



# **PERMANENT MAGNET PUMPING SYSTEMS**

## **SECTION 3 MOTOR SEAL (PROTECTOR) CATALOGUE**

## INTRODUCTION

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Magnetic Pumping Solutions offers a complete range of Modular Motor Seals that have been designed for installation with all motor series. The Motor Seal plays a very important part in the proper functioning of the Permanent Magnet Motor driven Electric Submersible Pumping System and is a key component that affects the run-life and performance of the system. The Motor Seal is located above the top motor in a standard ESP installation and connects the motor to the Intake module or the Gas Separator.

The main functions of the Motor Seal are;

1. To act as a barrier between the well fluid and the clean motor oil.
2. To equalize the pressure in the motor with the annulus pressure.
3. To transfer the torque developed by the motor to the Intake / Gas Handler section.
4. To act as a chamber that allows the expansion and contraction of motor oil during the operation of the ESP System.
5. To carry the Thrust Bearing that absorbs the down thrust forces developed by the pump during operation, which is critical when using pumps built in compression construction.

All MPS Motor Seals are available with the following options.

1. Standard or High Load Thrust Bearings
2. Standard MONEL® or High Strength INCONEL® Shafts
3. Standard Carbon Steel or Corrosion Resistant Stainless Steel Construction
4. Standard HNBR Elastomers or High Temperature AFLAS® Elastomers

All MPS motor seals are built with Industry proven Shaft Seals. The sealing faces are made of Silicon Carbide and all metal hardware is made of MONEL®.



*AFLAS® is a registered trademark of Asahi Glass Co., Ltd.; MONEL® and INCONEL® are registered Trade Marks of Special Metals Corporation*

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## MODULAR MOTOR SEALS

The Modular type Motor Seals are manufactured by putting together Bag or Labyrinth Chambers in an arrangement that is best suited for the application. The design incorporates the use of common parts in the different configurations enabling reduced inventory requirement of parts and consumables for repair and service.

MPS Modular Motor Seals are available in 338, 387/400, and 513 series and in different configurations of which the most common are LsL, LsB, BsL, BpBsL, BsBsL, LsBsB, LsBpB and LsLsL.

Labyrinth chambers work on the gravitational separation of fluids based on their density. These are not suitable for deviated wells as proper fluid separation in the chamber is compromised when a Labyrinth chamber is not vertical. A Bag Chamber provides a positive seal between the contaminated fluid that stays outside the bag and the clean motor fluid that stays inside the bag and hence these are ideal for deviated wells. The pressure equalization in a bag chamber is controlled by the contraction/expansion of the bag and the expulsion of motor oil from the inside of the bag through a one way relief valve.

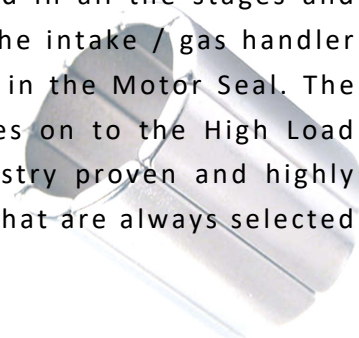
When two Bag chambers are connected in parallel, they work together as one chamber but doubling the amount of volume available for expansion and contraction. A parallel arrangement of bag chambers is selected when tandem motors are used in an application. The temperature differential which affects the volumetric expansion/contraction of the motor oil during the heating and cooling cycles also has an influence in the selection process of the motor seal configuration. Labyrinth chambers can never be connected in a parallel arrangement.

Special Motor Seal configurations are available on request.

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## HIGH LOAD THRUST BEARINGS

Motor Seals contain a Down Thrust Bearing that is capable of carrying a high amount of thrust load is necessary when using pumps that are built in Compression design. The Down Thrust force developed in all the stages and the weight of the pump shaft is transmitted through the intake / gas handler shaft and the motor seal shaft to the runner installed in the Motor Seal. The Runner runs on a fluid film, transferring all the forces on to the High Load Thrust Bearing. Magnetic Pumping Solutions use industry proven and highly reliable High Load Thrust Bearings in the Motor Seals that are always selected to run with Pumps built in the compression design.



## MODULAR MOTOR SEALS - DATA

### 338 Series Modular Motor Seals

Description	Type	Length	Weight	Length	Weight
		[ft]	[lb]	[m]	[kg]
LsL	Labyrinth/Labyrinth	5.9	130	1.8	59.1
LsB	Labyrinth/Bag	5.9	135	1.8	61.4
BsL	Bag/Labyrinth	5.9	135	1.8	61.4
BpBsL	Bag/Bag/Labyrinth	8.2	180	2.5	81.8
BsBsL	Bag/Bag/Labyrinth	8.2	180	2.5	81.8
LsBsB	Labyrinth/Bag/Bag	8.2	180	2.5	81.8
LsLsL	Labyrinth/Labyrinth/Labyrinth	8.2	175	2.5	79.5

### 387/400 Series Modular Motor Seals

Description	Type	Length	Weight	Length	Weight
		[ft]	[lb]	[m]	[kg]
LsL	Labyrinth/Labyrinth	5.9	145	1.8	65.9
LsB	Labyrinth/Bag	5.9	155	1.8	70.5
BsL	Bag/Labyrinth	5.9	155	1.8	70.5
BpBsL	Bag/Bag/Labyrinth	8.2	205	2.5	93.2
BsBsL	Bag/Bag/Labyrinth	8.2	205	2.5	93.2
LsBsB	Labyrinth/Bag/Bag	8.2	205	2.5	93.2
LsLsL	Labyrinth/Labyrinth/Labyrinth	8.2	195	2.5	88.6

### 513 Series Modular Motor Seals

Description	Type	Length	Weight	Length	Weight
		[ft]	[lb]	[m]	[kg]
LsL	Labyrinth/Labyrinth	6.5	270	2.0	122.7
LsB	Labyrinth/Bag	6.5	280	2.0	127.3
BsL	Bag/Labyrinth	6.5	280	2.0	127.3
BpBsL	Bag/Bag/Labyrinth	8.9	380	2.7	172.7
BsBsL	Bag/Bag/Labyrinth	8.9	380	2.7	172.7
LsBsB	Labyrinth/Bag/Bag	8.9	380	2.7	172.7
LsLsL	Labyrinth/Labyrinth/Labyrinth	8.9	370	2.7	168.2

The 338 series motor seal connects to the 375 series motor.

The 387/400 series motor seal connects to the 456 series motor.

The 513 series motor seal connects to the 540 and 562 series motors.



**MOTOR SEAL - TECHNICAL DATA**

338 Series		60 Hz	50 Hz
Housing Diameter		3.38"	85.85 mm
Shaft Diameter		0.875"	22.23 mm
Shaft BHP Limit -	Standard	255 HP	210 HP / 155 kW
	High Strength	410 HP	340 HP / 250 kW

387/400 Series		60 Hz	50 Hz
Housing Diameter		3.87/4.00"	98.30 / 101.60 mm
Shaft Diameter		0.875"	22.23 mm
Shaft BHP Limit -	Standard	255 HP	210 HP / 155 kW
	High Strength	410 HP	340 HP / 250 kW

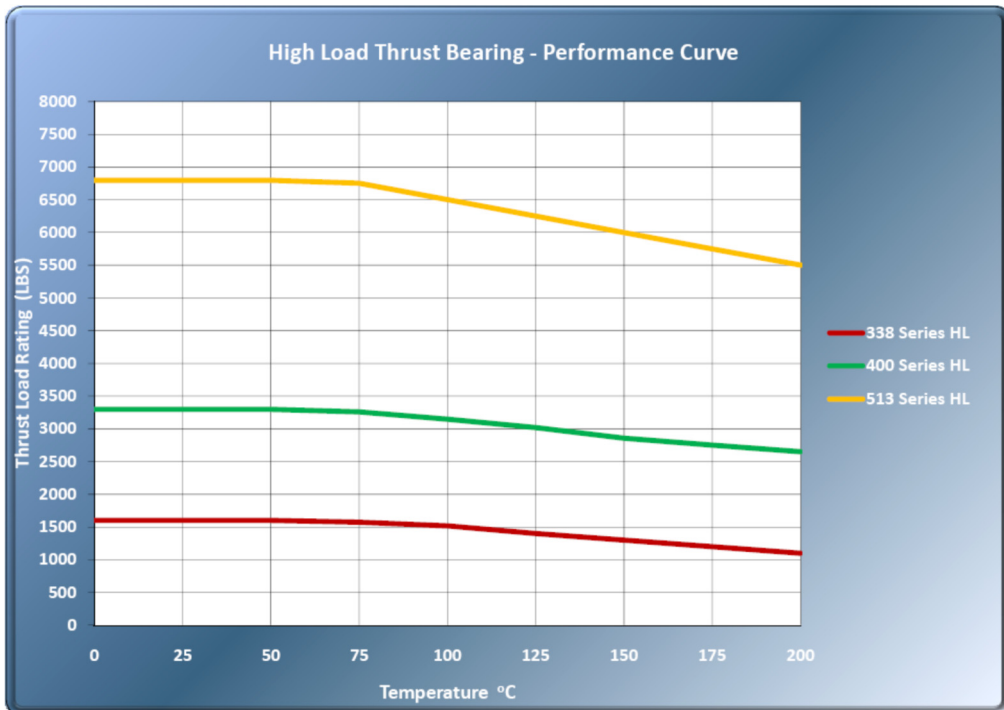
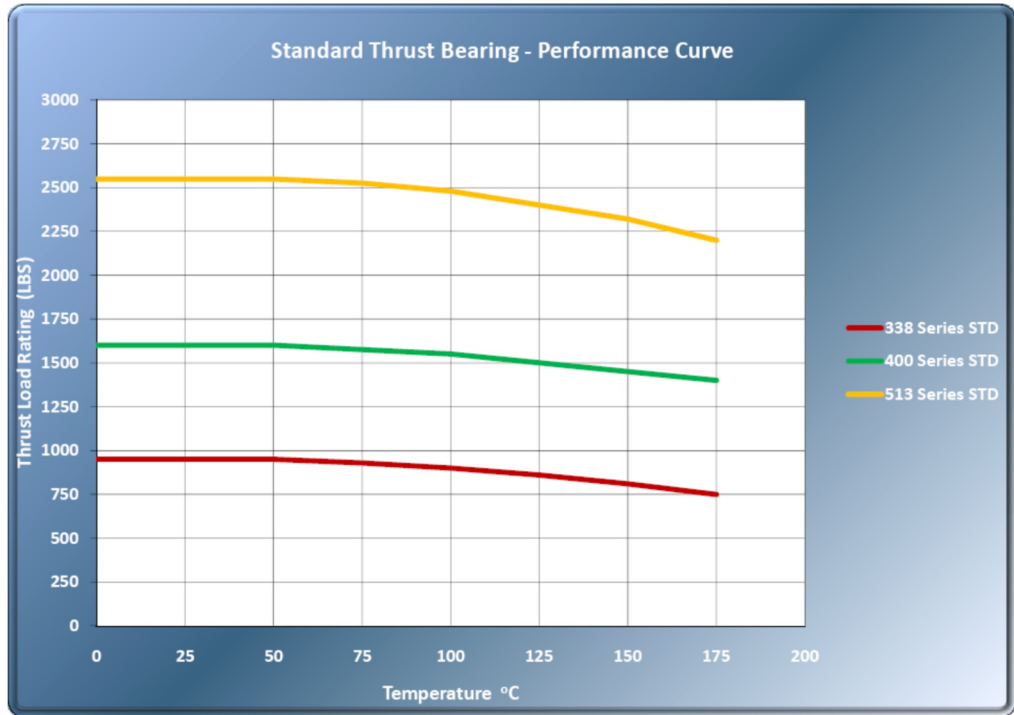
513 Series		60 Hz	50 Hz
Housing Diameter		5.13"	130.30 mm
Shaft Diameter		1.187"	30.15 mm
Shaft BHP Limit -	Standard	635 HP	530 HP / 395 kW
	High Strength	1015 HP	845 HP / 630 kW

**MOTOR SEAL - OPTIONS**

Metallurgy		Elastomers		Shaft		Thrust Bearing	
CS Head & Base, CS Housing, CS Fasteners	<b>CS</b>	HNBR	<b>Std</b>	Monel	<b>Std</b>	Standard	<b>Std</b>
SS Head, Base & Seal Bodies, SS Housing, Monel Fasteners	<b>SS</b>	AFLAS	<b>HT</b>	Inconel	<b>HSS</b>	High Load	<b>HL</b>
SS Head, Base & Seal Bodies, Monel Coated CS Housing, Monel Fasteners	<b>MC</b>						



## THRUST BEARING PERFORMANCE CURVES



*\*\*The Thrust Capacity represented is based on results obtained in testing using Synthetic Motor Oil in the Motor Seal.*

Magnetic Pumping

S O L U T I O N S

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