

Industrial Horizontal Bearings

IH and
HD Series



**Mitchell
Bearings**



About Us

As the inventor of the hydrodynamic bearing over 100 years ago, Michell Bearings has continued to develop its products to meet the changing needs of industry.

The company's in-house design engineers work alongside its specialist manufacturing team in the UK to provide customers with high quality, innovative hydrodynamic white metal and PTFE lined bearings serving a range of industrial, commercial marine and naval markets.

In order to support critical applications in industries where products are required to meet stringent specifications and perform in demanding environments, Michell Bearings has developed a range of unique performance software tailored to its products. This provides more accurate and reliable performance predictions than with any other commercially available software. Results from the software, which are backed up by years of product research and development testing, give customers peace of mind and confidence in Michell Bearings ability to deliver safe and reliable bearing solutions.

Our product range includes:

- Vertical Guide Bearings (V)
- Advanced Vertical Thrust and Guide Bearings (AV)
- Large Vertical Thrust and Guide Bearings (LV)
- Thrust Bearings for marine applications
- Industrial Horizontal Bearings (IH)
- Heavy Duty Thrust Bearings (HD)
- Marine Propeller Shaft Bearings (MA & MT)
- Self-aligning Pedestal Bearings (NSA)
- Omega Thrust Rings
- Omega Equalised Thrust Rings
- Journal Pad Units
- Special designs to individual customer specification

Quality

- The quality system operated at Michell Bearings for design and support of our products is approved to BS EN ISO 9001:2008
- Our management system has been certified to the health, safety and environmental standard BS EN ISO 14001:2004
- Michell Bearings also complies with the occupational health and safety standard BS OHSAS 18001:2007.

Overview of Industrial Horizontal Bearings

Michell Bearings' horizontal bearings (IH and HD Series) have been designed and developed as fully self-contained, general purpose, modular assemblies to meet customer's requirements.

Applications

Typical applications for horizontal bearings include:

- Horizontal motors
- Horizontal generators
- Hydro turbines
- Hydro generators
- Marine propulsion motors and generators

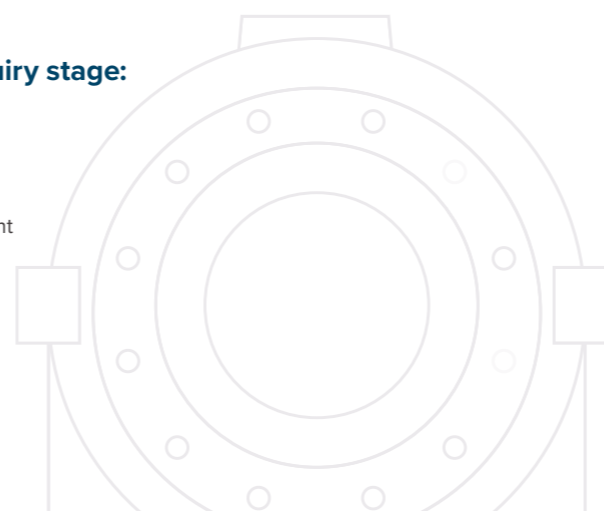
Common end user applications include:

- Steel industry
- Power generation
- Hydro power generation
- Oil and gas industry
- Cruise ship propulsion

For special applications Michell Bearings can offer bespoke bearing solutions and special self-contained bearing designs.

Basic information required at enquiry stage:

- Project details
- Quantity of bearings
- Shaft diameter
- Axial loading data including shaft rotor weight
- Radial loading data
- Speed ranges, directions and durations
- Preferred cooling type
- Preferred oil type
- Water/oil inlet temperature



Technical Features of Industrial Horizontal Bearings

Application of polytetrafluoroethylene (PTFE) material for IH and HD ranges

- Michell Bearings introduced PTFE lined bearing designs into its portfolio of products in 1995
- Since then the company has built up a sizeable reference list covering a wide variety of rotating machine applications
- If required, for high axial thrust load applications, such as steel mill motor drives, the larger sizes of the IH range (from IH56 upwards) and the HD range of bearings can be supplied with PTFE lined thrust pads, allowing the bearing to operate with increased axial thrust capacity when compared with whitemetal pads
- The use of PTFE may also eliminate the need for high pressure oil lift (jacking) in the thrust face, which could have a cost benefit for both the OEM and the end user

Cooling

The Industrial Horizontal Bearing range offers three types of cooling methods:

- Water cooling using high performance cooling coils available in cupro nickel
- Circulating oil using an external lubrication system
- Where conditions allow, air cooling can be considered

The choice depends on a number of factors, such as water availability at site, water composition, operational duty and specification requirements.

Instrumentation

All instrumentation can be physically supplied or provision made in the design and can either be compliant to end user specification or our own standard design. Examples include:

- Temperature measurement – oil bath and whitemetal surfaces using a combination of the following methods:
 - Dial type thermometer for local measurement
 - Resistance temperature detector (RTD) or thermocouples for remote measurement
- Use of thermowells to facilitate the replacement of instruments without the need to dismantle the bearing
- Provision for vibration or shaft displacement measurement
- Oil level float switches for monitoring the bearing oil level

Insulation

- Michell Bearings standard method of electrically insulating bearings is to insulate the baseplate, cooling connections and instrumentation.

If there is a special requirement, the bearings can also be insulated at the journal spherical diameter.

Sealing

The Industrial Horizontal Bearings range can be provided with sealing suitable for prevention against the ingress of water, dust or foreign particles, to meet IP ratings and therefore making them suitable for outdoor applications.

There are various options available including:

- Multi-stage labyrinth end baffles fitted to the bearing to give protection against the ingress of dust and water to IP42, IP44 or IP55
- Rubber lipped oil seals can also be fitted
- Where suction pressures at the machine side of the bearing are high, a separate seal assembly for pressure compensation is used

Load carrying components

- Axial thrust loads are normally supported with offset pivoted whitemetal (babbitt) lined thrust pads positioned around the shaft thrust collar
- For the IH Bearing an option is available for a plain whitemetal location face
- Radial loads are supported on a spherically seated whitemetal journal bush which is supplied in halves

Non-standard features

- High pressure jacking lift incorporated either in the thrust face and or the journal bush
- Load measurement using load cells
- Any other customer or specification specific requirements

Technical documentation

With every order Michell Bearings will provide:

- A detailed arrangement drawing
- An Operating and Maintenance Instruction Manual
- A comprehensive bearing performance prediction including:
 - Oil viscosity grade
 - Thrust and journal pad geometry
 - Minimum oil film thickness
 - Maximum pad operating temperatures
 - Power losses
 - Bearing oil bath temperature
 - Cooling requirement



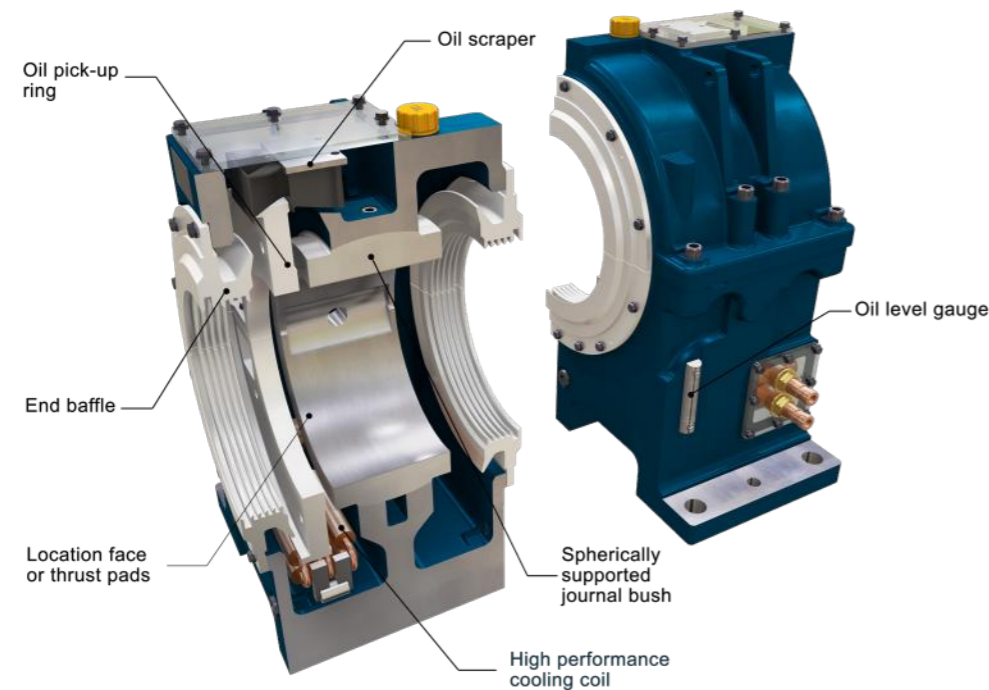
Industrial Horizontal (IH) Bearings

Overview of the IH Bearing

The Michell Bearings Industrial Horizontal Bearing, known as the IH Series, has been designed and developed as a self-contained, general purpose, standard range of compact and robust bearings for a wide range of horizontal machine applications. This standard economic range has been designed to meet the requirements of original equipment manufacturers (OEMs).

Key features:

- Eleven bearings frame sizes
- Shaft diameter range of 280mm to 1000mm
- Radial loads up to 1388kN
- Axial load capability up to 784kN
- Available with water cooling, circulating oil cooling or air cooling



Selection Criteria

Selecting one option from the following headings will provide Michell Bearings with an understanding of the product you require. However, we are more than happy to work with you on creating a bespoke product to meet your needs; if this is the case please contact us.

Type of bearing

IH (industrial horizontal)

Frame size

From 32 to 100 - actual shaft diameter

Cooling

N – air cooling
Z – lubrication by oil circulating from an external supply
W1 – single water cooler (finned tube) in oil sump
W2 - double water cooler (finned tube) in oil sump

Type of lubrication

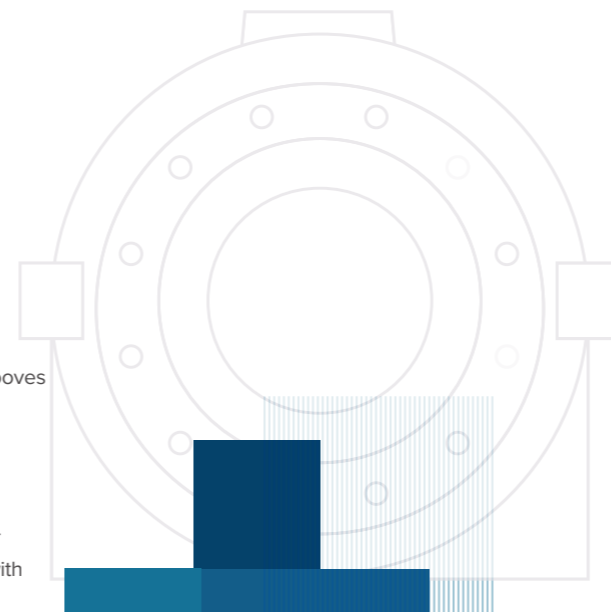
C – plain cylindrical bore without fixed oil ring
F – plain cylindrical bore with fixed oil ring

Thrust surface

B – plain whitemetal lined location face with oil grooves
A – shoulders fitted with pivoting thrust pads
Q – without thrust bearing (non-locating bearing)

Example:

An IH with frame size 32 - 300 with a double water cooler, plain cylindrical bore and shoulders fitted with pivoting thrust pads – IH32-300 W2 F A



Technical Information

IH Series Capacity

IH Frame Size	Maximum Shaft Journal Diameter	Journal Load	Location Load	Thrust Load Standard Centre Pivot	Thrust Load Maximum Offset Pivot
	mm	kN	kN	kN	kN
IH32	315	138	14	50	77
IH36	355	178	18	63	99
IH40	400	225	24	80	125
IH45	450	281	31	102	158
IH50	500	350	37	125	197
IH56	560	434	48	157	247
IH63	630	551	61	199	310
IH71	710	701	78	253	394
IH80	800	890	98	321	502
IH90	900	1125	125	407	637
IH100	1000	1388	156	502	784

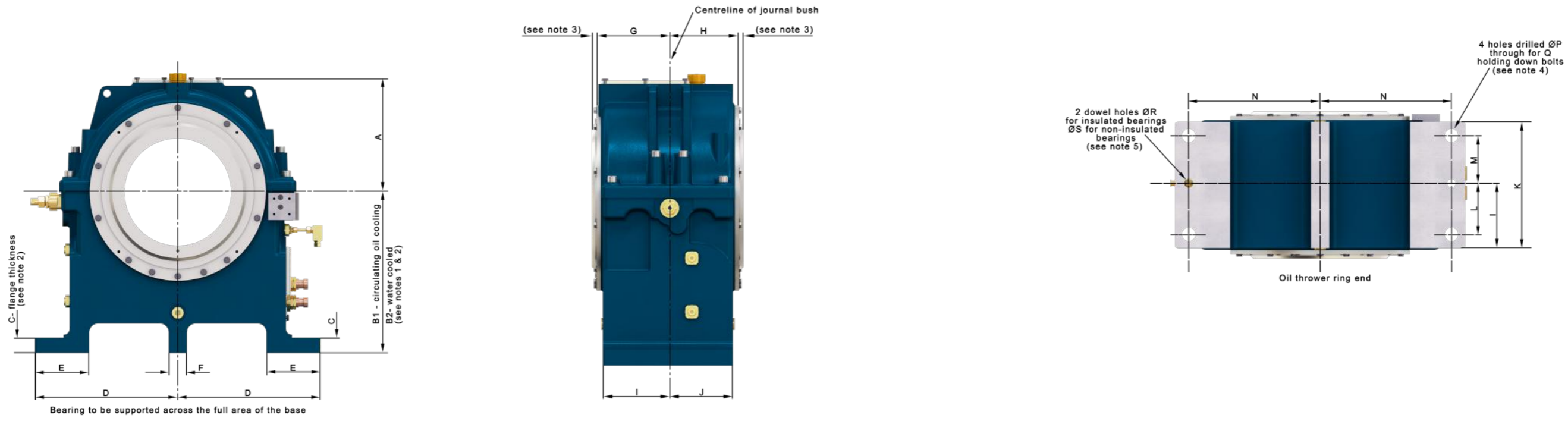
Notes:

1 - Location load shown corresponds to the maximum shaft diameter within each frame size. Higher loads are possible for smaller diameter shafts.

Operating Speeds:

IH Series bearings will generally operate water cooled for shaft linear speeds of up to 25m/s. Using circulating oil cooling, shaft speeds of up to 34 m/s may be achieved.

Technical Information

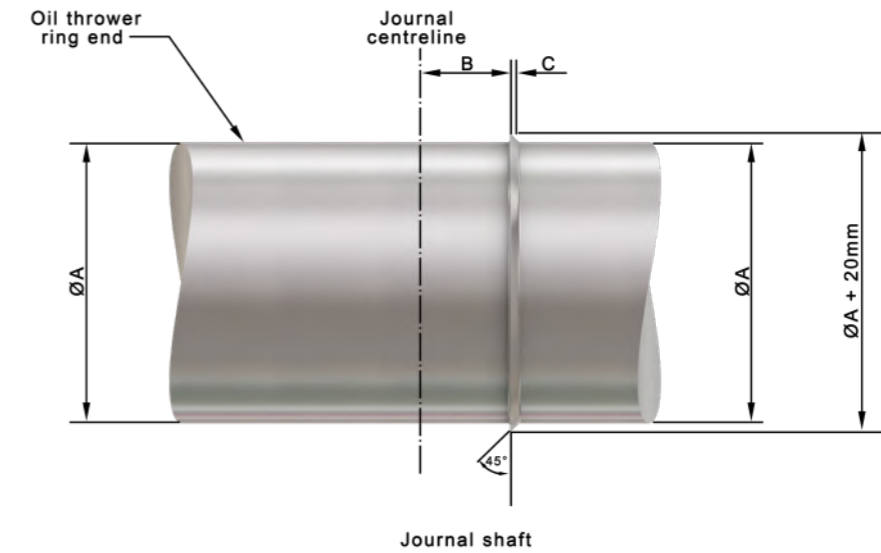
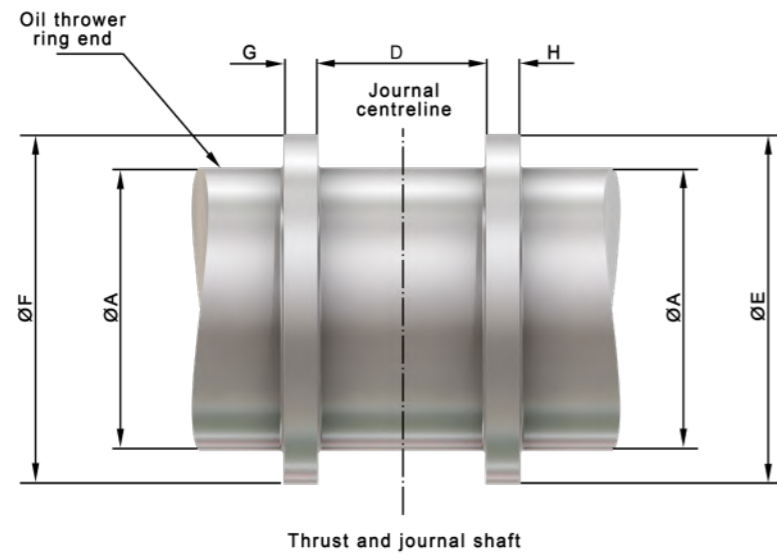


IH Series Dimensions

IH Frame Size	Nom. Shaft Dia.	Journal Length	A	B1	B2	C	D	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	Oil Sump Cap	Approx Brg Wt.
	mm																						
IH32	280 300 315	175	324	450	450	40	403	160	60	219	218	200	200	400	160	160	363	38	M30	20	30	25	520
IH36	315 335 355	200	370	530	530	50	474	180	60	231	218	212	200	412	167	155	429	45	M36	20	30	32	730
IH40	355 375 400	225	380	530	530	50	484	180	60	252	218	236	202	438	191	157	439	45	M36	20	30	40	800
IH45	400 425 450	250	430	600	600	55	534	180	60	256	236	243	223	466	190	170	489	45	M36	20	30	45	1050
IH50	450 475 500	280	450	600	600	55	554	180	60	271	255	258	242	500	213	197	509	45	M36	20	30	55	1210
IH56	500 530 560	310	500	670	670	65	619	220	60	288	276	275	263	538	225	213	569	55	M42	30	40	65	1620
IH63	560 600 630	350	542	670	710	65	660	220	60	336	333	311	308	619	261	258	610	55	M42	30	40	85	2050
IH71	630 670 710	395	610	750	775	70	722	230	60	371	365	348	342	690	291	285	667	62	M48	30	40	105	2790
IH80	710 750 800	445	680	750	858	75	825	250	80	409	409	384	384	768	324	324	764	68	M56	40	50	140	3380
IH90	800 850 900	500	761	850	933	75	900	250	80	451	448	428	425	853	368	365	840	68	M56	40	50	195	4610
IH100	900 950 1000	555	810	950	1016	85	990	280	100	485	485	462	462	924	390	390	920	72	M64	50	60	270	6000

- Notes:**
- 1 - Water cooled (as shown) and circulating oil cooled bearing dimensions are identical except for centre line to base height (columns B1 and B2)
 - 2 - For insulated bearings increase dimensions B1, B2 and C by 3mm
 - 3 - For IP44 protection dimensions G and H are increased by 15mm for IP55 protection dimensions G and H are increased by 47mm
 - 4 - Minimum grade of holding down bolts = 5.8 (tensile strength (minimum) N/mm² = 520)
 - 5 - Minimum strength of dowel material (N/mm²)
 - a) Journal location bearings = 215 (yield strength)
 - b) Thrust and journal bearings = 665 N/mm² (0.2% proof stress)

Technical Information



IH Shaft Dimensions

IH Frame Size	Shaft dia. A	B	C	D H7	Dia. E +0.00 / -0.25	Dia. F h7	G	H
	h6							
IH32	279.580	107	1	195	390	390	45	23
	299.550							
	314.622							
IH36	314.622	120	1	220	439	439	45	26
	334.598							
	354.574							
IH40	354.574	133	1	245	494	494	45	30
	374.550							
	399.520							
IH45	399.520	145	1	270	555	555	45	35
	424.490							
	449.460							
IH50	449.460	160	1	300	620	620	45	39
	474.430							
	499.400							
IH56	499.400	175	1	330	693	693	45	45
	529.364							
	559.328							
IH63	559.328	195	1	373	778	778	53	53
	599.280							
	629.244							
IH71	629.244	218	1	422	878	878	61	61
	669.196							
	709.148							
IH80	709.148	243	1	472	988	988	70	70
	749.100							
	799.040							
IH90	799.040	270	1	530	1111	1111	80	80
	848.980							
	898.920							
IH100	898.920	298	1	590	1233	1233	87	87
	948.860							
	998.800							

Notes:

The shaft dimensions provided opposite are outline details only and a fully dimensioned shaft drawing, including geometric tolerances and surface finish details, will be provided with the bearing arrangement drawing as part of the official purchase order document package.

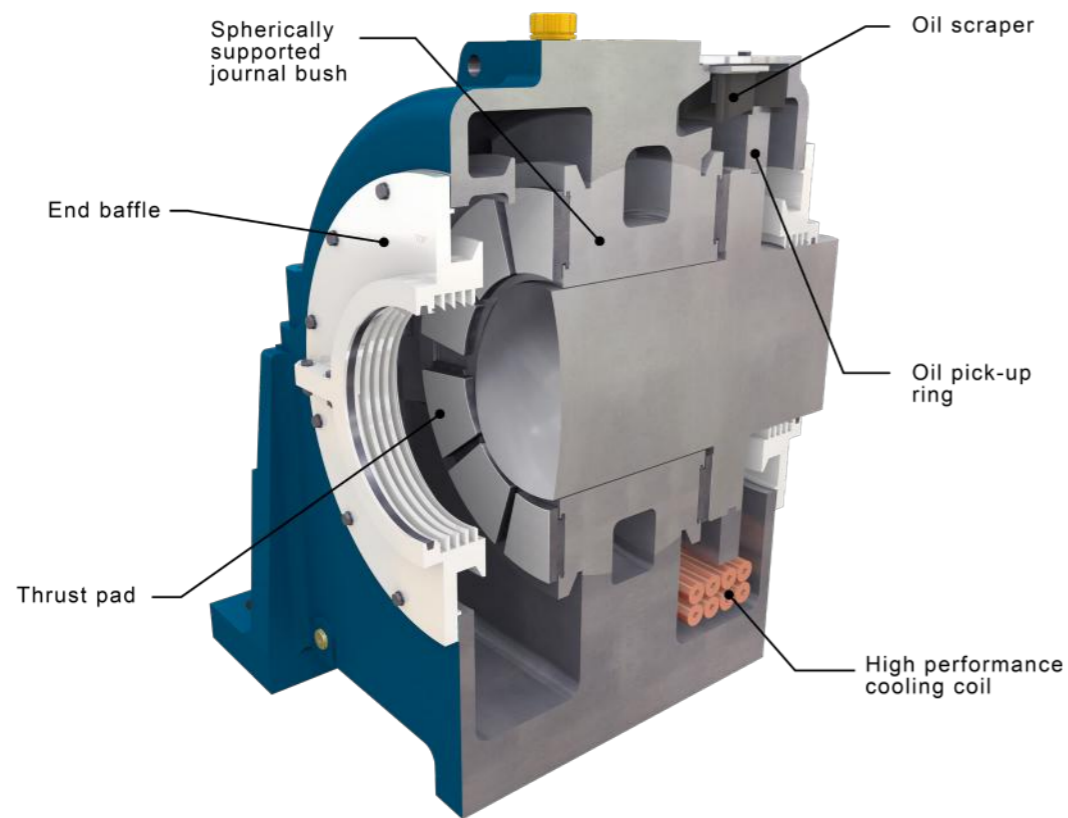
Heavy Duty (HD) Horizontal Bearings

Overview of the HD Bearing

The Michell Bearings Heavy Duty Horizontal Bearing, known as the HD Series, has been designed and developed as a fully self-contained, heavy duty, standard assembly to meet customer's requirements. This series is a range of high capacity horizontal shaft thrust and journal bearings, for a range of horizontal shaft hydro turbine, generator and electric motor applications.

Key features:

- Two bearing frame sizes
- Shaft diameter range from 300mm to 500mm
- Axial load capacity up to 480Kn
- Radial load capacity up to 385kN
- Available with water cooling, circulating oil cooling or air cooling



Selection Criteria

Selecting one option from the following headings will provide Michell Bearings with an understanding of the product you require. However, we are more than happy to work with you on creating a bespoke product to meet your needs; if this is the case please contact us.

Type of bearing

HD (heavy duty)

Frame size

1 or 2

Bearing construction

T – thrust and journal
J – journal

Shaft diameter

300mm to 500mm

Cooling

A – air cooling
T – water cooler (finned tube) in oil sump
C – lubrication by oil circulating from an external supply

Example:

An HD with frame size 1 with a thrust and journal bearing construction, 300mm shaft diameter and water cooler
HD1 T300 T

Technical Information

HD Series Capacity

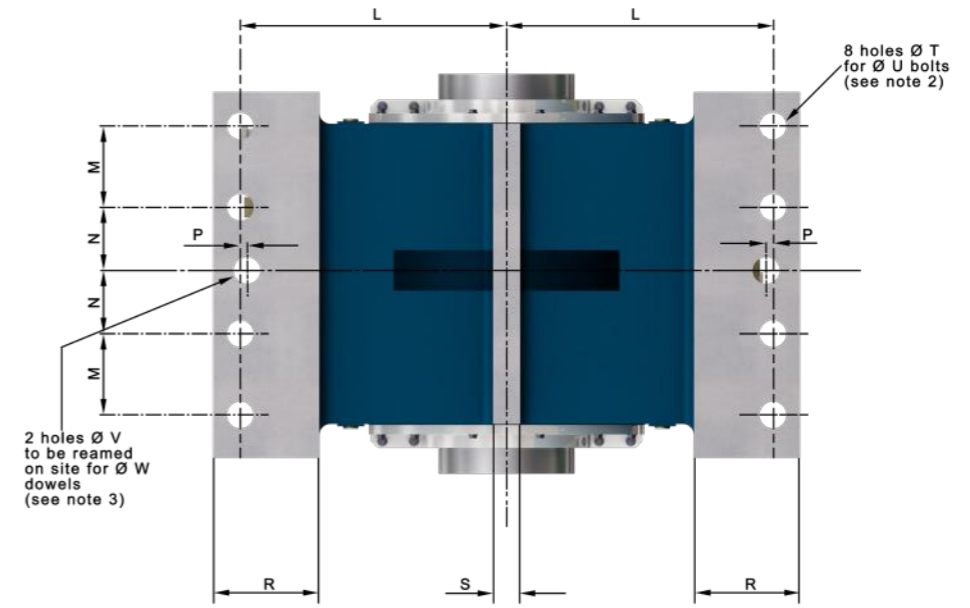
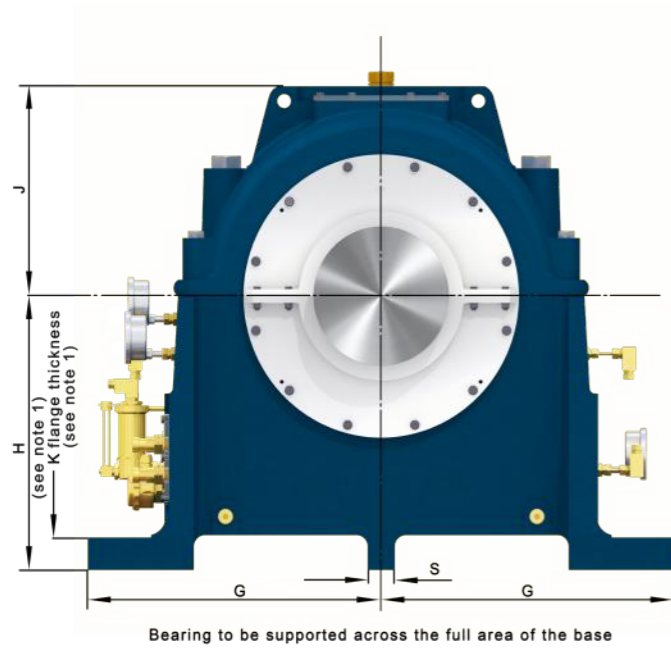
Shaft Journal Diameter	Maximum Running Loads			
	Frame size 1		Frame size 2	
	Journal Load for T and J and J Brgs (HD1-T and HD1-J)	Thrust Load for T and J Brg Only (HD1-T)	Journal Load for T and J and J Brgs (HD2-T & HD2-J)	Thrust Load for T and J Brg Only (HD2-T)
mm	kN	kN	kN	kN
300	190	280	-	-
315	200	280	-	-
335	210	280	-	-
355	220	280	-	-
375	230	-	285	480
400	250	-	305	480
425	-	-	325	480
450	-	-	345	480
475	-	-	365	-
500	-	-	385	-

Shaft Journal Diameter	Guide to Safe Maximum Operating Speeds				
	Water Cooled			Circ Oil	
	Maximum Thrust Load. Maximum Journal Load.	½ Maximum Thrust Load. ½ Maximum Journal Load.	¼ Maximum Thrust Load. ¼ Maximum Journal Load.	Maximum Thrust Load. Maximum Journal Load.	
mm	RPM	RPM	RPM	RPM	
HD1-T	300	1290	1440	1590	1750
	315	1260	1410	1560	1750
	335	1230	1380	1530	1750
	355	1200	1350	1490	1750
HD2-T	375	890	990	1100	1500
	400	870	970	1080	1500
	425	850	950	1060	1500
	450	820	920	1030	1500

Operating Speeds:

The maximum RPM given above ensures safe and reliable bearing performance with acceptable operating temperatures and oil film thicknesses - based on an oil bath temperature of 65°C.

Technical Information

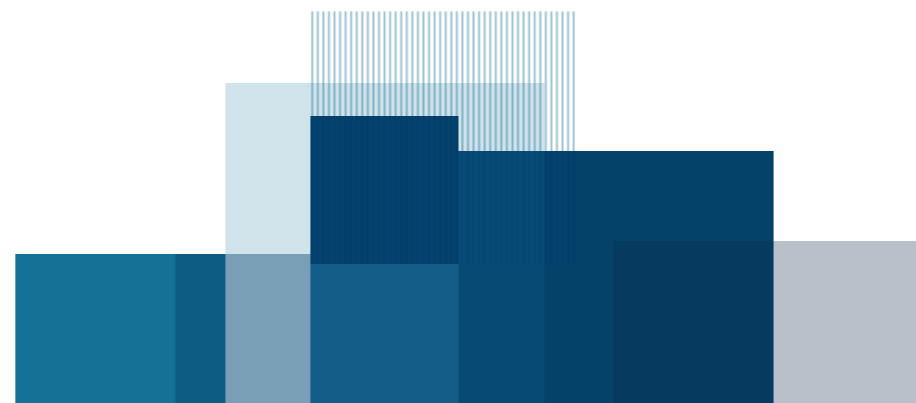


HD Series Dimensions

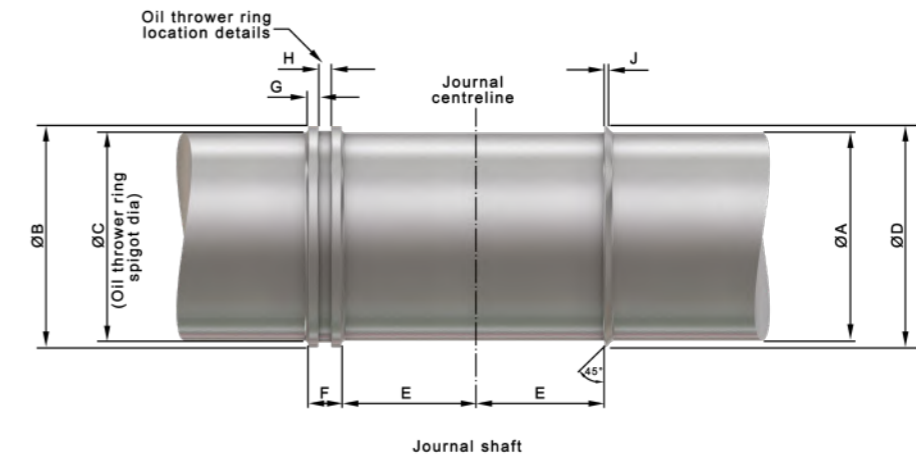
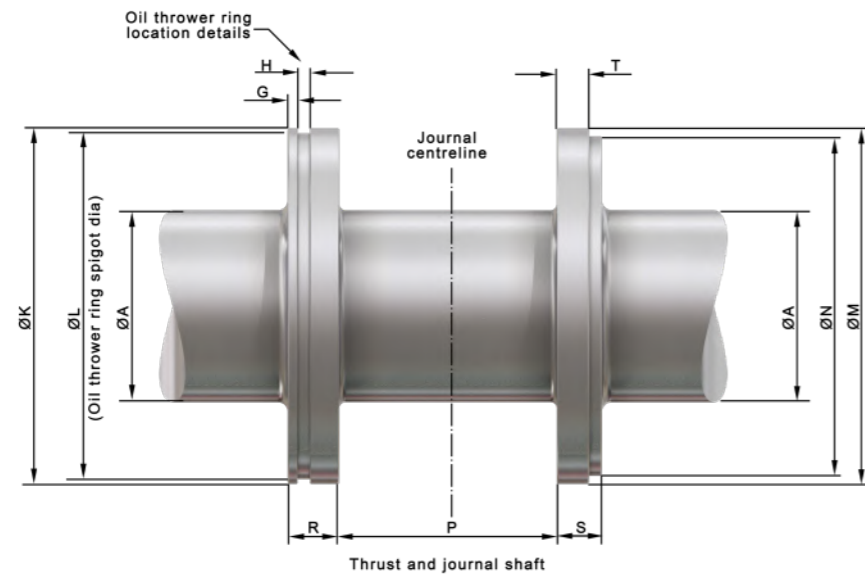
HD Frame Size	Journal Length	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	S	T	U	V	W	Oil Sump cap.	Approx Brg Wt.
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	litres	kg
HD1	300	359	344	75	340	325	70	650	590	455	70	590	180	140	15	235	60	60	M56	64	65	76	2200
HD2	370	386	371	75	370	355	75	720	650	520	80	650	200	155	15	240	80	69	M64	69	70	86	2900

Notes:

- 1 - For insulated bearings increase dimensions H and K by 3mm
- 2 - Minimum grade of holding down bolts = 5.8 (tensile strength (minimum) $N/mm^2 = 520$)
- 3 - Minimum strength of dowel material (N/mm^2)
 - a) Journal and journal location bearings = 215 (yield strength)
 - b) Thrust and journal bearings = 665 N/mm^2 (0.2% proof stress)



Technical Information



HD Shaft Dimensions

HD Frame Size	Shaft dia. A h6	Dia. B h8	Dia. C	Dia. D	E	F	G	H H8	J	Dia. K h8	Dia. L	Dia. M h7	Dia. N +/- 0.25	P +0.05 +0.00	R	S	T
	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
HD1	300	320	305	320	200	50	15	20	1	570	555	555	530	340	80	70	50
	315	335	320	335	200	50	15	20	1	570	555	555	530	340	80	70	50
	335	355	340	355	200	50	15	20	1	570	555	555	530	340	80	70	50
	355	375	360	375	200	50	15	20	1	570	555	555	530	340	80	70	50
	375	395	380	395	200	50	15	20	1	-	-	-	-	-	-	-	-
	400	420	405	420	200	50	15	20	1	-	-	-	-	-	-	-	-
HD2	375	395	380	395	235	50	15	20	1	710	695	694	638	410	80	70	50
	400	420	405	420	235	50	15	20	1	710	695	694	638	410	80	70	50
	425	445	430	445	235	50	15	20	1	710	695	694	638	410	80	70	50
	450	470	455	470	235	50	15	20	1	710	695	694	638	410	80	70	50
	475	495	480	495	235	50	15	20	1	-	-	-	-	-	-	-	-
	500	520	505	520	235	50	15	20	1	-	-	-	-	-	-	-	-

Notes:

The shaft dimensions provided opposite are outline details only and a fully dimensioned shaft drawing, including geometric tolerances and surface finish details, will be provided with the bearing arrangement drawing as part of the official purchase order document package.

Our Total Customer Support Model

The Michell Bearings customer support model ensures our customers have peace of mind throughout the lifetime of our products and the solutions we engineer for them.

We know that bearing failure is serious; that downtime is expensive and with this in mind, exacting maintenance and servicing is key. If the worst happens speed of response is critical to ensure repair of existing parts or availability of replacement and spare parts.

Our global network and 24 hour manufacturing capability ensures Michell Bearings can react quickly and efficiently to the requirements of our customers. We have the in-house technical expertise to undertake virtually any whitmetal bearing repair, whether on an original Michell Bearings product or any other manufacturer's product.

However, service is the key to preventing bearing failure. Our dedicated service team, all highly trained engineers, travel all over the world to carry out both installation and routine service work in both the marine and industrial sectors.

Michell Bearings offers tailored, structured maintenance programmes to ensure bearing reliability. Whether scheduled or unplanned our diagnostic and corrective maintenance is vital to the continued smooth running of your operations and the satisfaction of your customers.



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