MAGNES Series

SLIDING VANE MAGNETIC DRIVE PUMPS | PRODUCT BROCHURE

PSG a DOVER company

Blackmer®

Where Innovation Flows

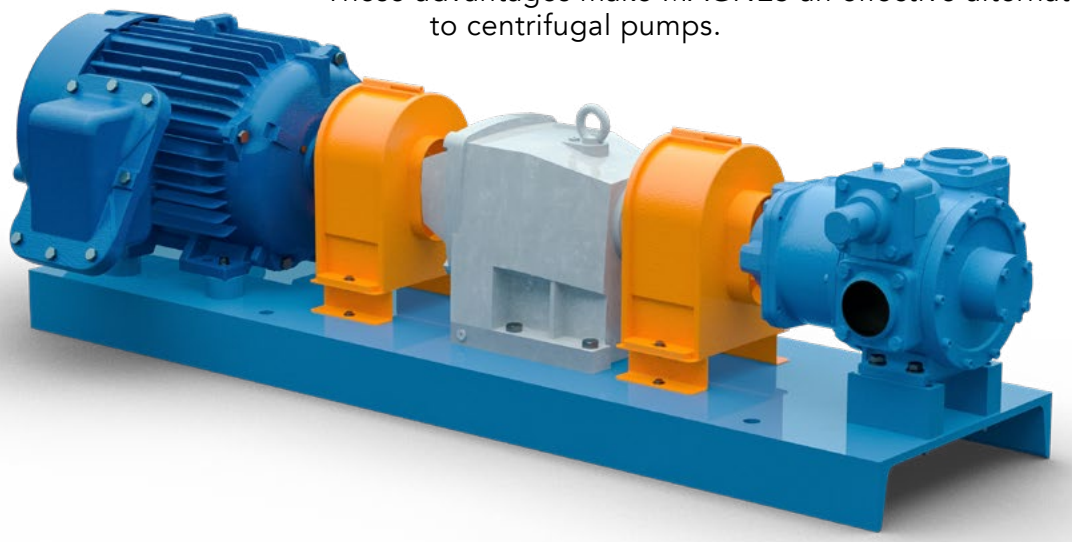
MAGNES, the sliding vane magnetic drive pump by Blackmer® contains no dynamic seals and provides a leak-free pumping solution for difficult-to-seal liquids and many liquids that are expensive, valuable, dangerous or hazardous.

Blackmer® MAGNES Series Sliding Vane Magnetic Drive Pumps

With 3- and 4-in models available in either iron (MI3, MI4) or stainless-steel (MS3, MS4) construction and flow rates up to 520 gpm (1,968 L/min), MAGNES Sliding Vane Pumps provide superior magnetic drive capabilities. Innate advantages of sliding vane technology provide a world class solution to the chemical market. **MAGNES is a true self-priming pump**, that will not need to be pre-flooded prior to start-up, and is well suited for **continuous duty operation**, since the pump has no cumulative dry run limit, providing operators the confidence that dry run events will not result in catastrophic pump failure.

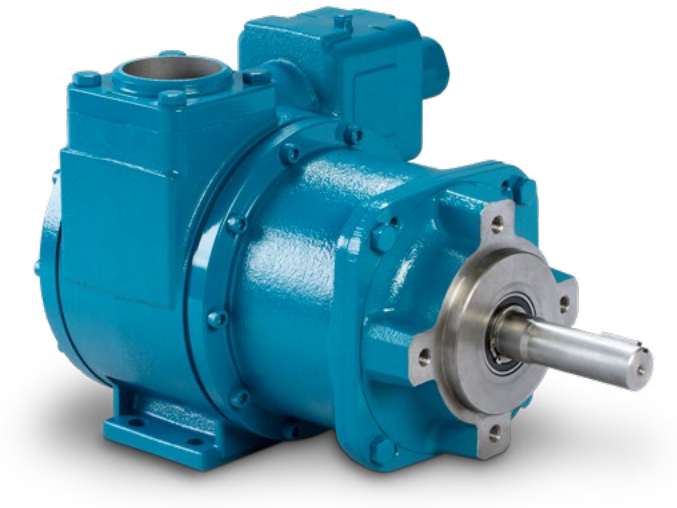
MAGNES offers **numerous advantages** of sliding vane technology such as self-priming, line-stripping, product recovery, dry-run capability, solids handling, thin/thick viscosity flexibility, easy maintenance and 70% to 90% pump efficiencies.

These advantages make MAGNES an effective alternative to centrifugal pumps.



Blackmer® MAGNES Series | Features & Benefits

The MAGNES Series is enhanced with a new magnetic drive design that offers **zero leakage** and numerous operational benefits to deliver the performance necessary for effective high volume liquid transfer within chemical-processing applications.



Among the most notable MAGNES benefits are:

- Indefinite Dry Run
- Fluctuations in Viscosity*
- Cavitation & Vapor Mixtures Handling
- Full Curve & System Performance
- Solids Handling (Consult Factory)

- Indefinite dry-run capability: Eliminates sensitivity to both unexpected and expected dry-run scenarios. The guaranteed dry-run performance is orders of magnitude better than competing technologies.* The indefinite dry-run allowance contrasts with the brief cumulative allowances offered by competing seal-less pumps.

- Fluctuations in Viscosity: MAGNES provides consistent flow and pressure for liquids with viscosities ranging from 1 cP (similar to water) to 2,200 cP (highly viscous). This broad viscosity spectrum is managed without compromising performance, generating excessive heat or incurring component wear.

- Low required NPSH: MAGNES offers sustained performance with liquids that contain up to 20% vapor, operating as a near-zero-NPSHr solution. MAGNES processes vapor where competing pumps fail, regardless if vapor forms in the tank, piping, or pump.

- Full-curve BEP: Unlike centrifugal pumps that are tuned to a single best efficiency point or BEP, MAGNES offers robustness and flexibility across a wide operating range. Sliding vane technology seamlessly handles the dynamic conditions expected in chemical-processing systems.

- Zero leakage: The containment shell is unlike any currently available, because it has the thickness of a metallic shell with the benefits of a composite shell. As a thermoplastic polymer, the shell will not create heat or produce eddy currents like traditional metallic shells. The proprietary MAGNES shell has long carbon fibers embedded in PEEK (polyether ether ketone) and is capable of unmatched pressure containment capability given its thickness. Competing shells use chopped carbon fiber or unreinforced polymers, which require much greater thickness for the same pressure, reducing the strength of the coupling and increasing the cost.

- Self-priming operation: With suction-lift capability exceeding 25 feet (7.6 meters), sliding vane pumps offer new functionality, reduce operating costs and enhance safety for all operators by eliminating the need to pre-prime the system.

- Product recovery: Exceptional line-stripping ability reduces product waste during or after production runs, recovers the cost of expensive liquids and enhances safety for plant operators and their staff.

- Solids handling: Unlike most competing technologies that self-destruct when confronted with contaminants, leak-free vane pumps can effectively process liquids with some level of suspended solids.

* Indefinite dry run assumes open inlet and discharge.

BLACKMER® MAGNES SERIES

Positive Displacement Design

- A flow-creating pump that transports a fixed volume of fluid for each pump rotation
- Matches the system's backpressure, accommodating a wide range of operating conditions
- Has inherent functionality: self-prime, suction lift, line strip and solids & vapor handling

Aftermarket & Maintenance

- Low-cost and renewable wear parts provide an optimized total lifecycle cost
- Designed for continuous and extended operating time between maintenance intervals
- Simple maintenance renews performance while the pump remains installed in the piping system

Magnet Coupling

- Designed and manufactured by Blackmer to have unmatched torque density (torque/volume)
- 3"size: 415 ft-lb (560 Nm)
- 4"size: 990 ft-lb (1340 Nm)

Bearing Housing

- Sealed for life bearings are completely maintenance free and protected by lip seal
- Machined for use with optional Blackmer alignment-free gear reducers

Containment Shell

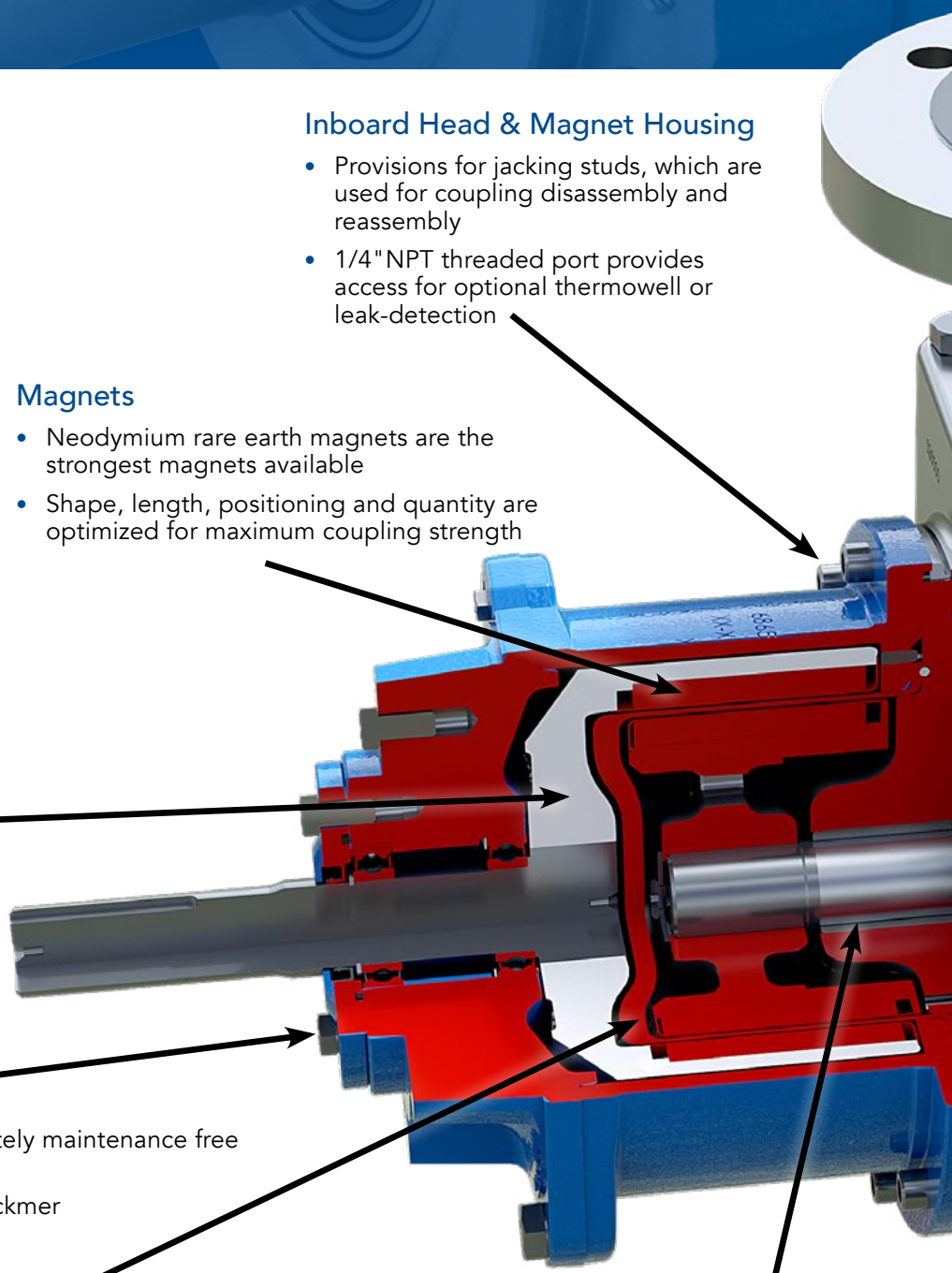
- Coupling strength of a thin-wall metallic shell and reliability from being eddy-current-free
- Long carbon fibers improve strength
- Polyether ether ketone (PEEK) thermoplastic polymer has excellent chemical compatibility

Inboard Head & Magnet Housing

- Provisions for jacking studs, which are used for coupling disassembly and reassembly
- 1/4"NPT threaded port provides access for optional thermowell or leak-detection

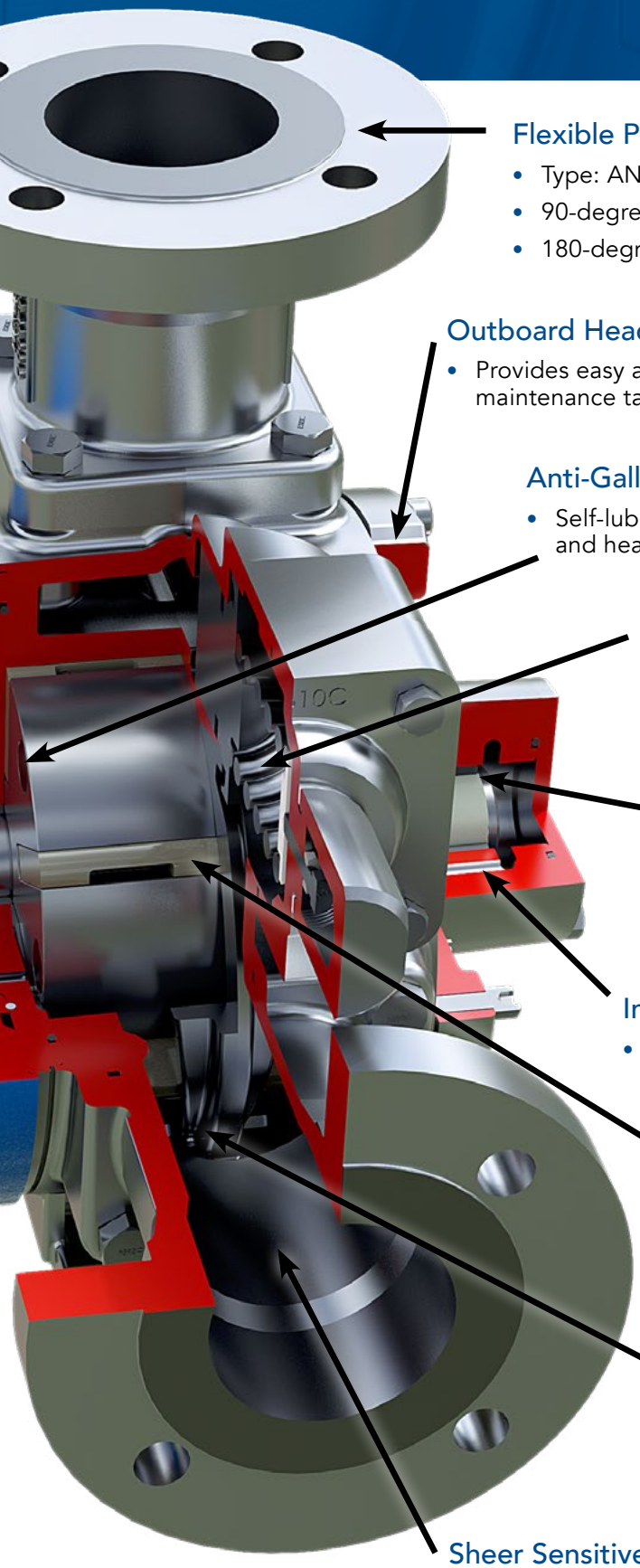
Magnets

- Neodymium rare earth magnets are the strongest magnets available
- Shape, length, positioning and quantity are optimized for maximum coupling strength



Hydrodynamic Lubrication

- A film of pumped liquid suspends the shaft within each bearing, enabling frictionless and maintenance free operation
- Turbulence within the magnet area prevents solids from settling



Flexible Porting Options

- Type: ANSI flanged, welded, and NPT threaded
- 90-degree: side inlet & top outlet (standard for all models)
- 180-degree: side inlet & side outlet (option for iron models MI3, MI4)

Outboard Head

- Provides easy access to the main pumping chamber for maintenance tasks that renew pumps to new condition

Anti-Galling Rotor Thrust Pad

- Self-lubricating carbon thrust pads prevent contact between rotor and head (stainless steel MS3 and MS4 models only)

Integral Relief Valve

- Relief valve is integral to the pump cylinder (casing). Pressure setting corresponds to motor rating, preventing overload and nuisance trips of motors

Self-Lubricating Bearings

- Low rotational speed & low surface velocity yield exceptional life
- Lubricating materials allow for expected and unexpected dry run, non-lubricating and abrasive liquids and vapor mixtures

Internal Porting

- Internal porting routes fluid back to the pump inlet (along with any solids) on both inboard and outboard ends

Sliding Vanes

- Vanes are non-metallic and lubricating, well suited for dry run, vapor and suspended solids
- Vanes self-compensate for wear, providing like-new performance throughout the life cycle

Pump Chamber

- Open flow paths are well suited for suspended solids
- Large internal volume yields high displacement, resulting in one or more port sizes smaller than competing positive displacement pumps

Sheer Sensitive Profile

- Low internal flow velocity and unobstructed inlet and outlet create a gentle flow path for sheer sensitive liquids and those with low available NPSH

THE SOLUTION FOR PUMPING PAIN POINTS

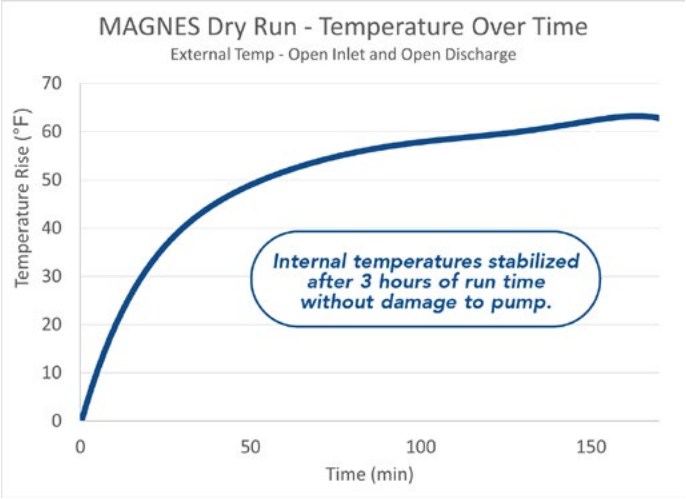
Blackmer® MAGNES Series | For Indefinite Dry Run

MAGNES Series Magnetic-Drive Sliding Vane Pump provides an innovative alternative to centrifugal pumps, mag-drive or otherwise. A key differentiator of MAGNES is its non-metallic proprietary containment shell, which prevents the pump from overheating. MAGNES also has no dynamic seals around pressure parts, which makes it ideal for difficult-to-seal liquids that are too valuable, dangerous or hazardous to leak. MAGNES can pull a vacuum, strip lines and create suction lift exceeding 25 feet (7.6 meters) while ultimately working continuously during and after any planned or unanticipated dry-run events.

Some of the most common dry run events are due to the following conditions:

- Unanticipated Dry Run – caused by operator error, faulty instrumentation or system transients
- Self-Priming – Required when a pump isn't pre-flooded
- Line Stripping – Required when liquid is to be recovered

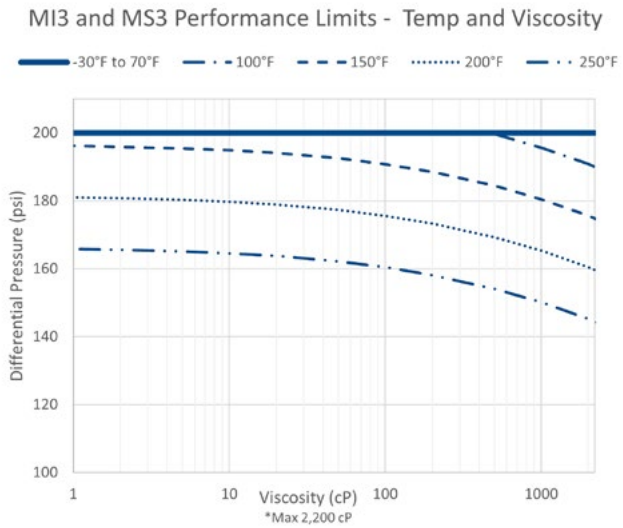
Dry run seems simple — "operating a pump without any liquid" — but the consequences of doing it are anything but, unless you have MAGNES.

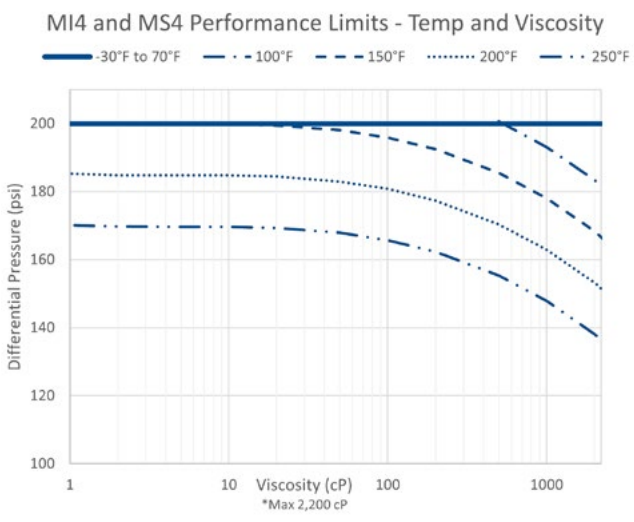


Blackmer® MAGNES Series | For Fluctuations in Liquid Viscosity

MAGNES Series Magnetic Drive Sliding Vane Pumps are built to handle high-viscosity and viscosity-changing liquids with ease. Utilizing seal-less magnetic drive technology combined with a sliding vane design, MAGNES delivers consistent flow and pressure across a wide range of viscosities — from water-like liquids (1 cP) to thick liquids (up to 2,200 cP) — without sacrificing performance.

MAGNES pumps, available in 3- and 4-inch models with flow rates of up to 520 gpm (1,968 L/min), are constructed from either ductile iron or stainless steel. While operating at a speed of just 400 rpm, MAGNES generates the same pressures and flow rates of other pumps that operate at 3,600 rpm, with no excessive heat buildup or component wear.

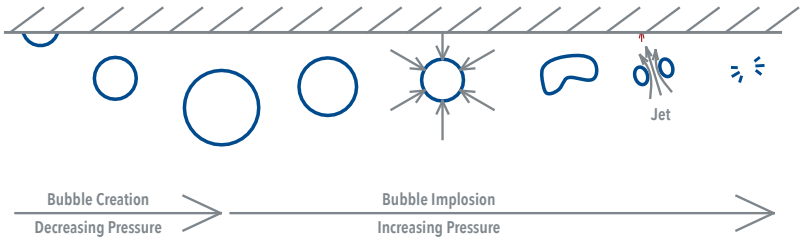




Blackmer® MAGNES Series | For Cavitation & Vapor Mixture Handling

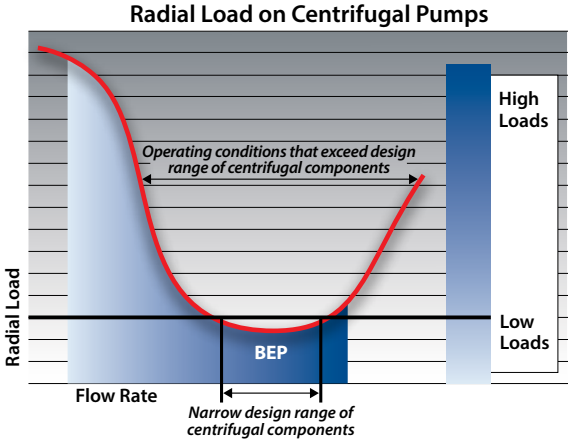
Positive displacement sliding vane pumps like MAGNES are able to operate with vapor mixtures and can overcome or eliminate cavitation. The design of MAGNES allows it to pump liquids with a 20% vapor content at an NPSHr level that is close to zero. Comparisons of NPSHa and NPSHr can signal when vapor is formed within a pump. MAGNES processes this vapor as well as any vapor formed upstream within the tank or piping. This is especially convenient when the liquids that are being pumped are stored in vacuum tanks, which lowers the level of NPSHa. Vapor mixtures are often detrimental, as most pumps fail while operating under cavitation. MAGNES is a permanent solution for these difficult applications.

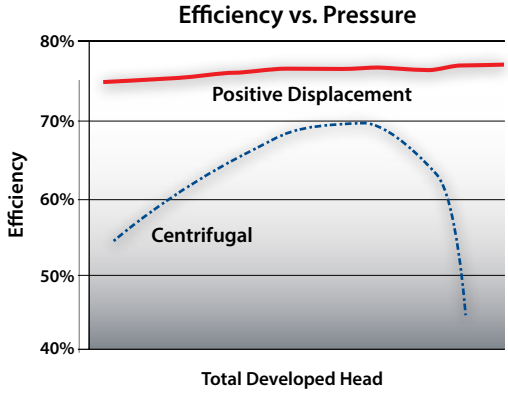
Entrained vapor and poor inlet conditions degrade the performance of centrifugal and gear pumps, often leading to costly pump damage.



Blackmer® MAGNES Series | For Full Curve & System Performance

Positive displacement sliding vane pumps feature a constant-flow method of operation – vanes slide in and out of the pump rotor as it turns, creating pockets where a uniform amount of liquid is captured and carried to the discharge port – that is impervious to changes in volume, pressure, and viscosity. The result is optimized liquid output across the entire flow curve. This benefits real world piping systems that operate across a wide range of operating points, and not a narrow range. Wide operating ranges are often devastating to magnetic drive centrifugal pumps, but not MAGNES, the sliding vane magnetic drive pump.





Blackmer® MAGNES Series | For Solids Handling

Clogged strainers and contaminated tanks are legitimate threats to most process pumps and maintenance budgets, and MAGNES has been designed to accommodate the transfer of liquids with some smaller suspended solids. The general design of a sliding vane pump allows for open flow paths between the vanes. Additionally, MAGNES has low internal flow velocities, meaning particles are not moved violently through the pump casing, as is the case with pump styles that rely on high internal flow velocities to operate effectively (e.g., centrifugal pumps). Contact a Blackmer Applications Engineer for applications with suspended solids to discuss specific details.

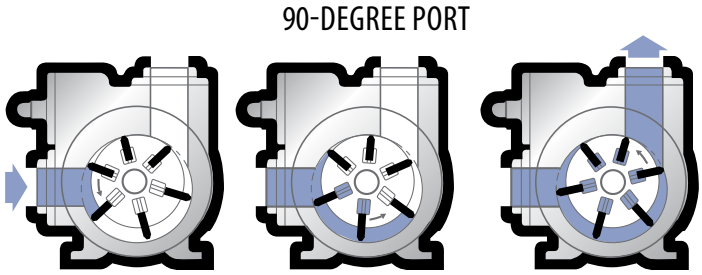
Clogged strainers signal suspended solids, which are a legitimate threat to most process pumps.

BLACKMER® MAGNES SERIES

Blackmer® | Sliding Vane Technology

How Blackmer Sliding Vane Pumps Work

Blackmer Sliding Vane Pumps use a rotor with sliding vanes that draw the liquid in behind each vane, through the inlet port and into the pumping chamber. As the rotor turns, the liquid is transferred between the vanes to the outlet where it is discharged as the pumping chamber is squeezed down. Each vane provides a positive mechanical push to the liquid before it.



Vane contact with the chamber wall is maintained by three forces: (1) centrifugal force from the rotor's rotation, (2) push rods moving between opposing pairs of vanes, and (3) liquid pressure entering through the vane grooves and acting on the rear of the vanes.

Each revolution of a Blackmer pump displaces a constant volume of fluid. Variance in pressure has minimal effect. Energy-wasting turbulence and slippage are minimized and high volumetric efficiency is maintained.

Advantages of sliding vane technology:

- Unique sliding vane pump design self-adjusts for wear to maintain flow rates
- Excellent at self-priming, eliminates expensive priming systems
- Extended dry-run capability, eliminates nuisance current monitoring systems
- Sliding vane design provides sustained performance and trouble-free operation
- Easy maintenance: vanes can be easily replaced without removing the pump from the piping system
- High suction lift abilities that exceed 25 feet (7.6 meters) and line-stripping capabilities to completely empty tanks, and piping of fluid
- Low maintenance and low life-cycle costs, pumps are renewable and repairable
- Solids handling, provided by large displacement and slow internal velocities
- Thin to thick fluid viscosity flexibility, eliminates expensive heating systems
- Highly efficient, sliding vane pumps require less horsepower than other pumps, meaning spending less on motors initially and less on electricity to power the pump

Blackmer® MAGNES Series | Capabilities

MAGNES vs. Gear & Centrifugal Pumps

- As a true self-priming pump, MAGNES never requires pre-flooding prior to startup.
- As an air moving pump, MAGNES can pull a vacuum, strip lines and create suction lift exceeding 25 feet (7.6 meters).
- As a flow-creating pump, MAGNES generates the pressure and flow rate at 400 rpm that other pumps require upwards of 3,600 rpm. Reduced speed eliminates heat buildup and component wear.
- As a leak-free pump, MAGNES is well suited to replace leaking pumps: single mechanical seals, double mechanical seals, and cartridge lip seals.
- As a positive displacement pump, MAGNES has sustained efficiency of up to 90% across wide operating ranges.

Chemical Transfer Capabilities Comparison for Sliding Vane, Centrifugal and Gear Pumps	MAGNES	Centrifugal	Gear
Indefinite Dry-Run Capability	YES	NO	NO
Leak-Free Pumping	YES	YES	YES
Seal-Less Technology	YES	YES	YES
Ability to Pump Liquid/Vapor Mixtures	YES	NO	NO
Low Required NPSH	YES	NO	NO
Solid & Abrasive Media Handling	YES	NO	NO
Full-Curve BEP Capability	YES	NO	YES
Self-Priming Operation	YES	NO	NO
Product Recovery	YES	NO	NO

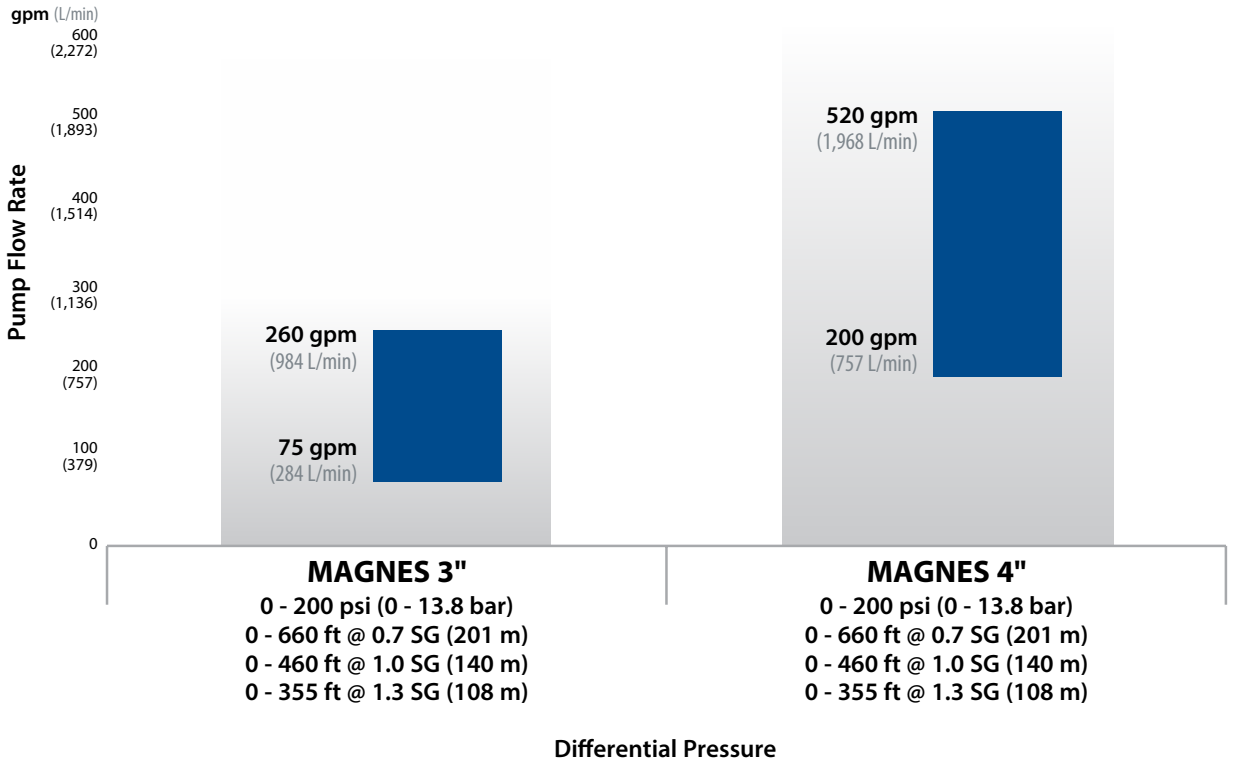
Available MAGNES Accessories:

- **Baseplate:** C-channel (standard), fabricated steel (optional), or BaseTek composite (optional)
- **Gear Reducer:** NORD SK52W (standard)
- **Guards:** Rexnord Orangepeel (standard), sheet metal (optional)
- **Couplings:** Jaw couplings and sleeve couplings
- **Motors:** An array of NEMA and IEC/ATEX options, for both 60Hz and 50Hz service

Accessories **Not Required** by MAGNES *(due to inherent functionality):*

- Separate low-flow models
- Run-dry bearings or coatings
- Steam heat jackets or viscosity suppression systems
- Power monitors and temperature probes
- Priming systems & tanks
- Complicated seal support systems

Nominal Flow Rate Range



Operating Limits (Standard Materials)

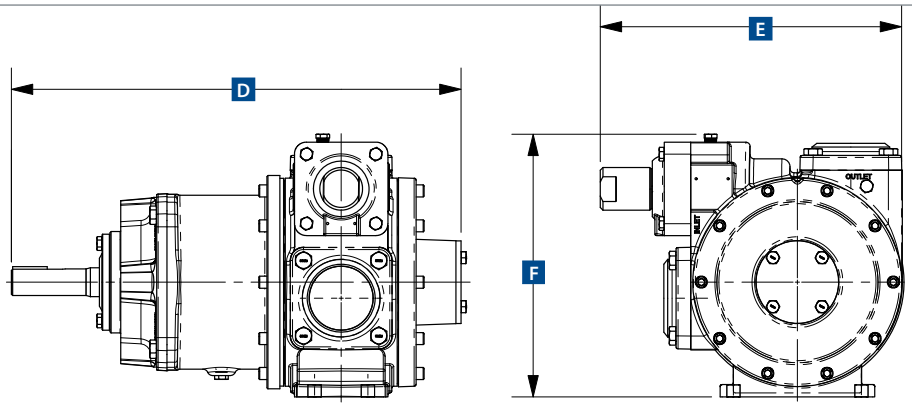
Pump Model	Nominal Flow Rate Range	Viscosity	Maximum Operating Temperature	Minimum/ Maximum Speed	Maximum Working Pressure	Maximum Differential Pressure	Total Developed Head (1.0 sg)	Power at Maximum Speed & Pressure
3"	75 to 260 gpm (284 to 984 L/min)	1 to 2,200 cP	-30°F to 250°F (-34°C to 121°C)	250 to 640 rpm	225 psi (15.5 bar)	200 psi (13.8 bar)	0 to 460 ft. (0 to 140 m)	3 to 40 HP (0 to 30 kW)
4"	200 to 520 gpm (757 to 1,968 L/min)	1 to 2,200 cP	-30°F to 250°F (-34°C to 121°C	250 to 520 rpm	225 psi (15.5 bar)	200 psi (13.8 bar)	0 to 460 ft. (0 to 140 m)	3 to 75 HP (0 to 55 kW)

Maintenance Kits: Wear Parts
3": MI3: BLK899097 | MS3: BLK899098
4": MI4: BLK899083 | MS4: BLK899084

Rebuild Kits: Wear Parts & Rotor/Shaft
3": MI3: BLK899197 | MS3: BLK899198
4": MI4: BLK899183 | MS4: BLK899184

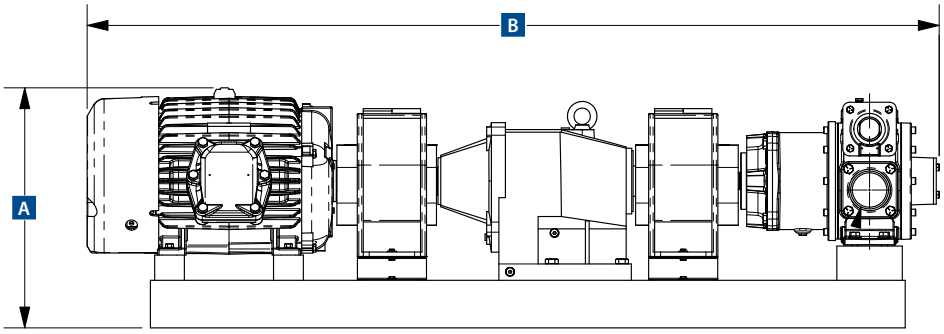
Note: Kits include FKM elastomers

MAGNES Series | Dimensions[1]



Pump Model	Length (D)	Width (E)	Height (F)	Max. Weight
MAGNES 3"	21 1/16" (535 mm)	14 1/8" (358 mm)	12 1/4" (311 mm)	SS 205 lb (93 kg) Iron 199 lb (90 kg)
MAGNES 4"	27 3/16" (691 mm)	18 9/16" (471 mm)	16 7/8 (429 mm)	SS 469 lb (213 kg) Iron 452 lb (205 kg)

[1] All dimensions and weights approximate. Please refer to Dimension Sheets for precise dimensions.



Motor Size	HP	MAGNES 3"				MAGNES 4"			
		A	B	Max. Weight SS	Max. Weight Iron	A	B	Max. Weight SS	Max. Weight Iron
213T	7.5	18 3/16" (462 mm)	66 1/8" (1680 mm)	969 lb (439 kg)	963 lb (436 kg)	—	—	—	—
215T	10	18 3/16" (462 mm)	66 1/8" (1680 mm)	992 lb (449 kg)	986 lb (447 kg)	—	—	—	—
254T	15	20 3/16" (584 mm)	69 15/16" (1776 mm)	1,114 lb (505 kg)	1,108 lb (502 kg)	—	—	—	—
256T	20	20 3/16" (584 mm)	71 11/16" (1820 mm)	1,138 lb (516 kg)	1,132 lb (513 kg)	—	—	—	—
284T	25	20 15/16" (532 mm)	72 7/8" (1851 mm)	1,282 lb (581 kg)	1,276 lb (578 kg)	22 5/8" (559 mm)	90 5/8" (2,286 mm)	1,802 lb (817 kg)	1,835 lb (832 kg)
286T	30	20 15/16" (532 mm)	74 3/8" (1889 mm)	1,334 lb (605 kg)	1,328 lb (602 kg)	22 7/8" (559 mm)	88 1/8" (2,235 mm)	1,894 lb (859 kg)	1,927 lb (874 kg)
324T	40	21 1/2" (546 mm)	77 1/16" (1957 mm)	1,503 lb (681 kg)	1,496 lb (678 kg)	24 1/16" (610 mm)	91" (2,311 mm)	2,089 lb (948 kg)	2,122 lb (963 kg)
326T	50	21 1/2" (546 mm)	77 1/16" (1957 mm)	1,535 lb (696 kg)	1,528 lb (693 kg)	23 13/16" (584 mm)	91 13/16" (2,311 mm)	2,095 lb (950 kg)	2,128 lb (965 kg)
364T	60	—	—	—	—	24 11/16" (610 mm)	93 3/4" (2,362 mm)	2,204 lb (1,000 kg)	2,237 lb (1,015 kg)
365T	75	—	—	—	—	24 11/16" (610 mm)	93 3/4" (2,362 mm)	2,382 lb (1,081 kg)	2,415 lb (1,095 kg)

PSG Grand Rapids
1809 Century Avenue SW
Grand Rapids, MI 49503-1530
USA
P: +1 (616) 241-1611
F: +1 (616) 241-3752
info@blackmer.com
blackmer.com

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