HepcoMotion®

PRT
ring slides and track system

Introducing the **HepcoMotion**® **PRT**

Ring Slides And Track System

Hepco has been solving Customers' circular motion problems for years, building up an indispensable knowledge of applications and clever technical solutions. This knowledge coupled with many months of research and development has resulted in the introduction of a comprehensive range of ring slides and track systems to suit virtually every need.
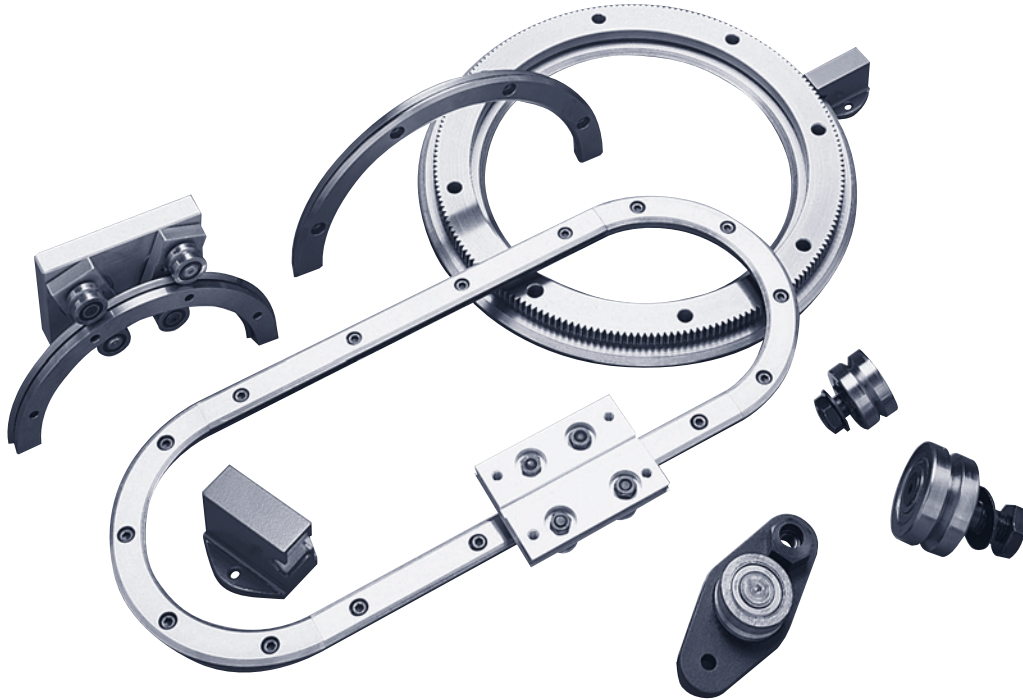
The ring slide and track system products complement Hepco's extensive range of linear motion products enabling customers to choose a single source for all their motion guidance requirements.

Benefits

Common

- Friction free motion.
- Fully adjustable.
- Tolerant of debris.
- Simple and effective means of lubrication.
- Zero play.
- Works in any plane.
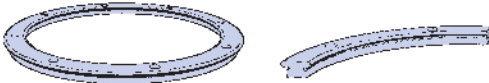- Tolerant of misalignment.
- Easy to install.

Ring Slides and Segments

- Circular motion control at the periphery where it is needed.
- Large hollow centre to accommodate other components.
- Will track the curvature of cylindrical shapes.
- Easy means of driving available.

Track Systems

- Limitless variety of circuits available.
- Precision positioning possible.
- High stability assured.
- Simple alignment facility provided.

Contents

System Composition

Ring Systems

A useful range of nine different ring diameters comprising four different sections is available together with corresponding bearing assemblies. 90° and 180° stock segments are available in each ring size.

RINGS

- Precision ground all over for optimum accuracy and concentricity.
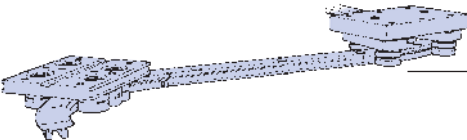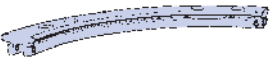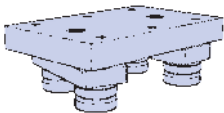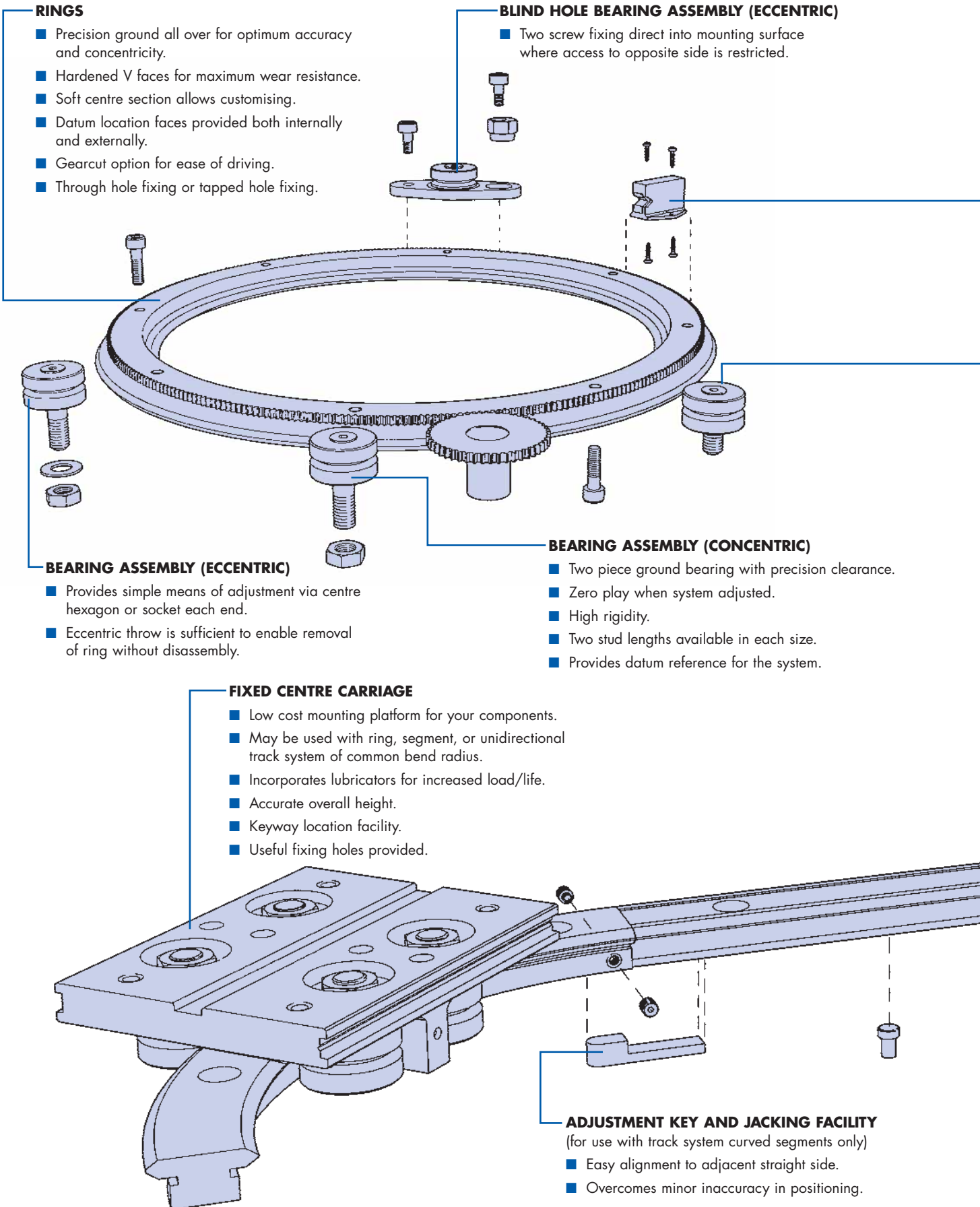- Hardened V faces for maximum wear resistance.
- Soft centre section allows customising.
- Datum location faces provided both internally and externally.
- Gearcut option for ease of driving.
- Through hole fixing or tapped hole fixing.

BLIND HOLE BEARING ASSEMBLY (ECCENTRIC)

- Two screw fixing direct into mounting surface where access to opposite side is restricted.

BEARING ASSEMBLY (ECCENTRIC)

- Provides simple means of adjustment via centre hexagon or socket each end.
- Eccentric throw is sufficient to enable removal of ring without disassembly.

BEARING ASSEMBLY (CONCENTRIC)

- Two piece ground bearing with precision clearance.
- Zero play when system adjusted.
- High rigidity.
- Two stud lengths available in each size.
- Provides datum reference for the system.

FIXED CENTRE CARRIAGE

- Low cost mounting platform for your components.
- May be used with ring, segment, or unidirectional track system of common bend radius.
- Incorporates lubricators for increased load/life.
- Accurate overall height.
- Keyway location facility.
- Useful fixing holes provided.

ADJUSTMENT KEY AND JACKING FACILITY

(for use with track system curved segments only)

- Easy alignment to adjacent straight side.
- Overcomes minor inaccuracy in positioning.

System Composition

Track Systems

Ring segments combine with straight slides to build into an almost limitless variation of either open or closed circuits. Unidirectional or bidirectional bends can be negotiated depending upon the carriage used. Segments in all standard ring sizes are available in addition to straight slides up to 4 metres in length.

BOGIE CARRIAGE
- Negotiates 'S' bends and differing bend radii.
- Large platform for mounting purposes.
- Adjustable axial/radial swivel bearings lubricated for life.
- Accurate overall height.
- Useful fixing holes provided.
- Factory adjusted to suit track system.

LUBRICATOR
- Provides lubrication to the contact surfaces thereby increasing the load capacity and life.
- Alternative screw fixing options.
- Flanged and compact versions available.

BLIND HOLE BEARING ASSEMBLY (CONCENTRIC)
- Screws directly into mounting surface where access to opposite side is restricted.
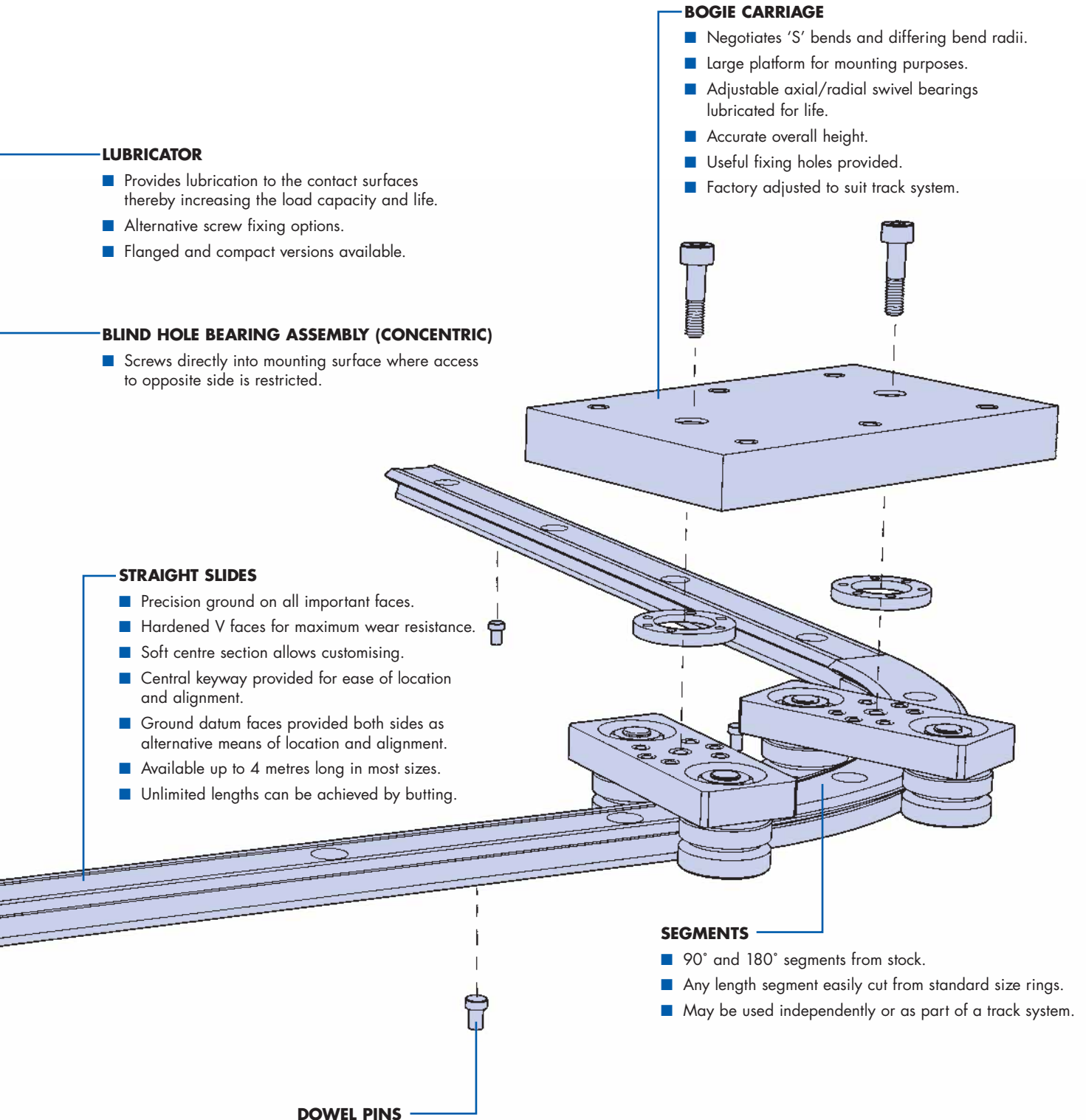
STRAIGHT SLIDES
- Precision ground on all important faces.
- Hardened V faces for maximum wear resistance.
- Soft centre section allows customising.
- Central keyway provided for ease of location and alignment.
- Ground datum faces provided both sides as alternative means of location and alignment.
- Available up to 4 metres long in most sizes.
- Unlimited lengths can be achieved by butting.

SEGMENTS
- 90° and 180° segments from stock.
- Any length segment easily cut from standard size rings.
- May be used independently or as part of a track system.

DOWEL PINS
- Locates in central keyway of straight side providing easy method of location and alignment.
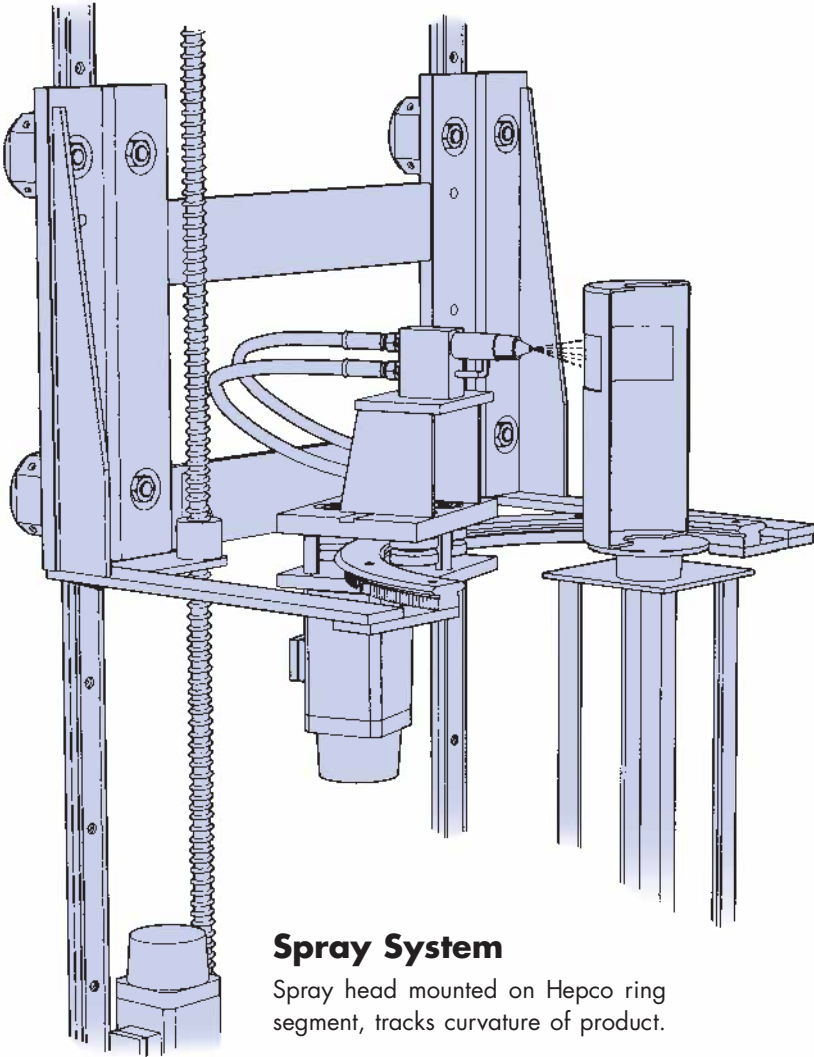
Spray System

Spray head mounted on Hepco ring segment, tracks curvature of product.
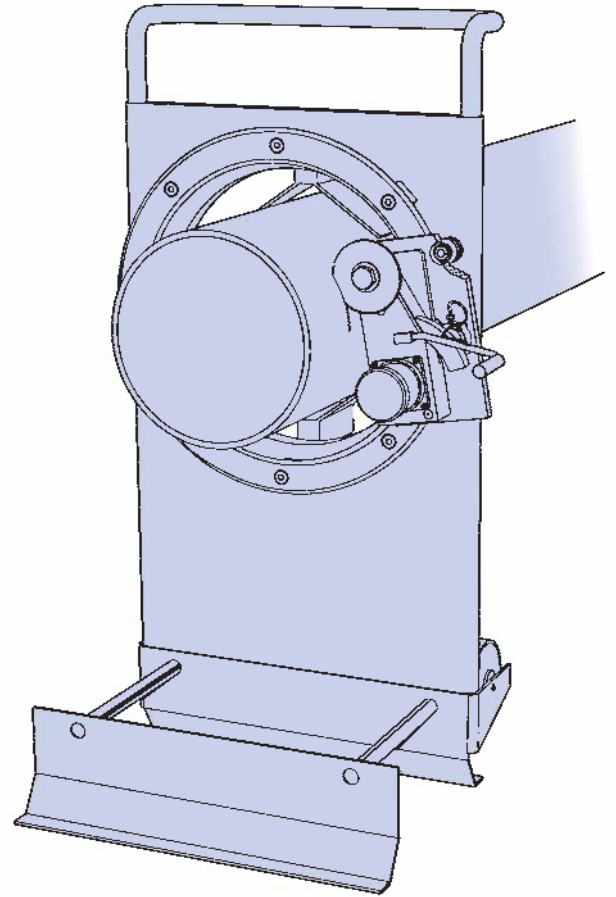
Mobile Saw for Long Tubes

Motor and saw assembly mounted on carriage, is hand operated around 360° Hepco ring slide to cut tube.
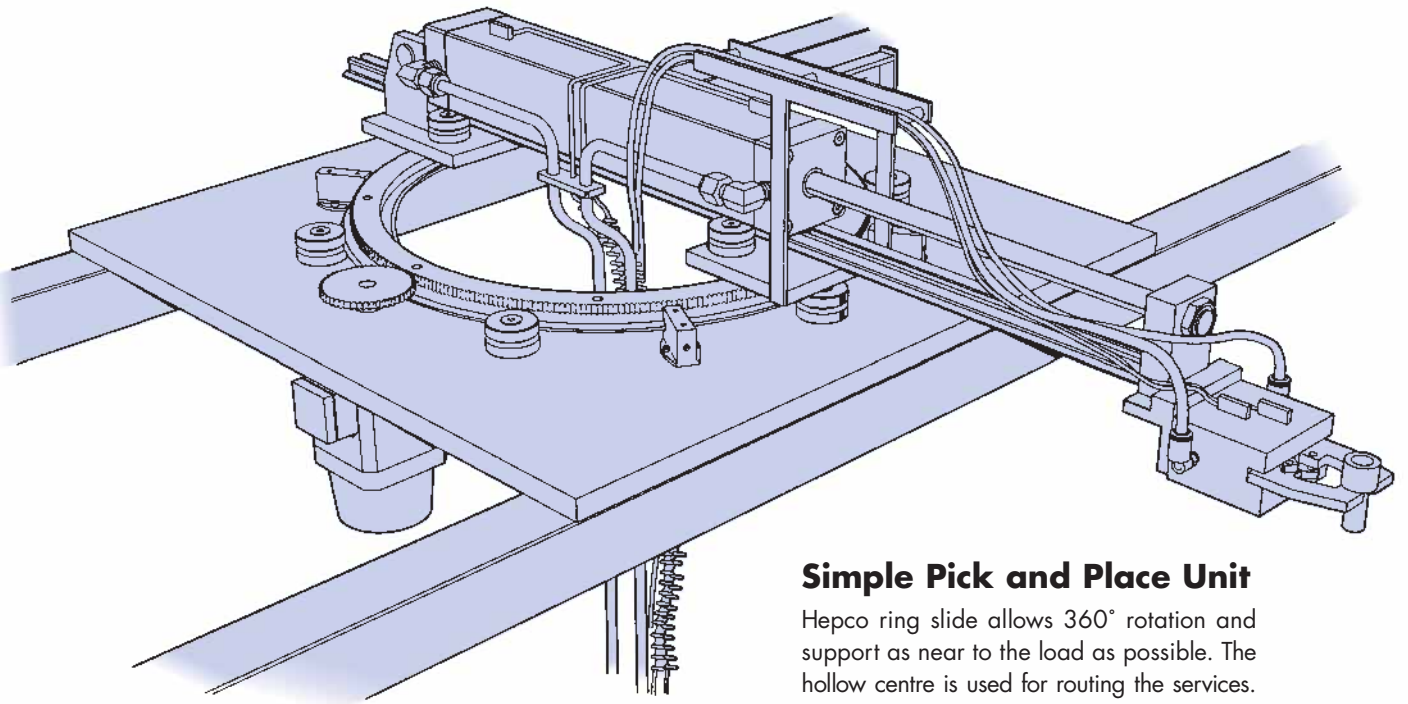
Simple Pick and Place Unit

Hepco ring slide allows 360° rotation and support as near to the load as possible. The hollow centre is used for routing the services.

Application Examples
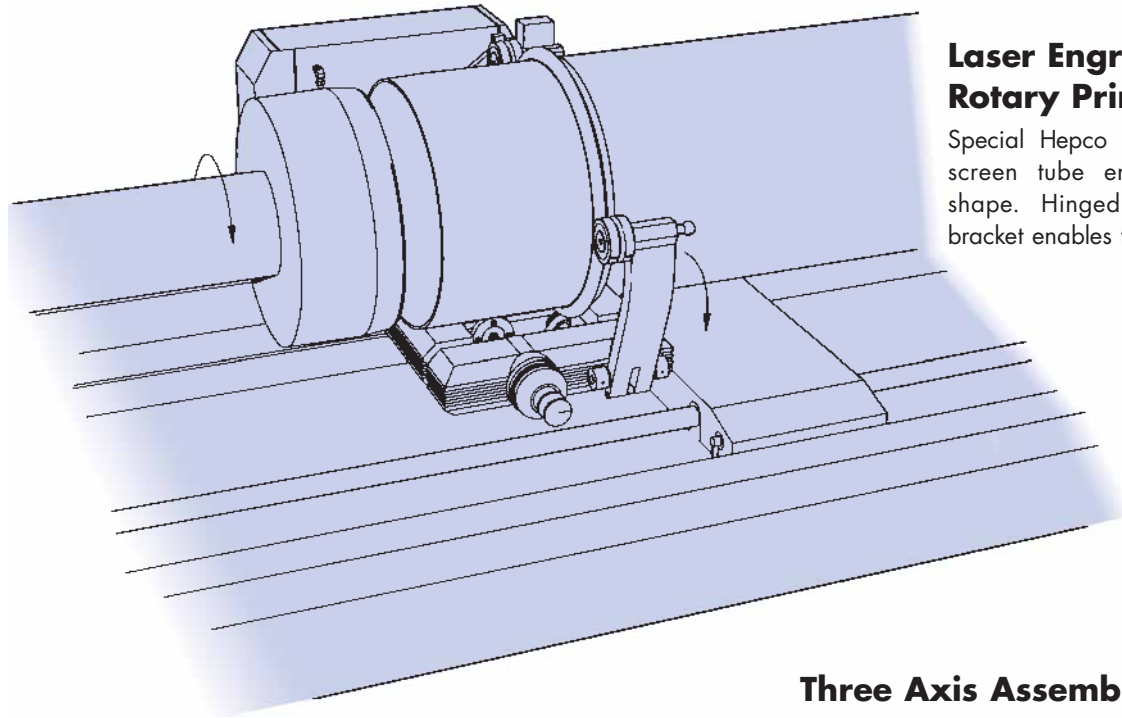
Laser Engraver for Rotary Print Screens

Special Hepco ring slide slips over screen tube ensuring integrity of shape. Hinged bearing assembly bracket enables fast load and unload.

Three Axis Assembly Robot

Excellent stability and friction free rotation provided by Hepco ring slide ensures smooth rigid movement.
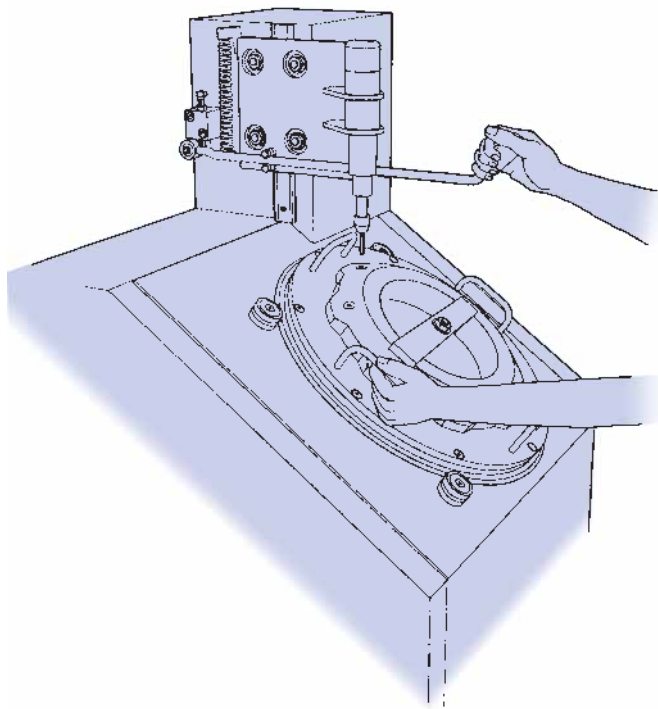
Rotary Assembly Fixture

Hepco ring slide allows friction free manual rotation and provides control and support adjacent to where the load is being applied.
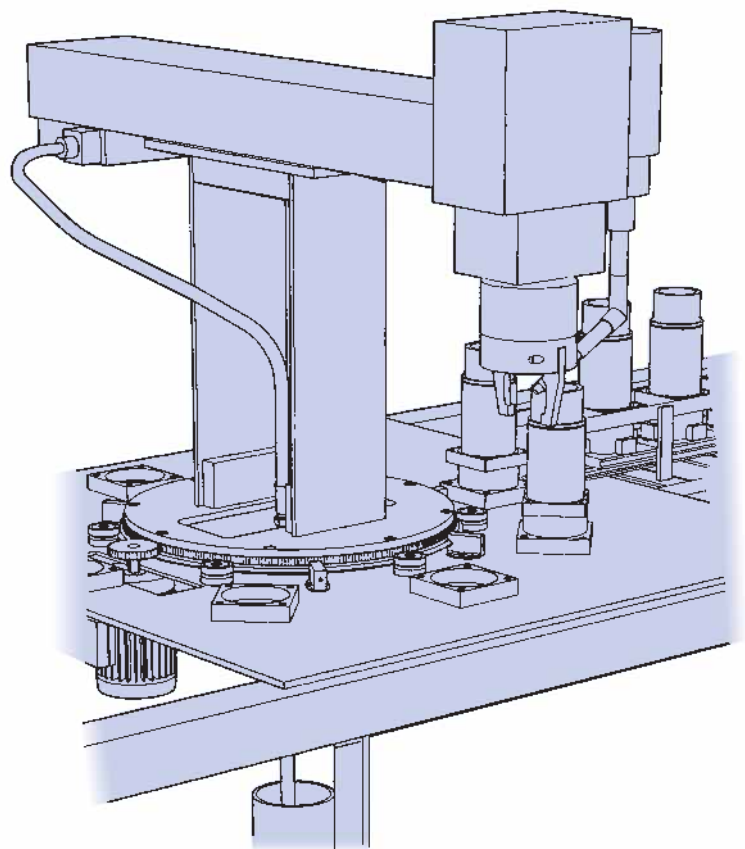
Application Examples
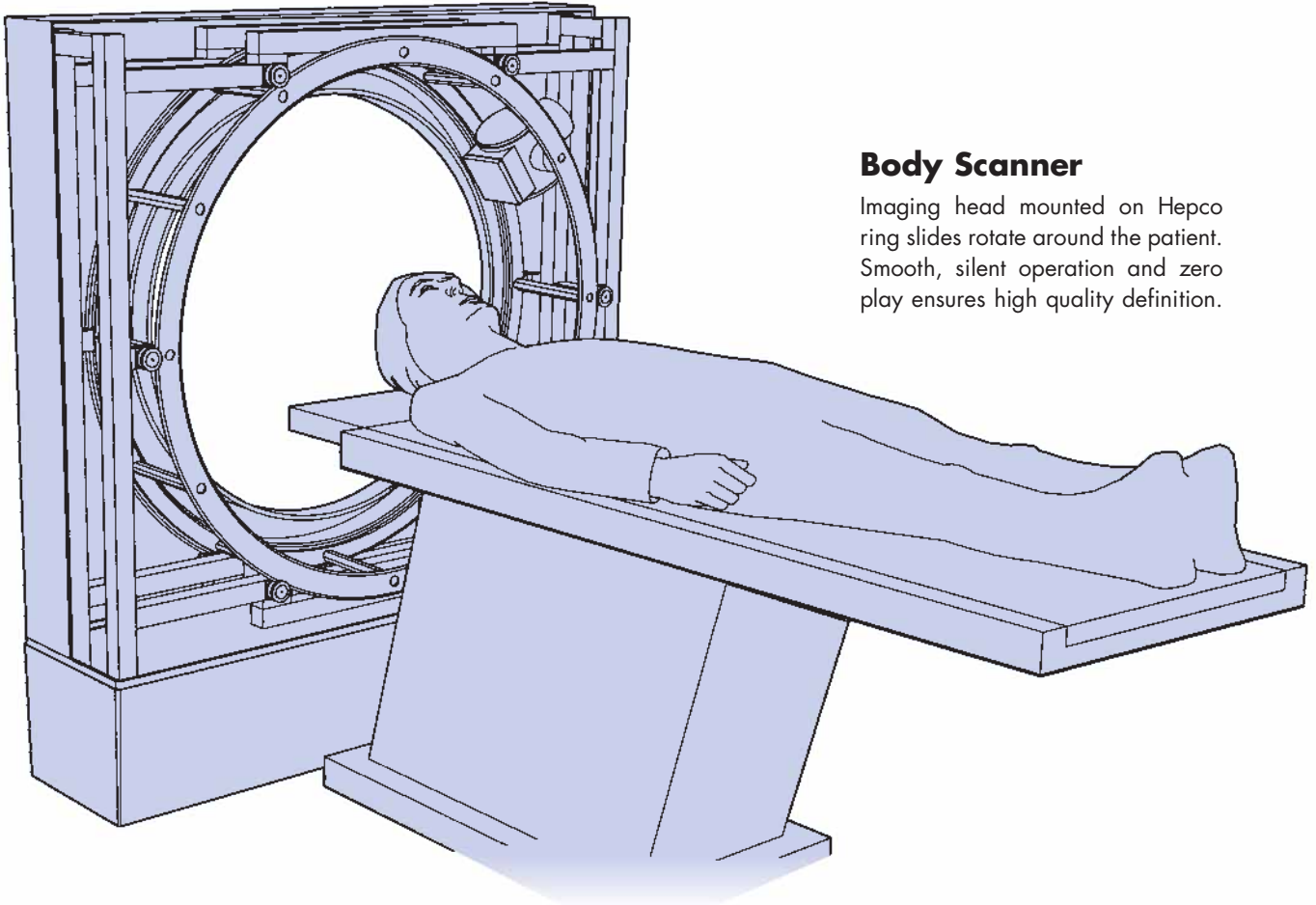
Body Scanner

Imaging head mounted on Hepco ring slides rotate around the patient. Smooth, silent operation and zero play ensures high quality definition.
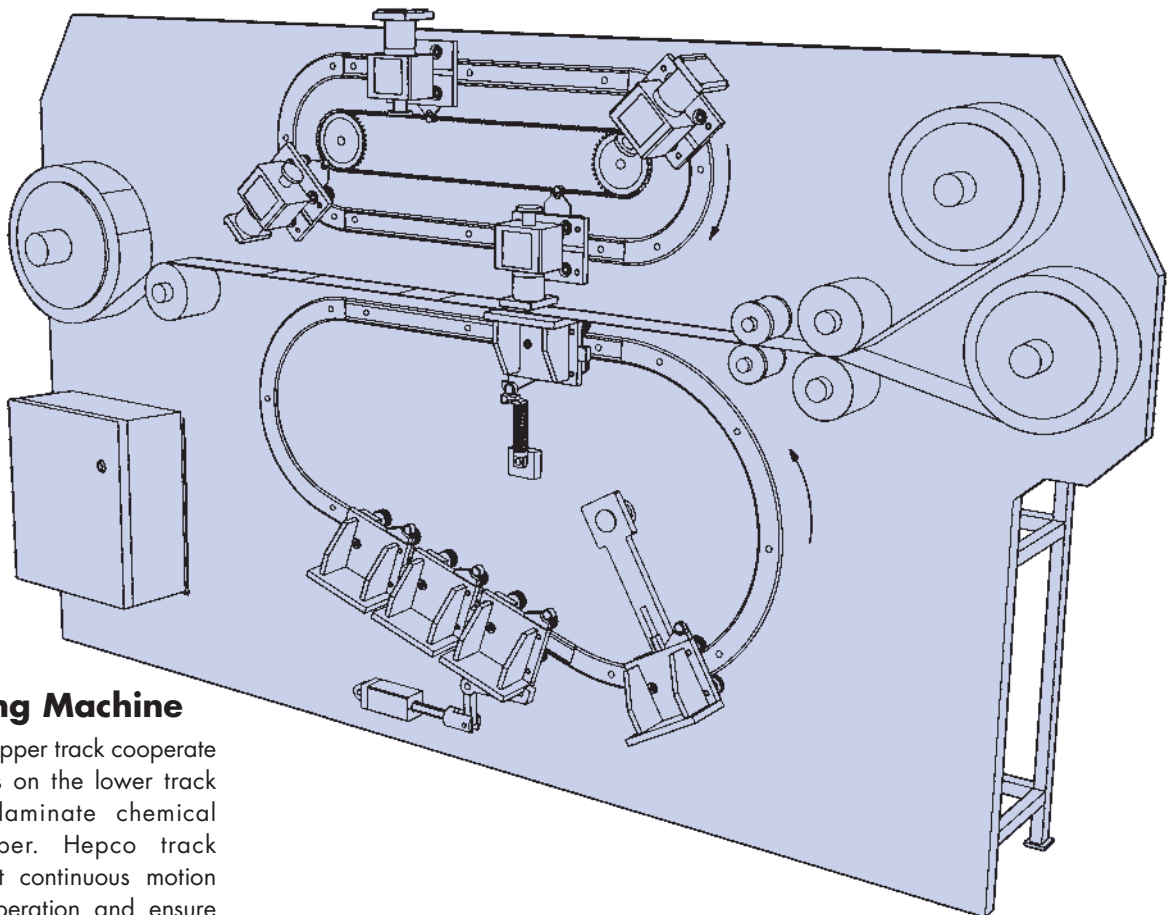
Laminating Machine

Carriages on upper track cooperate with carriages on the lower track to pressure laminate chemical sensitive paper. Hepco track systems permit continuous motion high speed operation and ensure precise alignment.
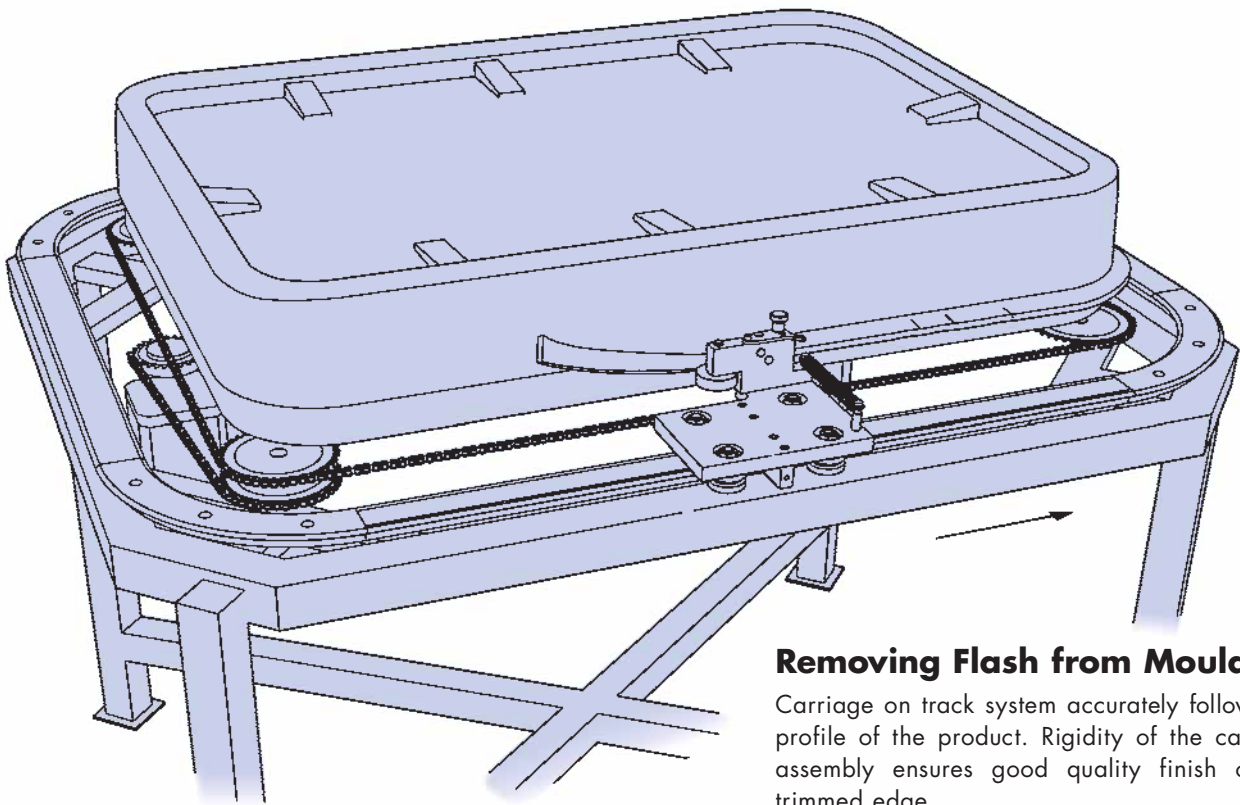
Removing Flash from Moulding

Carriage on track system accurately follows the profile of the product. Rigidity of the carriage assembly ensures good quality finish of the trimmed edge.

Multi-Station Assembly Machine

Carriages linked by connecting rods are indexed around rectangular path circuit. Zero play and precise positioning enables highly accurate work to take place at each station.
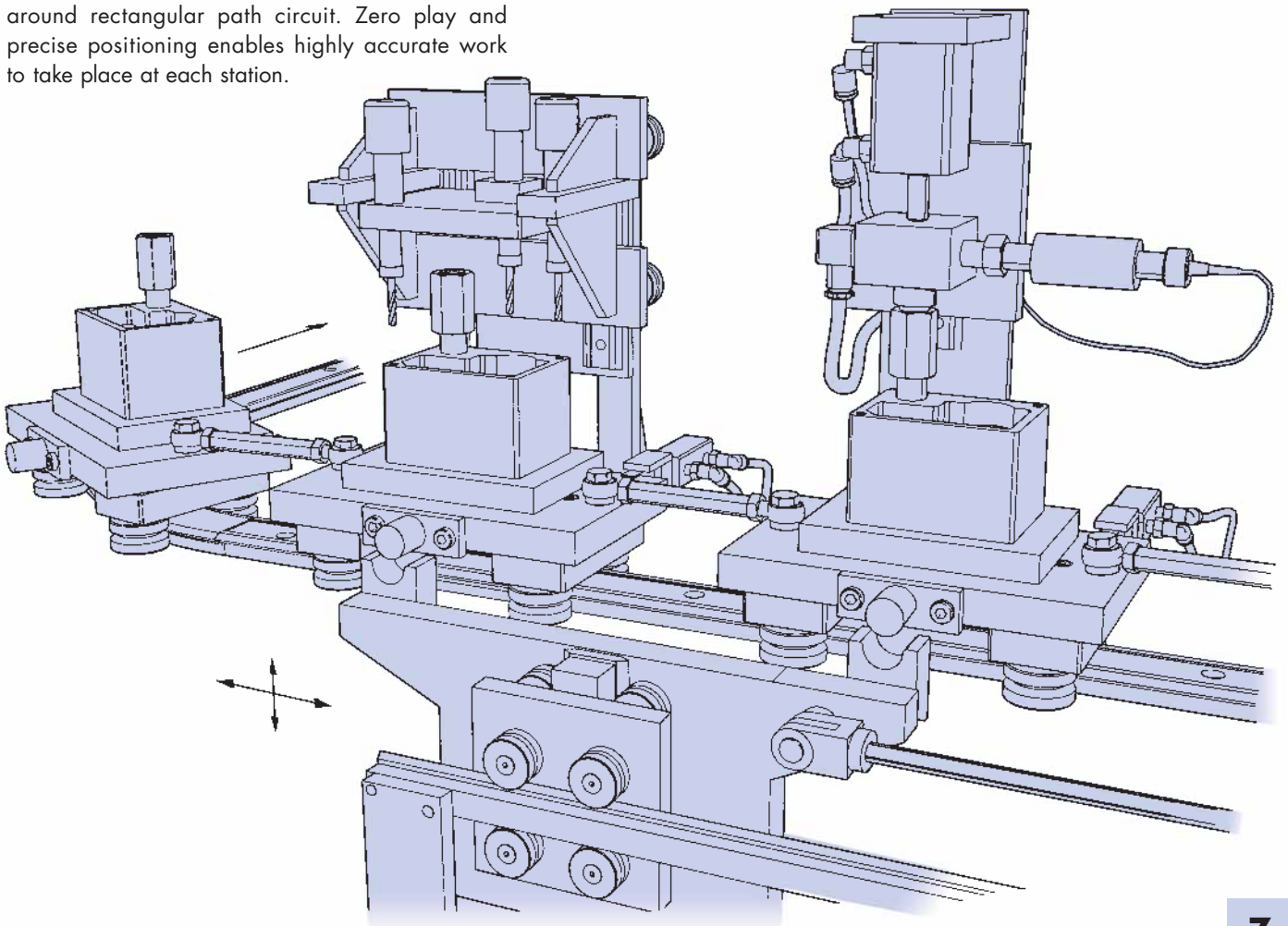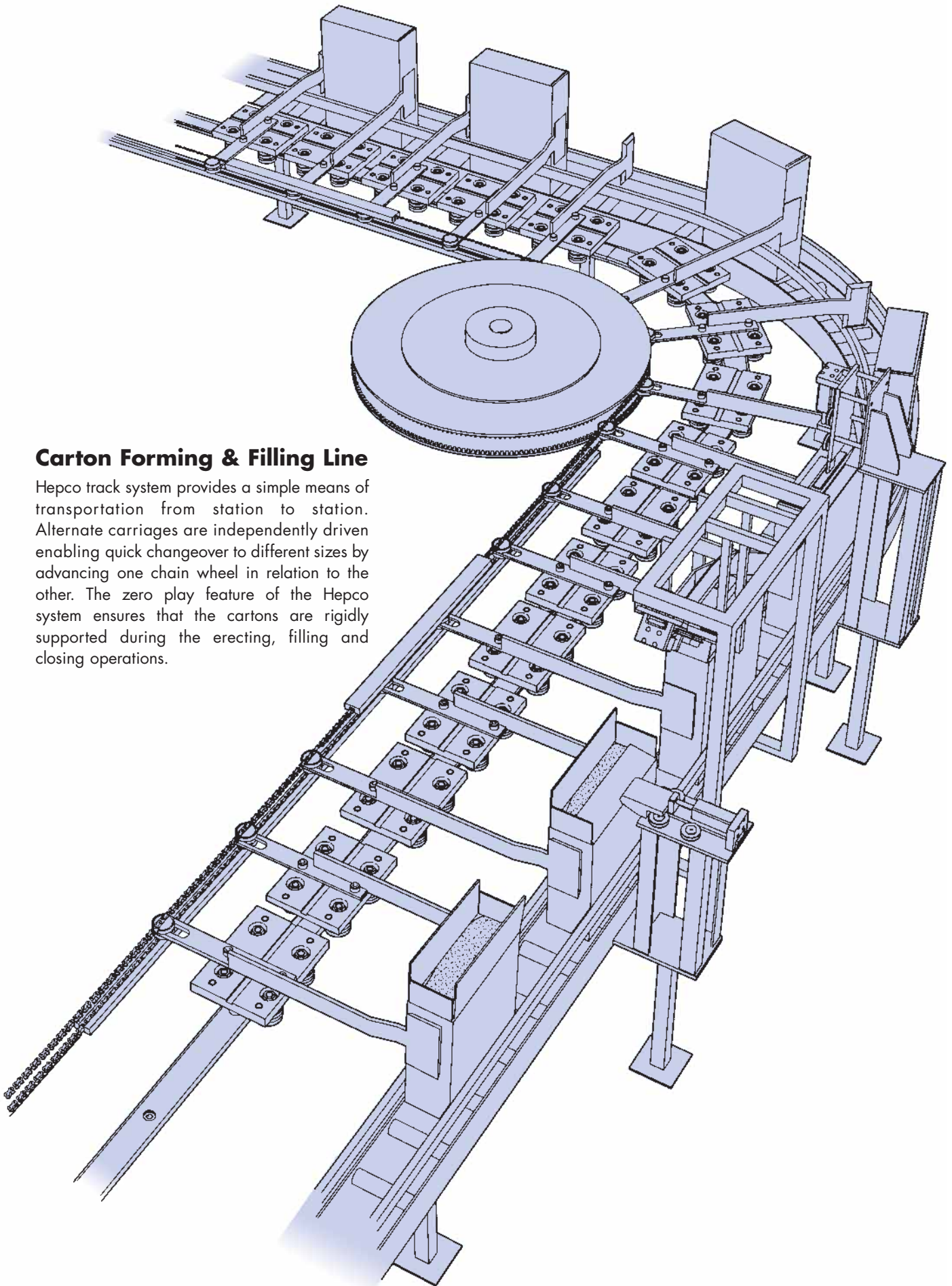
Carton Forming & Filling Line

Hepco track system provides a simple means of transportation from station to station. Alternate carriages are independently driven enabling quick changeover to different sizes by advancing one chain wheel in relation to the other. The zero play feature of the Hepco system ensures that the cartons are rigidly supported during the erecting, filling and closing operations.

Driving Mechanisms for Track Systems (Please refer also to other application examples)
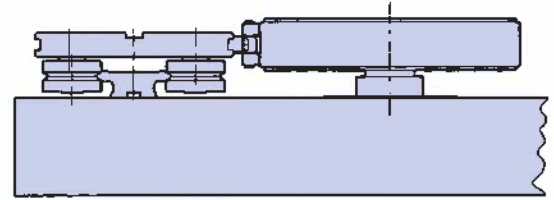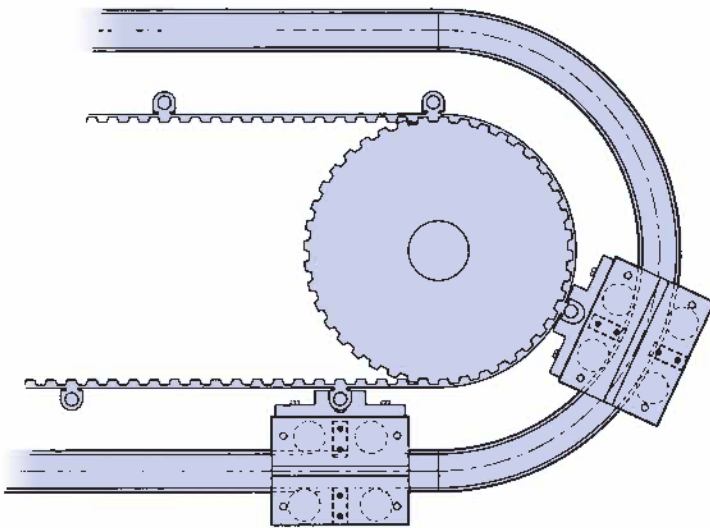
Timing belt with pins through moulded lugs (as shown) or chain with extended pins and rollers (see other application examples).

IMPORTANT: Distance from belt or chain to carriage connection point varies from curve to straight section. A slot must be provided to allow for this variation, plus variation due to drive tension adjustment.
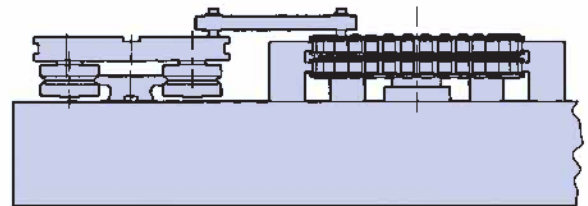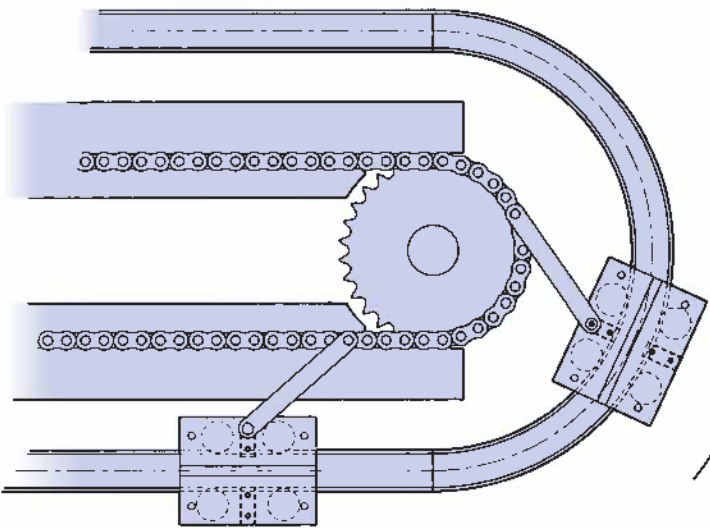
Simple link from extended chain pin to carriage provides for one way drive only. It is recommended that chain support rails be fitted to overcome offset load.

Carriages linked by adjustable length connecting rods. Rollers on carriages engage with nylon screw to provide drive. (Send for design information sheet No. TS1).
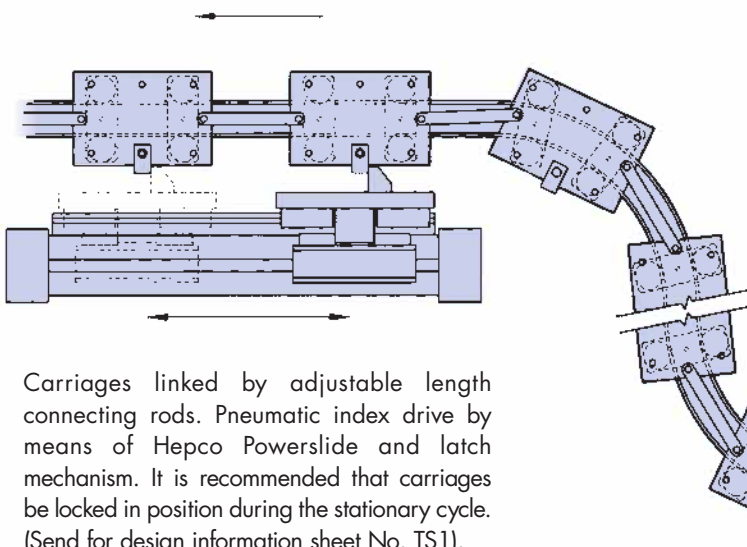
Carriages linked by adjustable length connecting rods. Pneumatic index drive by means of Hepco Powerslide and latch mechanism. It is recommended that carriages be locked in position during the stationary cycle. (Send for design information sheet No. TS1).
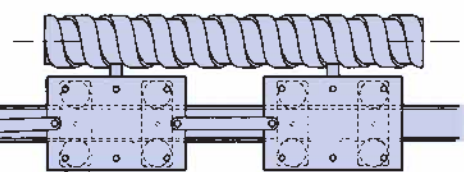
Assembled Ring System

The Hepco Ring system may be used in either complete ring form or as segments. The carriage may be used to run on the ring track (see below) or constructed in order to embrace the complete ring (see page 11) where the bearing assemblies may be placed internally and/or externally. In all cases either the ring or the carriage may be the moving component. The specially developed Hepco 'R' series bearing assemblies have sufficient adjustment to enable complete removal of the ring slide from the carriage (see page 28).
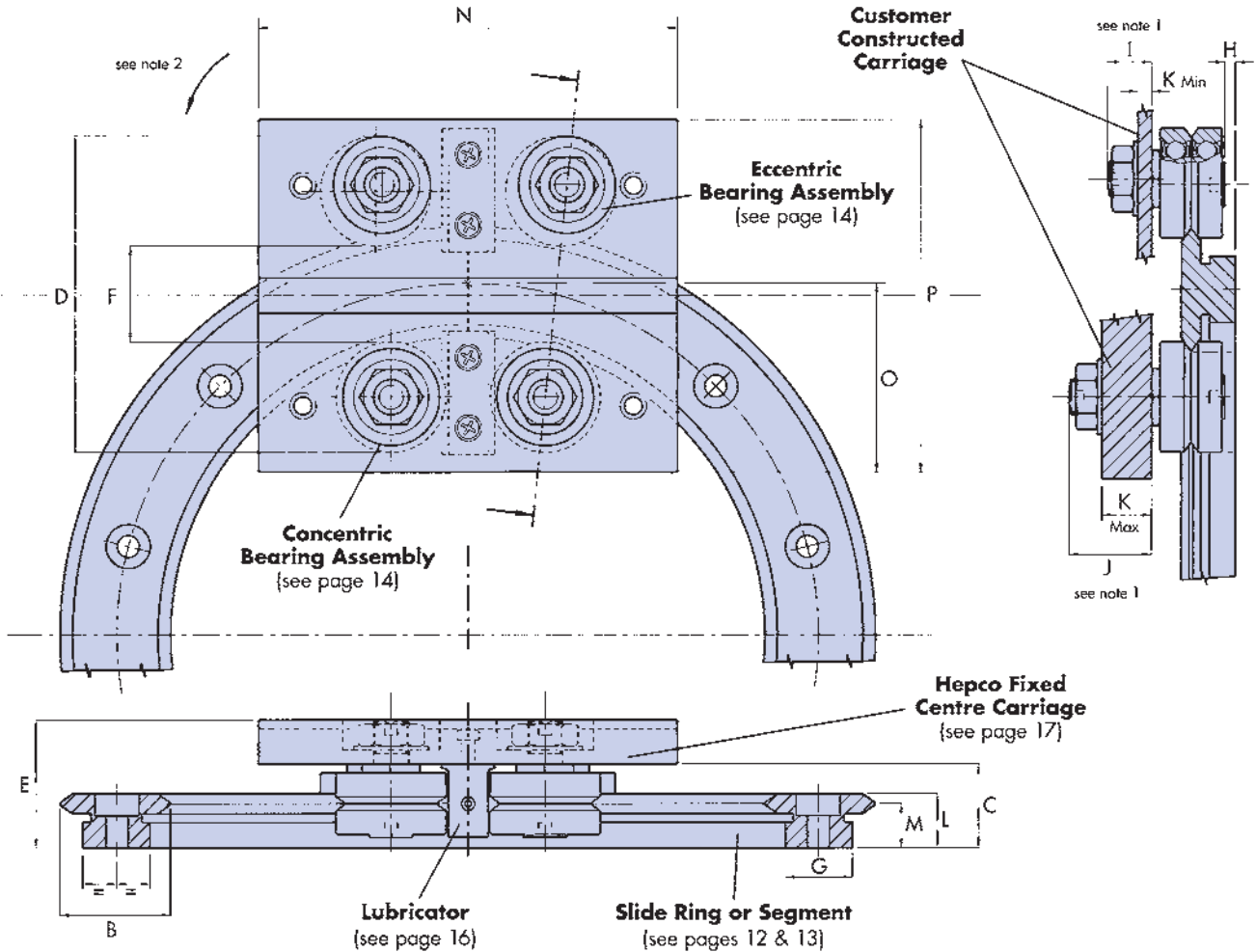
Slide Ring Ref No	A	~ B	±0.05 C	D	+0.13 -0.05 E	F	G	H	I	J	K Max	K Min
R12-93	93	12	11.67	34.7	17.67	9.3	8.6	1.5	5.8	9.5	6	2.5
R12-127	127	12	11.67	34.7	17.67	9.3	8.6	1.5	5.8	9.5	6	2.5
R25-159	159	25	19	72.1	29	22.1	15.4	2.4	9.8	19	13	2.5
R25-255	255	25	19	71.2	29	21.2	15.4	2.4	9.8	19	13	2.5
R25-351	351	25	19	71.2	29	21.2	15.4	2.4	9.8	19	13	2.5
R44-468	468	44	24	105.9	38	37.9	26	2.7	13.8	22	14	5.5
R44-612	612	44	24	105.9	38	37.9	26	2.7	13.8	22	14	5.5
R76-799	799	76	38.5	172.8	56.5	64.7	50.5	3.8	17.8	30	20	6
R76-1033	1033	76	38.5	172.8	56.5	64.7	50.5	3.8	17.8	30	20	6

Notes:

1. Two lengths of stud are available for each size bearing assembly (see page 14). Choose according to your required carriage thickness.
2. Offset holes in carriage for eccentric bearing assemblies, necessitate adjustment rotation in direction shown.
3. Standard pinions are available from most manufacturers to suit gear drive option slide rings (see page 12).
4. Exact theoretical values have been given for 'Q', 'R' and 'S'. Positional accuracy of dimension 'S' will determine the axis of the ring. Positional accuracy for dimensions 'Q' and 'R' are not normally critical. Holes for bearing assemblies should be reamed to tolerance as per dimension 'R' on page 17.
5. Except where specified, dimensions in mm.

Data & Dimensions

Assembled Ring System

When using rings as shown below it is recommended that two concentric bearing assemblies should be placed 120° apart in order to provide a datum reference. The other bearing assemblies used should be the eccentric type. All eccentrics may be used where positional adjustment of the ring is required. One or more lubricators may be fitted at convenient positions to take advantage of the increased load/life afforded by lubrication (see technical section pages 24-27).
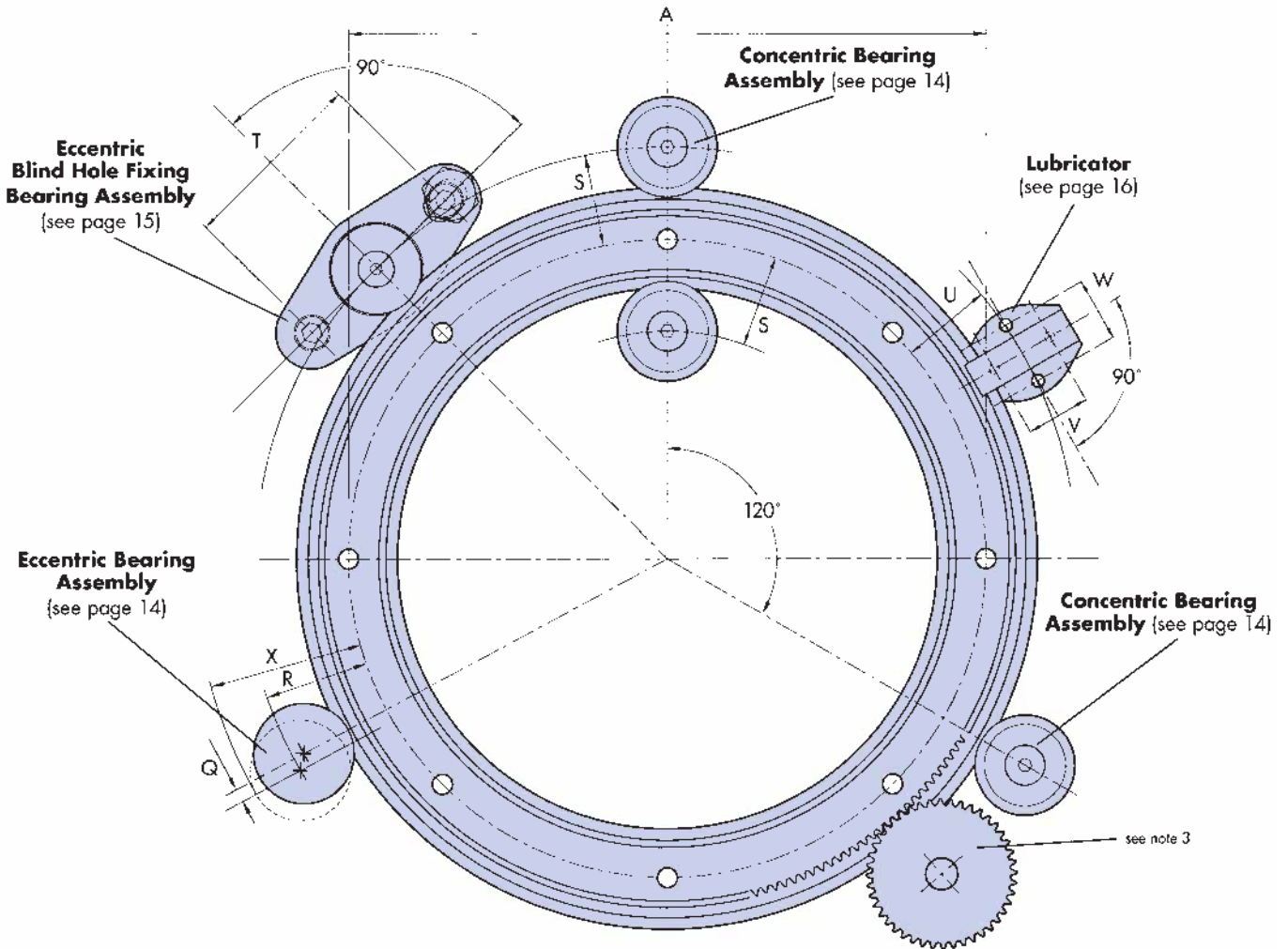
L	±0.025 M	N	O	P	Drilling Positions (see note 4)							X	Slide Ring Ref No
					Q	R	S	±0.2 T	±0.2 U	±0.2 V	±0.2 W		
7.7	6.2	55	22	40	0.9	11.9	11.0	30	11.5	6.5	12	19.6	**R12-93**
7.7	6.2	55	21	40	0.9	11.9	11.0	30	11.5	6.5	12	19.6	**R12-127**
12.2	10	95	43	80	1.4	24.5	23.1	50	22.5	16	18	39	**R25-159**
12.2	10	100	42	80	1.4	24.5	23.1	50	22.5	16	18	39	**R25-255**
12.2	10	105	42	80	1.4	24.5	23.1	50	22.5	16	18	39	**R25-351**
15.5	12.5	145	61	115	1.8	37.8	36	60	34.5	22	25	57.3	**R44-468**
15.5	12.5	150	60	115	1.8	37.8	36	60	34.5	22	25	57.3	**R44-612**
24	19.5	190	96	185	3.2	62.6	59.4	89.5	57	33	38	94	**R76-799**
24	19.5	210	96	185	3.2	62.6	59.4	89.5	57	33	38	94	**R76-1033**

Ordering Details: Simply list the components required and if relevant, bracket those you wish to be factory assembled.

Example: Assembled { 1 x R25-159-R180 ———————— 180° Ring Segment (see pages 12 & 13)
1 x FCP-25-159 ———————— Fixed Centre Carriage (see page 17)

Slide Rings & Segments

Hepco 'R' series slide rings are manufactured from high quality steel, zone hardened on the V edges and precision ground all over with datum register faces provided both internally and externally for ease of location. Gear drive options are available with teeth machined into either the internal or external register face. The number of teeth on the standard external option is divisible by 12 in order to provide maximum choice of pinion size for exact ratio requirements. Customers may also choose the tapped hole option 'N' which enables the slide ring to be bolted from below.

Slide Ring Section X-X

Standard Gear Drive Option 'P' (External)

Special Gear Drive Option 'Q' (Internal)

'O' Chamfer x 45° (Internal & External)

Tapped Hole Option 'N'
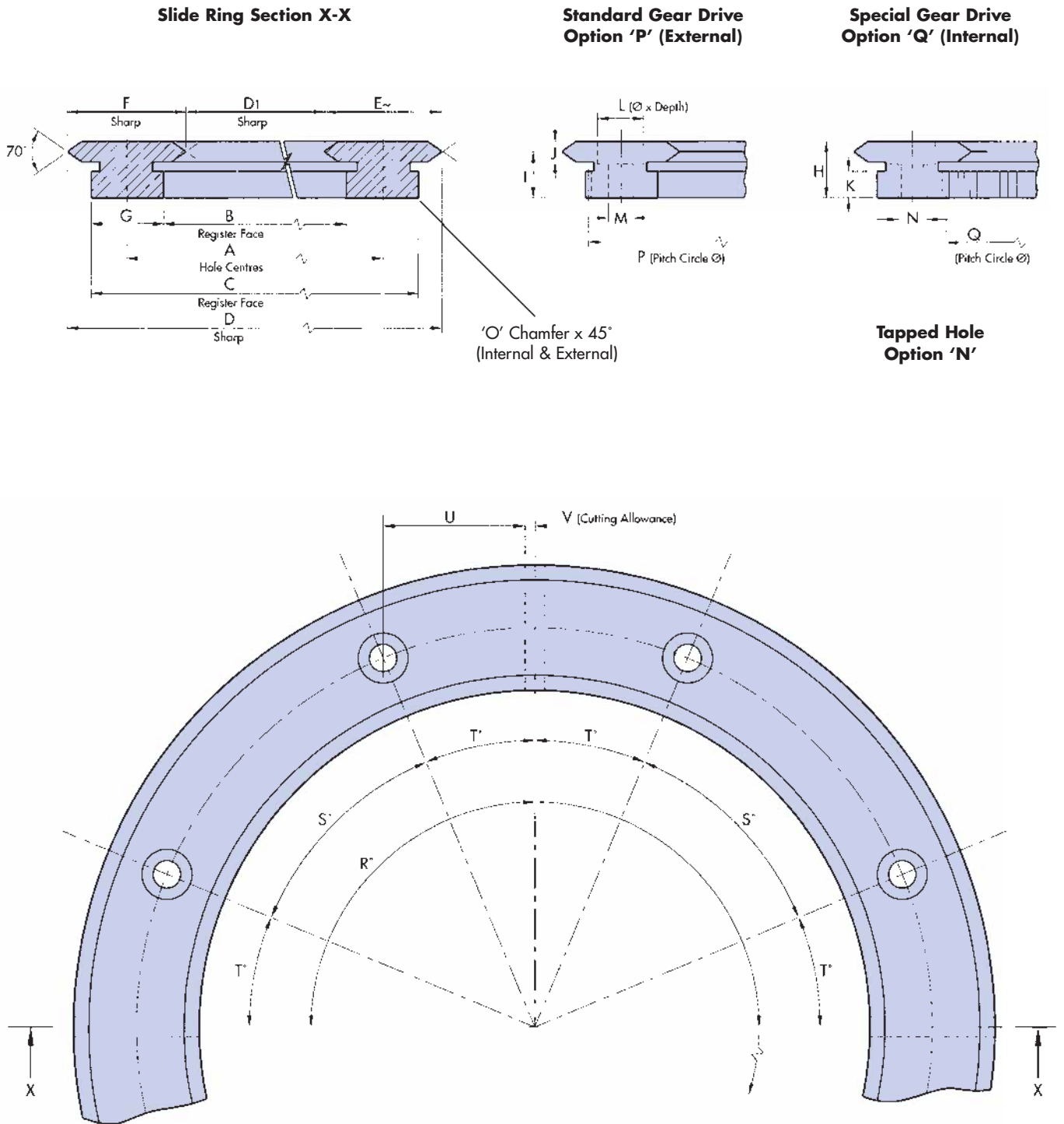
Data & Dimensions

Slide Rings & Segments

Hepco 'R' series ring segments are cut from complete 360° slide rings and held in stock in nominal 90° and 180° sections. Any length segment can be cut to customer's special order and additional holes drilled as required. Although suitable for most applications, slight out of roundness and flatness may be experienced with slide rings and segments in their free unmounted condition. This may be overcome by installing against a register and bolting to flat surface.

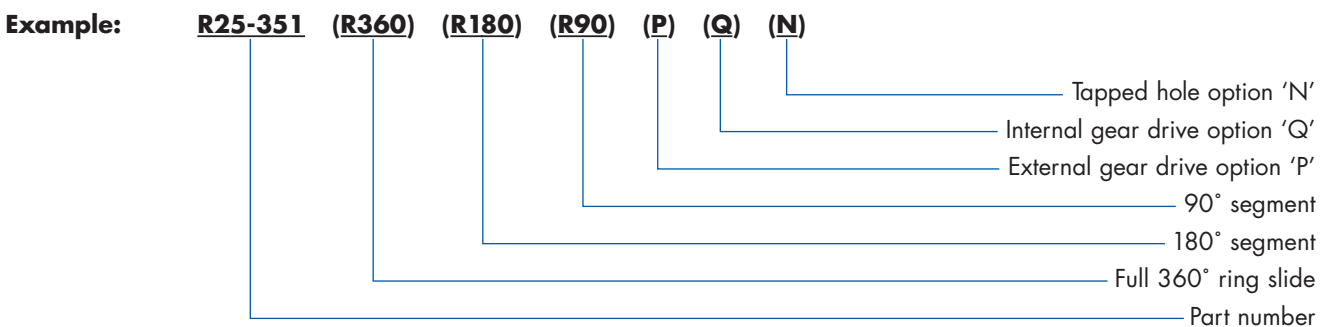| Part Number	±0.2 A	JS6 B	C	D	D_1	~ E	F	G	H	±0.025 I	J	K	L	M	SOCKET CAP HEAD SCREW ISO 4762 (SEE NOTE 2)	N
R12-93	93	84.4 ±0.011	101.6 ±0.037 REF	105.37	80.63	12	12.37	8.6	7.7	6.2	3	3.5	6 x 3	3.7	M3*	M4x0.7
R12-127	127	118.4 ±0.011	135.6 ±0.037 REF	139.37	114.63	12	12.37	8.6	7.7	6.2	3	3.5	6 x 3	3.7	M3*	M4x0.7
R25-159	159	143.6 ±0.013	174.4 ±0.039 REF	184.74	133.26	25	25.74	15.4	12.25	10	4.5	5.75	9 x 6	5.5	M5	M8x1.25
R25-255	255	239.6 ±0.015	270.4 ±0.041 REF	280.74	229.26	25	25.74	15.4	12.25	10	4.5	5.75	9 x 6	5.5	M5	M8x1.25
R25-351	351	335.6 ±0.018	366.4 ±0.044 REF	376.74	325.26	25	25.74	15.4	12.25	10	4.5	5.75	9 x 6	5.5	M5	M8x1.25
R44-468	468	442 ±0.02	494 ±0.046 REF	512.74	423.26	44	44.74	26	15.5	12.5	6	7	11 x 7	6.8	M6	M8x1.25
R44-612	612	586 ±0.022	638 ±0.048 REF	656.74	567.26	44	44.74	26	15.5	12.5	6	7	11 x 7	6.8	M6	M8x1.25
R76-799	799	748.5 ±0.025	849.5 ±0.051 REF	875.74	722.26	76	76.74	50.5	24	19.5	9	12	20 x 13	14	M12	M16x2
R76-1033	1033	982.5 ±0.028	1083.5 ±0.054 REF	1109.74	956.26	76	76.74	50.5	24	19.5	9	12	20 x 13	14	M12	M16x2

O	External Gear			Internal Gear			STOCK SEGMENTS (SEE NOTE 1) R°			NUMBER OF HOLES (R=360°)	HOLES WITHIN ±0.2 OF TRUE POSITION		U	V	MASS-KG (R=360°)	Part Number
	P	MOD	NO OF TEETH (R=360°)	Q	MOD	NO OF TEETH (R=360°)					S°	T°				
0.2	100.8	0.4	252	85.2	0.4	213	90	180	360	8	45	22.5	16.8	1	0.16	R12-93
0.2	134.4	0.4	336	119.2	0.4	298	90	180	360	8	45	22.5	23.3	1	0.22	R12-127
0.5	172.8	0.8	216	145.6	0.8	182	90	180	360	8	45	22.5	29.4	1	0.77	R25-159
0.5	268.8	0.8	336	241.6	0.8	302	90	180	360	8	45	22.5	47.8	1	1.2	R25-255
0.5	364.8	0.8	456	337.6	0.8	422	90	180	360	12	30	15	44.4	1	1.65	R25-351
0.5	492	1.0	492	444	1.0	444	90	180	360	12	30	15	58.6	2	5.1	R44-468
0.5	636	1.0	636	588	1.0	588	90	180	360	16	22.5	11.25	57.7	2	6.7	R44-612
1.0	846	1.5	564	751.5	1.5	501	90	180	360	16	22.5	11.25	75.9	2	25	R76-799
1.0	1080	1.5	720	985.5	1.5	657	90	180	360	20	18	9	78.8	2	32	R76-1033

Notes:

1. Standard ring segments will be slightly less than 90° and 180° because of the cutting allowance. Full 90° and 180° segments can be supplied to customer's special order.
2. Socket head cap screws ISO 4762 will protrude 1mm above the surface of the R12 section slide rings. Customers requiring screws to be flush should use low head type DIN 7984, available from Hepco upon request.
3. Except where specified, dimensions in mm.

Ordering Details

Example: **R25-351** **(R360)** **(R180)** **(R90)** **(P)** **(Q)** **(N)**

- Tapped hole option 'N'
- Internal gear drive option 'Q'
- External gear drive option 'P'
- 90° segment
- 180° segment
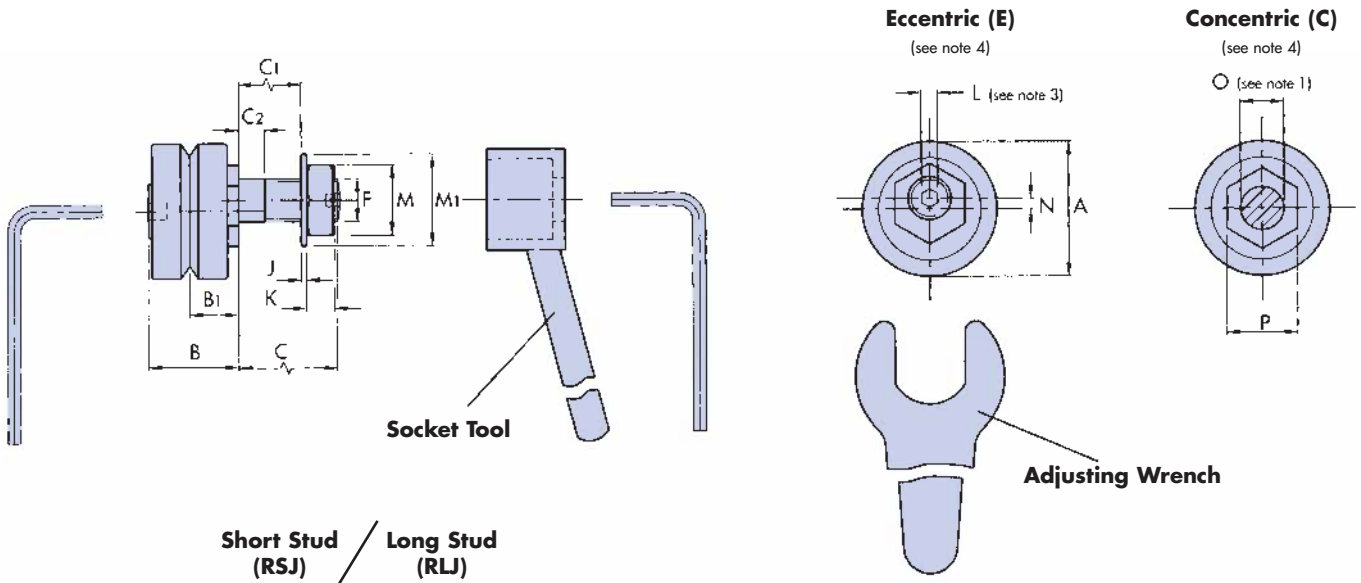- Full 360° ring slide
- Part number

Data & Dimensions

Bearing Assemblies

Two basic bearing assembly options are available, the standard economy through fixing type which requires access to the retaining nut on the opposite side of the mounting plate, and the blind hole fixing type for use where access to the opposite side is denied. The through fixing type is available in two stud lengths to cater for most applications, the short stud version being compatible with the Hepco carriage plates. All bearing assemblies incorporate Hepco high precision ball races for durability, rigidity and friction free running. The bearings are greased for life and are supplied dust shielded as standard or neoprene sealed upon request. Bearing assemblies are available in concentric form to provide a datum reference and in eccentric form for ease of system adjustment.

Through Fixing Type (RSJ/RLJ)

Socket Tool

Short Stud (RSJ) / Long Stud (RLJ)

Eccentric (E)
(see note 4)

Concentric (C)
(see note 4)

Adjusting Wrench

Part Number	FOR USE WITH RING/SLIDE SECTION (SEE NOTE 6)	A	B	±0.025 B₁	RSJ C	RLJ C	RSJ C₁	RLJ C₁	
RSJ/RLJ-13-C/E / BHJ-13-C/E	R–12/TNMS–12	12.7	10.1	5.46	5.8	9.5	3	6	
RSJ/RLJ-25-C/E / BHJ-25-C/E	R–25/TNS–25	25	16.6	9	9.8	19	4	13	
RSJ/RLJ-34-C/E / BHJ-34-C/E	R–44/TNM–44	34	21.3	11.5	13.8	22	6	14	
RSJ/RLJ-54-C/E / BHJ-54-C/E	R–76/TNL–76	54	34.7	19	17.8	30	8	20	

Q	R	S	S₁	T	T₁	T₂	±0.2 U	U₁	V	W	X	Y	
1.5	1.0	6.25	8	8	3.75	6.75	30	47.5	8	20	M3 x 0.5	5.5	
3	1.5	7	8.5	12	5	10	50	72	14	32	M5 x 0.8	8.5	
4	2.0	9.5	8.5	17.5	6.5	12.5	60	90.5	17	42	M6 x 1	10	
8	3.0	14.5	14	23.5	10.5	18.5	89.5	133	25	62	M8 x 1.25	13	

Notes:

1. It is recommended that holes to suit bearing assembly mounting studs should be reamed to tolerance as per dimension 'R' on page 17.
2. Thread form is metric fine. See 'F' dimension in table above.
3. All RSJ/RLJ type eccentric bearing assembly fixing studs are supplied with sockets for adjustment as shown with the exception of the RSJ/RLJ-13-E.
4. Nuts and washers are supplied with both concentric and eccentric RSJ/RLJ type bearing assemblies.
5. 'R' dimension is both the eccentric offset of the adjusting nut and the total adjustment available at the bearing centre line for 360° rotation of the adjusting nut.
6. Each size of bearing assembly has been designed for use with a specific size of ring/slide section (see table above). However, any bearing assembly may be used in conjunction with any ring/slide section larger than that for which it was designed if required by the application. Additionally, size 34 bearing assemblies may be used with size 25 ring/slide section and size 54 bearing assemblies may be used with size 44 ring/slide section.
7. Except where specified, dimensions in mm.

Data & Dimensions

Bearing Assemblies

Studs and fixing nuts are manufactured in 700MPa (45 ton) condition high tensile steel and are supplied chemically blacked. Fastenings used on the eccentric version are bright zinc plated for ease of identification. The eccentric blind hole fixing base/bearing spigot is manufactured from high grade cast steel which together with the steel adjuster nut is supplied chemically blacked.

Installation and adjustment of relevant bearing assemblies may be carried out using the Hepco adjusting wrench, alternatively, the Hepco socket tool with standard allen key may be used (see table below for details).
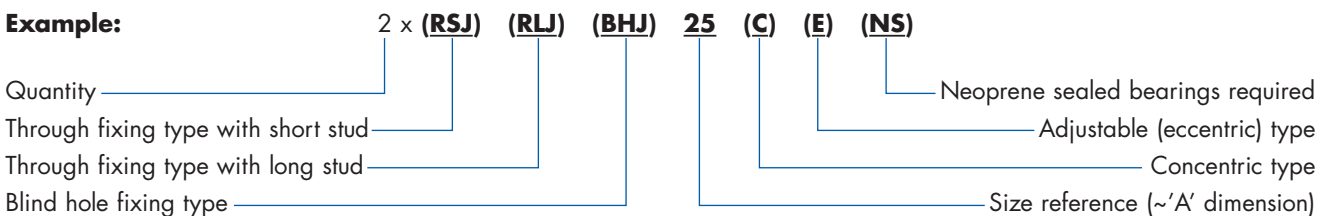
Blind Hole Fixing Type (BHJ)

Concentric (C)   **Eccentric (E)**
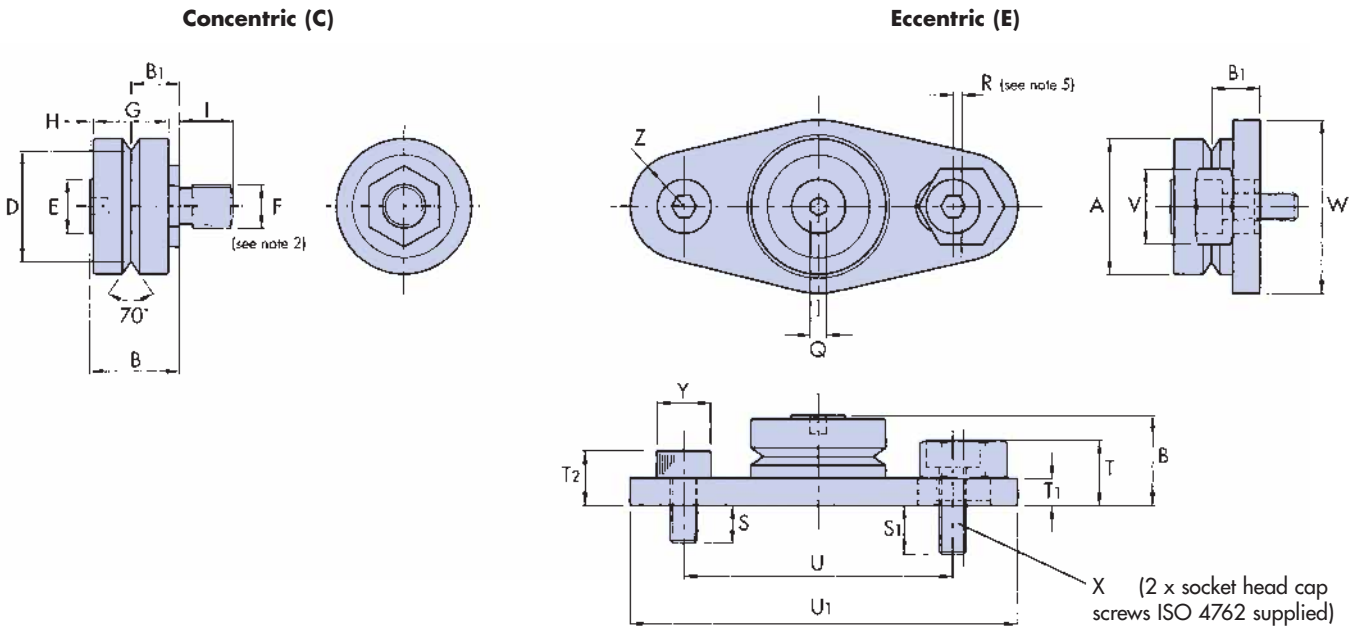
C₂	±0.025 D	E	F	G	H	I	J	K	L	M	M₁	N	O (+0.00 -0.03)	P
2.5	9.51	5	M4 x 0.5	8	0.5	6	0.8	2	–	7	9	1.3	4	7
2.5	20.27	10	M8 x 1	14	0.5	10	1	5	3	13	17	2.0	8	13
5.5	27.13	12	M10 x 1.25	18	0.7	14	1.25	6	4	17	21	2.5	10	15.2
6	41.76	25	M14 x 1.5	28	1.6	18	1.6	8	6	22	28	4.5	14	27

Z	ADJUSTING WRENCH	SOCKET TOOL	MASS ~g				Part Number
			RSJ C/E	RLJ–C/E	BHJ–C	BHJ–E	
8	AT12	–	8	8	7	27	**RSJ/RLJ-13-C/E / BHJ-13-C/E**
10	AT25	RT8	48	51	43	105	**RSJ/RLJ-25-C/E / BHJ-25-C/E**
14	AT34	RT10	115	120	105	235	**RSJ/RLJ-34-C/E / BHJ-34-C/E**
20	AT54	RT14	415	425	390	800	**RSJ/RLJ-54-C/E / BHJ-54-C/E**

Ordering Details

Example: 2 x **(RSJ)** **(RLJ)** **(BHJ)** **25** **(C)** **(E)** **(NS)**

Quantity

Through fixing type with short stud

Through fixing type with long stud

Blind hole fixing type

Neoprene sealed bearings required

Adjustable (eccentric) type

Concentric type

Size reference (~'A' dimension)

Lubricator

The Hepco Lubricator consists of an impact resistant polyacetal plastic moulding, housing a sprung loaded oil impregnated felt wiper and is designed to apply a constant film of oil to the working surfaces of the slide without imposing undue friction. The application of oil significantly increases the load/life of the system.
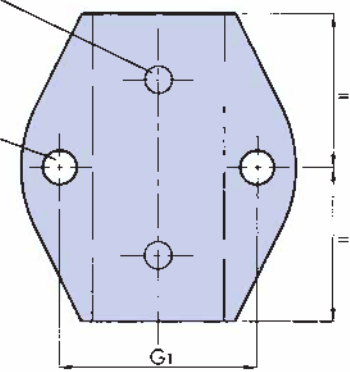
Compact Type (C)   **Flanged Type (F)**

Oil Impregnated Felt Wiper

Oil Lubrication Point
(See note 2)
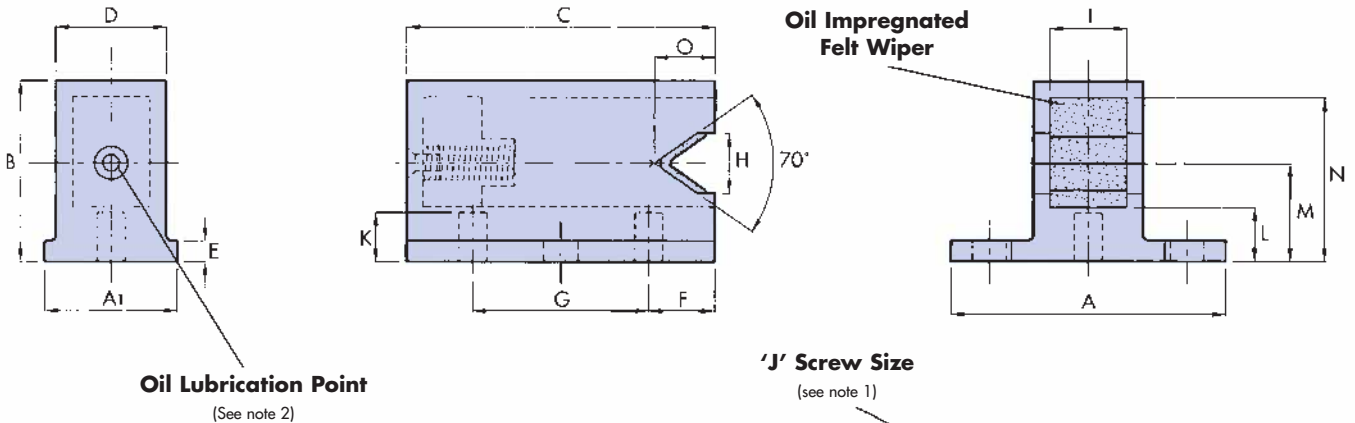
'J' Screw Size
(see note 1)

'J1' (see note 1)

Part Number	USE WITH RING/ SEGNATE TYPE	Type F A	Type C A1	B	C	D	E
LB-12	R/TR–12	17	7	10	13	5.2	2
LB-25	R/TR–25	25	12	16.5	28	9.9	2
LB-44	R/TR–44	34	17	20	38	15	2.4
LB-76	R/TR–76	50	25	33.5	57	22.7	4.5

F	G	G1	H	I	J Ø x LENGTH	J1 Screw	J1 Hole Ø	K	L	M	N	O	Part Number
3	6.5	12	3.1	3	2.5 x 5	M2.5 x 0.45 x 6	2.7	2.5	3	5.46	9	2.2	**LB-12**
6	16	18	5.5	7	3 x 10	M3 x 0.5 x 8	3.2	4.5	5	9	15.25	5.5	**LB-25**
8	22	25	7	11	3 x 16	M4 x 0.7 x 10	4.2	5.5	6.25	11.5	18.25	8	**LB-44**
12	33	38	10	18	3.5 x 22	M5 x 0.8 x 12	5.2	9	10	19	31.5	11.5	**LB-76**

Notes:

1. 2 x "Plastite" 45 self-tapping cross recessed pan head screws conforming generally to ISO 7049 are supplied with each lubricator for fixing via holes 'J'.
   Additionally, 2 x cross recessed cheese head screws ~DIN 84A are supplied with flanged type lubricator for fixing via holes 'J1'.
2. Replenishment of oil should be carried out via the lubrication point provided using BP Energol GHL68 or similar 68 viscosity EP mineral oil.
3. Except where specified, dimensions in mm.

Ordering Details

Example: 3 x **LB-44** (**F**) (**C**)

Compact Type 'C'
Flanged Type 'F'
Part Number
Quantity

Data & Dimensions
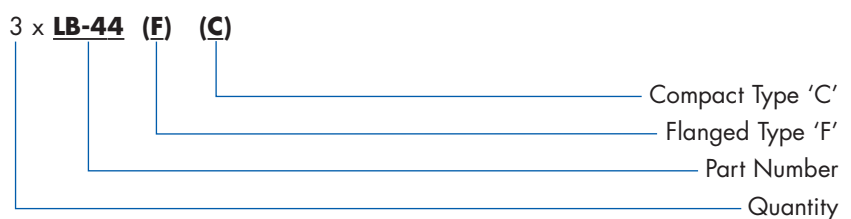
Fixed Centre Carriage

The Hepco fixed centre carriage is designed for use with Hepco track systems of common bend radii without 'S' bends and also for ring slide tracks and segment tracks (see note 1). The geometry has been cleverly devised to enable the carriage to traverse from straight to curve without the necessity for each pair of bearings to independently follow the slide, thus enabling a low cost carriage to be produced. A small amount of play is experienced whilst the bearing assemblies traverse the join between the straight and curve (see table on page 28) but this is not detrimental in most applications. The anodised aluminium alloy carriage plate can be manufactured to customer's special length requirements but the bearing assembly mounting hole centres must remain as specified. Each carriage is supplied fully assembled and adjusted to suit the accompanying slide if required.
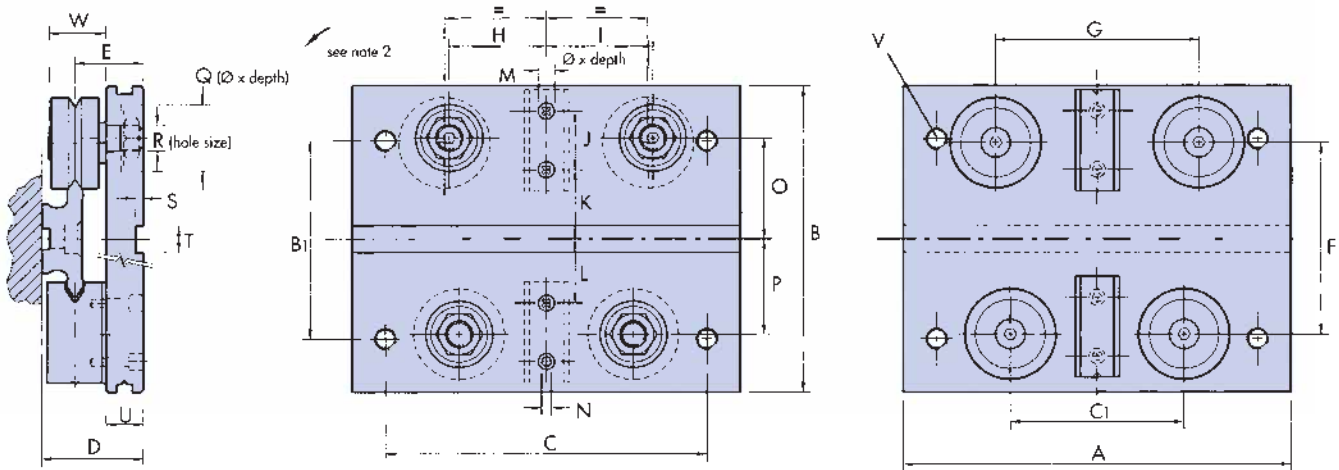
Part Number	USE WITH RING/ SEGMENT TYPE	A	B	B1 ±0.1	C ±0.1	C1 ±0.1	D +0.13 -0.5	E	F	G	H ±0.1	I ±0.1	J
FCP-12-93	R/TR–12–93	55	40	25	45	20	17.67	11.47	22	25.56	11.86	13.70	6.5
FCP-12-127	R/TR–12–127	55	40	25	45	20	17.67	11.47	22	23.86	11.01	12.85	6.5
FCP-25-159	R–25–159	95	80	50	75	37	29	19	47.1	42.00	19.59	22.41	16
FCP-25-255	R/TR–25–255	100	80	50	80	36.5	29	19	46.1	43.88	20.53	23.35	16
FCP-25-351	R/TR–25–351	105	80	50	85	40	29	19	46.1	45.67	21.42	24.25	16
FCP-44-468	R/TR–44–468	145	115	75	120	65	38	25.5	71.9	75.96	36.21	39.75	22
FCP-44-612	R/TR–44–612	150	115	75	125	70	38	25.5	71.9	78.80	37.63	41.17	22
FCP-76-799	R/TR–76–799	190	185	100	160	90	56.5	37	118.7	104.60	49.12	55.48	33
FCP-76-1033	R/TR–76–1033	210	185	100	180	110	56.5	37	118.7	123.51	58.57	64.94	33

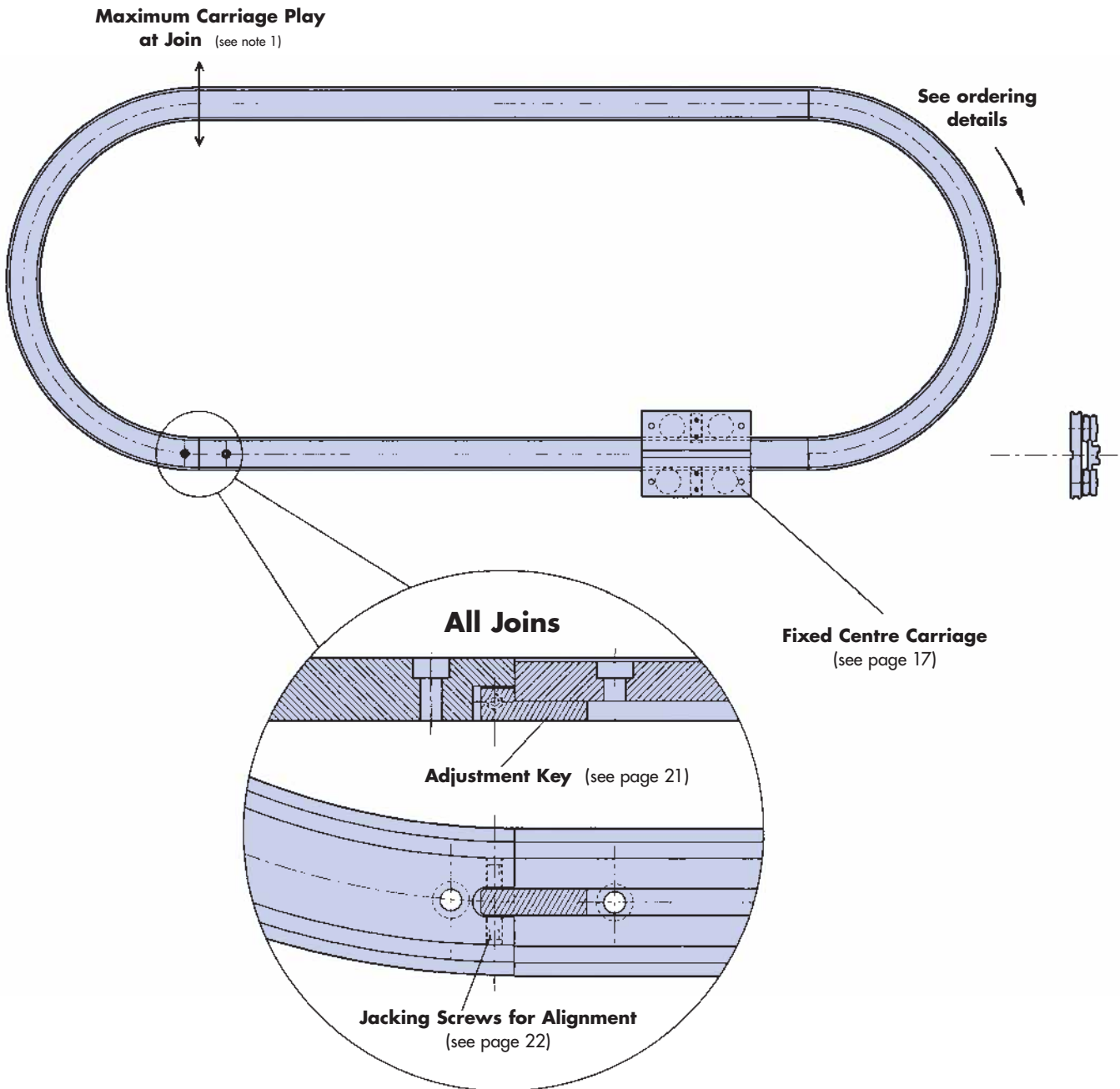| K	L	M	N∅	O ±0.1	P ±0.1	Q	R∅	S +0.1 -0	T +0.025 -0	U	V	W	Mass ~g	Part Number
9.3	7.8	4.4 x 2.5	2.7	11.92	11.0	11 x 3.5	4 +0.008 +0.018	1.5	4	6	M4 x 0.7	10.1	70	FCP-12-93
8.8	7.8	4.4 x 2.5	2.7	11.92	11.0	11 x 3.5	4 +0.008 +0.018	1.5	4	6	M4 x 0.7	10.1	70	FCP-12-127
17.1	10.8	5.4 x 3.2	3.2	25.50	23.0	22 x 6.9	8 +0.010 +0.022	2	8	10	M6 x 1.0	16.6	400	FCP-25-159
15.9	14	5.4 x 3.2	3.2	24.55	23.0	22 x 6.9	8 +0.010 +0.022	2	8	10	M6 x 1.0	16.6	410	FCP-25-255
15.6	14	5.4 x 3.2	3.2	24.55	23.0	22 x 6.9	8 +0.010 +0.022	2	8	10	M6 x 1.0	16.6	420	FCP-25-351
25.8	23	5.4 x 2.1	3.2	37.93	35.75	25 x 8.5	10 +0.010 +0.022	3	10	14	M8 x 1.25	21.3	1000	FCP-44-468
25.5	23	5.4 x 2.1	3.2	37.93	35.75	25 x 8.5	10 +0.010 +0.022	3	10	14	M8 x 1.25	21.3	1000	FCP-44-612
43	40	6.5 x 2.7	3.8	62.67	59.25	32 x 11.5	14 +0.015 +0.027	4	10	18	M10 x 1.5	34.7	3300	FCP-76-799
43	40	6.5 x 2.7	3.8	62.67	59.25	32 x 11.5	14 +0.015 +0.027	4	10	18	M10 x 1.5	34.7	3400	FCP-76-1033

Notes:

1. Fixed centre carriage FCP–25–159 cannot be used with a track system.
2. Offset holes in carriage for eccentric bearing assemblies necessitate adjustment rotation in the direction shown.
3. Except where specified, dimensions in mm.

Ordering Details: Simply specify the quantity and part number required.

Example: 6 x **FCP-44-612**
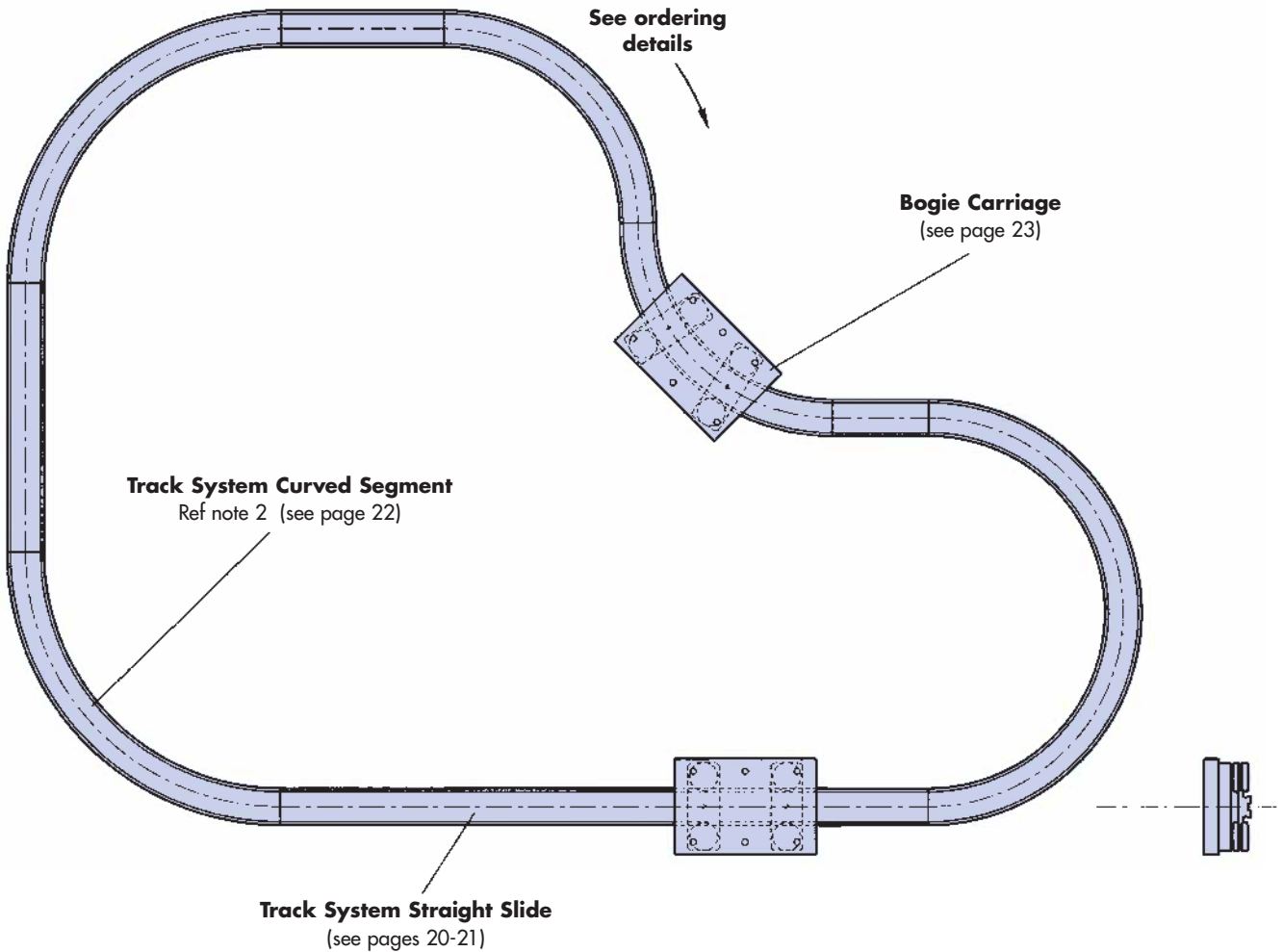
Data & Dimensions

Track Systems

Hepco track systems provide a unique method of achieving an almost limitless variation of controlled routing. Any number of carriages can be accommodated, either the fixed centre economy type which is suitable for unidirectional bends of the same radius or the bogie type which enables 'S' bends of varying radii to be negotiated and provides a larger platform for mounting purposes. Various drive possibilities exist, some of which are illustrated in the applications section on pages 6-9. The relevant dimensions of individual track system slides are held on record to enable spares and replacements to be supplied.

Maximum Carriage Play at Join (see note 1)

See ordering details

All Joins

Adjustment Key (see page 21)

Jacking Screws for Alignment (see page 22)

Fixed Centre Carriage (see page 17)

Installation Procedure

Hepco track systems are supplied in separate sections ready for installation marked with a system reference number and individual sequence number (see ordering details page 19). It is recommended that track system slides should be assembled and clamped in position as a complete circuit prior to drilling through all holes and bolting down the straight slides. Final adjustment of the joins should be carried out using the keyway alignment facility provided, ensuring that both jacking screws are subsequently locked and all curved segment fixing screws are tightened. A final stoning of the V faces is necessary to ensure smooth travel across the joins.

Track Systems

See ordering details

Bogie Carriage
(see page 23)

Track System Curved Segment
Ref note 2 (see page 22)

Track System Straight Slide
(see pages 20-21)

Notes:

1. With the fixed centre carriage a small amount of play is experienced as each pair of opposing bearing assemblies traverses the join between straight and curve. This is not normally detrimental in most applications. The maximum play acting in the direction of the arrows is given in the table on page 28.

2. Due to the cutting procedure, Hepco 90˚ and 180˚ curved segments are supplied slightly shorter than their theoretical length (see page 22). This is not detrimental to the smoothness of travel across the join, provided installation has been carried out according to procedure (see page 18).

3. Except where specified, dimensions in mm.

Ordering Details:

Simply list the curved segment and straight slide part numbers in sequential order in clockwise direction (see arrows in illustrations), starting at any point according to preference. Viewing plan elevation as per illustrations and travelling clockwise round the circuit, curved segments should be designated suffix 'C' for clockwise bend and suffix 'A' for anticlockwise bend. The final item should indicate the quantity and part number of the carriages required.

Example:	1 x	**(1)**	**TNM-44-B1020- 2 x AK** ———— Track system straight slide	(pages 20–21)
		(2)	**TR-44-468-R180/C** ———— Clockwise curved segment	(page 22)
		(3)	**TNM-44-B1020- 2 x AK** ———— Track system straight slide	(pages 20–21)
		(4)	**TR-44-468-R180/C** ———— Clockwise curved segment	(page 22)
			6 x **FCP-44** ———— Fixed centre carriage	(page 17)

Data & Dimensions

Track System Straight Slides

Hepco track system straight slides are modified straight slides from Hepco's highly acclaimed GV3 slide system for which there is a separate catalogue. The slides are manufactured from quality high carbon steel, zone hardened on the V edges then precision ground on the important V faces, register width and mounting face. Additional holes or machining may be carried out in the soft centre portion of the slide if required. Standard lengths are available up to 4020mm (1020mm in the TNMS-12 section) and unlimited lengths can be achieved by butting matched slides together.
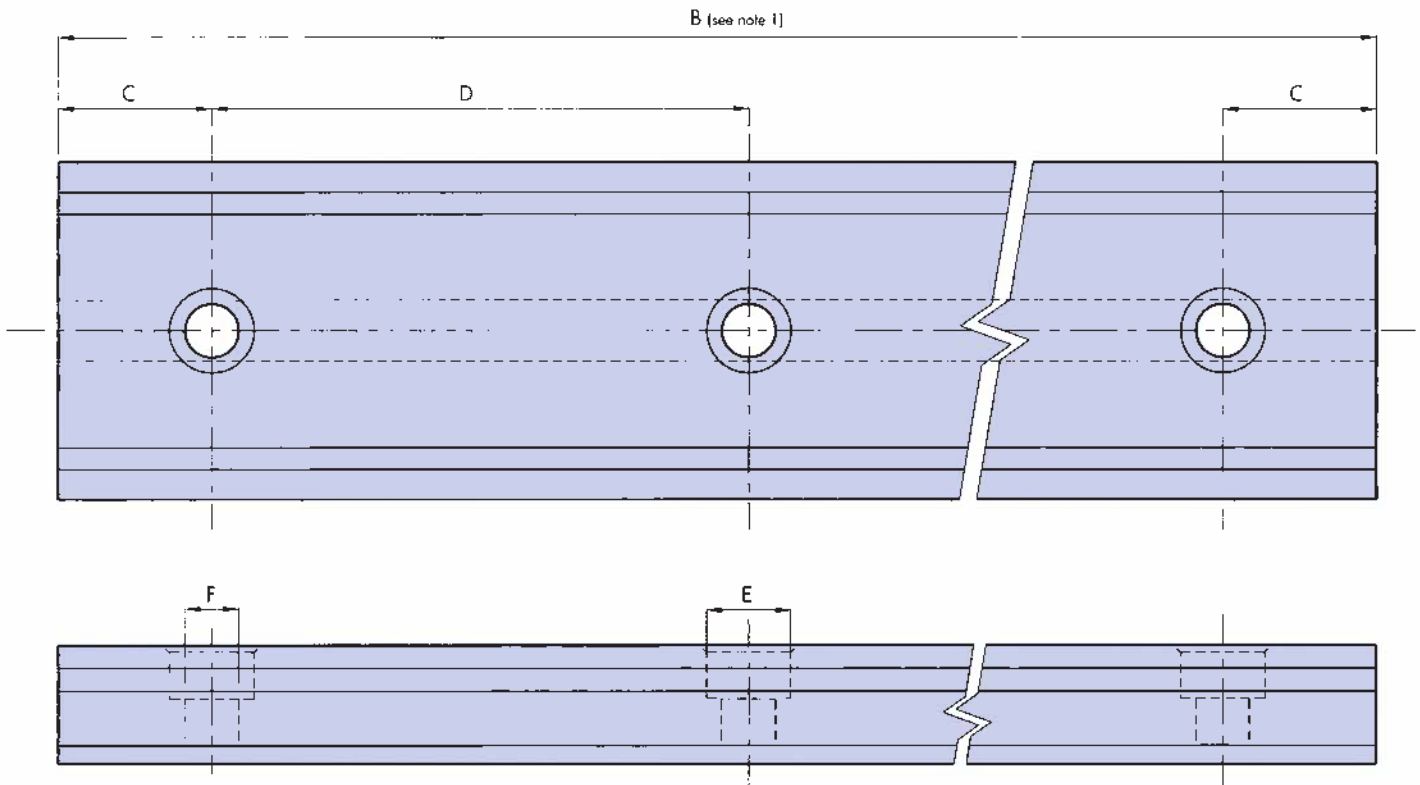
Part Number	~ A	SEE NOTE 5 A₁	B MAX	+0 -0.2 C	D	E	F	SOCKET HEAD CAP SCREW ISO 4762	G	+0.05 -0.00 H	H₁	±0.025 I	J	
TNMS-12	12	12.37	1976	15	45	6 x 3	3.5	M3	3	4	1.8	8.5	1.7	
TNS-25	25	25.74	4020	30	90	10 x 5	5.5	M5	4.5	6	2.5	15	2.5	
TNM-44	44	44.74	4020	30	90	11 x 6	7	M6	6	8	3	26	2.5	
TNL-76	76	76.74	4020	30	180	20 x 12	14	M12	9	15	5	50	5	

Notes:

1. Standard slide lengths are available in multiples of hole pitch 'D'+ (2 x 'C') up to a maximum length per 'B' dimension in the table above. Special length slides can be cut to order.
2. Adjustment keys are required at every join between straight slide and curved slide. Please order accordingly (see ordering details). Please note that 'Q' dimension for the TNMS–12 slide is stepped one end to fit keyway 'H'.
3. Please note that dowel pins for the TNMS–12 slide are not stepped.
4. Slides in their free unmounted state are not necessarily straight. They should be set to the required straightness when bolting down to the mounting surface at assembly.
5. Dimensions 'A₁' and 'K' will be matched with corresponding dimensions 'F' and 'I' page 12, for track system requirements.
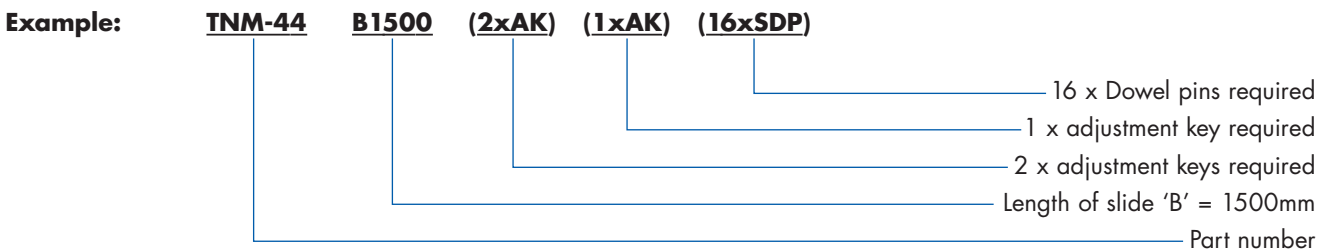6. Except where specified, dimensions in mm.

Data & Dimensions

Track System Straight Slides

All track system straight slides are ground square on the ends and marked with reference number and sequence number for installation and replacement purposes (see pages 18 & 19). Opposing slides within a track system are ground to identical lengths. Adjustment keys are available to facilitate alignment with adjacent curved segments (see page 22). Hepco dowel pins positioned at regular intervals along the slide keyway provide a convenient means of location and alignment. Alternatively, the ground datum faces of the slide may be set against a machined register in the mounting surface (see note 4).

Adjustment Key (AK)
(see note 2)

Dowel Pin (SDP)
(see note 3)
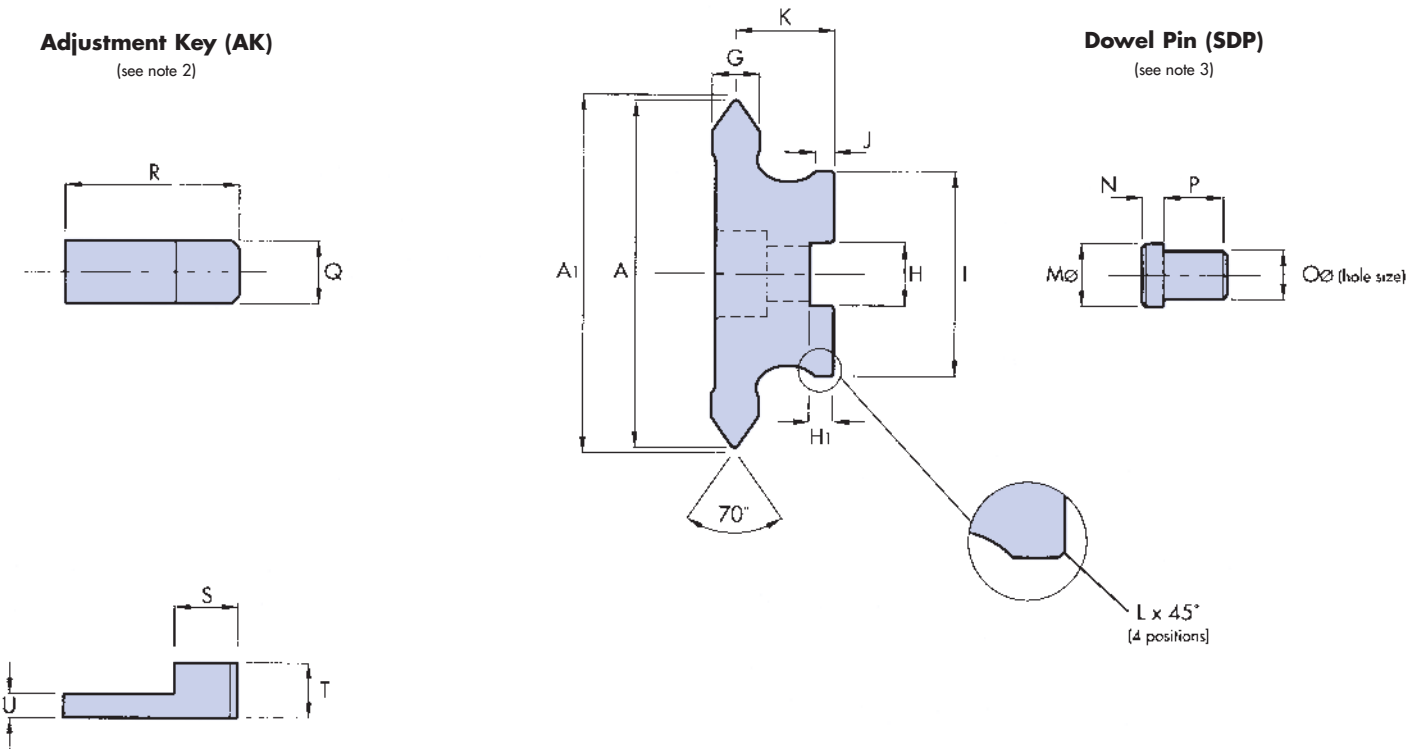
SEE NOTE 5 K	L	MØ	m6 N	+0.0 -0.3 OØ	K6 P	Q	R	S	T	U	Mass ~g/100mm	Part Number
6.2	0.2	4	+0.012 +0.004	–	4	+0.002 -0.006	6.75	2	16	4	3	1.5	44	TNMS-12
10	0.3	6	+0.012 +0.004	2.25	4	+0.002 -0.006	6	6	32	7	6	2.2	140	TNS-25
12.5	0.3	8	+0.015 +0.006	2.75	6	+0.002 -0.006	8	8	33	8	7	2.7	330	TNM-44
19.5	0.3	15	+0.018 +0.007	4.75	10	+0.002 -0.007	15	15	32	10	11	4.5	1000	TNL-76

Ordering Details

Example: **TNM-44   B1500   (2xAK)   (1xAK)   (16xSDP)**

- 16 x Dowel pins required
- 1 x adjustment key required
- 2 x adjustment keys required
- Length of slide 'B' = 1500mm
- Part number

Track System Curved Segments

Hepco track system curved segments are modified from stock 90° and 180° slide ring segments (see pages 12 & 13 for dimensions and details). The segment ends are ground square to a specified dimension relative to the true shape of the segment and a clearance keyway and tapped hole facility is incorporated each end to provide a method of alignment when assembled together with the mating key of the track system straight slide (see page 21). An additional fixing hole is provided adjacent to the keyway each end to give extra support at the join position for all segments except the TR12–93 and TR12–127. All track system curved segments are marked with a reference number and sequence number (see pages 18 & 19).
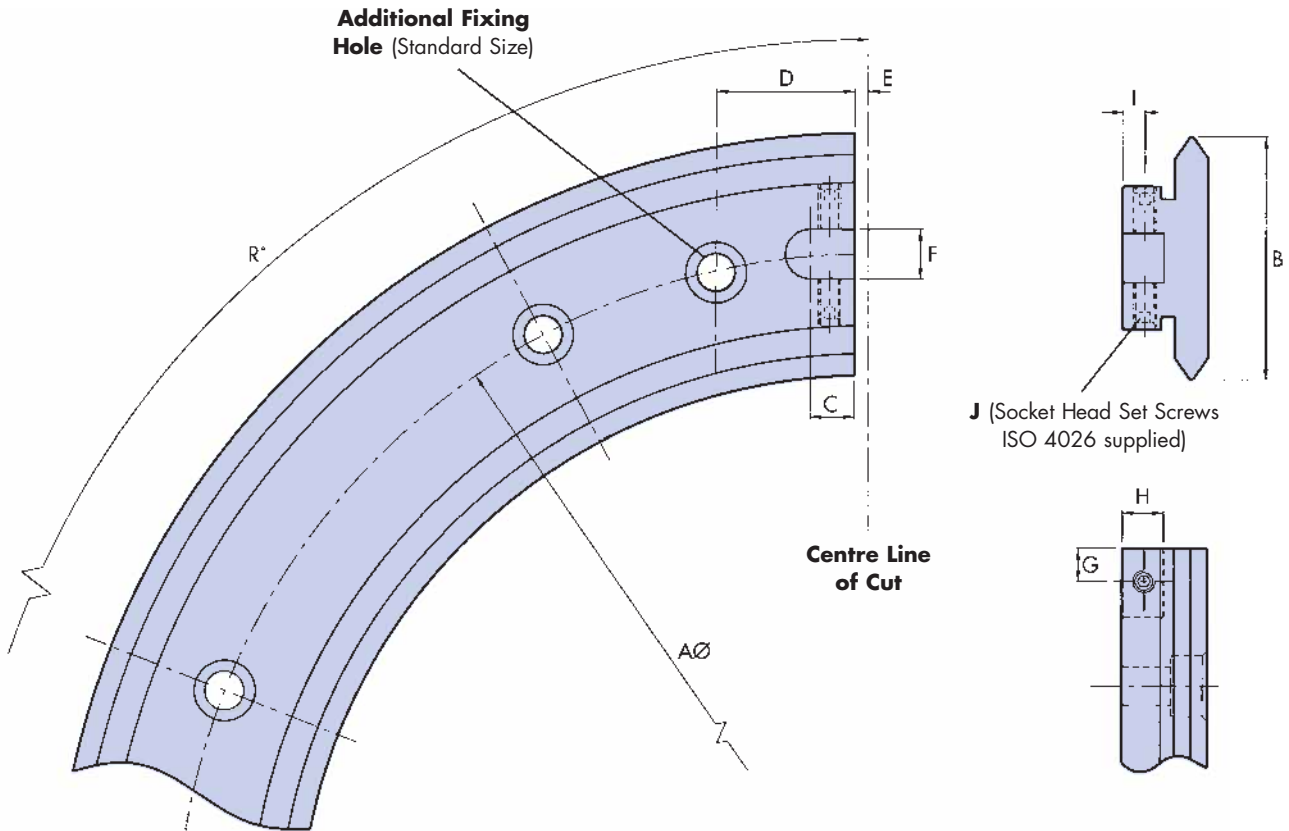
For all other details & dimensions see pages 12 & 13

Part Number	A	~ B	C	D	±0.2 E	F	G	H	I	J	R°	
TR12-93	93	12	4.25	–	1.5	2.5	2	3.25	1.75	M2.5 x 3	90	180
TR12-127	127	12	4.25	–	1.5	2.5	2	3.25	1.75	M2.5 x 3	90	180
TR25-159	159	25	7	18	1.5	7	5	6.5	3	M4 x 4	90	180
TR25-255	255	25	7	20	1.5	7	5	6.5	3	M4 x 4	90	180
TR25-351	351	25	7	20	1.5	7	5	6.5	3	M4 x 4	90	180
TR44-468	468	44	8	25	2.5	10	6	7.5	4	M5 x 6	90	180
TR44-612	612	44	8	25	2.5	10	6	7.5	4	M5 x 6	90	180
TR76-799	799	76	10	30	2.5	18	7	11.5	6	M8 x 16	90	180
TR76-1033	1033	76	10	30	2.5	18	7	11.5	6	M8 x 16	90	180

Notes:

1. Except where specified, dimensions in mm.

Ordering Details

Example: TR44-612 (R90) (R180) (N)

Tapped hole option 'N' (see page 12)
180° segment
90° segment
Part number
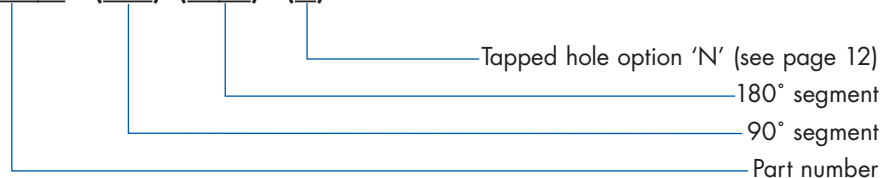
Data & Dimensions

Bogie Carriage

The Hepco bogie carriage is designed for use with track systems where 'S' bends or bends of varying radii are to be negotiated, or where increased stability due to wide spacing of the bearing assemblies is required. Each bogie swivels on a unique self-lubricating axial/radial bearing with adjustable preload facility, enabling it to follow exactly the path of the slideway at all times. The bogie and carriage plate are manufactured in anodised aluminium alloy and the complete carriage is supplied fully assembled and adjusted to suit the accompanying slide. Special size carriages are available upon request.
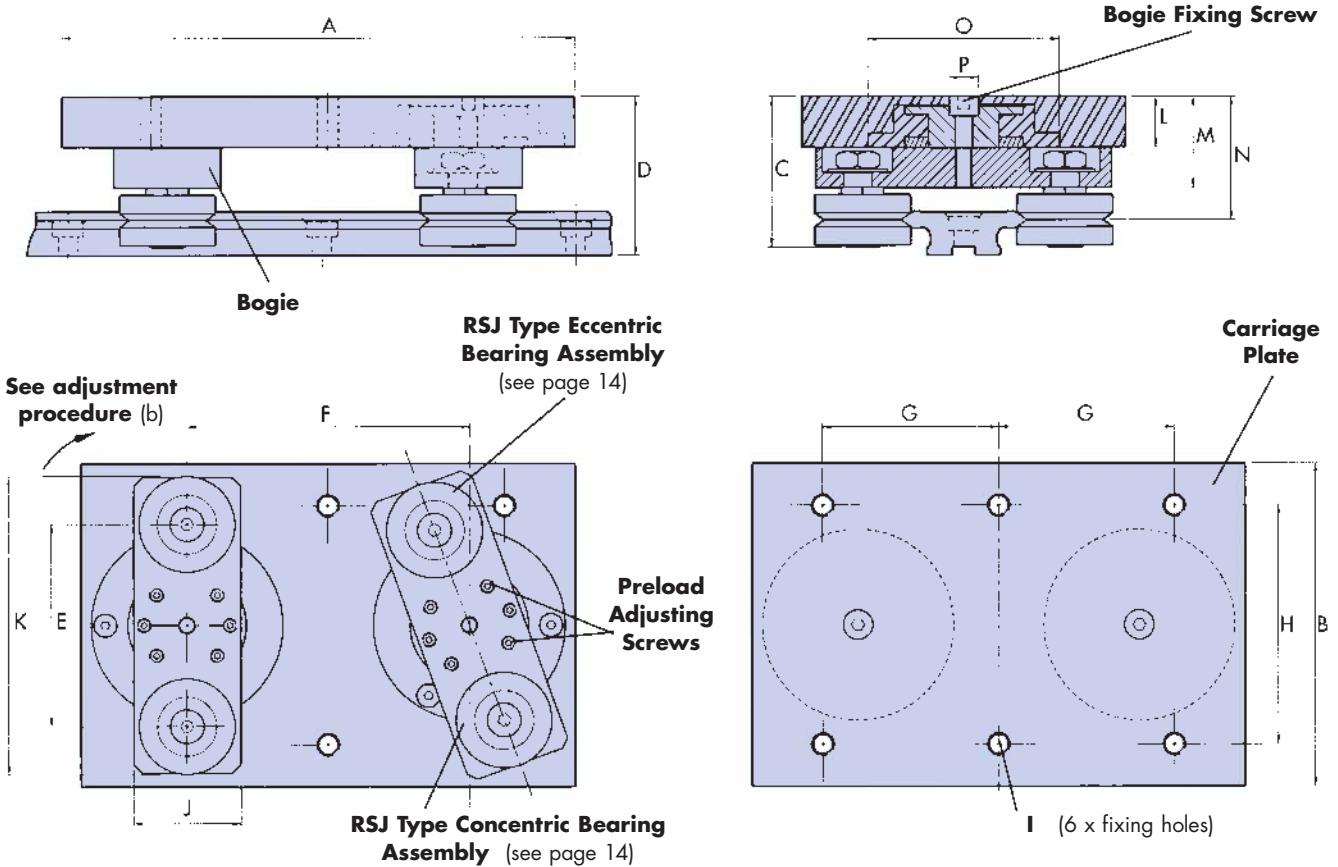
Part Number	USE WITH TRACK SYSTEM (SEGMENT TYPE)	A	B	C	D ±0.1	E	F	G ±0.1	H ±0.1	I	J	K	L	M	N	O	P	ADJUSTMENT BRACE	Mass ~kg
BCP-12	TR–12	65	40	26.4	28	22	30	25	30	M4 x 0.7	16	36	10	16.3	21.8	28	7.5	AB–12	0.13
BCP-25	TR–25	130	80	42.1	44.5	46.1	75	45	60	M6 x 1	32	75	15	25.5	34.5	48	9	AB–25	0.8
BCP-44	TR–44	175	115	53.8	56.5	71.9	100	62.5	85	M8 x 1.25	38	105	18	32.5	44	68	10.5	AB–44	2.1
BCP-76	TR–76	240	185	77.2	81	118.7	130	87.5	125	M10 x 1.5	50	170	24	42.5	61.5	100	13.5	AB–76	6.3

Adjustment Procedure:

a) The preload of the bogie swivel bearings is factory adjusted. However, should it become necessary to readjust, tighten the preload adjusting screws evenly until all play is removed whilst still allowing freedom of rotation of the bogie. A suitable thread locking compound (Loctite 242 or equivalent) must be used when resetting the preload adjusting screws.

b) The bearing assemblies are factory adjusted to suit the accompanying slide system. However, should it become necessary to readjust, the carriage must first be removed from the bogies by undoing the fixing screws then the bogies connected together using Hepco adjustment brace (see table above). The exposed bearing assembly fixing nuts may then be slackened and adjustment effected by rotating the eccentric **in direction of arrow shown** in accordance with the system adjustment procedure (see page 28). Bearing assembly adjusting tools are available and are illustrated on page 14.

Ordering Details: Simply specify the quantity and part numbers required.

Example: 8 x **BCP-76** ————————————— Bogie carriage

              1 x **AB-76** ————————————— Adjustment brace

Load Capacity and Life Expectancy

The load capacity and life expectancy of Hepco ring, segment and track systems will be determined by several factors. These are the size of the ring and the size and number of bearing assemblies used, the presence of lubrication, the magnitude and direction of loads, the speed of operation (see note 2 page 25) and the length of the path traversed (see note 3 page 25).

It is usual to run systems with less than the maximum load to prolong the life, which can be calculated using the data and formulae in this section. For calculation purposes, Hepco ring slide and track systems fall into two categories, those in which a carriage runs on a ring segment or track, and those in which a ring rotates captivated by a number of bearing assemblies (or a similar arrangement where the ring is stationary and the bearing assemblies and load rotate).

Wherever possible, Hepco ring and track systems should be lubricated using the Hepco lubricators (see page 16). Such lubrication will greatly increase the load capacity and extend the life of the system (see tables on pages 24 & 25 and nomograms on pages 25 & 26).

Systems with Carriages on Rings, Segments & Tracks

When calculating the life, the loading on the system should be resolved into the direct load components L_1 and L_2 and the moment load components M, M_V and M_S (see adjacent diagram and refer also to note 2).
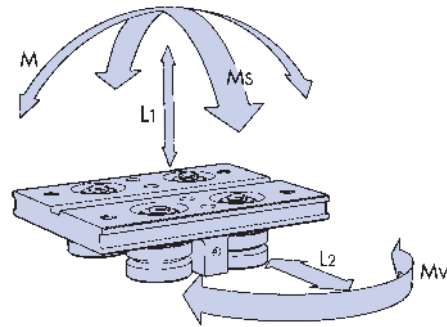
	Maximum Lubricated Load Capacity					Maximum Unlubricated Load Capacity				
	Direct Loads (N)		Moment Loads (Nm)			Direct Loads (N)		Moment Loads (Nm)		
Carriage	L_1	L_2	M	M_V	M_S	L_1	L_2	M	M_V	M_S
FCP-12-93	120	120	1.25	1.25	0.6	80	80	0.8	0.8	0.4
FCP-12-127	120	120	1.2	1.2	0.6	80	80	0.8	0.8	0.4
BCP-12	120	120	1.7*	1.7*	0.6	80	80	1.2*	1.2*	0.4
FCP-25-159	800	800	16	16	9	300	300	6	6	3.5
FCP-25-255	800	800	15	15	9	300	300	6	6	3.5
FCP-25-351	800	800	17	17	9	300	300	7	7	3.5
BPC-25	800	800	27*	27*	9	300	300	10*	10*	3.5
FCP-44-468	1600	1600	57	57	35	600	600	22	22	14
FCP-44-612	1600	1600	65	65	35	600	600	24	24	14
BCP-44	1600	1600	75*	75*	35	600	600	28*	28*	14
FCP-76-799	3800	3800	165	165	140	1400	1400	62	62	55
FCP-76-1033	3800	3800	210	210	140	1400	1400	81	81	55
BCP-76	3800	3800	220*	220*	140	1400	1400	86*	86*	55

*see note 1

To calculate the life of a system using a standard carriage, first obtain the load factor L_F by entering the values for L_1, L_2, M, M_V and M_S in respect of the proposed duty into equation [1] below, together with the maximum load capacities from the table above.

$$[1] \qquad L_F = \frac{M}{M_{(max)}} + \frac{M_V}{M_{V(max)}} + \frac{M_S}{M_{S(max)}} + \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}}$$

The life for the system can be read from the nomogram on page 25 (for lubricated systems) or on page 26 (for systems running dry) by taking the life figure on the lower scale opposite the calculated value for L_F on the upper scale (see examples on pages 26 & 27).

Notes:

1. If using a bogie type carriage which differs from the standard length, the M and M_V moment load capacities will increase pro rata with the increase in the distance between the bogie swivel centres (see dimension 'F' on page 23).
2. When calculating L_2 and M_S, the centrifugal force must be included, which acts radially outwards from the centre of mass (COM) of the moving object. Its magnitude is $F = DV^2/R$ where V is the velocity of the COM in m/s, R is the distance of the COM from the ring axis in m and D is the mass in kg. F is in N (newtons).

Technical

Systems with Rings rotating within Enclosing Bearing Assemblies

In those duties having a complete ring which rotates in a number of encircling bearing assemblies, it is usual to equally space the bearing assemblies around the ring (see note 1). When calculating the life, the loading on the system should be resolved into the direct load components L_A and L_R and the moment load component M (see adjacent diagram and refer also to note 2 on page 24).
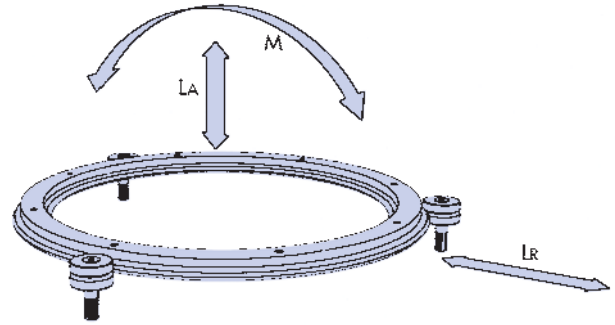
Bearing Assembly Size	Used with Ring Part Number	Number of Bearing Assemblies Equally Spaced	Maximum Lubricated Load Capacity			Maximum Unlubricated Load Capacity		
			L_A (N)	L_R (N)	M (Nm)	L_A (N)	L_R (N)	M (Nm)
RSJ/BHJ-13	R12–93 R12–127	3	90	52	18 x Øc*	60	34	13 x Øc*
		4	113	60	22.5 x Øc*	75	40	16 x Øc*
		EACH ADDITIONAL 1	23	15	4.5 x Øc*	5	3	1.2 x Øc*
RSJ/BHJ-25	R25–159 R25–255 R25–351	3	600	350	150 x Øc*	230	125	55 x Øc*
		4	750	400	187 x Øc*	285	150	69 x Øc*
		EACH ADDITIONAL 1	150	100	37 x Øc*	18	12	5 x Øc*
RSJ/BHJ-34	R44–468 R44–612	3	1200	700	300 x Øc*	460	255	110 x Øc*
		4	1500	800	375 x Øc*	575	300	138 x Øc*
		EACH ADDITIONAL 1	300	100	75 x Øc*	38	24	27 x Øc*
RSJ/BHJ-54	R76–799 R76–1033	3	2850	1650	750 x Øc*	1050	600	260 x Øc*
		4	3600	1900	875 x Øc*	1300	700	325 x Øc*
		EACH ADDITIONAL 1	700	470	175 x Øc*	75	50	18 x Øc*

*see note 4   *see note 4

To calculate the life of this system, first obtain a value for the load factor L_F by entering the values for L_A, L_R and M in respect of the proposed duty, into equation 2 below, together with the maximum load capacities from the table above.

[2]
$$L_F = \frac{M}{M_{(max)}} + \frac{L_A}{L_{A(max)}} + \frac{L_R}{L_{R(max)}}$$

See note 2 on page 24

The life for the system can be read from the nomogram below (for lubricated systems) or on page 26 (for systems running dry) by taking the life figure on the lower scale opposite the appropriate value for L_F on the upper scale (see example page 26).

Load/Life Nomogram for Lubricated Systems

Load Factor **L_F**

Life (km)
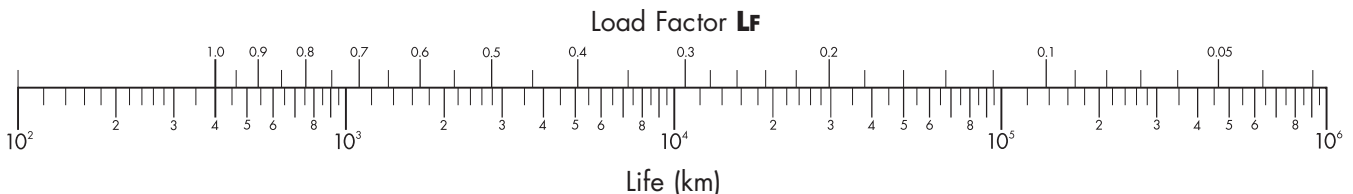
Notes:

1. In certain applications in which the bearing assemblies rotate with the load, and this has large L_R or M components, it may be beneficial to space the bearing assemblies unequally around the ring. Consult Hepco for details.

2. SPEED OF OPERATION. Hepco ring, segment and track systems are rated for speeds of 1m/s without lubrication or 1.5m/s when lubricated. Greater speeds may be tolerated at reduced loads. Consult Hepco for details.

3. SHORT STROKE OPERATION. The life of Hepco ring, segment and track systems will be reduced when the length of the path traversed in each cycle is very short. For path lengths below 0.2m, the life will reduce pro-rata with the path length, e.g. a system with a 0.08m stroke will have its life reduced by a factor of 0.08 ÷ 0.2 = 0.4 compared to that calculated from the appropriate nomogram.

4. Øc is the contact diameter, ie the diameter of the circle which passes through the points of contact between bearing assemblies and the ring. This will be usual to the P.C.D of the ring ± 9, 20, 37 & 64mm for the 12, 25, 44 & 76 sections respectively (depending on whether the bearing assemblies are running on the outside or inside of the ring).

Figure 4: Load/Life Nomogram for unlubricated Systems

Load Factor **LF**

Life (km)
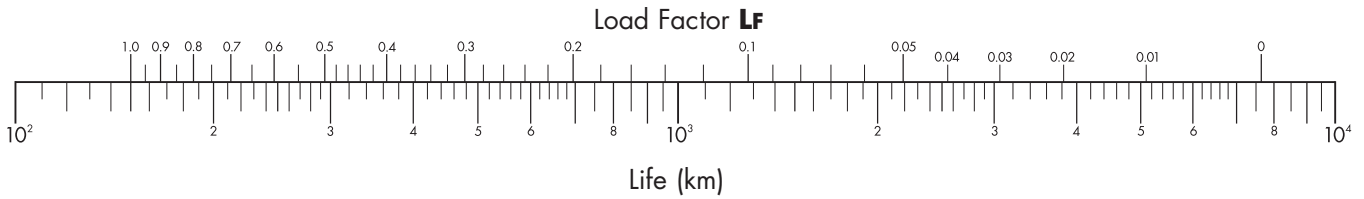
Load/Life Calculation Examples

Example 1

A track system consists of: 1 x TR44–468–R180/C;
1 x TNM–44–B870 – 2 x AK; 1 x TR44–468–R180/C;
1 x TNM–44–B870 – 2 x AK; 1 x FCP–44–468.
The carriage carries a dead weight such that the mass of the load and the carriage together is a total of 40kg whose centre of mass is over the middle of the carriage. The centre of mass is 80mm above the slide V's. The speed of operation is 0.7m/s and the system is lubricated with the Hepco lubricators which are supplied as part of the fixed centre carriage.

L_1 = 40kg x 9.81m/s^2 (g) = 392.4N
L_2 (centrifugal force see note on page 24 = DV^2/R)
L_2 = 40kg x (0.7m/s)^2 ÷ 0.234m = 83.7N
M_s = L_2 x 0.08m = 83.7N x 0.08m = 6.7Nm
M_v = M = 0

Plan View

0.7m/s

40kg

80mm
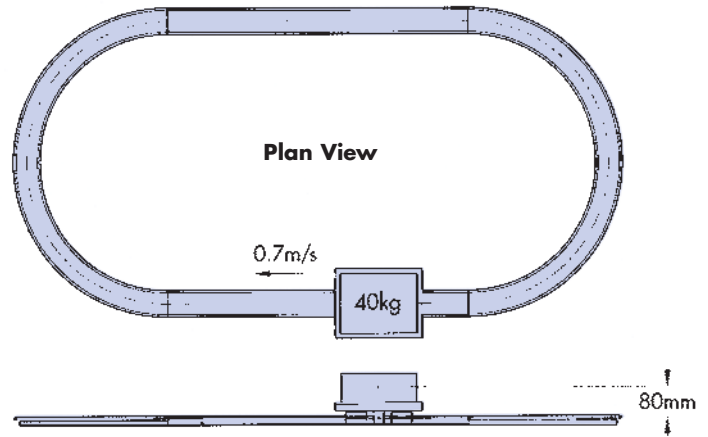
$$L_F = \frac{M}{M_{(max)}} + \frac{M_v}{M_{v(max)}} + \frac{M_s}{M_{s(max)}} + \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}} = \frac{0}{57} + \frac{0}{57} + \frac{6.7}{35} + \frac{392.4}{1600} + \frac{83.7}{1600} = 0.49$$

The value of 0.49 for the life factor L_F can then be entered into the nomogram for lubricated systems to obtain the linear life. Reading from the nomogram on page 25 we see that the life corresponding to an L_F value of 0.49 is **2,900km**.

Example 2

100mm

COM

150mm
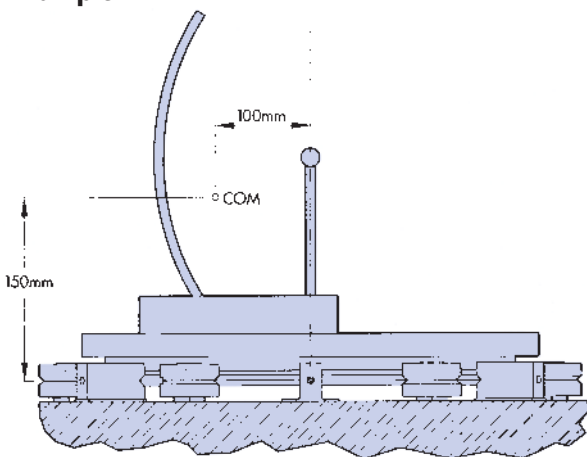
An antenna is mounted on a Hepco R25–351–360 ring which rotates in 6 x RLJ–25 bearing assemblies. The system is lubricated with 5 x LB–25 lubricators. The antenna rotates once per second and the mass of the rotating assembly (which includes the ring, platform and the antenna) is 8 kg. The centre mass of the assembly is 100mm from the axis of the ring, and 150mm above the ring V's. The system is required to work on average 36 hours per week.

L_A = 8kg x 9.81m/s^2 (g) = 78.5N
Speed of the centre of mass: 1rev/s = 2 x π x 0.10m x 1 = 0.63m/s
L_R = DV^2/R = 8kg x (0.63m/s)^2 ÷ 0.10m = 31.8N
M = L_R x h = 31.8N x 0.15m = 4.77Nm
From the table on page 25 we find that $M_{(max)}$ = (187+2 x 37) x $\emptyset$c
= 261 x (0.351 + 0.020) = 96.8Nm
$L_{A(max)}$ = 750 + 2 x 150 = 1050N; $L_{R(max)}$ = 400 + 2 x 100 = 600N

$$L_F = \frac{M}{M_{(max)}} + \frac{L_A}{L_{A(max)}} + \frac{L_R}{L_{R(max)}} = \frac{4.77}{96.8} + \frac{78.5}{1050} + \frac{31.8}{600} = 0.177$$

Reading from the nomogram on page 25 we see that the life corresponding to an L_F value of 0.177 is 39000km.
1 revolution = .351 x π = 1.1m. Each week the system runs for 3600 revs/hour x 36 hours = 143km.

System life = 39000 ÷ 143 = 273 weeks = **5.25 years**

Example 3

A feeding mechanism incorporates an R44–612–R90 slide ring segment and FCP–44–612 fixed centre carriage. This mechanism has a paddle which pushes components onto a conveyer via a curved path. The pusher is powered by a rotary actuator which engages on a pin on the centre of the carriage plate, 70mm above the centre line of the V's. The mass of the carriage assembly is 10kg and the centre of mass is 70mm from the system centre. When the mechanism is pushing products onto the conveyer, the pushing force F_P is 200N which acts 100mm from the centre of the system and at a height of 60mm from the centre line of the V's. The length of travel is 150mm and the system is lubricated by the Hepco lubricators supplied with the fixed centre carriage.

Plan View

The application is slow speed and low acceleration, so centrifugal and inertial forces can be ignored for the calculation.

$L_1 = 10kg \times 9.81m/s^2 (g) = 98.1N$ $\qquad\qquad L_2 = 0$

Reaction force on carriage pin = Fp x mechanical advantage
= F_P x paddle force radius ÷ carriage reaction force radius
= F_P x [(306 + 100) ÷ 306] = 200 x 1.327 = 265N
$M = 265N \times 0.07m - 200N \times 0.06m = 6.55Nm$
$M_V = 200N \times 0.1m = 20Nm$
$M_S = 98.1N \times 0.07m = 6.87Nm$

View from direction of F_P
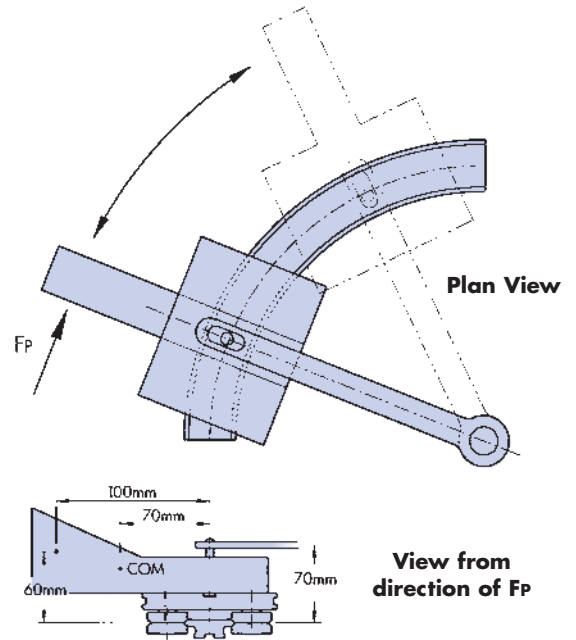
$$L_F = \frac{M}{M_{(max)}} + \frac{M_V}{M_{V(max)}} + \frac{M_S}{M_{S(max)}} + \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}} = \frac{6.55}{65} + \frac{20}{65} + \frac{6.87}{35} + \frac{98.1}{1600} + \frac{0}{1600} = 0.67$$

Reading from the nomogram on page 25 we see that the linear life corresponding to an L_F value of 0.67 is 1200km, however, due to the short stroke the system should be derated by applying the short stroke correction (see note 3 page 25). The life from the nomogram must therefore be multiplied by 0.15 ÷ 0.2 = 0.75. The correct linear life of the system thus calculated is 1200 x 0.75 = **900km or 6 million strokes**.

Example 4

Front Elevation
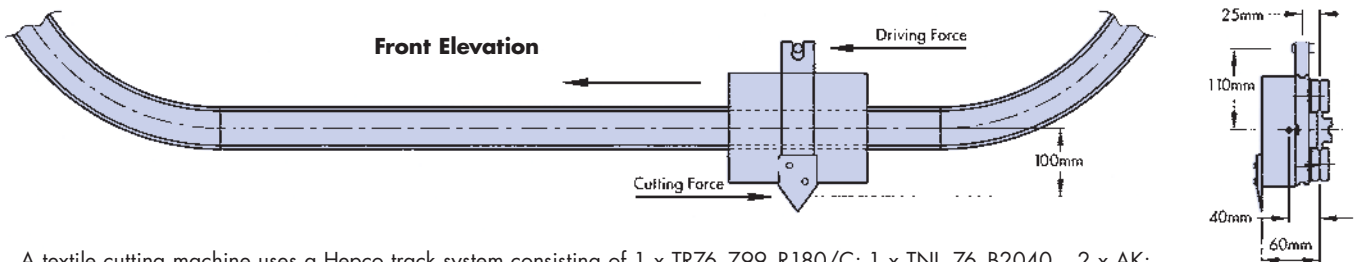
A textile cutting machine uses a Hepco track system consisting of 1 x TR76–799–R180/C; 1 x TNL–76–B2040 – 2 x AK; 1 x TR76–799–R180/C; 1 x TNL–76–B2040 – 2 x AK; 1 x FCP–76–799. The carriage carries a knife which experiences a resistance force of 200N at a distance of 100mm from the system centre, and the blade is offset by 60mm from the centreline of the V's. The carriage is driven by a timing belt which engages a pin in a yoke on the side of the carriage. The line of the force is offset by 110mm from the system centre. The carriage and knife assembly weighs 15kg and travels at 1m/s. The knife only cuts while the carriage is on the lower of the two straight portions of the track. The system is lubricated by Hepco lubricators.

On lower straight section:
$L_1 = 0$ $\qquad\qquad L_2 = 15kg \times 9.81m/s^2 = 147.2N$ $\qquad\qquad$ Cutting force ≈ Driving force
$M = 200N \times 0.06m - 200N \times 0.025 = 7Nm$ $\quad M_V = 200N \times 0.10m + 200N \times 0.11m = 42Nm$ $\quad M_S = 147.2N \times 0.04 = 5.9Nm$

$$L_F = \frac{M}{M_{(max)}} + \frac{M_V}{M_{V(max)}} + \frac{M_S}{M_{S(max)}} + \frac{L_1}{L_{1(max)}} + \frac{L_2}{L_{2(max)}} = \frac{7}{165} + \frac{42}{165} + \frac{5.9}{140} + \frac{0}{3800} + \frac{147.2}{3800} = 0.38$$

The corresponding life figure from lubricated nomogram on page 25 is 6000km.

On the curved sections there is no cutting force and the driving force will be small, but there will be a centrifugal force = DV^2/R = 15kg x $1^2/0.3995$ = 37.5N plus the weight of the carriage. On the top straight section there is only the weight of the carriage acting. The worst case loading anywhere in the system other than on the lower straight portion occurs on the bottom of the curved sections where the various load components are as follows:

$L_1 = 0$ $\qquad\qquad L_2 = 15kg \times 9.81m/s^2 + 37.5N = 185N$ $\qquad\qquad M = 0$
$M_V = 0$ $\qquad\qquad M_S = 185 \times 0.04m = 7.4Nm$

From these figures , a life factor of 0.10 can be calculated, as above. This life factor corresponds to a linear life of 140,000 km.

Because the life calculations show that the expected life on the section where the cutting is done is 23 times shorter than on the return section of the track, the wear on the return section can be ignored for the purposes of this approximate life prediction.

On this basis the system will last for 6000km ÷ 2040mm = **2.9 million circuits of the track**.

Note: In applications where a ring slide or track system experiences a range of loads within a cycle which all significantly contribute to the wear, an appropriate allowance should be made. Calculations for such duties fall outside the scope of this catalogue. Consult Hepco for details.

Fixed Centre Carriage Play at Straight/Curve Transition Zones (see page 18)

Hepco fixed centre carriages are designed to have the same fit on both straight slides and curved segments of the radius for which they are specified. When the carriage traverses the join between these two components, a small clearance will appear between the female V's of the bearing assemblies and the male V's of the straight and curved slides. The amount of this clearance is given in the table below.

Carriage Type	FCP 12-93	FCP 12-127	FCP 25-159	FCP 25-255	FCP 25-351	FCP 44-468	FCP 44-612	FCP 76-799	FCP 76-1033
Maximum Clearance	0.18	0.08	NOT FOR USE WITH TRACK SYSTEMS	0.18	0.09	0.21	0.21	0.13	0.19

The figures given in the table above are the theoretical clearance (in mm). In those applications which preload the bearing assemblies against the slides, not all of this clearance will appear as play, but as a slight reduction in the preloading of the system. In these instances the carriage will have a freer movement as it goes between straight and curved section than it does when it is wholly on the straight or curved sections.

In most duties this momentary loosening of the carriage is unimportant, however, in some applications it may be undesirable. In such cases, customers should consider using the Hepco bogie type carriage (see page 23) which does not develop clearance in the same way when traversing from straight to curved sections.

System Adjustment

To get the best performance from a Hepco slide system, it must be correctly assembled and adjusted.

To fit a carriage, the eccentric bearing assemblies should be adjusted to their outermost positions and nuts semi-tightened. Concentrics should be fitted with nuts two full turns loose. With concentrics extended below the carriage plate, the carriage should be fitted onto the slide as shown on the left. The concentrics should then be fully tightened and eccentrics rotated (in the direction shown on the right) until the bearing assemblies captivate the slide with minimal preload. To fit a ring into encircling bearing assemblies, all eccentrics should be adjusted fully out to permit the ring to be engaged. The eccentrics may then be adjusted in as for carriages.
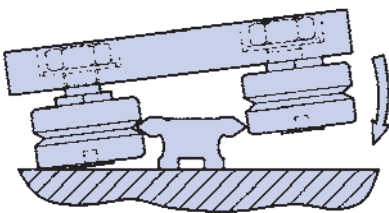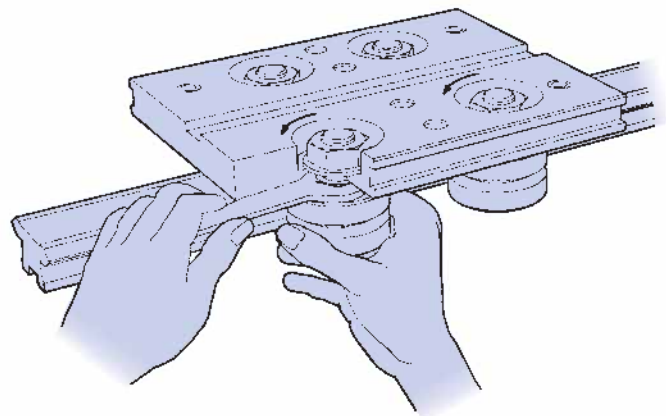
The correct condition of adjustment should be assessed by rotating the bearings of each bearing assembly by means of holding them between forefinger and thumb whilst preventing the ring or carriage from moving such that the bearings skid against the slide. A uniform degree of resistance should be felt, but the bearings should be able to be rotated without difficulty.

Once adjusted in this manner, the eccentric bearing assembly fixing nut should be fully tightened, using the Hepco adjusting wrench to prevent further rotation of the bearing assembly.

A further check should be made to ensure the correct condition of adjustment.

It should be noted that the load/life calculations assume a light preload as is described above. Systems which are preloaded more heavily than this will suffer a reduction in the life as compared with that predicted by the calculations.

In some circumstances, it may be difficult to gain access to the hexagonal flange for the purposes of system adjustment. In these situations it is possible to adjust by rotating the eccentric bearing assembly using an allen key located in the hexagonal socket in the end of the stud, and to tighten the securing nut at the same time using the Hepco socket tool (see pages 14 & 15). Due to the reduced control associated with this method, it is only recommended when the adjusting wrench method above is not possible.

When adjusting fixed centre carriages the lubricators should first be removed in order to gain access.

When adjusting bogie carriages, the steps outlined in the adjustment procedure on page 23 should also be observed.

In cases where an assembled system is supplied, the carriages will be supplied ready adjusted.
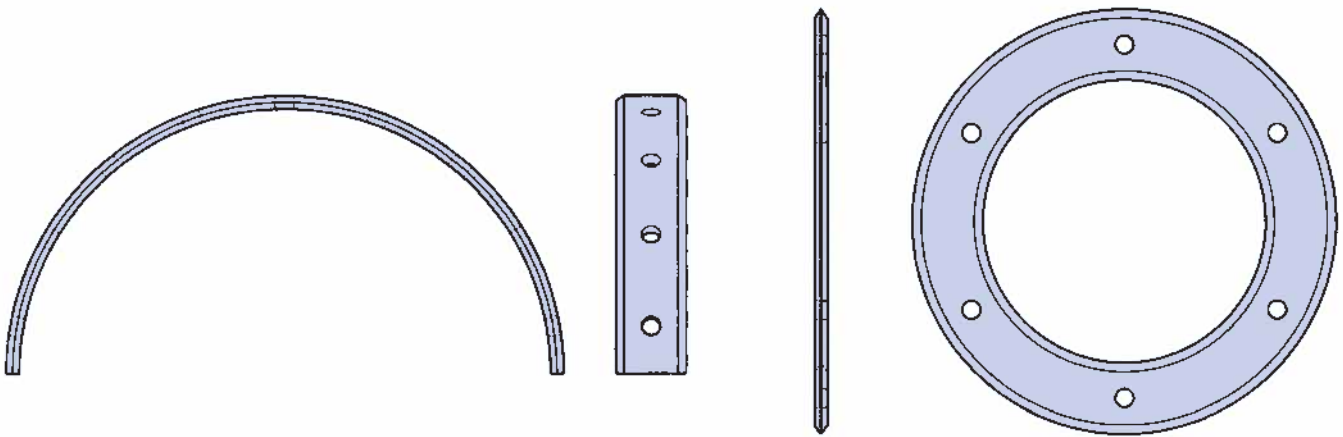
Specials

Although customers are recommended to choose standard catalogue components for reasons of economy and off the shelf availability, Hepco's specials department welcomes enquiries for non-standard rings and track systems. Our team of highly skilled technicians working with the most up to date equipment is able to cope with complex special requirements producing a cost effective solution with surprising short delivery times.

Rings of non-standard section and diameter can be produced, often from material held in stock. Stainless steel rings and track systems can be manufactured depending upon size and degree of hardness required. Alternatively, various plating processes may provide adequate corrosion resistance. Hepco application engineers are always on hand to provide advice and recommendations. Please consult us for your special requirements, preferably at an early stage in the design process.

A small selection of special ring components is shown below.
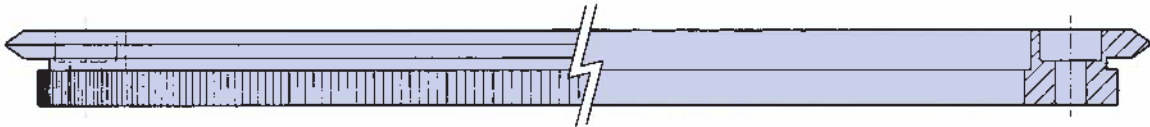
Rings with single V profile only either internal, or external as shown, with or without gear cutting.

Hepco commercial series flat sides can be rolled into special ring segments of various lengths and diameters (see separate Hepco GV3 Catalogue for slide section details).

Ring disc. V may be internal, external or both.
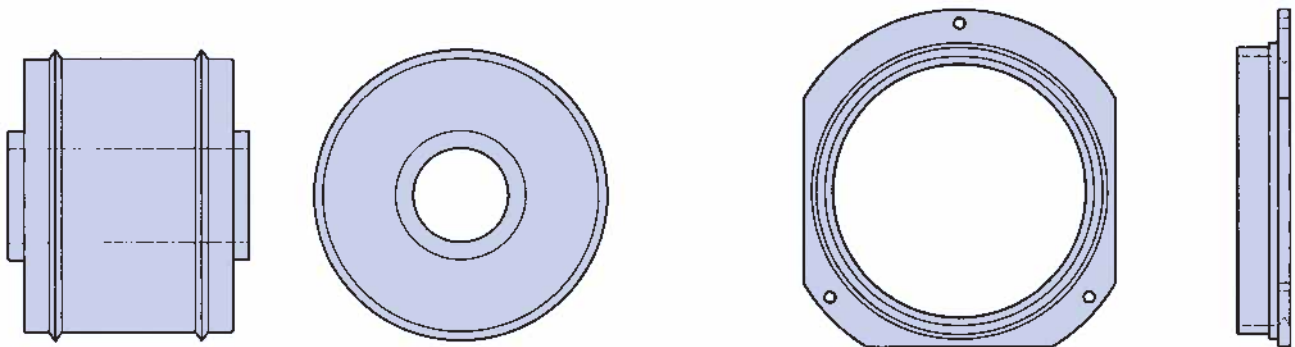
Duplex barrel ring.

Flanged ring with internal V.

The V profile can often be incorporated within the customer's own design, resulting in a single multi-purpose component. Hepco's highly sophisticated heat treatment techniques can provide a choice between zone hardening and through hardening depending on size and shape.

HepcoMotion® Product Range

GV3
Linear Guidance and
Transmission System

HDS
Heavy Duty Slide System
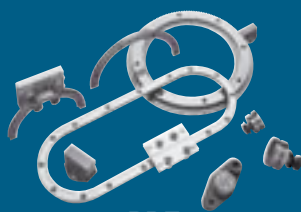
PRT
Ring Slides and
Track System

SL2
Stainless Steel Based
Slide System
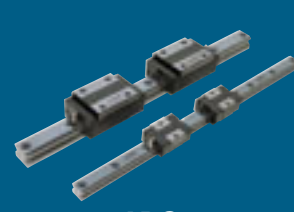
LBG
Linear Ball Guides
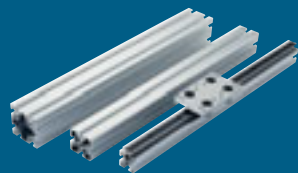
MCS
Aluminium Frame and
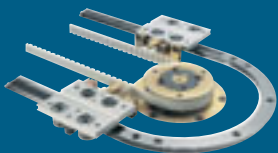Machine Construction System

HPS
Powerslide-2 Guided
Rodless Cylinder

HDLS
Heavy Duty Driven
Linear System

DLS
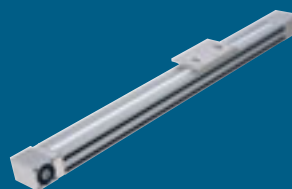Linear Transmission and
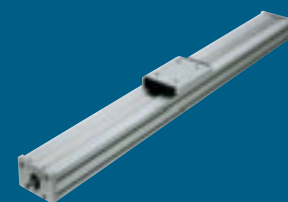Positioning System

HTS
Telescopic Ball
Bearing Slides

DTS
Driven Track System

BSP
Ballscrew Premier

Simple Select®
Vee Slide Linear
Guidance Systems

PDU2
Profile Driven Unit

PSD120
Profile Screw Driven Unit

BishopWisecarver Product Range

HepcoMotion® – Exclusive European partners and distributors for Bishop-Wisecarver since 1984.
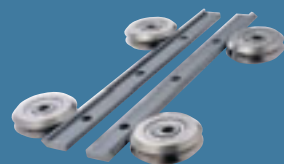
DualVee
Single Edge Slide System
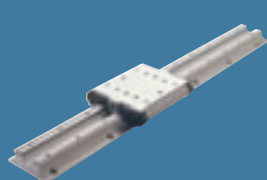
LoPro
Aluminium Based
Slide System

UtiliTrak
Lightweight U Channel
Guideway

**For further information on HepcoMotion® products –
please request our leaflet 'FPL'**

HEPCO®

www.HepcoMotion.com

HepcoMotion®

Lower Moor Business Park, Tiverton Way, Tiverton, Devon, England EX16 6TG
Tel: +44 (0)1884 257000 Fax: +44 (0)1884 243500
Email: sales@hepcomotion.com

ISO 9001
UKAS
QUALITY MANAGEMENT