	✓
1500	400	600	320	2646	5214	821	1618	1333	3237	326	791	...J 25...	✓	✓	✓	✓	✓
3000	900	1400	800	5018	9293	1362	2523	2600	5291	557	1270	...J 34...	✓	✓	✓	✓	✓
5000	2500	3200	1800	12899	21373	2777	4601	6657	13595	1136	2320	...J54...	✓	✓	✓	✓	✓

Ordering Details



Slimline Bearings

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.

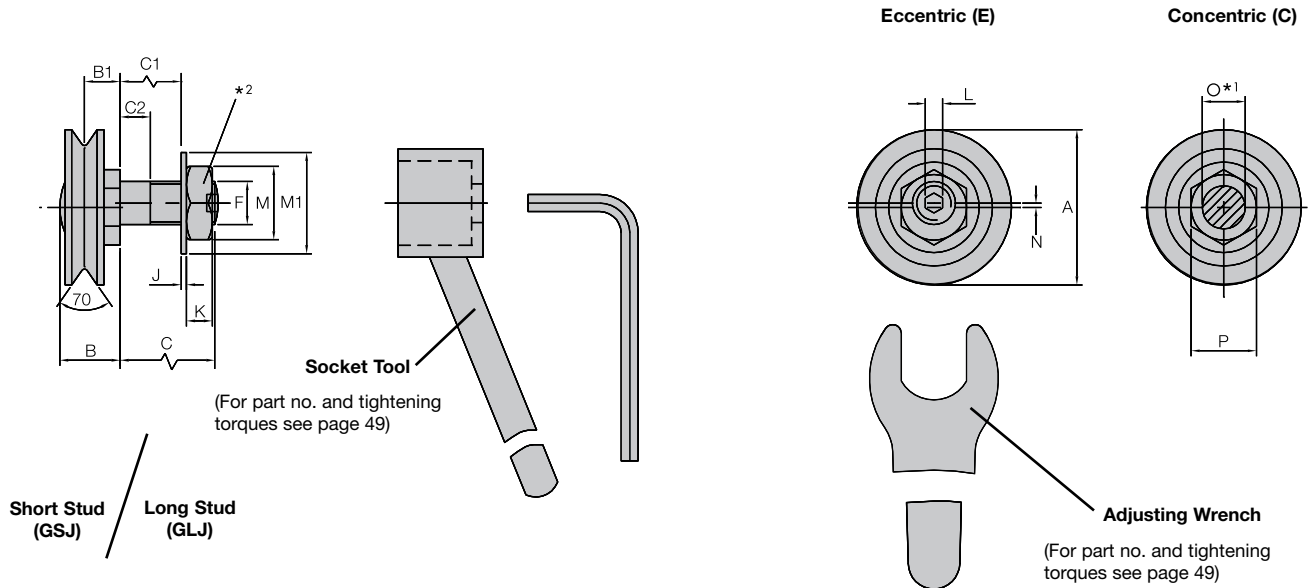
Slimline bearings are compatible with all grades of slide and although designed to be used with particular sizes of slide, may be "mixed and matched" in many instances.

The following options and fixing methods may be chosen to cater for most design requirements.

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

The through hole fixing type is available in two stud lengths covering most thicknesses of carriage or mounting plate, the short stud version being compatible with the slimline carriage plates. Both versions are available in **Concentric type (C)** which are fixed and

Through Fixing Type (GSJ/GLJ)



Part Number	Use with Slide Section ⁶	A	B	± 0.025 B1	C		C1		C2		D	D1
					Short Stud	Long Stud	Short Stud	Long Stud	Short Stud	Long Stud		
...J 195...	V & NV	19.5	9.2	5.7	7.4	14	3.4	10	2.4	2.5	14.8	7.4
...J 265...	S & NS	26.5	11.3	6.8	9.8	19	3.8	13	3.4	4.9	19.98	9.99
...J 360...	M & NM	36	14	8.3	13.8	22	6.6	14.8	5.2	5.9	27.57	13.79
...J 580...	L & NL	58	22.8	14.3	17.8	30	8.2	20.4	5.7	7.9	46.08	23.04

R ³	S	S1	T	T1	T2	T3	± 0.1 U	U1	V	W	X	Y	Z
1.2	8	10.5	8.6	4	8	2.8	38	54	11	24.5	M4	7	7
1.5	7	9	11	5	10	3.6	50	72	14	32	M5	8.5	10
2	9.5	11.3	13.3	6.5	12.5	4.3	60	90.5	17	42	M6	10	14
3	14.5	16.4	21.9	10.5	18.5	8.6	89.5	133	25	62	M8	13	20

***Notes:**

1. It is recommended that holes to suit bearing mounting studs should be reamed to tolerance F6 for a sliding fit.
2. Nuts for the through fixing type bearings are chemically blackened on the concentric version and bright zinc plated on the eccentrics for identification purposes.
3. 'R' dimension is both the eccentric offset of the adjusting nut and the total adjustment available at the bearing center line for 360° rotation of the adjusting nut.
4. The blind hole eccentric bearings cannot be fitted with cap wipers, however lubricators may be specified instead.
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.
6. The preferred slide choices for each bearing are listed. Other slides may be used as shown in the "mix & match" tables available at www.bwc.com/products/gv3.html.

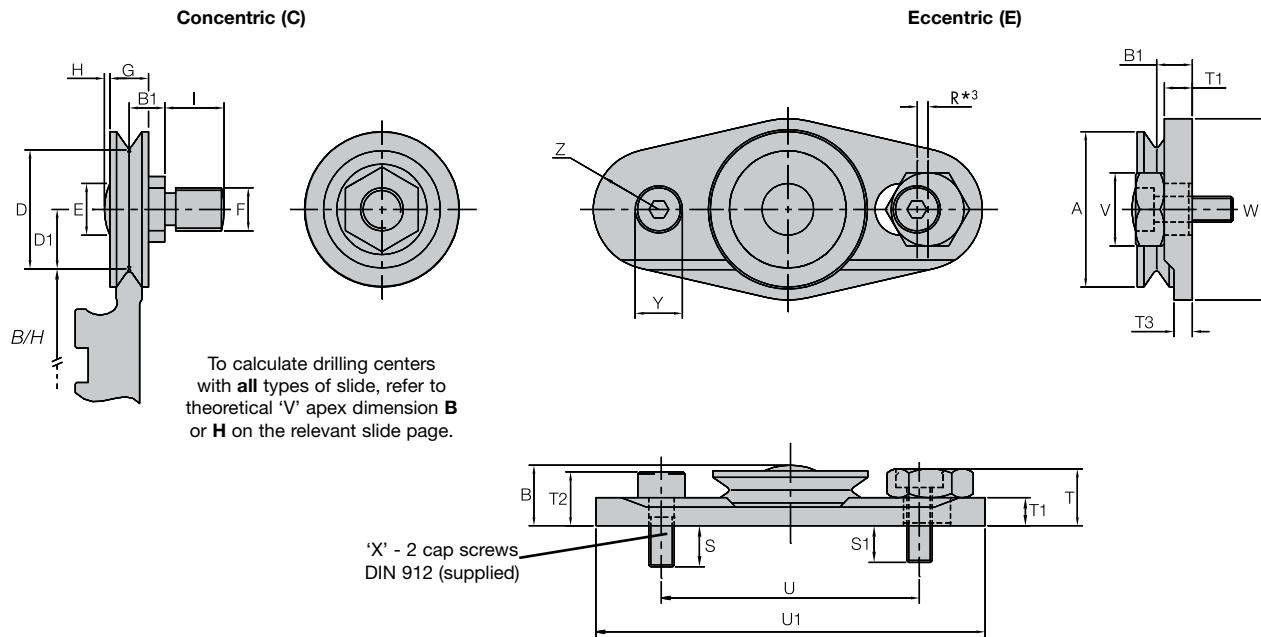
Eccentric type (E) which are adjustable.

The Blind Hole fixing type (GBHJ) allows mounting into a solid machine base where through mounting holes are not possible, or where the thickness of the mounting plate is too great. The blind hole fixing type is also useful where adjustment from the front is preferred or where access to the opposite side of the mounting hole is restricted. They are available in **Concentric type (C)** which are fixed, or **Eccentric type (E)** which are adjustable*4.

All bearings are greased for life internally. Customers are strongly recommended to provide lubrication to the interface between bearings and slide by specifying cap wipers which fit over the bearings, or by using slimline lubricators. Lubrication greatly increases load capacity and life.

See Application Examples on pages 8-11 and 12

Blind Hole Fixing Type (GBHJ)



E	F Metric Fine	G	H	I	J	K	L	M	M1	N	+0 -0.03 O ¹	P
7	M6 x 0.75	5	1	7.4	0.8	3.2	2.5	10	13	0.7	6	11
10	M8 x 1	7	1	9.8	1	5	3	13	17	0.75	8	13
12	M10 x 1.25	9	1.2	13.8	1.25	6	4	17	21	1	10	15
23.5	M14 x 1.5	14	1.5	17.8	1.6	8	6	22	28	1.5	14	27

Weight-g			
GSJ...	GLJ...	GBHJ...C	GBHJ...E
14	16	16	40
28	30	30	85
65	70	70	185
280	290	290	660

Max Working Load Capacities		Static (Co) and Dynamic (C) Load Capacities (N) ⁵			
		Radial Loads		Axial Loads	
		Co	C	Co	C
Radial	Axial	563	1366	164	398
240	100	1267	3075	310	751
575	235	2470	5625	530	1206
1200	500	6324	12915	1079	2204

Part Number	Options Available	
	-	NS
	Metal Sheets	Nitrile Sheets
...J 95...	✗	✓
...J 265...	✓	✓
...J 360...	✓	✓
...J 580...	✓	✓

Ordering Details

Fixing type. Choose from: _____ **GLJ 265 C (NS)**

GSJ = Short stud, **GLJ** = Long stud
 & **GBHJ** = Blind Hole fixing

Part Number (~10x bearing diameter in mm) _____

_____ **Nitrile Sealed bearings**
 Leave blank if metal shields are required

_____ **C** = Concentric (fixed), **E** = Eccentric (adjustable)

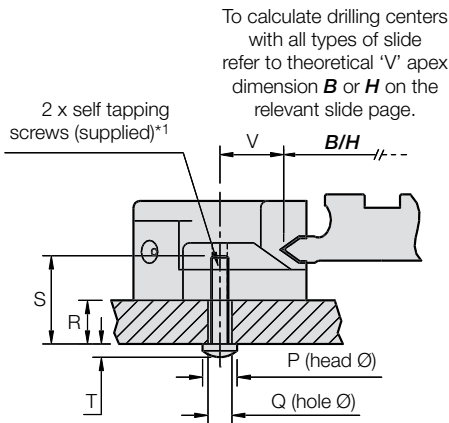
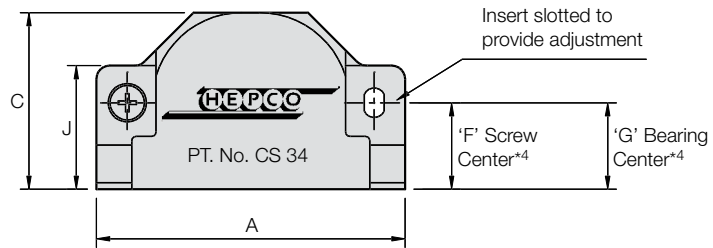
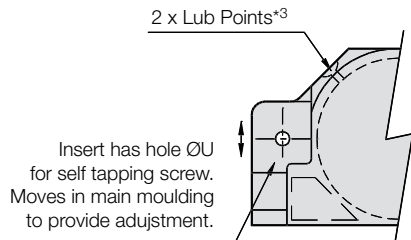
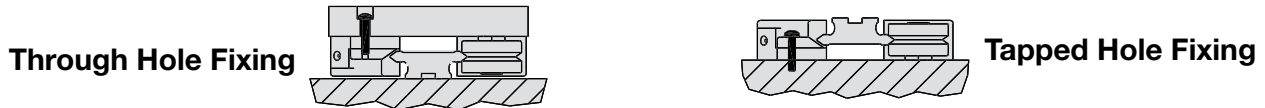
Cap Seals

Flexible plastic cap seals fit over individual standard bearings, providing effective sealing and protection, plus wiping of debris from the slide profile. Lubrication of the 'V' surface is provided by means of oil-impregnated felt wipers.

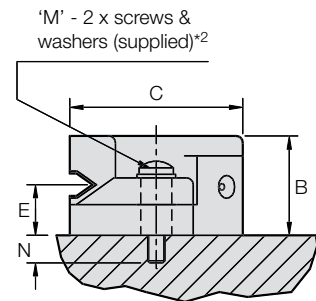
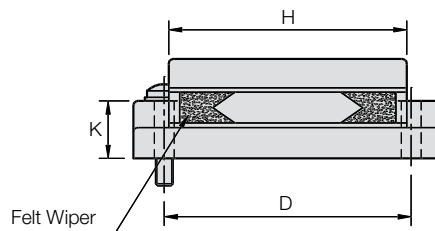
The internal cavity is filled with grease via the lubrication points, further improving lubrication and recharging the felt wipers as the grease partially liquefies under operation. Most systems require no further lubrication during the lifetime of the machine*³. Fitment of these seals increases load, life and linear speed capability as well as improving operator safety.

Cap seals are not available for use with size 12 bearings.

See Application Examples on pages 9-12



To calculate drilling centers with all types of slide refer to theoretical 'V' apex dimension **B** or **H** on the relevant slide page.



Part Number	Use With Bearings	A	B	C	±0.1 D	E	F	G	H	J	K	M* ²		N	P	Q	R _{max}	S	T	U	V	Mass ~g
												Screw	Length									
CS 18	...J 18...	42	13.8	21.2	32.5	6.75	12.3	10.4	32.3	18	6	M2.5	12	5.5	4.5	3	8.5	12	2	2	8.9	6
CS 25	...J 25...	55	18	30	44	9	14.8	14.8	43	22	8.6	M3	12	2.9	5.5	3.5	11	16	2	2.5	10.2	13
CS 34	...J 34...	70	22.5	40	56	11.5	19.6	19.6	54	28	13	M4	20	6.2	7	4.5	14	20	2.7	3.3	13.6	28
CS 54	...J 54...	98	36.5	60	80	19	29.7	29.7	78	40	20	M5	25	4	9	6	24	35	3.5	4	21	78

Part Number	Suitable for Slide Sections				
	MS	V	S	M	L
CS 18	x	✓	✓	✓	✓
CS 25	x	x	✓	✓	✓
CS 34	x	x	x	✓	✓
CS 54	x	x	x	x	✓

Ordering Example

State quantity and part number _____ 4 x **CS 34**

*Notes:

- 2 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 machine screws with cross-recessed pan heads (~DIN84A) and 2 flat washers (DIN125A) are supplied.
- 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 a complete gun is available from Bishop-Wisecarver if required.
- The fixing screw positions for the CS18 do not lie on the centerline of the nominal bearing position, unlike all other sizes. Please ensure that this is taken into account if designing your own carriage plate.

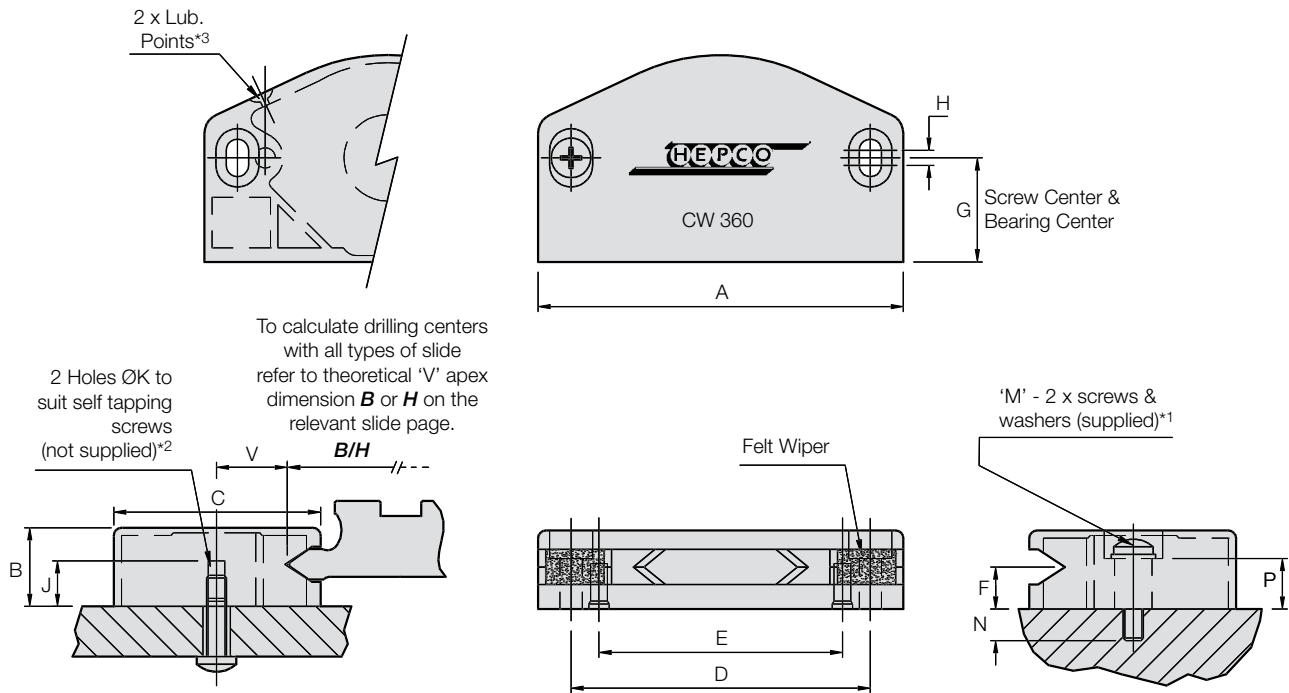
Cap Wipers

Rigid plastic cap wipers fit over individual 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 partially liquefies under operation. Most systems require no further lubrication during the lifetime of the machine*³. Fitment of cap wipers increases load, life and linear speed capability as well as improving operator safety.

Cap wipers may be attached using either of the methods shown below. If using the through hole method, please ensure that the mounting hole is slotted to provide for adjustment.

See Application Examples on pages 8 and 10



To calculate drilling centers with all types of slide refer to theoretical 'V' apex dimension **B** or **H** on the relevant slide page.

Part Number	Use With Bearings	A	B	C	±0.1	±0.1	F	G	H	J	K	M*1		N	P	V	Weight ~g
					D	E						Screw	Length				
CW 195	...J 195...	43	11.2	22.8	35	27.5	5.7	11.3	2	7	2.4	M2.5	12	3	8.5	7.4	6
CW 265	...J 265...	54	13	30.3	44	35	6.8	15.3	2.5	8.5	2.8	M3	16	5.5	10	10	10
CW 360	...J 360...	72	15.5	40.8	59	48	8.3	20.5	3	9	3.8	M4	16	5.5	10	13.8	20
CW 580	...J 580...	106	25	63.3	90	74	14.3	31.8	3.5	18	4.8	M5	25	4	20	23	55

Part Number	Suitable for Slide Sections				
	MS	V	S	M	L
CW 195	x	✓	x	x	x
CW 265	x	x	✓	x	x
CW 360	x	x	x	✓	x
CW 580	x	x	x	x	✓

Ordering Example

State quantity and part number _____ 4 x CW 360

Notes:

- 2 cross-recessed pan head screws to DIN 7985A and washers (DIN 433) are supplied with each cap wiper.
- 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.
- 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.

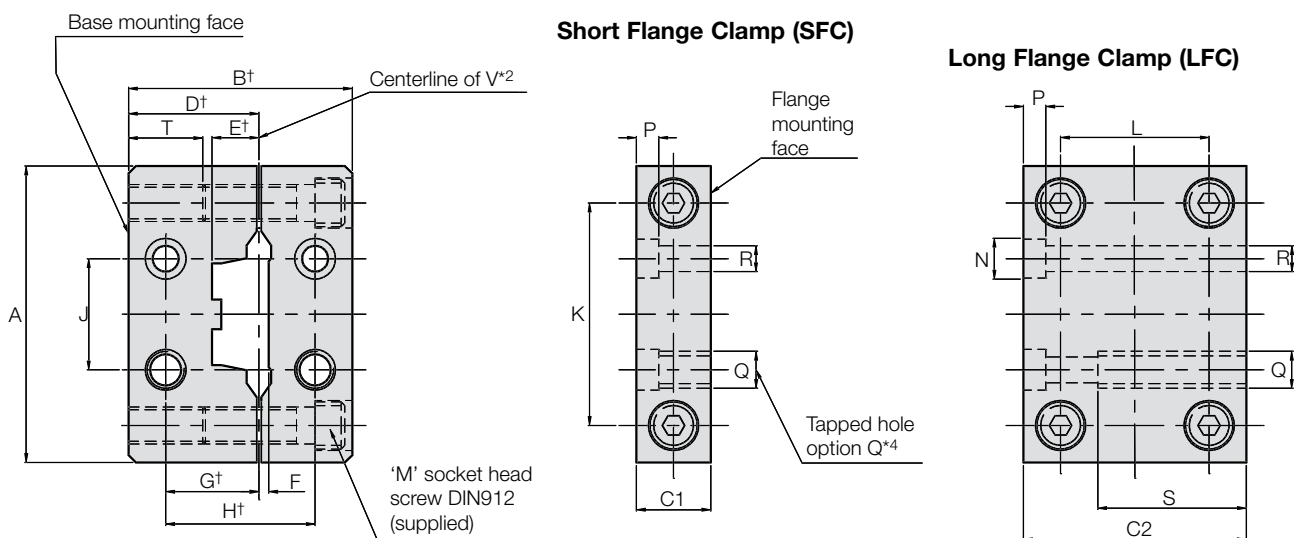
Flange Clamps

Flange clamps enable the slide system to act as a self-supporting constructional element of the machine. Manufactured from aluminum alloy, the clamps are anodized to achieve an attractive and corrosion resistant finish. They are available for use with all double edged spacer slides in the S series sizes and larger. **Short Flange Clamps (SFC)** enable the slide to be supported between two opposing faces. The **Long Flange Clamp (LFC)** enables short lengths of slide to be supported from one end only. The machined base mounting facility may be utilized by customers wishing to space the slide system away from the mounting surface. Deflection of slides can be determined using data given in the calculations section.

Assembly

During assembly, care should be taken to ensure that the flange clamps are positioned proud of the ends of the slide*¹. Flange fixing screws should be located and slightly tightened, before clamping screws 'M' are fully tightened. Progressive tightening of each screw 'M' is recommended. Flange fixing screws may then be fully tightened.

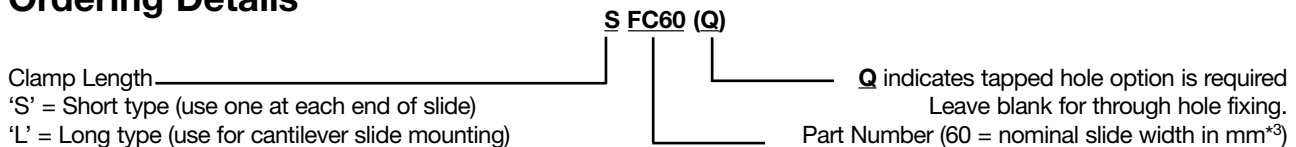
See Application Examples on pages 10 and 12



Dimensions marked† will differ slightly between application with P1 and P2 & P3 slides*²

Part Number* ³	For Use With Slide	A	B	C1	C2	D	E	F	G	± 0.2 H	± 0.2 J	K	L	M	N	P	Q	R	S	T	Weight ~g	
																					SFC	LFC
S/L FC 25	NS25	60	55	15	55	30	10	1.8	20	35	20	45	35	M6 X 30	9.5	5	M8	6	35	17	120	405
S/L FC 35	NS35	76	62	20	60	37	10	1.8	25	40	26	56	40	M8 X 35	11	6	M10	7	30	17	240	740
S/L FC 50	NS50	86	62	20	60	37	10	1.8	26	42	32	66	40	M8 X 35	11	6	M10	7	30	17	260	770
S/L FC 44	NM44	80	60	20	60	35	12.5	2.5	25	40	30	60	40	M8 X 30	11	6	M10	7	40	20	220	630
S/L FC 60	NM60	100	62	25	75	37	12.5	2.5	27	42	40	78	50	M8 X 35	11	6	M10	7	40	17	370	1150
S/L FC M76	NM76	127	75	25	75	50	12.5	2.5	30	45	55	95	50	M10 X 40	14	8	M12	9	45	23	530	1780
S/L FC 76	NL76	120	75	25	75	45	19.5	4	30	50	55	95	50	M10 X 40	14	8	M12	9	45	23	500	1430
S/L FC 120	NL120	170	100	25	75	62.5	19.5	4	35	54	95	140	45	M12 X 50	17	11	M16	11	40	35	1050	2750

Ordering Details



*Notes:

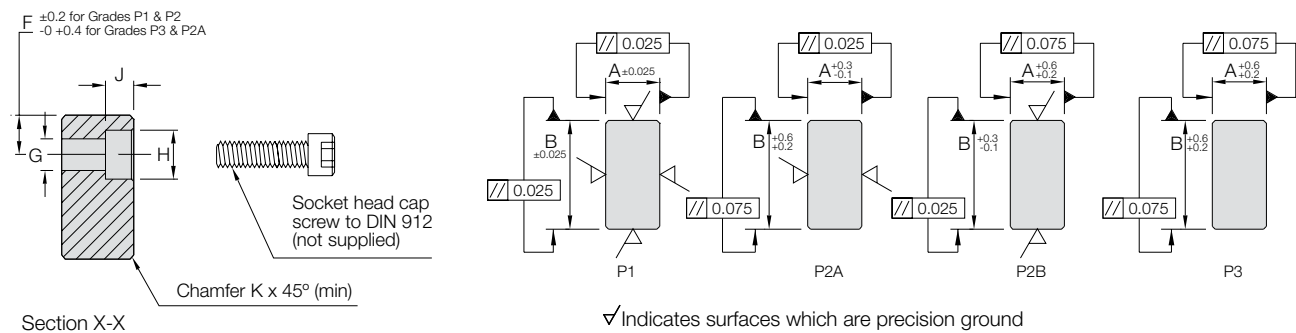
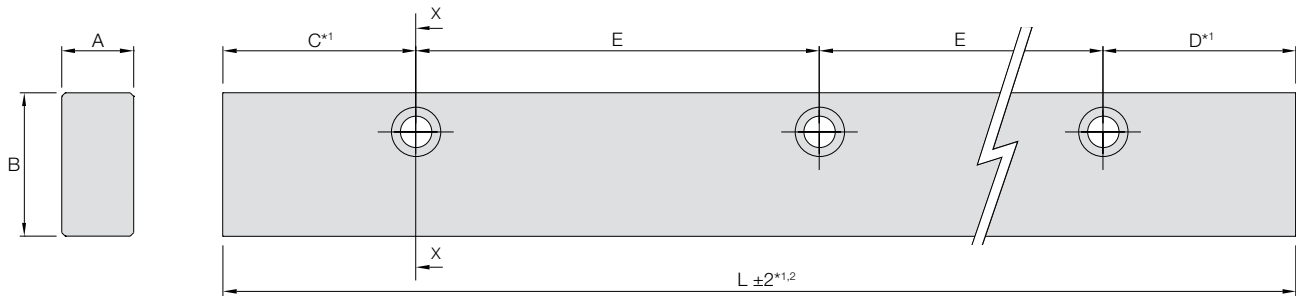
- For mounting slides between opposing faces, slides should be ordered 2 mm shorter than the required span.
- The drawings show dimensions from the centerline of slide 'V' when in the clamped condition. The figures quoted are valid for precision grades P2 & P3. For P1 slides, dimensions D & E will be reduced by 0.2 mm and dimensions B & H will be reduced by 0.4 mm. The keyway register ensures the slide is located centrally.
- Flange clamps are available to suit both the NM76 and NL76 slides. For the NM76 compatible flange clamp, please state S/L FC M76 as per table.
- Standard drilled flange clamps will be reworked for customers requiring tapped hole option 'Q'.

Flat Tracks

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 a range of track rollers. Flat tracks are often used in conjunction with V slides in large systems where the design can eliminate the requirement to set slides accurately parallel. Flat tracks are available in 4 sizes and in a number of quality grades. The P3 grade has a commercial finish on all faces and is sufficiently accurate for many applications while the other grades are precision surface ground to high accuracy on various faces according to the requirements of the application.

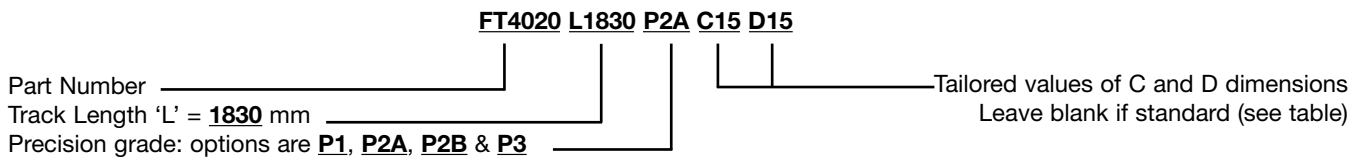
The standard means of securing flat tracks to the mounting surface is via counterbored fixing holes in the positions shown. Other fixing hole possibilities are available on request. Tracks in their free unmounted state are not necessarily absolutely straight, however, they may be set to the required degree of straightness during installation. It is recommended that holes in the mounting surface are positioned by 'spotting through' from the flat track.

See Application Examples on page 13



Part Number	Use With Track Roller	A	B	C+1	D+1	E	F	G Ø	Screw Size	H Ø	J ~	K (min)	L*1.2 (max)	Weight kg/m
FT 24 12	...R 18...	12	24	20.5	20.5	45	7.5	6	M5	10	5	0.4	2000	2.3
FT 32 16	...R 25...	16	32	43	43	90	8.75	7	M6	11	6	0.4	4020	4
FT 40 20	...R 34...	20	40	43	43	90	12	9	M8	15	8	0.4	4020	6.3
FT 66 33	...R 54...	33	66	88	88	180	17	14	M12	20	12	0.4	4020	17

Ordering Details



*Notes:

- 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.
- 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.

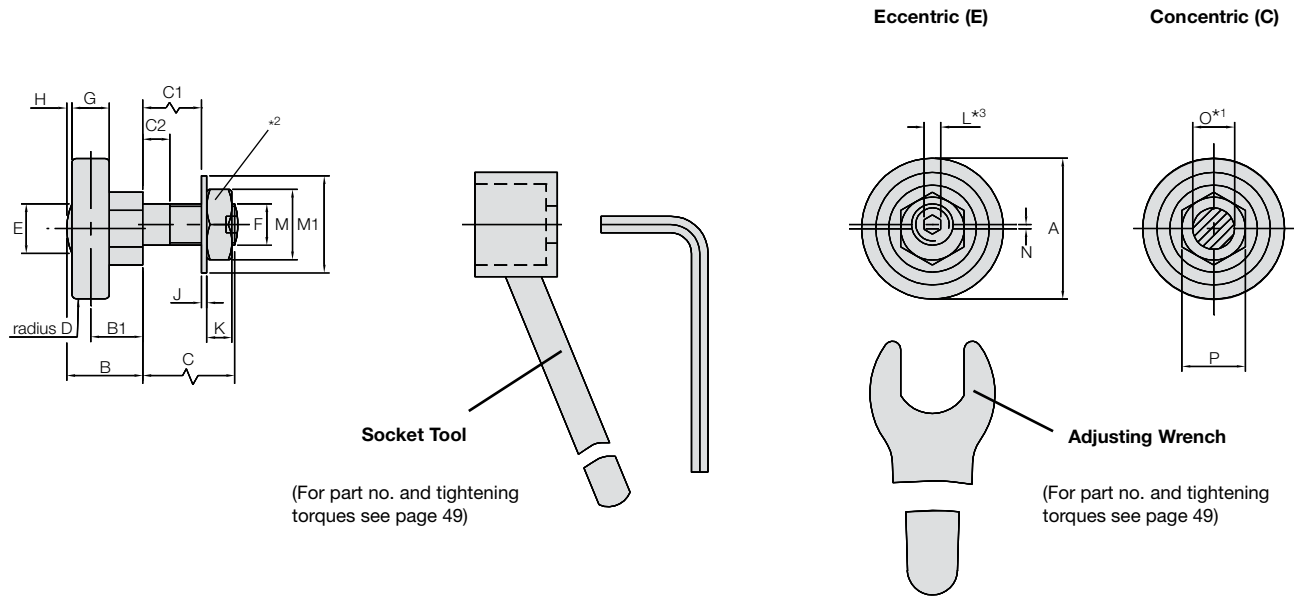
Narrow Track Rollers

The range of narrow track rollers complements the other ranges of bearings in the GV3 program. They are available mounted on both concentric and eccentric through hole fixing studs, but there is no blind hole version.

Narrow track rollers can be used in conjunction with flat tracks, single edge spacer slides and almost any type of running surface. Each uses a high capacity single row deep groove ball bearing with a substantial and stiff outer ring and a crowned outer profile. Their design makes them particularly suited to use as a retaining roller on the rear face of single edged spacer slides, and their low cost makes them suitable for any application where the high load capacity of the wide track rollers is not needed.

All track rollers are available with the **Nitrile Seal (NS)** option which provides a higher degree of sealing against ingress of water and debris than does the default metal shielded type. A small increase in friction may result.

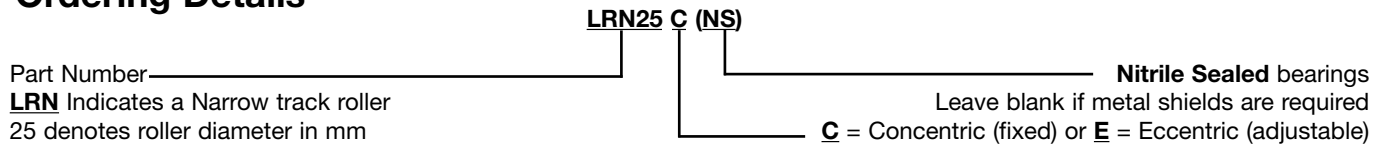
See Application Examples on page 13



Part Number	Use With Flat Track ⁵	A	B	B1	C	C1	C2	D	E	F Metric Fine	G	H	J	K
LRN 18...	FT 24 12	18	11.5	8	14	10	2.5	500	7	M6 x 0.75	5	1	0.8	3.2
LRN 25...	FT 32 16	25	14.5	10	19	13	5	500	10	M8 x 1	7	1	1	5
LRN 34...	FT 40 20	34	18.2	12.5	22	14.8	6	500	12	M10 x 1.25	9	1.2	1.25	6
LRN 54...	FT 66 33	54	29.5	21	30	20.4	8	500	23.5	M14 x 1.5	14	1.4	1.6	8

L*3	M	M1	N	+0 -0.03 O*1	P	Weight ~g	Max Working Load Capacity	Roller Static and Dynamic Radial Load Capacities (N) ⁴		Part Number	Options Available	
								Co	C		Metal Shields (-)	Nitrile Seals (NS)
2.5	10	13	0.7	6	11	16	400	593	1438	LRN 18...	✗	✓
3	13	17	0.75	8	13	40	1000	1333	3227	LRN 25...	✓	✓
4	17	21	1	10	15	85	2000	2600	5921	LRN 34...	✓	✓
6	22	28	1.5	14	27	310	5000	6657	13595	LRN 54...	✓	✓

Ordering Details



*Notes:

- It is recommended that holes to suit track roller mounting studs should be reamed to tolerance F6 for a sliding fit.
- Nuts are chemically blackened on the concentric version and bright zinc plated on the eccentrics for identification purposes.
- All eccentric narrow track roller fixing studs are supplied with sockets for adjustment as shown.
- 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.
- Each size of narrow track roller has been designed for use with a specific size of flat track, as shown in the table. However, any track roller may be used in conjunction with any size of flat track, single edged slide or other running surface according to practicality of design.

Wide Track Rollers

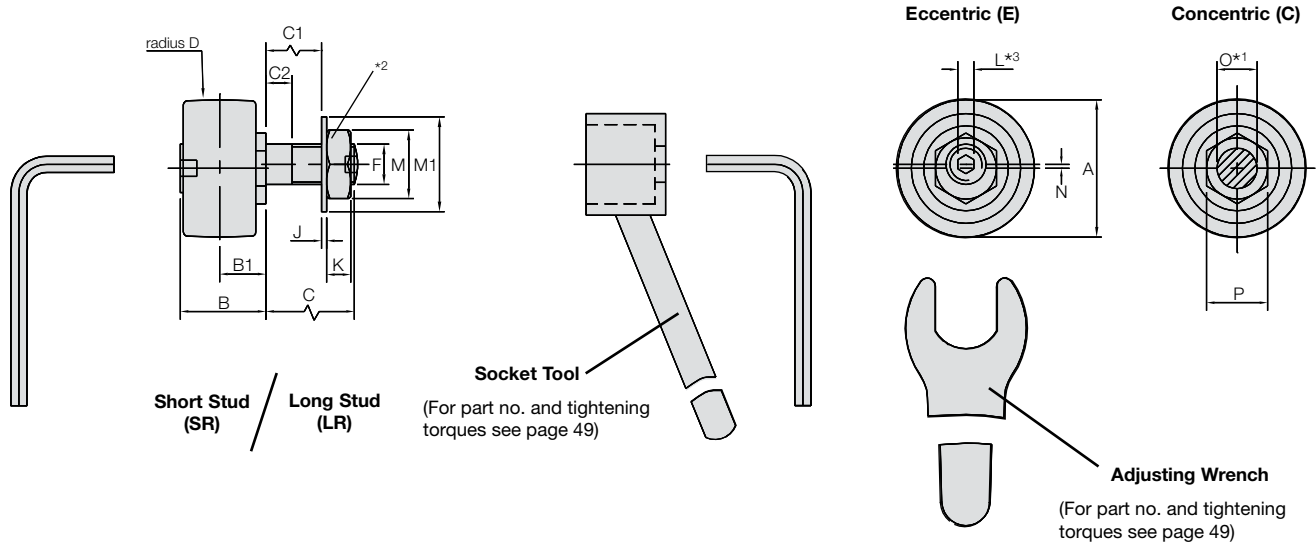
The range of wide track rollers includes a broad range of mounting options to cater for most design requirements, and can be used in conjunction with flat tracks, single edge spacer slides and almost any type of running surface. Each uses a high capacity twin row deep groove ball bearing with a substantial and stiff outer ring and a crowned outer profile.

The through hole fixing type is available in two stud lengths covering most thicknesses of mounting plate and are available with concentric (fixed) and eccentric (adjustable) fixing studs.

The **Blind Hole fixing type (BHR)** allows mounting into a solid machine base where through mounting holes are not possible, or where the thickness of the mounting plate is too great. The blind hole fixing type is also useful where adjustment from the front is preferred, or where access to the opposite side of the mounting hole is restricted. They are available in **Concentric type (C)** which are fixed, or **Eccentric type (E)** which are adjustable.

The wide track rollers are available in the same basic sizes as standard 'V' bearings. This ensures that systems using both 'V' bearings and track rollers will be matched well in terms of functionality and performance.

Through Fixing Type (SR/LR)



Part Number	Use With Flat Track*6	A	B	B1	C		C1		C2		D	E
					Short Stud	Long Stud	Short Stud	Long Stud	Short Stud	Long Stud		
...R 18...	FT 24 12...	18	12.4	6.75	7.4	14	3.4	10	2.4	2.5	500	7
...R 25...	FT 32 16...	25	16.6	9	9.8	19	3.8	13	3.4	4.9	500	10
...R 34...	FT 40 20...	34	21.3	11.5	13.8	22	6.6	14.8	5.2	5.9	500	12
...R 54...	FT 66 33...	54	34.7	19	17.8	30	8.2	20.4	5.7	7.9	500	23.5

S	S1	T	T1	T2	U	U1	V	W1	W2	X	Y	Z
8	10.5	10	4	8	38	54	11	12.3	7.8	M4	7	7
7	9	12	5	10	50	72	14	16	11	M5	8.5	10
9.5	8.5	17.5	6.5	12.5	60	90.5	17	21	15.3	M6	10	14
14.5	16.4	23.5	10.5	18.5	89.5	133	25	31	25	M8	13	20

***Notes:**

1. It is recommended that holes to suit track roller mounting studs should be reamed to tolerance F6 for a sliding fit.
2. Nuts are chemically blackened on the concentric version and bright zinc plated on the eccentrics for identification purposes.
3. All eccentric wide track roller fixing studs are supplied with sockets for adjustment as shown.
4. 'R' dimension is both the eccentric offset of the adjusting nut and the total adjustment available at the roller centerline for 360° rotation of the adjusting nut.
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.
6. Each size of wide track roller has been designed for use with a specific size of flat track, as shown in the table. However, any track roller may be used in conjunction with any size of flat track, single edged spacer slide or other running surface according to practicality of design.

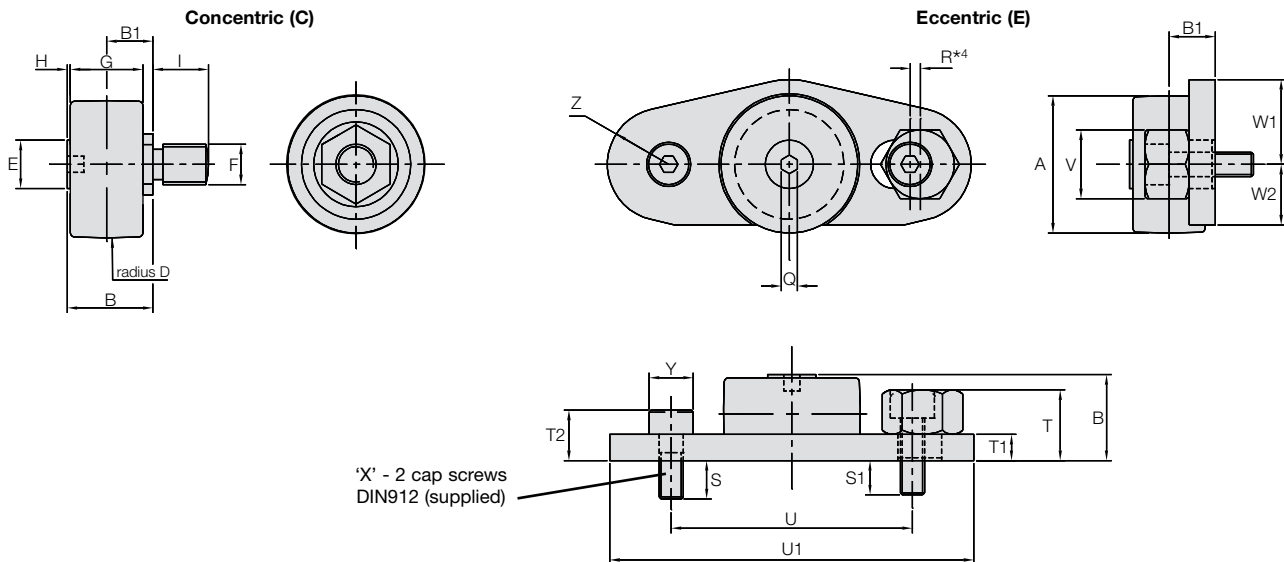
Common mounting faces for track rollers and 'V' bearings in conjunction with flat tracks and single edge spacer slides have been achieved in most instances, to simplify customer's machine design.

All track rollers are available with the **Nitrile Seal (NS)** option which provides a higher degree of sealing against ingress of water and debris than does the default metal shielded type. A small increase in friction may result.

Since track rollers have a pure rolling contact with the track, wear is much less of an issue than it is with 'V' bearings. Special lubricating devices are not normally required, but it is recommended that rollers and tracks are lightly oiled to ensure maximum durability.

See Application Examples on page 13

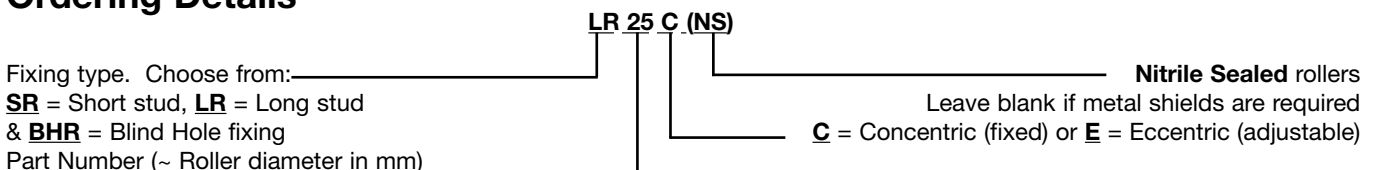
Blind Hole Fixing Type (BHR)



F Metric Fine	G	H	I	J	K	L*3	M	M1	N	+0 -0.03 O*1	P	Q	R*4
M6 x 0.75	10	0.6	7.4	0.8	3.2	2.5	10	13	0.7	6	11	2	1.2
M8 x 1	14	0.5	9.8	1	5	3	13	17	0.75	8	13	3	1.5
M10 x 1.25	18	0.7	13.8	1.25	6	4	17	21	1	10	15	4	2.0
M14 x 1.5	28	1.6	17.8	1.6	8	6	22	28	1.5	14	27	8	3.0

Weight ~g				Max Working Load Capacity	Static and Dynamic Radial Load Capacities (N) ⁵		Part Number	Options Available	
SR...	LR...	BHR...C	BHR...E		Co	C		Metal Shields (-)	Nitrile Seals (NS)
20	21	19	45	600	1168	2301	...R 18...	✗	✓
50	55	45	105	1600	2646	5214	...R 25...	✓	✓
120	125	110	235	3200	5162	9560	...R 34...	✓	✓
440	450	415	800	8000	13271	21989	...R 54...	✓	✓

Ordering Details



Racks

HepcoMotion GV3 racks provide a durable and powerful linear drive when used in conjunction with good quality hardened tooth pinions.

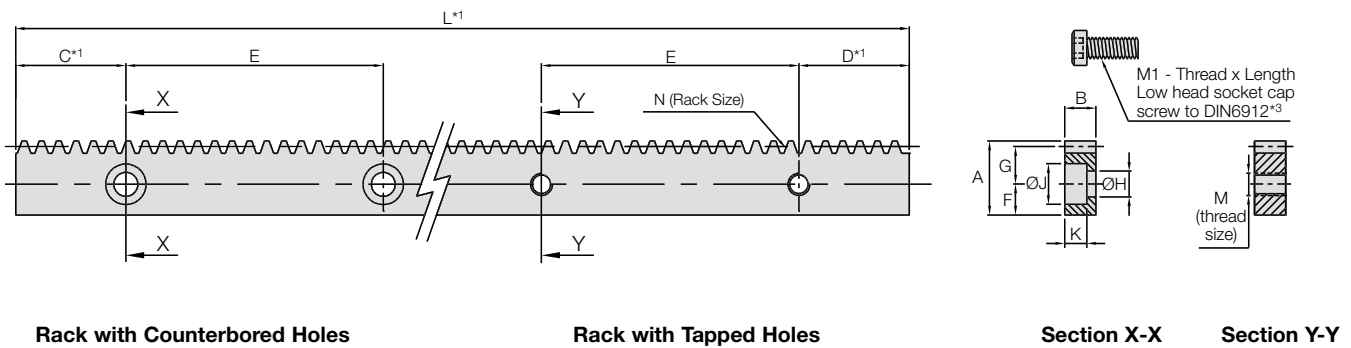
Racks are made from high quality carbon steel, ground on all faces prior to tooth cutting. They are available in 4 standard sizes, with tooth forms from 0.7 to 2.0 metric module with 20° pressure angle and are supplied in an attractive corrosion resistant black finish.

The teeth are machined to a high degree of precision and conform to ISO 1328 grade 8. The back face of the rack is controlled parallel to the tooth pitch line enabling it to be used as a register for setting.

The racks are available with counterbored fixing holes, through tapped holes or without holes for customers to drill as required. All holes are accurately positioned to enable customers to pre-drill their mounting holes.

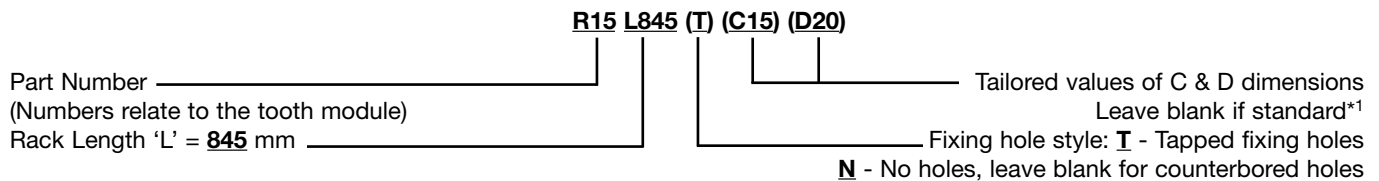
Care should be taken at installation to set the rack straight, and to align parallel with the relevant slide*4. Adjustment for the pinion should be provided in order to achieve the desired mesh quality. For best performance, the teeth should be lubricated with No. 2 consistency lithium soap-based grease.

See Application Examples on pages 10 - 11



Part Number	Use With Pinions	A	B	C	D	E ±0.25	F	G	H	J	K	L*1,2 (max)	M	M1*3		N mod	Max Rack Force (N)*5	Weight kg/m
														Screw	Part No.			
R 07...	P 07 W 5...	12.7	4.0	20.5	20.5	45	6.35	5.65	4.5	7.6	2.9	1828	M4	M4 x 10	FS410	0.7	110	0.37
R 10...	P 10 W 7...	15.65	6.75	43	43	90	7.8	6.85	5.5	9.6	4.0	1828	M5	M5 x 10	FS510	1.0	250	0.77
R 15...	P 15 W 8...	20.0	8.25	43	43	90	8.3	10.2	6.5	11	4.5	1828	M6	M6 x 12	FS612	1.5	400	1.2
R 20...	P 20 W 13...	31.75	14.0	43	43	90	13.2	16.55	11	18	10.5	1828	M10	M10	-	2.0	950	3.3

Ordering Details



*Notes:

- 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.
- Where longer racks are required, standard lengths matched suitable 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.
- 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 DIN912 which are widely available.
- Racks in their free unmounted state are not necessarily absolutely straight. If straightness is important, the rack should be set by bolting down with the rear face located against a register.
- The max rack force quoted is that continuous drive force which can be sustained by a well lubricated rack used in conjunction with the appropriate pinion.

Pinions

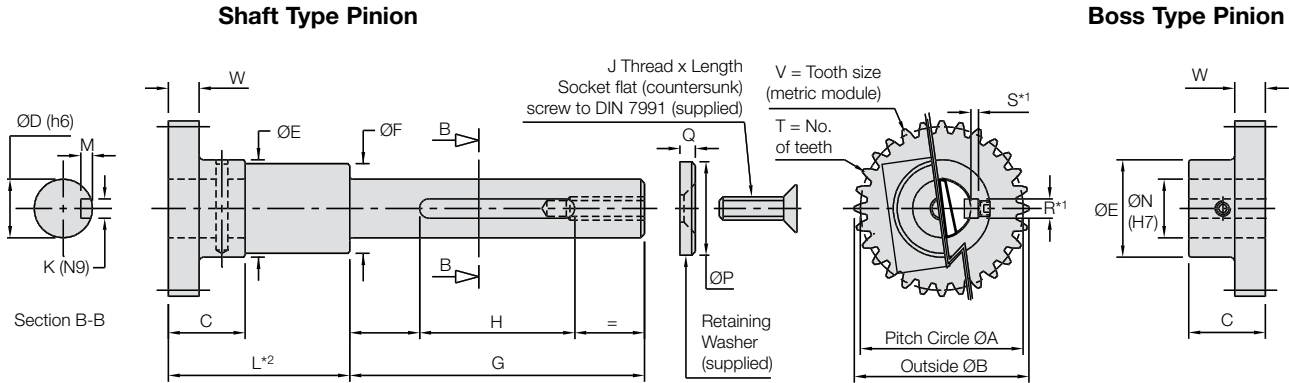
Bishop-Wisecarver supplies a range of pinions which are compatible with rack cut single edge spacer slides, double edge spacer slides with fitted racks and separate racks. Pinions have teeth with a 20° pressure angle and metric module tooth sizes. They are made to standard ISO 1328 grade 10 and are nitride hardened for durability.

Pinions are available in 2 formats: **Boss type (B, BK)** and **Shaft type (S)**. The boss type is supplied with a precision bore, optional keyway*1 and grub screw and is specified for general use. The shaft type includes an extended shaft with keyed diameter, which is compatible with the hollow shaft of the worm gearbox/AC geared motor and flange. This assembly provides a powerful and accurate linear drive system. (See rack driven carriage page for a complete system using these parts.)

Shaft type pinions are supplied with the key, retaining washer and screw necessary to connect to the worm gearbox.

For best performance, the teeth of the rack and pinion should be lubricated with No. 2 lithium soap-based grease.

See Application Examples on pages 10 - 12



Shaft type pinions are supplied with a steel key.

Part Number	A	B	C	D	E	F	G	H	J Thread x Length	K	L ²	M	N	P	Q	R ¹	S ¹	T	mod V	W	Weight/g Boss Type
P05 W7 T28...	14	15	14	-	10	-	-	-	-	-	-	-	5	-	-	-	-	28	0.5	7	11
P07 W9 T28...	19.6	21	17	-	16	-	-	-	-	-	-	-	5	-	-	-	-	28	0.7	9	31
P07 W5 T28...	19.6	21	13	-	16	-	-	-	-	-	-	-	5	-	-	-	-	28	0.7	5	22
P10 W11 T42...	42	44	23	15	30	23	76	40	M6 x 16	5	to order	3	15	24	4	5	2.3	42	1	11	160
P10 W7 T42...	42	44	18.5	-	30	-	-	-	-	-	-	-	15	-	-	5	2.3	42	1	7	120
P125 W14 T34...	42.5	45	25.5	20	30	30	81	50	M8 x 20	6	to order	3.5	15	32	5	5	2.3	34	1.25	14	200
P15 W8 T28...	42	45	19.8	15	30	23	76	40	M6 x 16	5	57.4	3	15	24	4	5	2.3	28	1.5	8	125
P20 W20 T27...	54	58	35	20	40	30	81	50	M8 x 20	6	to order	3.5	20	32	5	6	2.8	27	2	20	430
P20 W13 T27...	54	58	25	20	40	30	81	50	M8 x 20	6	64.4	3.5	20	32	5	6	2.8	27	2	13	300

Part Number	For Use With				Available Types	
	Rack	Single Edge Spacer Slide	Double Edge Spacer Slide	Worm Gearbox/ AC Geared Motor	Boss	Shaft
P05 W7 T28...	-	NMSE...R	-	-	✓	✗
P07 W9 T28...	-	NVE...R	-	-	✓	✗
P07 W5 T28...	R07...	-	NV...R	-	✓	✗
P10 W11 T42...	-	NSE...R	-	WG3...	✓	✓
P10 W7 T42...	R10...	-	NS...R	-	✓	✗
P125 W14 T34...	-	NME...R	-	WG4...	✓	✓
P15 W8 T28...	R15...	-	NM...R	WG3...	✓	✓
P20 W20 T27...	-	NLE...R	-	WG4...	✓	✓
P20 W13 T27...	R20...	-	NL...R	WG4...	✓	✓

Ordering Details

P20 W13 T27 S (68) (D20)

Part Number _____
 number is 10 x tooth module (size)
 ~ Face width 'W' = **13** mm
 Number of teeth 'T' = **27**

Shaft engagement diameter D = **20** mm
 Leave blank for boss type pinion
 Pinion shaft length (Dim 'L' above) in mm
 Leave blank for boss type pinion
 Pinion format: **B** = Boss type;
BK = Boss type with Key; **S** = Shaft type

*Notes:

- Small boss type pinions (with bores below 8 mm) are not supplied with keyways as standard. It is usual to secure these small pinions by an alternative method such as a set screw onto a flat on the mating shaft or using a taper pin.
- The length of the pinion shaft will depend on the exact design. Shaft pinions are made to length from part machined stock, to ensure rapid delivery and economy. The lengths shown for the P15W8T28 & P20W13T27 are those used in the rack driven carriage. Other lengths are available as required.

Belt Driven Carriages

Belt driven carriages are available to suit 10 sizes of double edge slide in all grades of precision. They have all of the benefits of the standard carriages along with many additional features:

Carriages may be specified with the **Removable option (R)** which is the key feature of the removable carriage. This allows the carriage to be disengaged from the slide at any position along its length, without the need for complete disassembly.

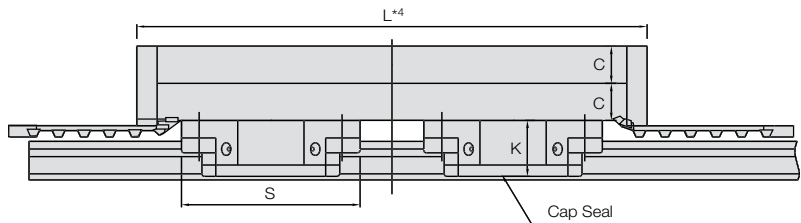
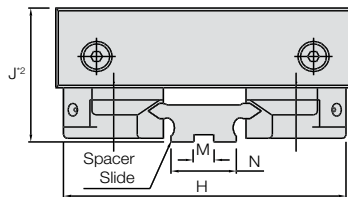
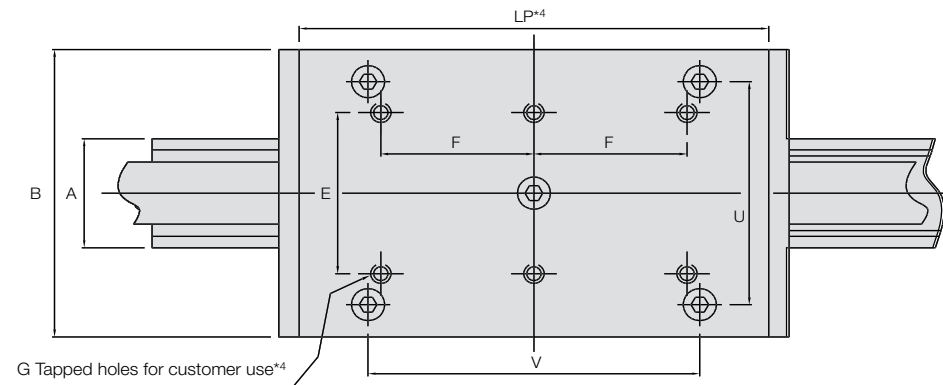
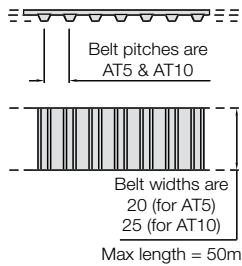
Each belt driven carriage incorporates a base plate and a removable top plate which can simply be unscrewed and reworked as required. Tapped holes are provided in convenient positions to enable components to be attached.

Belt driven carriages are normally supplied as **Assembled Units (AU)** which are factory assembled and set to the slide. Information regarding the options for bearings, lubrication devices and load capacities is given on the page for standard carriages*¹.

The belt driven carriage incorporates an integral belt gripper & tensioner at each end. The gripper securely holds the toothed belt and the fixing screws allow controlled pretensioning and adjustment.

Example: Short Carriage with Cap Seals on a Spacer Slide

Optional Toothed Belt



Part Number	For Use With Slides	Bearing Ø	A	B	C	D ⁴	E	F ⁴	G ⁴	H	J ²				
											No of Holes x Thread	P1	P2 & P3		
AU BD 35 25...	S 35 & NS 35	25	35	90	13	70	150	48	50	100	4 x M6	6 x M6	88	45	45.2
AU BD 50 25...	S 50 & NS 50	25	50	112	14	82	162	60	50	90	4 x M6	6 x M6	103	47	47.2
AU BD 44 34...	M 44 & NM 44	34	44	116	15	95	168	65	60	90	6 x M8	6 x M8	114	54	54.2
AU BD 60 34...	M 60 & NM 60	34	60	135	17	119	199	75	75	115	6 x M8	6 x M8	130	58	58.2
AU BD 76 34...	M 76 & NM 76	34	76	150	18	139	239	100	80	130	6 x M8	6 x M8	146	60	60.2

Carriage Part Number	Pulleys								Belt Part No.	Belt Tension ⁵	
	Part Number	W	W1	X	X1	Y	Z	No of Teeth		Working	Max
AU BD 35 25...	TP20...& IP20...	49.5	47	25	27	12	39.4	27	DB 20 AT5...	560	5390
AU BD 50 25...	TP20...& IP20...	49.5	47	25	27	12	39.4	27	DB 20 AT5...	560	5390
AU BD 44 34...	TP25...& IP25...	67	67	30	32	15	56.8	20	DB 25 AT10...	1225	12450
AU BD 60 34...	TP25...& IP25...	67	67	30	32	15	56.8	20	DB 25 AT10...	1225	12450
AU BD 76 34...	TP25...& IP25...	67	67	30	32	15	56.8	20	DB 25 AT10...	1225	12450

* Notes:

- For load capacities see standard carriages page. It is strongly recommended that load and life are determined using the methods shown in the calculations section.
- Some dimensions will vary by the amount of the grinding allowance according to the grade of slide selected. All carriages are compatible with all grades of slide.
- CH (Controlled Height) bearings are selected to be within ±0.005 mm in respect of 'B1' dimension on pages 28-29 compared to standard bearings which are within ±0.025 mm. Customers requiring CH bearings with the same tolerance band in respect of a number of carriages should state this on their order.
- Carriages are available in 2 standard lengths, therefore bearing centers 'D' and the number and position of component mounting holes 'G' will vary accordingly. Bishop-Wisecarver can provide carriages to your special length requirements on request.
- The max belt tension stated relates to the breaking load, and is provided for comparison purposes only. The working belt tension should not be exceeded when used with pulleys and grippers.
- The removable option is not available in conjunction with cap seals or controlled height bearings.
- The **IP 25 P15** idler pulley is fitted with 2 off 6302 2RS deep groove ball bearings (C = 11400N, Co = 5400N per bearing). The **IP 20 P12** idler pulley is fitted with 2 off 6001 2RS deep groove ball bearings (C = 5070N, Co = 2360N).

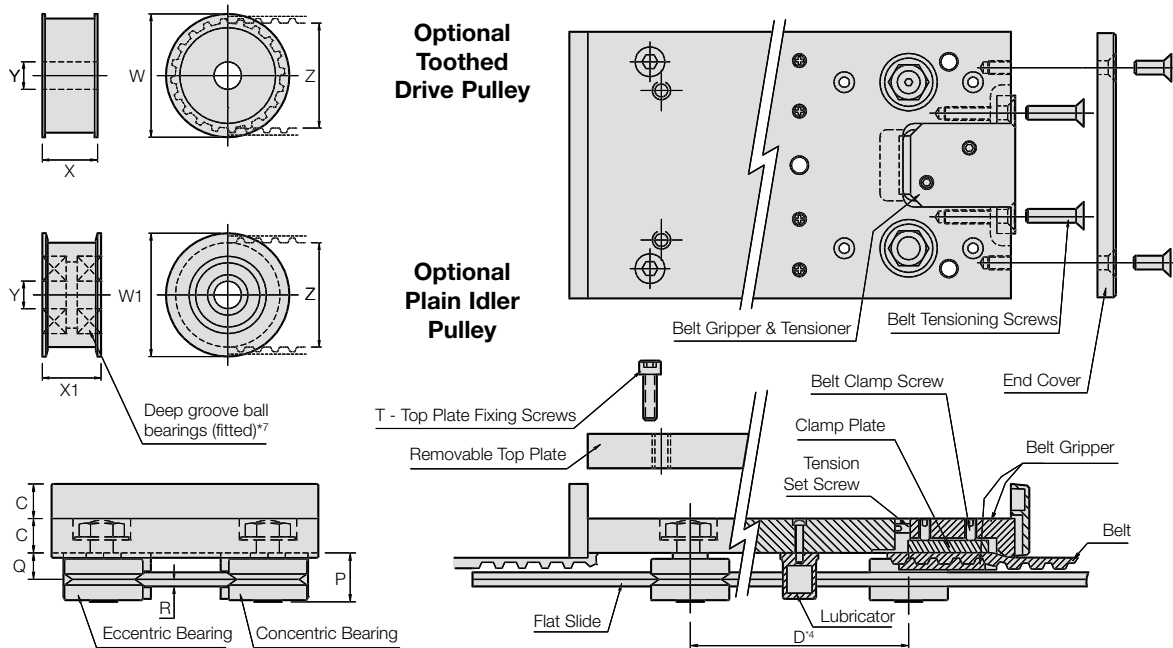
In addition to the carriage, Bishop-Wisecarver will supply the necessary belt and pulleys to complete the system. Belts are steel reinforced polyurethane, and have the high strength AT tooth profile. Bored drive pulleys with zero backlash AT profile teeth are available in one size to provide a useful driving ratio for most applications. Idler pulleys are plain without teeth and are supplied complete with fitted deep groove ball bearings, ready to fit onto a shaft.

Customers wishing to run the carriage on a flat slide must specify the counterbored slide fixing hole option as the belt would otherwise foul the heads of the screws.

Customers requiring a beam mounted belt driven carriage with pulleys should consider the HepcoMotion DLS Linear Transmission which is a complete ready to mount positioning system including drive motor if required. Please send for the DLS catalog.

See Application Examples on pages 10 and 12

Example: Short Carriage with Lubricators on a Flat Slide



K	L ⁴		LP ⁴		M	N ²			P	Q	R ²			S	T ⁴		U	V ⁴		Carriage ~Weight (kg) ⁴	
	18	240	138	218		25	P1 & P2	P3			9	2.4	2.5		55	4 x M6		5 x M6	70	97	180
18	160	240	148	228	10 x 3.5	40	40.4	16.6	9	2.4	2.5	55	5 x M6	5 x M6	88	112	192	1.6	2.3		
22.5	200	280	184	264	8 x 3	26	26.4	21.3	11.5	3.1	3.2	70	5 x M8	5 x M8	90	130	215	2.0	2.8		
22.5	224	304	208	288	10 x 3.5	42	42.4	21.3	11.5	3.1	3.2	70	5 x M8	5 x M8	109	156	236	3.4	4.3		
22.5	244	344	228	328	12 x 4	58	58.4	21.3	11.5	3.1	3.2	70	5 x M8	5 x M8	124	188	288	4.1	5.6		

Ordering Details

AUBD4434 L200 (R) (CS) (DR) (NS) (CH) (T) + Slide Part Number

Part Number _____

AU... = Assembled carriage
 Carriage Length 'L' = 200 mm _____
R = Removable carriage option _____
 Leave blank if not required*⁶
 Lubrication Options:
CS = Cap Seals or **LB** for Lubricators _____
 Leave blank if not required

_____ **T** = Tamper proof option
 Leave blank if not required
 _____ **CH** = Controlled Height bearings*³
 Leave blank if not required
 _____ **NS** = Nitrile Sealed bearings
 Leave blank if not required
 _____ **DR** = Double Row bearings
 Leave blank if not required

Ordering Details for Pulleys & Belts

TP 20 AT5 T27 P12 0 _____ **Toothed Drive Pulley** for 20 mm wide AT5 belt with 27 teeth & 12 mm plain bore.
TP 25 AT10 T20 P15 0 _____ **Toothed Drive Pulley** for 25 mm wide AT10 belt with 20 teeth & 15 mm plain bore.
IP 20 P12 _____ **Idler Pulley** for 20 mm wide belt with fitted bearings to run on 12 mm Ø shaft.
IP 25 P15 _____ **Idler Pulley** for 25 mm wide belt with fitted bearings to run on 15 mm Ø shaft.
DB 20 AT5 L2345 _____ **Drive Belt** 20 mm wide with AT5 tooth profile. **L2345** is the required length in mm.
DB 25 AT10 L3456 _____ **Drive Belt** 25 mm wide with AT10 tooth profile. **L3456** is the required length in mm.

Rack Driven Carriages

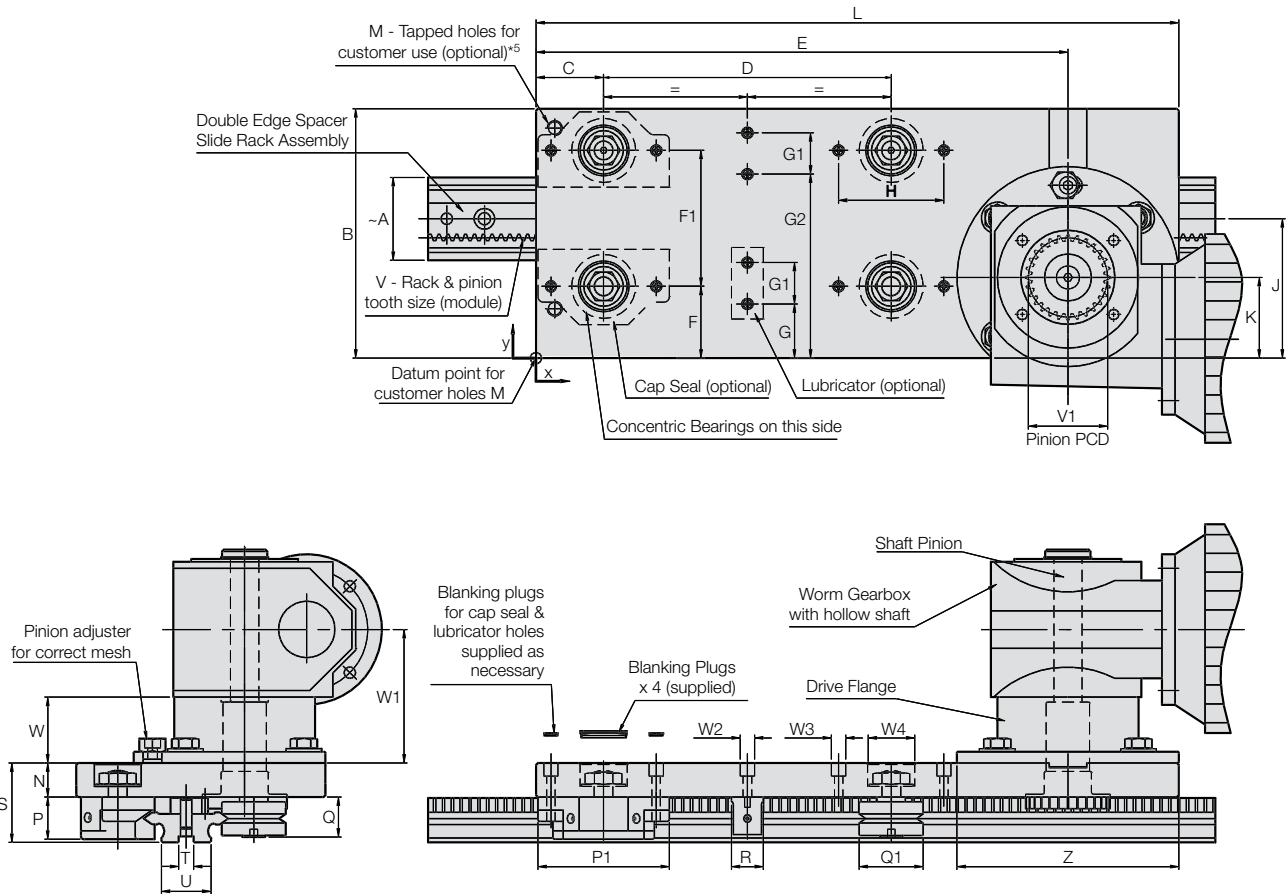
Driven carriages are available to suit 5 sizes of double edge spacer slide (with fitted racks) in all grades of precision. They have all of the benefits of the standard type carriage along with many additional features including micro-adjustment facility for achieving the correct engagement of the pinion with the rack.

Rack driven carriages include the worm gearbox, drive flange and shaft pinion of suitable ratio. The gearbox may be supplied coupled with an integral AC motor which is the most economical means of producing point-to-point linear motion, and which may be controlled for speed and acceleration via the AC speed controller, which is available from Bishop-Wisecarver. The gearbox can also be supplied with an adaptor flange and input shaft coupling tailored to suit other makes or types of motors including steppers and servos which benefit from the low backlash of the gearbox.

Tailored carriages are available on short delivery for customers wishing to use their own motor, gearbox and pinion.

Part Number	Use with Slides	A	B	F	F1*4		G	G1	G2	H	J	K	N	P	P1
					Standard	Removable									
AU RD 44 34...	NM 44...R	44	133	38.2	72.3	74.8	28.8	22	97.8	56	74.1	43	18	22.5	70
AU RD 60 34...	NM 60...R	60	144	29.7	88.3	90.8	20.3	22	105.3	56	74.1	43	18	22.5	70
AU RD 76 34...	NM 76...R	76	154	21.7	104.3	106.8	12.3	22	113.3	56	74.1	43	18	22.5	70
AU RD 76 54...	NL 76...R	76	193	41.2	119.1	123	27.2	33	141.2	80	100.6	57	20	36.5	98
AU RD 120 54...	NL 120...R	120	240	38.5	163.1	167	24.5	33	182.5	80	119.8	111.3	20	36.5	98

Please see other table for dimensions C, D, E & L



* Notes:

1. The maximum load capacities quoted on the standard and removable carriage pages, assume lubrication at the interface of bearings and slide. This can best be achieved by using cap seals or lubricators. It is strongly recommended that load and life are determined using methods shown in the calculations section.
2. Some dimensions will vary by the amount of the grinding allowance according to the grade of slide selected. All carriages are compatible with all grades of slide.
3. CH (Controlled Height) bearings are selected to be within ± 0.005 mm in respect of 'B1' dimension on pages 28-29 compared to standard bearings which are within ± 0.025 mm. Customers requiring CH bearings with the same tolerance band in respect of a number of carriages should state this on their order.
4. The carriage bearing and cap seal fixing centers F1 are optimized for use with any precision grade of slide. Customers making their own carriage plate should calculate their drilling centers for the particular grade of slide selected. Please see assembled systems or individual component page for details of calculations.
5. Any number and size of tapped mounting holes 'M' can be provided in any available position. These may be specified in the ordering details after the designation M by stating the co-ordinates X & Y relative to the datum point, followed by the tapped hole size. **Example:** M - X10Y25M6 - x=10 mm, y=25 mm, hole size = M6. Care should be taken to avoid any hole position that bridges the contact area between cap seal and carriage plate as this will allow grease to escape.
6. The removable option is not available in conjunction with cap seals or controlled height bearings.
7. The quoted rack drive force is determined by the rack and pinion size, gearbox bearings and gears, and the duty.

Carriages may be specified as the removable type which incorporates double eccentric bearings and allows the disengagement of the carriage from the slide at any position along its length without the need for complete disassembly.

Rack driven carriages are normally supplied as **Assembled Units (AU)** which are factory assembled and set to the slide. More specific information regarding the options for bearings, lubrication devices and load capacities is given on the pages for both standard and removable carriages*1. For details of linear drive performance, please see the calculations section.

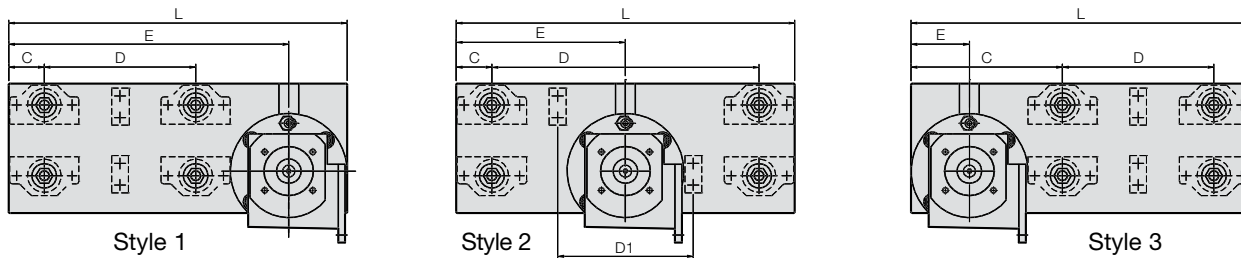
For best performance, the teeth should be lubricated with No. 2 consistency lithium soap-based grease.

Q	Q1	R	S		T	U		V MOD	V1 PCD	W	W1	W2	W3	W4	Z	Rack Drive Force/N*7
			P1	P2 & P3		P1 & P2	P3									
21.3	34	17	42	42.25	8	26	26.5	1.5	42	35	71	5.4	7.5	25	118	400
21.3	34	17	42	42.25	10	42	42.5	1.5	42	35	71	5.4	7.5	25	118	400
21.3	34	17	42	42.25	12	58	58.5	1.5	42	35	71	5.4	7.5	25	118	400
34.7	54	25	58.5	58.75	15	50	50.5	2	54	34.5	72.5	6.5	9.5	32	147	700
34.7	54	25	58.5	58.75	45	94	94.5	2	54	34.5	72.5	6.5	9.5	32	147	700

Specifying the Format and Size of the Carriage

3 styles of carriage are available with motor mounting positions as shown in the diagram below. The style and size are specified by selecting the required values for dimensions C, D, E, & L in the table below the diagram. Any values for these dimensions may be chosen subject to the recommended limitations in the table. If lubricators are specified with style 2 carriage, these will be offset to one another as indicated in the diagram.

The motor and gearbox can be mounted in any one of 8 orientations.



Carriage Style	Part Number	Minimum Recommended Values								
		With Cap Seals				With Lubricators				
		C	D	E	L	C	D	D1	E	L
Style 1	AU RD...34...	36	F1	C+D+92*	E+60	18	F1	-	C+D+73*	E+60
	AU RD...54...	51	F1	C+D+119*	E+75	28	F1	-	C+D+91*	E+75
Style 2	AU RD...34...	36	182*	C+92*	C+D+36	18	177*	124	C+89*	C+D+18
	AU RD...54...	51	237*	C+119*	C+D+51	28	235*	154	C+118*	C+D+28
Style 3	AU RD...34...	E+92*	F1	59	C+D+36	E+73*	F1	-	59	C+D+18
	AU RD...54...	E+119*	F1	73.5	C+D+51	E+91*	F1	-	73.5	C+D+28

Figures marked * are the minimums which can be achieved without the flange covering the bearing stud counterbore or the cap seal or lubricator fixings. Smaller values of these dimensions can be achieved if overlap is acceptable to the customer. When specifying such reduced dimensions, the customer should ensure that the pinion does not interfere with either bearings, cap seals or lubricators.

Ordering Details

AURD4434 L288 C36 D100 E228 (M) (R) (DR) (NS) (CH) (CS) (T)

Part Number _____

AU... = Assembled Carriage

Carriage Length 'L' = 288 mm _____

Dimension 'C' = 36 mm _____

Dimension 'D' = 100 mm _____

Dimension 'E' = 228 mm _____

M - Customer mounting holes*5 _____

Leave blank if not required _____

R for Removable carriage option _____

Leave blank if not required*6 _____

T = Tamper proof option
Leave blank if not required

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

CH = Controlled Height bearings*3
Leave blank if not required

NS = Nitrile Sealed bearings
Leave blank if not required

DR = Double Row bearings - Leave blank if not required

Double Edge Spacer Slide Rack Assembly page 20-21. Please state part number as the third line of your order.

Load/Life Calculations

V Slide & Bearing Systems

The load capacity and life of 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.

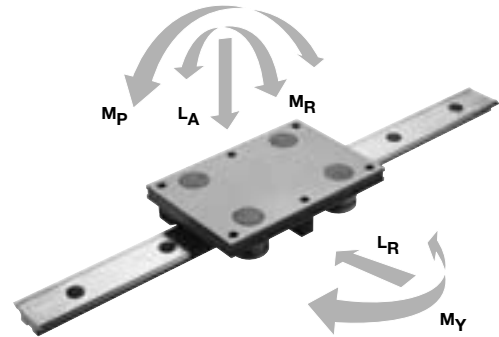
Other factors including operational speed, length of stroke and environmental conditions may also have an effect*2.

When calculating the system load and life, one of two approaches should be taken: if the system uses a conventional 4 bearing carriage (such as any of the GV3 carriages), then this may be treated as a single item, and the load and life be determined as in the 4 Bearing Carriage Calculations below; alternatively, each V bearing can be treated separately according to the method shown in the Individual Bearing Calculations section.

4 Bearing Carriage Calculations

When calculating the loading and life of a V slide system using a 4 bearing carriage, the loading on the system should be resolved into the direct load components, L_A and L_R , and the moment loading components M_P , M_Y and M_R (see diagram on right).

The maximum direct and moment load capacities for standard carriages are given in the tables below. Capacities are included for both 'dry' and 'lubricated'*4 conditions - this refers to the 'V' contact, since all bearings are greased internally for life. Values are based on shock-free duty.

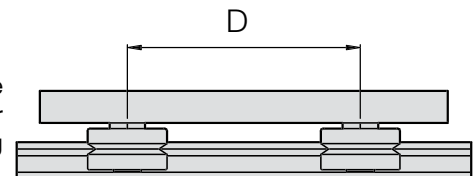


Carriage Part Numbers	Dry System, Twin and DR Type Bearing					Lubricated System, Twin Type Bearing					Lubricated System, DR Type Bearing				
	$L_A(max)$	$L_R(max)$	$M_R(max)$	$M_Y(max)$	$M_P(max)$	$L_A(max)$	$L_R(max)$	$M_R(max)$	$M_Y(max)$	$M_P(max)$	$L_A(max)$	$L_R(max)$	$M_R(max)$	$M_Y(max)$	$M_P(max)$
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm	N	N	Nm	Nm ⁶	Nm
AU...12 13...	90	90	0.5	45 x D	45 x D	240	240	1.3	120 x D	120 x D	Not Available				
AU...20 18...	180	180	1.6	90 x D	90 x D	500	400	4.5	200 x D	250 x D	760	1200	7	600 x D	380 x D
AU...28 18...	180	180	2.3	90 x D	90 x D	500	400	6.5	200 x D	250 x D	760	1200	10	600 x D	380 x D
AU...25 25...	400	400	4.5	200 x D	200 x D	1280	1200	14	600 x D	640 x D	1600	3000	18	1500 x D	800 x D
AU...35 25...	400	400	6.5	200 x D	200 x D	1280	1200	21	600 x D	640 x D	1600	3000	26	1500 x D	800 x D
AU...50 25...	400	400	9.5	200 x D	200 x D	1280	1200	30	600 x D	640 x D	1600	3000	38	1500 x D	800 x D
AU...44 34...	800	800	16	400 x D	400 x D	3200	2800	65	1400 x D	1600 x D	3600	6000	73	3000 x D	1800 x D
AU...60 34...	800	800	22	400 x D	400 x D	3200	2800	90	1400 x D	1600 x D	3600	6000	100	3000 x D	1800 x D
AU...76 34...	800	800	29	400 x D	400 x D	3200	2800	115	1400 x D	1600 x D	3600	6000	130	3000 x D	1800 x D
AU...76 54...	1800	1800	64	900 x D	900 x D	7200	6400	250	3200 x D	3600 x D	10000	10000	360	5000 x D	5000 x D
AU...120 54...	1800	1800	100	900 x D	900 x D	7200	6400	410	3200 x D	3600 x D	10000	10000	580	5000 x D	5000 x D

Carriage Part Number	Dry System, Slimline Type Bearing					Lubricated System, Slimline Type Bearing				
	$L_A(max)$	$L_R(max)$	$M_R(max)$	$M_Y(max)$	$M_P(max)$	$L_A(max)$	$L_R(max)$	$M_R(max)$	$M_Y(max)$	$M_P(max)$
	N	N	Nm	Nm	Nm	N	N	Nm	Nm	Nm
AU...20 195...	180	180	1.6	90 x D	90 x D	400	480	3.5	240 x D	200 x D
AU...28 195...	180	180	2.3	90 x D	90 x D	400	480	5	240 x D	200 x D
AU...25 265...	400	400	4.5	200 x D	200 x D	940	1150	10.5	575 x D	470 x D
AU...35 265...	400	400	6.5	200 x D	200 x D	940	1150	15	575 x D	470 x D
AU...50 265...	400	400	9.5	200 x D	200 x D	940	1150	22	575 x D	470 x D
AU...44 360...	800	800	16	400 x D	400 x D	2000	2400	40	1200 x D	1000 x D
AU...60 360...	800	800	22	400 x D	400 x D	2000	2400	55	1200 x D	1000 x D
AU...76 360...	800	800	29	400 x D	400 x D	2000	2400	70	1200 x D	1000 x D
AU...76 580...	1800	1800	64	900 x D	900 x D	4240	5200	150	2600 x D	2120 x D
AU...120 580...	1800	1800	100	900 x D	900 x D	4240	5200	240	2600 x D	2120 x D

Calculating the System Load Factor

To calculate the system life, the load factor L_F should first be calculated using the equation below. Where M_Y & M_P loads are concerned, the $M_{Y(max)}$ and $M_{P(max)}$ for the relevant carriage will need to be determined. This is established by multiplying the figure shown in the table by the spacing of the bearings, D, in meters.



$$L_F = \frac{L_A}{L_{A(max)}} + \frac{L_R}{L_{R(max)}} + \frac{M_R}{M_{R(max)}} + \frac{M_Y}{M_{Y(max)}} + \frac{M_P}{M_{P(max)}}$$

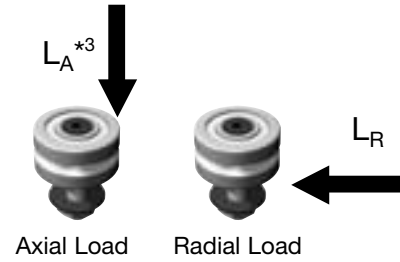
L_F should not exceed 1 for any combination of loads.

Once L_F has been determined for the application, the life is calculated as shown at the bottom of page 47.

Individual 'V' Bearing Calculations

Many systems do not use a standard 4 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^{*1}) and radial (L_R^{*1}) components.

The maximum L_A and L_R load capacities for all types of 'V' bearing are given in the tables 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.



Bearing Part Numbers	Dry		Lubricated	
	$L_{A(max)}$ N	$L_{R(max)}$ N	$L_{A(max)}$ N	$L_{R(max)}$ Nm
...J 13...	22.5	45	60	120
...J 18...	45	90	125	200
...J 25...	100	200	320	600
...J 34...	200	400	800	1400
...J 54...	450	900	1800	3200

Bearing Part Numbers	Dry		Lubricated	
	$L_{A(max)}$ N	$L_{R(max)}$ N	$L_{A(max)}$ N	$L_{R(max)}$ N ⁶
...J 18 DR...	45	90	190	600
...J 25 DR...	100	200	400	1500
...J 34 DR...	200	400	900	3000
...J 54 DR...	450	900	2500	5000

Bearing Part Numbers	Dry		Lubricated	
	$L_{A(max)}$ N	$L_{R(max)}$ N	$L_{A(max)}$ N	$L_{R(max)}$ N
...J 195...	45	90	100	240
...J 265...	100	200	235	575
...J 360...	200	400	500	1200
...J 580...	450	900	1060	2600

The above figures 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 on pages 28-31. For loading of bearings with smaller slides, please contact Bishop-Wisecarver Corporation.

Calculating the System Load Factor

To calculate the system life, the load factor L_F should first be calculated using the equation below.

$$L_F = \frac{L_A}{L_{A(max)}} + \frac{L_R}{L_{R(max)}}$$

L_F should not exceed 1 for any combination of loads.

Once L_F has been determined for each bearing, the life can be calculated as follows:

Calculating System Life

With L_F determined for either a 4 bearing carriage or for an individual bearing, the life in km can be calculated using one of the two equations below. In these equations, the Basic Life is taken from the table (right) in respect of the bearing and the lubrication condition applicable.

Dry System

$$\text{Life (km)} = \frac{\text{Basic Life}}{(0.03 + 0.97L_F)^2}$$

Lubricated System

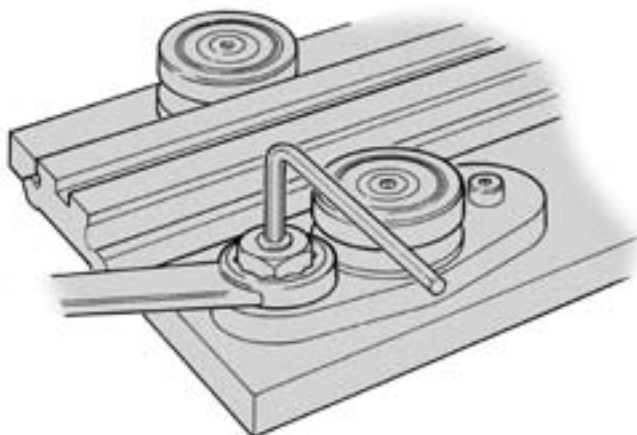
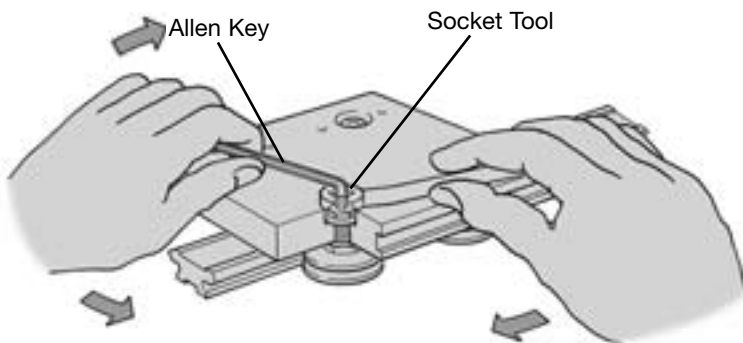
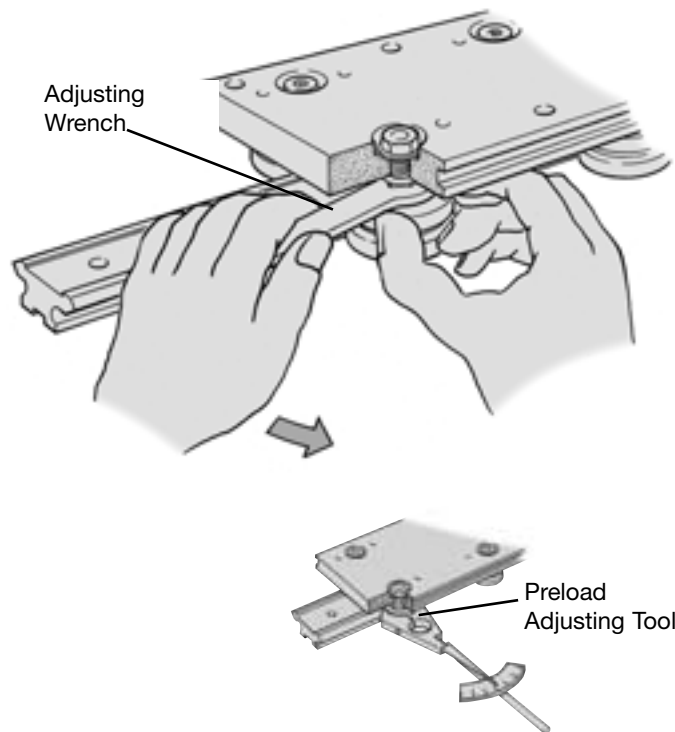
$$\text{Life (km)} = \frac{\text{Basic Life}}{(0.03 + 0.97L_F)^3}$$

Bearings	Basic Life Dry	Basic Life Lubricated
...J 13...	40	50
...J 18...	50	100
...J 18 DR...	50	100
...J 25...	70	50
...J 25 DR...	70	70
...J 34...	100	100
...J 34 DR...	100	250
...J 54...	150	250
...J 54 DR...	150	500
...J 195...	50	100
...J 265...	70	50
...J 360...	100	250
...J 580...	150	200

* Notes:

- The maximum values of M_R , M_P , M_V , 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.
- 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, then please calculate the distance travelled 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 Corporation for assistance.
- For the purposes of the load/life calculations on this page, the axial load L_A is that load in the axial direction which 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 which is quoted on the relevant bearing page.
- 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 lubricators, cap seals or cap wipers, however other methods which ensure the presence of a suitable grease or oil in the critical area are acceptable.
- When a system consists of more than 4 bearings per carriage (e.g. see application examples on pages 9 & 12) 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.
- 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 Corporation for details in instances where a higher system life is required.

System Assembly and Adjustment*



Through Fixing Type Bearings & Track Rollers

Having loosely assembled the components (minus load), the concentric bearings should be fully tightened and the eccentric bearings tightened just sufficiently to permit adjustment.

The adjusting wrench should then be engaged with hexagon flanges of the eccentric bearings and gradually turned until the slide or track is captivated between each pair of bearings such that there is no apparent play, but with minimal pre-load. Each pair of bearings should then be checked for correct pre-load by rotating one of them between forefinger and thumb with the slide or track stationary so that the bearing skids against it. A degree of resistance should be felt, but the bearing should turn without difficulty.

When all eccentric bearings have been adjusted and tested in this manner, the fixing nuts should be fully tightened to the recommended torque settings as in the table on page 49, then checked again for pre-load as before.

Please note that too much pre-load will shorten the life of the system. Customers not familiar with this setting procedure may wish to purchase a preload adjusting tool (available for standard bearings only) for use as a training aid and as a means of checking by the quality control department.

Alternative means of adjustment

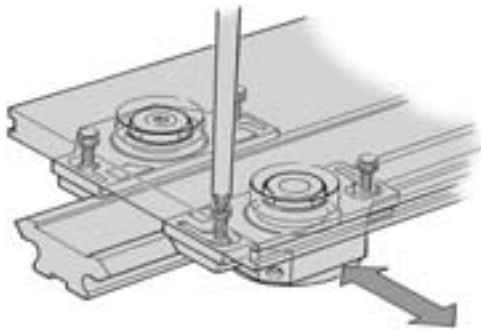
The eccentric bearings may also be adjusted using a standard allen key and socket tool. This method permits re-adjustment without first having to remove cap seals or cap wipers; however, extreme care should be taken not to induce excessive pre-load which can only be judged in this case from the resulting friction of the system. Due to the reduced control associated with this method, it is only recommended when the adjusting wrench method is not possible.

Blind Hole Fixing Type Bearings & Track Rollers

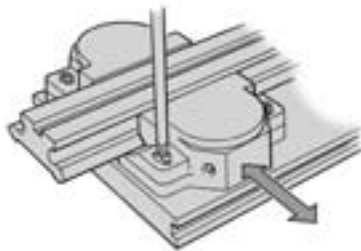
The concentric blind hole fixing bearings or track rollers are simply screwed into tapped holes in the mounting surface and tightened down using the adjusting wrench.

Each eccentric bearing or roller should be located by means of the two screws provided and tightened just sufficiently to still enable adjustment via the eccentric hexagon bush. The same basic procedures as outlined for the through fixing type should be used to ensure that the correct level of pre-load is applied before finally tightening down the fixing screws.

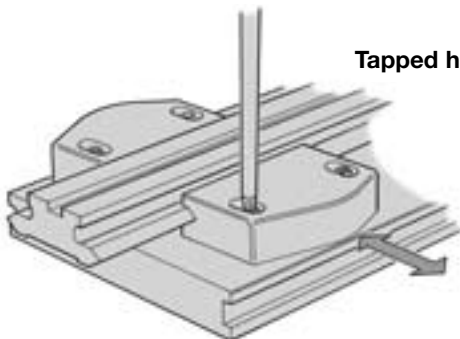
Through hole fixing



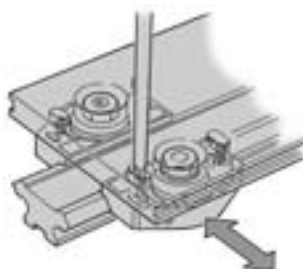
Tapped hole fixing



Tapped hole fixing



Through hole fixing



Cap Seals

Fitting of the cap seals should be carried out after bearing adjustment has been completed.

To fit the cap seals over the bearings, the carriage should be removed from the slide, then the cap seals loosely assembled to the carriage plate utilizing either the through hole fixing facility which is the default method for GV3 carriages, or the tapped hole fixing facility which requires tapped holes to be provided in the carriage plate. Two sets of plastic inserts are included with each cap seal to cater for both methods.

The slide should be re-engaged with the carriage and each cap seal adjusted in, until the felt wipers just make contact with the slide 'V' surface until smearing of the lubricant is observed when the system is operated. When adjusting the cap seal using the through hole fixing method, care should be taken to hold the plastic inserts to prevent them from moving while the screws are tightened.

Greater sealing effect, at the expense of increased friction, may be achieved by adjusting each cap seal body in further until it's 'V' profile makes contact with the 'V' profile of the slide.

The fixing screws should be fully tightened and each cap seal charged with a No. 2 lithium soap-based grease until grease is seen to overflow.

Male grease connector, part No. CSCHF 4034 or complete gun is available from Bishop-Wisecarver Corporation if required.

Cap Wipers

Fitting of the cap wipers should be carried out after bearing adjustment has been completed.

To fit the cap wipers over the bearings, the carriage should be removed from the slide, then the cap wipers loosely assembled to the carriage plate utilizing either the tapped hole fixing facility which is the default method for slimline carriages, or the through hole fixing facility which requires slotted clearance holes to be provided in the carriage plate for adjustment.

The slide should then be re-engaged with the carriage and each cap wiper adjusted in, until the felt wipers just make contact with the slide 'V' surface until smearing of the lubricant is observed when the system is operated.

The fixing screws should be fully tightened and each cap wiper charged with a No. 2 lithium soap-based grease until grease is seen to overflow.

Male grease connector, part No. CSCHF 4034 or complete gun is available from Bishop-Wisecarver Corporation if required.

Bearing/Track Roller Adjusting Tools and Tightening Torques

When ordering individual components for the first time, an adjusting wrench or socket tool should also be ordered - these are only available from Bishop-Wisecarver Corporation.

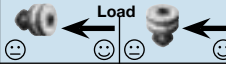



	Bearing/Roller Type									
	...13...	...195...	...18...	...265...	...25...	...360...	...34...	...580...	...54...	
Adjusting Wrench	AT13	AT18	AT18	AT25	AT25	AT34	AT34	AT54	AT54	
Socket Tool	-	RT6	RT6	RT8	RT8	RT10	RT10	RT14	RT14	
Preload Adjusting Tool	ST13	-	ST18	-	ST25	-	ST34	-	ST54	
Fixing Nut Torque	2 Nm	7 Nm	7 Nm	18 Nm	18 Nm	33 Nm	33Nm	90 Nm	90 Nm	

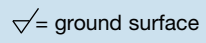



*A guide to installation and adjustment of other components may be found on the individual component pages as relevant.


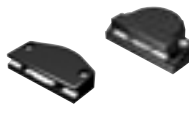
System Selector

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 (pages 2-7) and pages relating to the individual components for other features, benefits and variants.

Bearing Type		Speed	Smoothness	Tolerance of Misalignment	Rigidity	System Height	Tolerance of Debris	Price
 Standard Pattern Twin Type								
 Standard Pattern Double Row Type								
 Slimline Pattern								

Slide Precision Grade		General Accuracy	Smoothness / Quietness	Friction	Price
P1 					
P2 					
P3 					

Lubrication Method	Load	Lubrication Interval	Debris Exclusion	Friction	Safety & Appearance	Price
None			*			
 Lubricators			*			
 Cap Seals or Cap Wipers						

*The Vee 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.

APPLICATION DATA SHEET

Company: _____
 Contact: _____
 Address: _____

City: _____ State: _____ Zip Code: _____
 Phone: _____ Fax: _____ e-mail: _____

System Orientation: _____	horizontal		vertical		
Load: _____	lbs		N		
Stroke Length: _____	in		m		
Velocity: _____	in/s		m/s		
Accel/Decel: _____	in/s ²		m/s ²		
Linear Accuracy: _____	in/ft		mm/m		
Repeatability: _____	in		mm		
Duty Cycle: _____	in/day		m/day		
Environment: _____	factory	food grade	clean room	other	
Temperature: _____	°F		°C		
Additional Forces: _____	lbs		N		

Product/Machine Description: _____

Additional Requirements: _____

Expected Volume: _____ Date Needed: _____

System Sketch

BISHOPWISECARVER®

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 phone: 925.439.8272 fax: 925.439.5931
 info@bwc.com www.bwc.com

TECHNICAL SPECIFICATIONS

'V' Slides

Material and Finish: High carbon bearing steel AISI 52100, hardened on 'V' faces to 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 steel, hardened on all faces to 58-62 Rockwell 'C' scale. Those areas which are ground have N5 surface finish. Other areas have a chemical black finish.

Bearings & Track Rollers

Bearing Raceways and Balls: Carbon-chromium bearing steel AISI 52100, hardened and tempered
 Shields: Steel with bright zinc plated finish
 Seals: Nitrile rubber
 Cage: Plastic
 Studs: High tensile steel with tensile strength = 695 N/mm² chemical black finish
 BH... 'E' Base Plate: Cast steel with chemical black finish
 Temperature Range: -20°C to +120°C

Carriage Plates & 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

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:

4 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
2 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 =	12 m/s	} Higher speeds are possible. Speed depends upon stroke, duty and environmental conditions.
Lubricated 'V' slides & all flat track applications =	8 m/s	

Bishop-Wisecarver Corporation: Manufacturer of the original DualVee® guide wheel and industry leader in guided motion technology, and exclusive North and Central American partner and distributor for HepcoMotion products since 1984.

BISHOPWISECARVER®

Bishop-Wisecarver

DualVee® Guide Wheels
LoPro® Linear Motion System
MadeWell™ Crown Rollers
MinVee® Linear Slide System
QuickTrak® Linear Motion System
SRX-150 Linear Motion System
UtiliTrak® Linear Motion Guide



HepcoMotion®

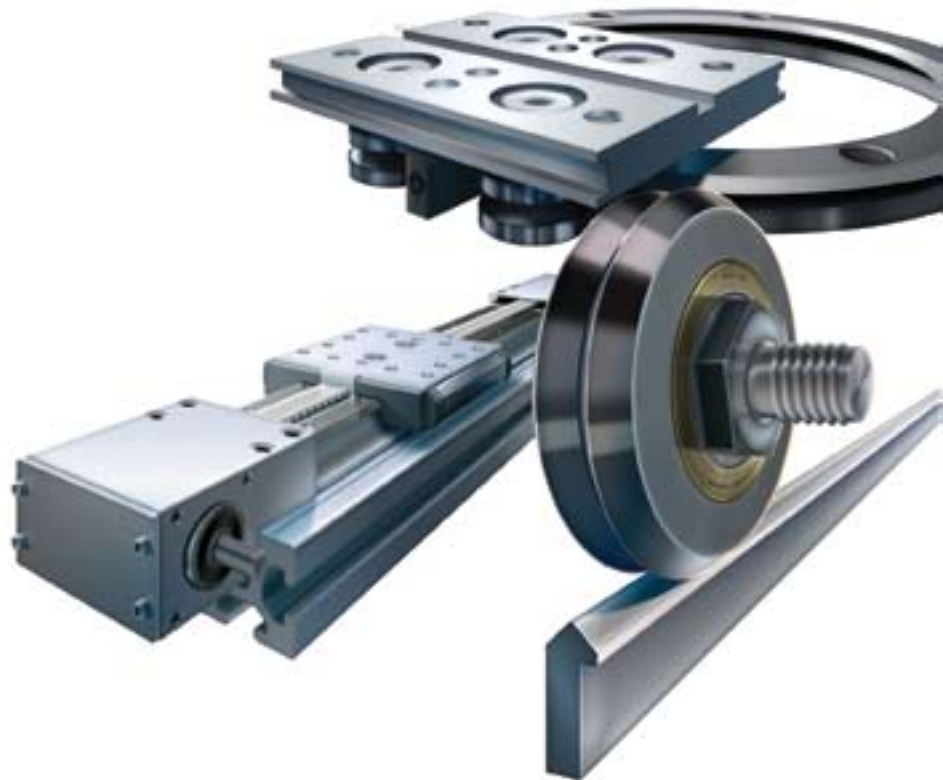
DAPDU2 Double Acting Profile Driven Unit
DLS Driven Linear System
DTS Driven Track System
GV3 Linear Guidance and Transmission System
HDCB Heavy Duty Compact Beam
HDCS Heavy Duty Compact Screw
HDLS Heavy Duty Driven Linear System
HDRT Heavy Duty Ring Slides and Track System
HDS Heavy Duty Slide System
MHD Heavy Duty Track Roller Guidance System
MCS Machine Construction System
PDU2 Profile Driven Unit
PRT Precision Ring and Track System
PSD120 Profile Screw Driven Unit
SBD Sealed Belt Drive
Simple-Select®
SL2 Stainless Steel Based Slide System

PRODUCT ORDERS

Please call Bishop-Wisecarver with your specific application requirements. Our technical staff is available to assist with your custom solution.

Bishop-Wisecarver provides a written one year limited warranty assuring the customer that its products conform to published specifications and are free from defects in material or workmanship.

Complete terms and conditions and warranty information is available at www.bwc.com/about_conditions.vp.html



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