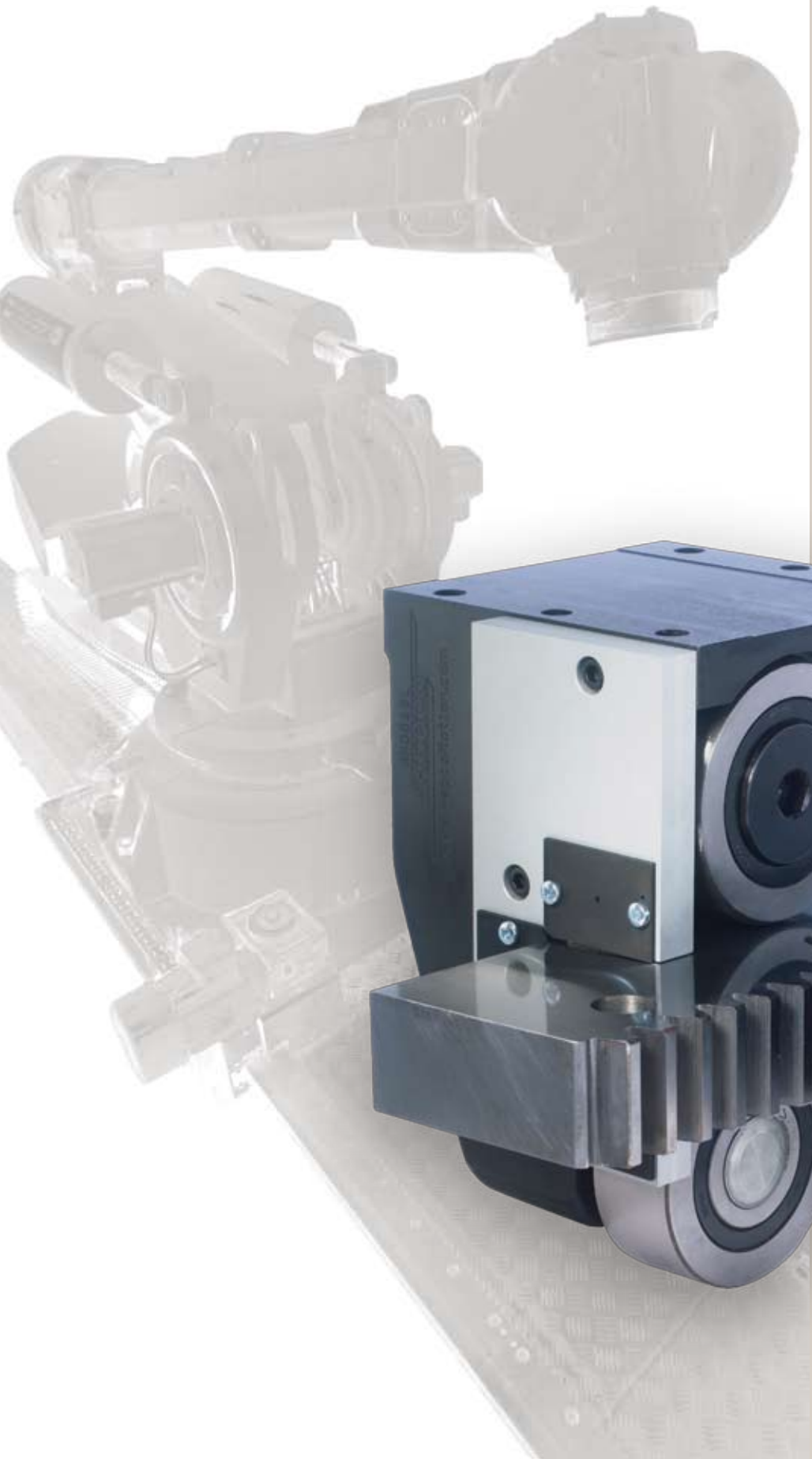
HepcoMotion®

MHD

Heavy Duty Track Roller Guidance System



BISHOPWISECARVER®

PRODUCT OVERVIEW

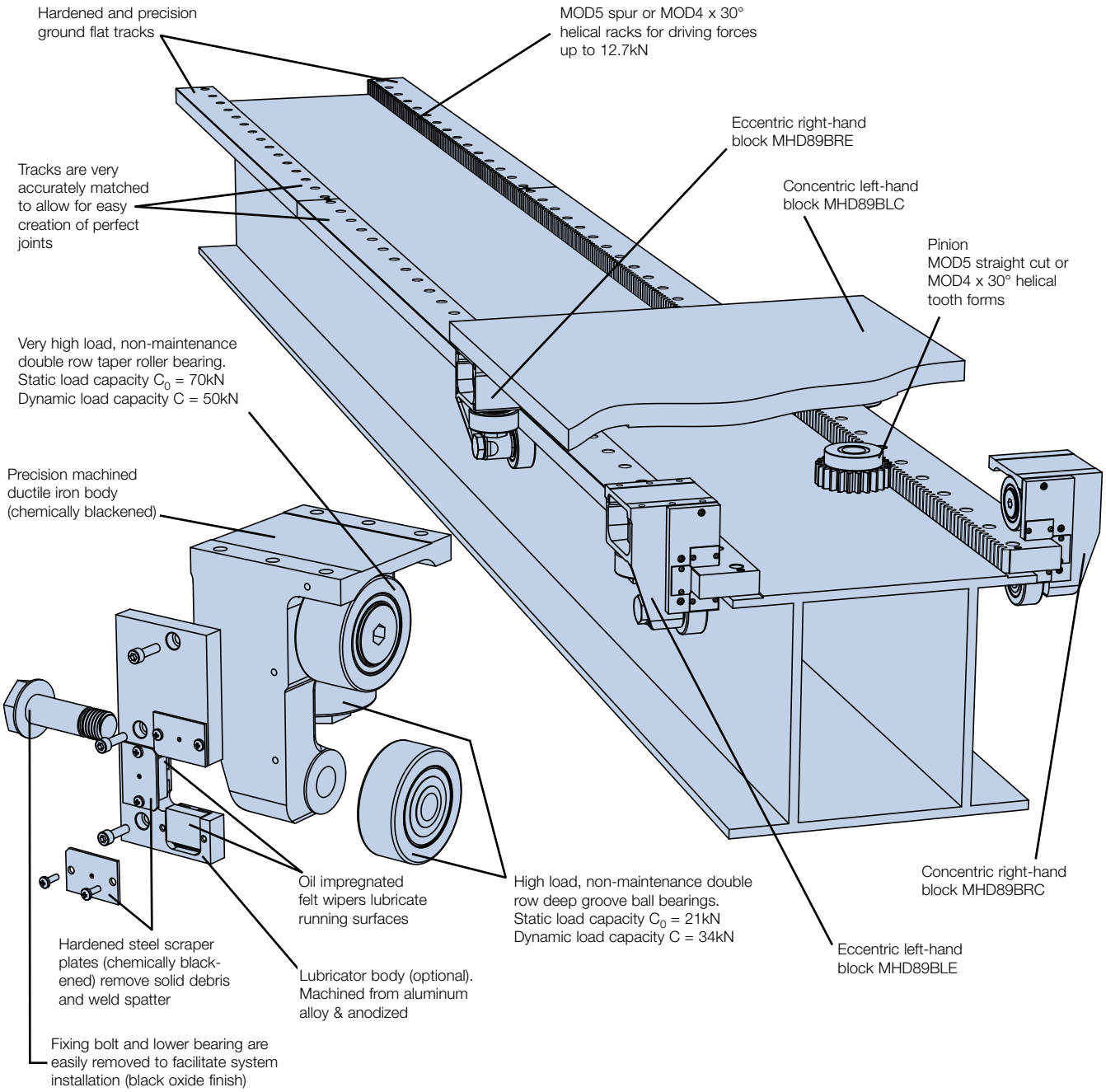
The HepcoMotion MHD system provides an accurate, durable and low friction linear guide which is particularly suitable for moving heavy items of automation equipment. Bearing blocks use wheels with sealed, maintenance free taper roller and deep groove ball bearings. The flat tracks are hardened and precision ground, and may be specified with spur or helical racks and pinions to provide a strong, precise drive.

The system has high load capacity and speed capability of over 6m/s. The large wheels with axial capacity make the system tolerant of debris, misalignment, disturbance to joints and accidental damage. It is easy to install in machines of any length and can be relied upon to give a long and trouble free service life.

Bearing blocks may be specified with lubricators. These apply oil to the tracks to maximize life, and the scraper plates remove debris, including weld spatter, from the track surfaces.

Bearing blocks have substantial capacity in all directions, but have enhanced strength in the downward direction to cater for heavy payloads. This arrangement is ideally suited to robot applications, even where there is an overhanging load and high acceleration.

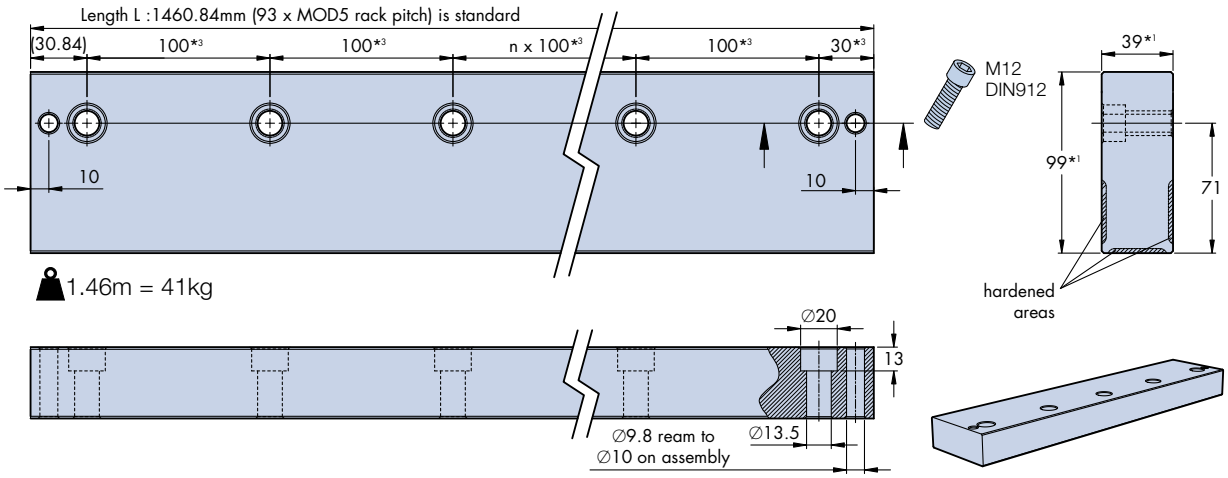
The lower bearing wheel of each block can be removed easily, which facilitates assembly onto the tracks by lowering the carriage from above. This unique feature dramatically simplifies installation and maintenance.



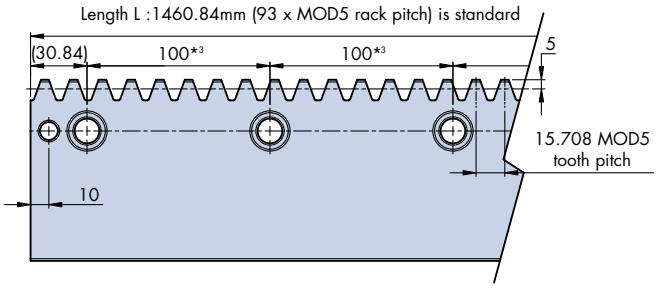
FLAT TRACKS

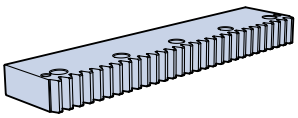
MHD flat tracks are made from high quality carbon steel, surface hardened for maximum durability and precision ground on all flat faces. Tracks may be specified plain or with a MOD5 straight-cut rack or a MOD4 30° helical rack to ISO 1328 grade 10. Plain and straight rack cut flat tracks are made in fixed lengths of ~1.46m which are joined to produce unlimited runs*1. Other lengths can be supplied. All tracks are drilled and counterbored to suit fixing with M12 socket head cap screws*3.

Installation is achieved by butting tracks end-to-end*1 against a machined register. This gives a perfect joint for bearings and pinions. Tracks should be doweled in place either side of the joint.

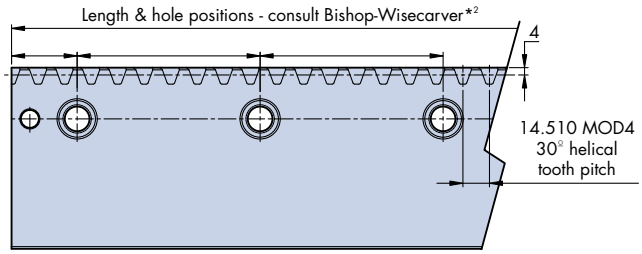


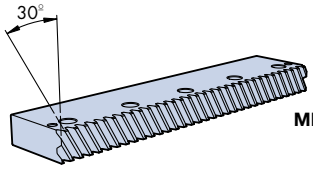
MHDT40100...





MHDT40100...R5





MHDT40100...HR4 *2

Ordering Details

MHDT40100 L1461 R5

Part Number. **MHDT40100** indicates an MHD flat track.

Length code. **1461** indicates the nominal track length in mm*2.

Rack option. **R5** - MOD5 straight cut rack; **HR4** - MOD4 x 30° helical rack; leave blank for no rack.

Notes

1. The width and thickness dimensions of tracks in one set are matched to 0.025mm, and the position of the ends of slides is accurately controlled to coincide with the center of the rack tooth root to give perfect running joints for tracks and racks.
2. Enter the full length of each complete track run. For plain tracks and those with the R5 rack, the standard length of each piece is L1461. Longer systems are made up from multiples of this length. Flat tracks with HR4 helical rack option in lengths over 1500mm will usually be supplied in more than one piece. Due to the rack helix, joints are angled and the pieces are handed. In such cases Bishop-Wisecarver will provide a drawing showing track lengths and hole positions.
3. Fixing holes are accurately positioned, and for systems up to 3m, holes in the mounting surface may be pre-drilled to nominal positions. For systems longer than this, it is recommended that fixing holes are drilled to suit by "spotting through" or a report on exact hole positions is requested with the order.

BEARING BLOCKS

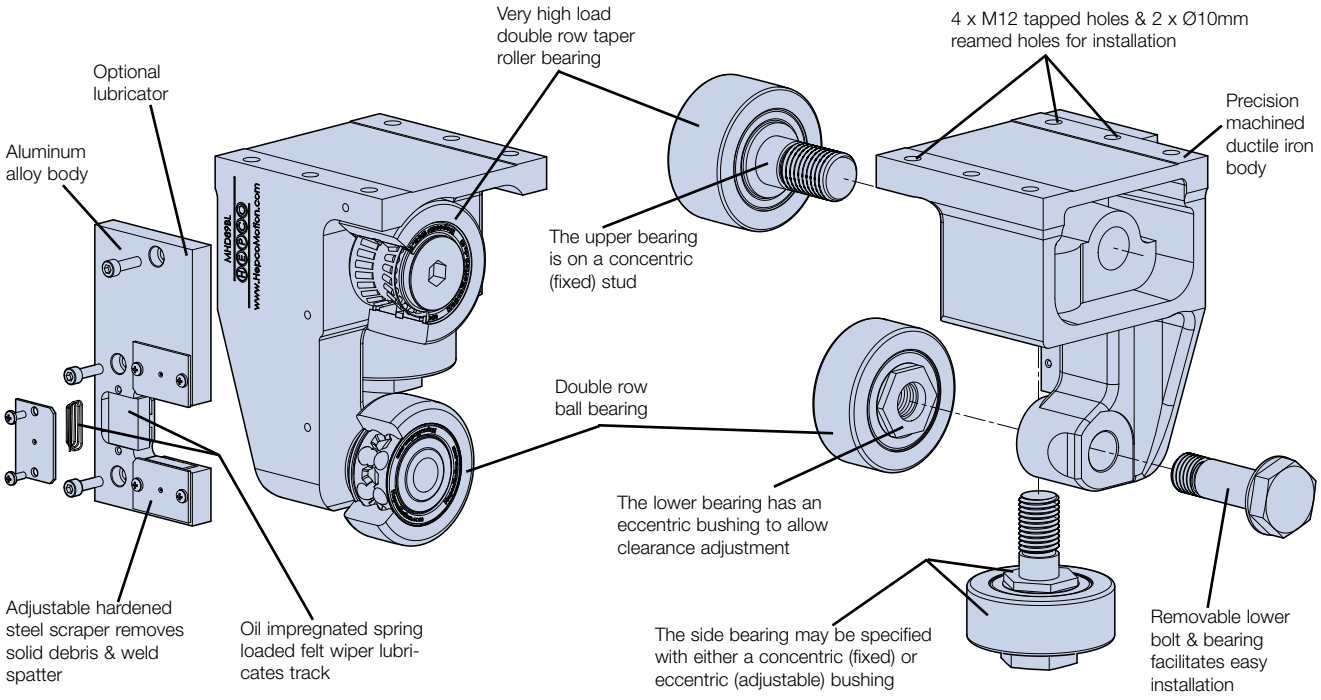
MHD bearing blocks have a high strength ductile iron body, precision machined and chemically blackened. The upper wheel uses a very high load double row taper roller bearing, and the lower two wheels have double row ball bearings. This arrangement gives high load capacity, excellent durability, and a predominant load capacity in the L_{1A} direction (📖6).

The upper wheel rotates on a fixed (concentric) stud. The lower wheel rotates on an eccentric fixing to allow the adjustment of running clearance. This wheel is easily removable to facilitate installation. The third roller is mounted concentrically or eccentrically depending on what is specified. In most systems it is usual to specify fixed (concentric) studs on the datum side of the system, with eccentric ones on the other side for ease of installation (📖1).

The lubricator has spring-loaded oil impregnated felts which wipe lubricant onto the track running surfaces. Adjustable hardened scrapers remove debris from the track surfaces, which ensures running quality is maintained even in dirty environments. Lubricators may be deleted where the application does not require them.

The default design has tapped holes, accurate machined registers and dowel holes for mounting off the top surface. An alternative block pattern is available which allows the block to be mounted using the rear face.

Features of MHD Bearing Blocks



The above drawings show a left-handed block

Ordering Details

MHD89B L E NL R

Part Number. **MHD89B** indicates an MHD block.

L indicates a **L**eft handed block; **R** indicates a **R**ight handed block (see above).

E indicates an **E**ccentric (adjustable) fitting for the side bearing; **C** indicates a **C**oncentric (fixed) fitting.

NL indicates a block without lubricator / slide scraper. Leave blank for blocks with lubricator / slide scraper.

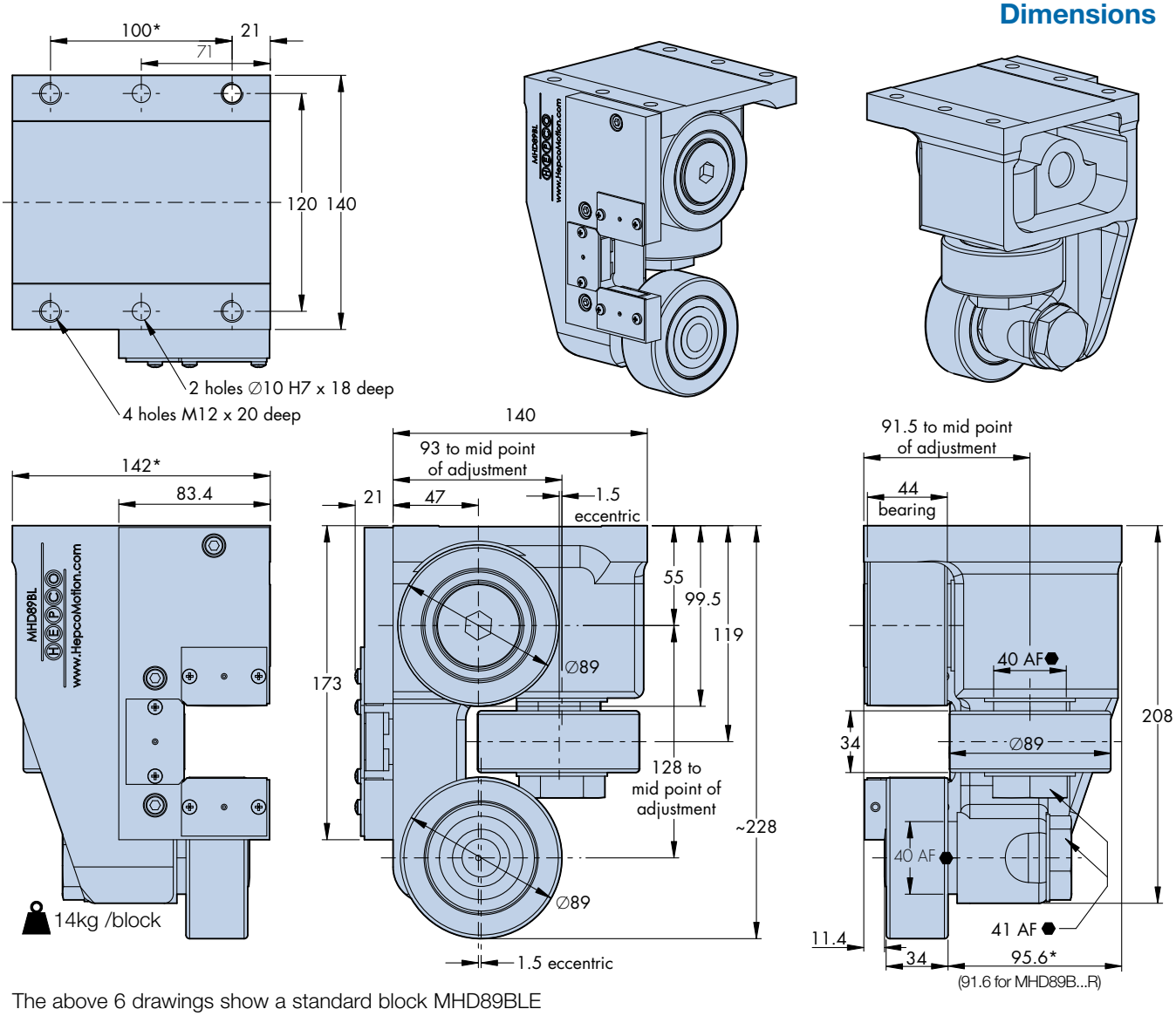
R indicates the rear fixing option. Leave blank for blocks with standard fixing.

Notes

1. To set up an MHD block on a track it is necessary to adjust the eccentrics. To do this a standard 41mm A/F spanner and a special 40mm A/F thin spanner (available from Bishop-Wisecarver: part number AT95) are required.

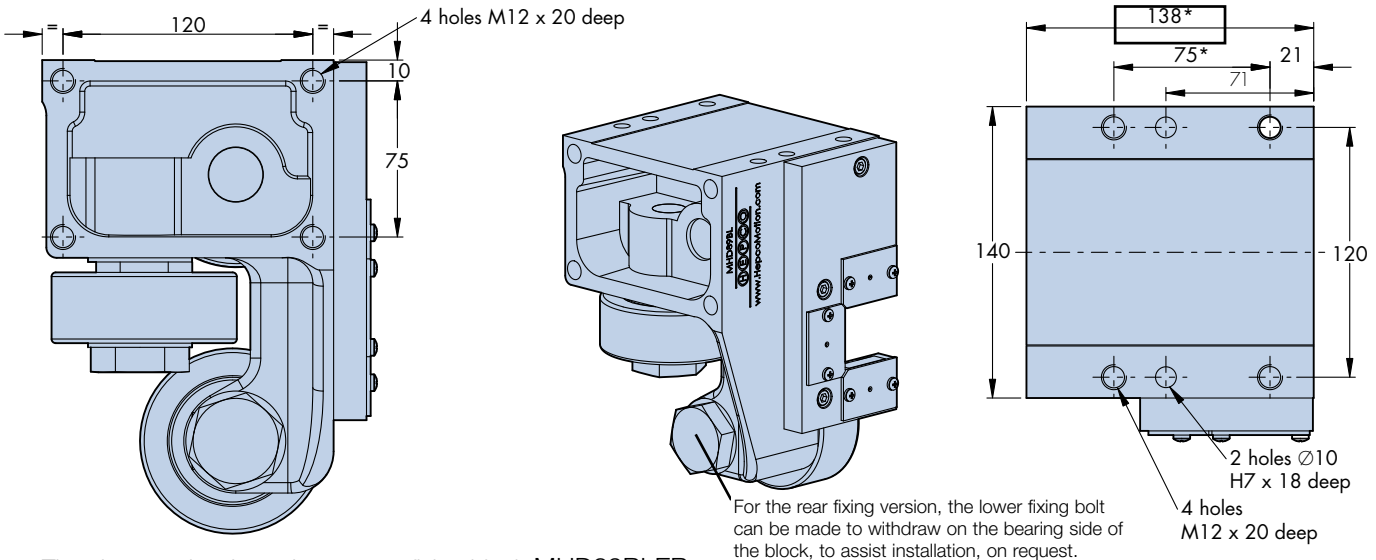
BEARING BLOCKS

Dimensions



The above 6 drawings show a standard block MHD89BLE

Right-handed blocks are a mirror image of the left-handed versions shown.



The above 3 drawings show a rear fixing block MHD89BLER

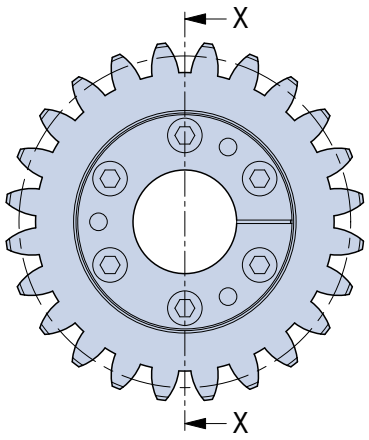
dimensions marked * differ between the standard and rear fixing variants.

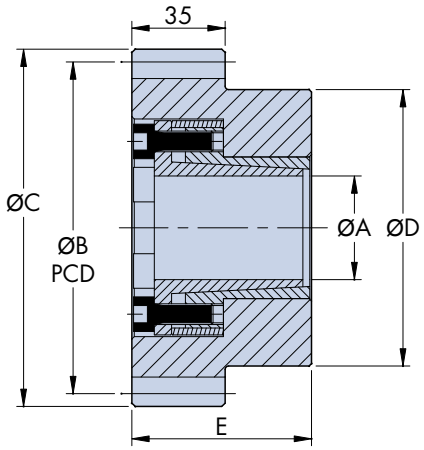
PINIONS

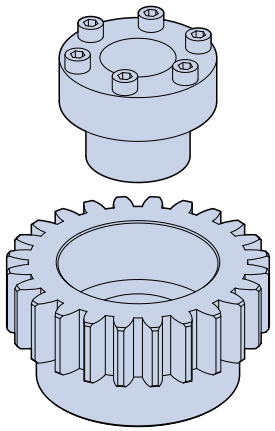
Pinions are available in two sizes to suit MHD flat tracks with both straight cut and helical racks. Pinions have a metric module tooth form with a 20° pressure angle and are made from high quality case hardened steel. The teeth are precision ground to ISO 1328 grade 6.

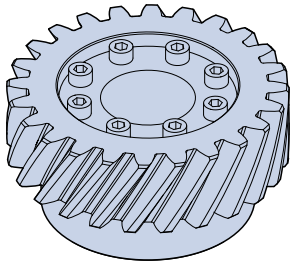
The pinions are supplied with keyless locking bushings which allow them to be securely fitted to a standard h8 toleranced shaft.

For best performance, the pinion and rack should be lubricated (see bottom of page).





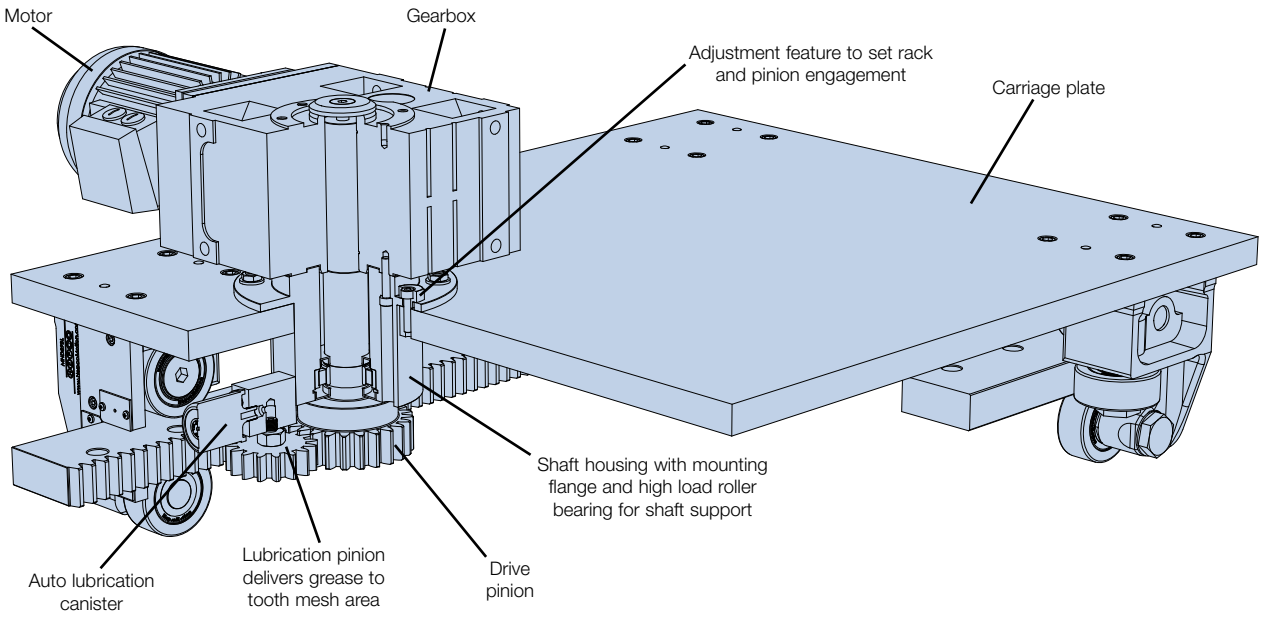


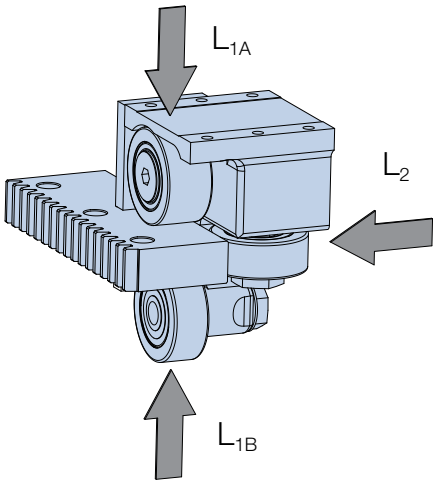


Part Number	Pinion Type	Helix Angle	Mod	Number of Teeth	ØA	ØB	ØC	ØD	E
HP4HX20	Helical	30°	4	20	30	92.38	100.38	75	52
HP4HX24	Helical	30°	4	24	40	110.85	118.85	90	59
HP5X18	Spur	-	5	18	30	90	100	75	52
HP5X24	Spur	-	5	24	40	120	130	100	59

CARRIAGE SOLUTIONS

Carriages for MHD systems can be made to suit any application. There are a number of standard elements including gearboxes, bearing cartridges and lubricating pinions as well as MHD blocks and pinions. These can be integrated into a rugged and cost-effective rack driven carriage, such as the one below. Please contact Bishop-Wisecarver for details.





Bearing Calculations

The MHD system uses track roller bearings which run on a flat track. Due to the hardness of the track and the contact with the bearings, the track will not determine system life. The system life will be equivalent to the shortest bearing life.

Bishop-Wisecaver quotes the basic life for each bearing, which corresponds to a linear travel of 1000km. The table also includes the expected bearing load for 10,000km of linear travel and the industry standard static (C_0) and dynamic (C) load capacity figures*1.

MHD block loading mode	Basic load capacity for 1000 km life	Load for 10000km life	Bearing load capacities *1	
			C - dynamic	C_0 - static
L_{1A}	$L_{1A(max)}$ = 34000 N	17000 N	50000 N	70000 N
L_2 & L_{1B}	$L_{2(max)}$=$L_{1B(max)}$ = 21000 N	9830 N	34000 N	21000 N

*1 The C and C_0 figures quoted are for cam roller operation. The normal C and C_0 figures can be up to 40% higher but are not relevant to this application. Some companies quote these higher figures.

To determine system life, the user should first resolve the load into L_{1A}, L_{1B} and L_2 components for each MHD block using normal statics calculations. The life for the upper (twin row taper roller) bearing is determined using the equation below:

$$\text{Upper bearing life (km)} = 1000 \times \left(\frac{L_{1A(max)}}{L_{1A}}\right)^{3.3}$$

The life for the lower (twin row deep groove) bearing is determined using the equation below:

$$\text{Lower bearing life (km)} = 1000 \times \left(\frac{L_{1B(max)}}{L_{1B}}\right)^{3}$$

The life for the side (twin row deep groove) bearing is similar to the above and is determined using the equation below:

$$\text{Side bearing life (km)} = 1000 \times \left(\frac{L_{2(max)}}{L_2}\right)^{3}$$

It will usually be apparent after the resolution of the load into components which bearing will determine the system life. The above calculation will normally only need to be done for that one bearing. Normal safety factors should be applied.

Rack and Pinion Force Calculations

The driving force which can be transmitted through a rack and pinion will depend on the choice of rack (i.e. MOD5 spur or MOD4 x 30° helical), the size of pinion selected, the length of stroke and the desired life (total travel in km). The table below details the driving force in N for all combinations of parts and for a useful range of stroke lengths and design lives. All figures assume ideal lubrication and pinion contact conditions, and that all movement is for the full stroke indicated. It is recommended that a safety factor be applied when selecting rack and pinion components. This table is suitable for initial selection of parts, but please contact Bishop-Wisecarver if you require a specific calculation tailored for your application.

Rack and Pinion Driving Forces

Rack and pinion combination	Stroke length = 1m			Stroke length = 4m			Stroke length = 16m		
	Expected life of rack & pinion			Expected life of rack & pinion			Expected life of rack & pinion		
	1000km	5000km	25000km	1000km	5000km	25000km	1000km	5000km	25000km
MOD5 & 18 tooth pinion MHDT40100…R5 & HP5X18	5700 N	4500 N	3300 N	8300 N	7200 N	4700 N	8600 N	7500 N	4900 N
MOD5 & 24 tooth pinion MHDT40100…R5 & HP5X24	7000 N	5500 N	4000 N	12500 N	8700 N	6300 N	12700 N	9600 N	6300 N
MOD4 helical & 20 tooth pinion MHDT40100…HR4 & HP4HX20	7300 N	5700 N	4200 N	8600 N	7900 N	5700 N	8700 N	8000 N	5800 N
MOD4 helical & 24 tooth pinion MHDT40100…HR4 & HP4HX24	8200 N	6400 N	4700 N	10000 N	8100 N	5900 N	10200 N	8300 N	6000 N

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.

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DualVee® Guide Wheels
LoPro® Linear Motion System
MadeWell® Crown Rollers
MinVee® Linear Slide System
UtiliTrak® Linear Motion Guide

HEPCO®

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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

3D CAD DRAWINGS

Download 3D CAD files for our complete product line at www.bwc.com/3dcad.php.

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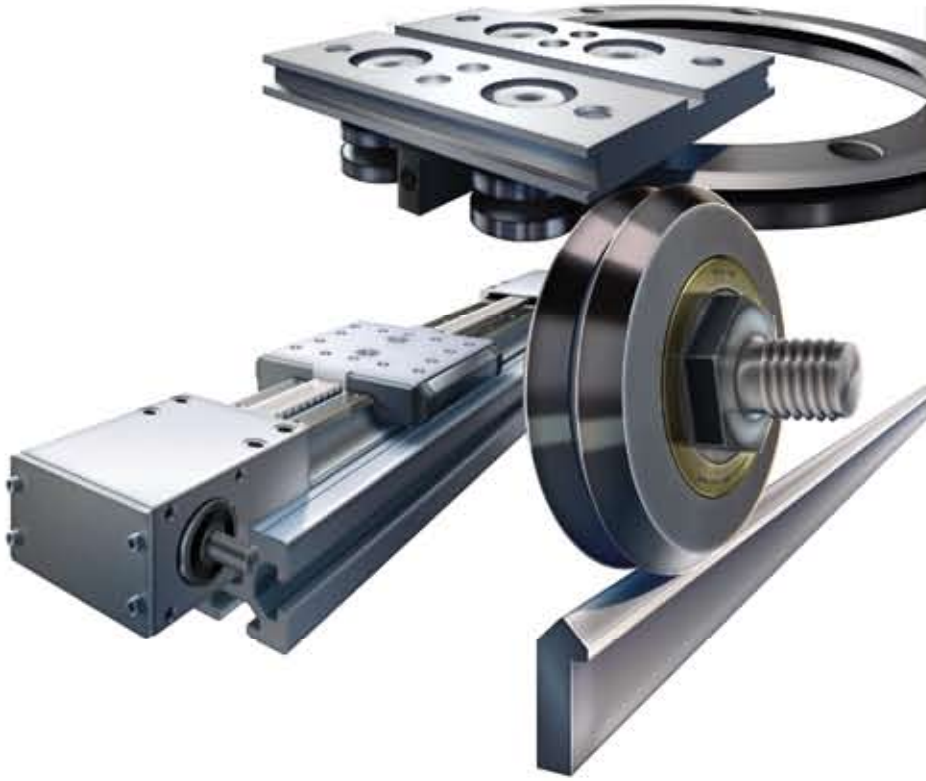
PRODUCT ORDERS

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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