“For a cleaner tomorrow”, is where it all starts. Innovative Mag-Drive strives to keep your work environment safe and clean by producing a zero emissions pump. Tomorrow really does start today.

We have been manufacturing Sealless, Non-metallic, Magnetically Driven Pumps since 1998. Our “claim-to-fame” is our Thrust Balanced product line, the TB-mag series. It’s introduction revolutionized the non-metallic, mag-drive pumping industry as the first fully thrust-balanced pump with the ability to handle solids. This was truly a first for this class of pumps, no longer do you need perfectly clean liquids! When applied right, an INNOMAG pump can make a real difference for your environment, maintenance staff and operators alike.

Innovative Mag-Drive is recognized as an innovator and leader in the sealless, non-metallic, mag-drive pump market. The literature you are reading is not fancy marketing but rather our attempt to explain to you some of our products and business philosophies.

Helping you create a cleaner tomorrow starts with our products, our distributors and of course... the INNOMAG team.

Sincerely,

The Owners & Employees of Innovative Mag-Drive

Innomag.com
INNOMAG has strongly focused on vertical integration and vertical manufacturing for one reason and one reason only, QUALITY! High quality is the result of good raw materials, making things yourself and having employees who care about what they make!

Why is INNOMAG so different? Our answer is simple... constant involvement! It’s not just the concept of Thrust Balancing or that each engineer has almost two decades of sealless engineering experience but rather everyone’s relentless desire to stay involved with every facet of the business.

This involvement starts from the top-down... from helping a Distributor or end-user choose the right pump, to direct oversight of every manufacturing step, to assembling and testing your pump, right down to finding out when your pump will ship. Customers enjoy INNOMAG because they know they have a voice... a voice that goes right to the top!

So, you already have an INNOMAG pump... what does this mean for you? Well, quite a bit! Have comfort knowing that you have one of the highest quality mag-drive pumps in the market today. You not only have the support of your local Distributor but also the Engineering staff at INNOMAG. If you choose to call direct to the Factory, we take great pride in answering the phone. NO VOICE-MAIL "run-around" or endless prompts to select from. If you do need to leave a message, WE WILL RETURN your call... PERIOD. WHY? Nothing short of respect! We strive to sell solutions, not problems and our No. 1 customer is a repeat one!
The Quality in Every INNOMAG Pump

Materials... materials... materials! It goes without saying, in order to manufacture an excellent pump, you need to have excellent raw materials. So when it comes to this area, INNOMAG spares no cost! Since our beginning in 1998, we have worked constantly to improve all our products through engineering improvements and the purchase of better and higher quality materials. Because of this, we know that you will be pleased with everything you find on the inside of our pumps.

**FLUOROPLASTICS**

To make a non-metallic pump you need non-metallic materials. For the ultimate in chemical and corrosion resistance, INNOMAG uses only the highest grade of fluoroplastic resins. That’s right, fluoroplastics! This is the technical word that describes ETFE, PTFE and PFA. So, as you look inside any INNOMAG pump, all the surfaces that you see will be made of these materials. This includes injection molded impellers and containment shells right down to the rotationally molded pump lining. There is no substitute for high quality, anything less will mean a short pump life and a future problem for you.

**Exterior Protection**

It’s not just the inside of the pump that needs chemical resistance, durability and longevity. All metal surfaces are coated with epoxy polyamide primer and catalyzed aliphatic polyurethane top-coat.

**Composites**

All INNOMAG Containment Shells are made with Aramid fibers for the ultimate in burst pressure resistance.

**Single Piece Impeller**

For ultimate strength and durability, all INNOMAG impellers are one piece. They are formed with fluoroplastics in a single-step injection molding process. This provides the strongest possible connection between the impeller, magnets and bearings. No balance problems, No sloppy splines, No trapped dirt and liquids!

**Welded Inner Magnet**

A Fully sealed Inner Magnet Assembly is the heart of every Impeller. INNOMAG understands permeation and how it can shorten your pumps life. So what’s our solution? A doubly, hermetically sealed magnet assembly. First, the magnets are covered with Stainless Steel that’s welded air-tight. Second, this is completely covered with our premium fluoroplastics so any permeation has a long way to go before it can damage your pump.

**Alpha Sintered Silicon Carbide**

Simply the best! This grade of ceramic is chemically inert, extremely hard and wear resistant. As such, it is the standard material found in every INNOMAG pump.

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The TB-mag Series

So what makes the TB-mag series so much better than the competition? Thrust balancing and engineering design. The TB-mag (short for Thrust Balanced mag-drive) is the most revolutionary engineering concept to enter the mag drive market since the invention of the mag drive pump itself.

The thrust balance technology behind the TB-mag series completely eliminates axial thrust bearings and provides the basis for a controlled internal environment. Superior engineering design minimizes the issue of secondary containment by providing secondary bearings.

No other product on the market today offers these features at such a cost-effective and cost-competitive price. In short, the TB-mag sets new standards for non-metallic sealless pumps in application of use, product durability and customer driven value.

Specifications

- **Temperature Range:**
  -20 to 250°F (-29 to 121°C)
- **Flange Connections:**
  ANSI Class 150
  ANSI Class 300
  ISO PN 16
  JIS 10kg/cm^2
- **Maximum Flow:**
  TB-mag A 295 gpm (66.9 m³/hr)
  TB-mag B 700 gpm (159 m³/hr)
  TB-mag C 1500 gpm (340.7 m³/hr)
- **Maximum TDH:**
  TB-mag A 190 ft (58.2m)
  TB-mag B 306 ft (93.2m)
  TB-mag C 503 ft (153m)
- **Maximum Solids:**
  Size  .25 inch
  Concentration  30 %
- **Maximum Discharge Pressure:**
  300 psi (20.6 bar)
- **Mounting:**
  NEMA or IEC
- **Maximum Power:**
  Rated @ 3500 rpm
  TB-mag A 14hp (10.4kW)
  TB-mag B 30hp (22.4kW)
  TB-mag C 100hp (74.6kW)

Apps:
- Metal Finishing - Pickling,
  Etching and Plating
- Tank Car Loading and Unloading
- Scrubber Systems
- Chemical Processing
- Reactor Feed
- Chlor-Alkali
- Waste Chemical Treatment

Services:
- Acetic Acid
- Ammonia
- Benzene
- Caustic Soda
- Chlorosulphonic Acid
- Chromic Acid
- Ferric Chloride
- Hydrochloric Acid
- Hydrogen Peroxide
- Methyl Ethyl Ketone
- Nitric Acid
- Oleum
- Phosphoric Acid
- Sodium Hypochlorite
- Sulfuric Acid
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Revolutionary Thrust Balancing

Introducing the TB-mag

Wonder why the name TB-mag? Thrust balancing is not new to the pump industry but it certainly is new to the non-metallic mag-drive world!

Nearly every competing product in the market today is based on thrust forward technology. This is the concept where under normal operation the impeller will thrust forward towards the pump suction. As an old design (more than 50 years) it has found a niche in the clean liquids market but is well known to fail easily upon process upset or system change.

The revolution of thrust balancing has added substantial durability along with wider and greater application of use. Those who deal in day-to-day reliability truly understand the destruction that thrust can cause. For those looking for a product that will last longer and run better, the TB-mag is certainly what you should consider! As you read, please understand that this is a “simple” explanation of what INNOMAG has created. For an in-depth explanation, please call your local distributor and schedule a demonstration.

Thrust... this is where it starts! Engineers explain that thrust is one of several forces in a mag-drive pump and it can be very destructive. When you think of a pump, the largest cause of force is from the very thing you want the pump to do, make pressure. When engineers see pressure, they see it as a Force, which is Pressure x Area (F = P x A). When INNOMAG looked at the inside of a pump, we saw a lot of unused pressure and unused areas that could solve a 50 year problem!

The picture to the upper left corner shows what INNOMAG created and patented. The white arrows show the path that some of your liquid will take when it goes through the TB-mag pump. The idea to keep in mind at all times is that high pressure (colored red) will always find low pressure (colored yellow). A good example is a balloon that you blow up and let go of. The air comes out because pressure inside the balloon is higher than outside. The top left picture shows that the suction side (left side) of the pump has the lowest pressure (colored yellow). The discharge will have the highest pressure (colored red). When the arrows are followed, the path traveled is: liquid enters the suction of the pump and the center of the impeller. The impeller then centrifugally creates pressure with the liquid (red colored area). As the pump housing is filled with the pressurized liquid, some of the liquid will go around to the back side of the impeller and pass thru the back clearance ring set (picture upper right side). This area is fixed and creates a constant, restricting pressure drop (red color changing to green color). From here, the liquid will pass over the impeller (the magnet assembly) and go around to the impeller back end (balancing pressure). At this point, it will travel through the center of the impeller (green area again) and find the suction (the low pressure area). Why? High pressure will always go to low pressure (just like the balloon)!

Looking at the picture located just above, we find that a way to thrust balance the impeller is to simply combine the suction pressure and the pressure on the front of the impeller to go against the pressure (and thrust) from the back of the impeller (the green area). If the impeller moves forward due to thrust (picture lower left corner) an opening controlled by the impeller becomes larger and allows more liquid to leave the green area, directly lowering the thrust and pressure. If too much thrust or pressure is lost, the impeller will move backward, closing the opening (picture lower right corner) causing the pressure or thrust in the green area to directly increase against the suction and front impeller pressures.

This is INNOMAG dynamic thrust balancing, your process and the TB-mag pump work together to eliminate thrust!
Pressurized Flowpath
- No flashing at the radial bearings.
- Bearing fluid pressure is 1/4 to 1/3 of discharge pressure.
- Bearing life greatly extended due to positive liquid film.
- Low vapor pressure liquids easily handled.
- High flow rate thru bearings keeps them clean and cool for longer life.

Higher Efficiency
- No thrust bearing drag!
- Less friction wear-and-tear.
- Less friction means less energy.
- The bigger the pump, the bigger the energy savings.

Upset Forgiveness
- Balance system greatly reduces loads during upsets.
- Survives suction starvation events that competitors thrust forward designs can’t handle.

Optimized Casing
- Modified concentric volute minimizes radial loads.
- Loads remain low over entire operating range.
- Confidently operate continuously from low-flow to end-of-curve.

Wear Ring
- Clearance is 0.005” (.127mm)
- Can never clog. As long as the impeller rotates, the clearance is open for flow.

Approximate Axial Loads

<table>
<thead>
<tr>
<th>Thrust Load</th>
<th>INNOMAG</th>
<th>Thrust load = 0</th>
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</thead>
<tbody>
<tr>
<td>Impeller Diameter (in.)</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Forward Thrust (lbs)</td>
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<td>1000</td>
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</table>

Competition
Solids enter the pump through the suction and pass out through the discharge nozzle. Some of the solids will try to leak around the impeller past the wear rings. The leakage past the front wear rings simply returns the particles directly to the suction flow; however, leakage past the back wear rings could bring particles in contact with the inner magnets, the containment shell and the radial bearings. Fortunately, back wear rings restrict solids larger than 0.005” (0.127 mm) from entering the containment shell area, keeping all bearings and critical flow paths clear.

This illustration shows the main solids laden stream around the impeller and the clean stream behind the impeller.

A 0.005” (0.127 mm) gap allow process fluids to pass through and lubricate the bearings while blocking larger solids from entering these critical areas between the containment shell and impeller where they could damage the pump.
Superior Solids Handling Capability

Solids Handling

- SiC Wear Rings, located front and back of the impeller, keep solids larger than 0.005” (0.127 mm) from entering the containment shell.

- Only clean liquid can reach the bearings and pump shaft.

No other non-metallic mag-drive keeps the solids from entering these critical areas behind the impeller.

Front Wear Rings

Liquid with solids from microns up to 1/4” (6.35mm)
**Motor Adapter**
- Mates NEMA C-face or IEC D-flange motors.
- Integral foot mates to existing ANSI base plates. All mounting bolts conveniently accessed from outside the adapter to simplify motor/pump mating.

**Outer Drive**
- One outer drive per motor frame size.
- Dowel pins eliminate motor shaft key for quick and easy install.
- Center drill & tap thread for easy removal from motor shaft.
- Motor shaft position set with visual alignment groove (no special tools).

**Bearing Frame**
- ANSI dimensioned bearing frame.
- Optional true metallic secondary seal.

**Containment Ring**
- Extra-heavy duty, one piece ductile iron casting.
- Separate from the adapter to allow servicing of the motor without opening the liquid end of the pump.
- Precisely aligns and supports the containment shell in the casing.
- Precisely aligns motor adapter to pump end.

**Containment Shell**
- One-piece carbon fiber ETFE molding for a combination of strength and chemical resistance.
- Reinforced socket for pump shaft.
- Outer housing made of aramid composite for high pressure, high strength and high shock resistance.

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**Pump Shaft**
- Pure alpha sintered silicon carbide.
- Cantilevered for lowest NPSHr.
- Oversized to handle all radial loads.
- Keyed for anti-rotation.
- Barbed for maximum grip.

**Radial Bearings**
- Dual sintered silicon carbide (SiC) bearings.
- Flexible impeller mount for optimal alignment to pump shaft.
- PTFE center spacer for proper bearing position.
- Individually replaceable.

**Pump Casing**
- One-piece cast ductile iron.
- Full open pump suction for lowest NPSHr.
- Fully bonded ETFE liner minimum of 1/8” (3 mm), rated to full vacuum.
- Fluoroplastic provides universal corrosion resistance.

**Gasket**
- Standard FEP/FKM construction for maximum chemical resistance.
- Optional in EPDM or FKM.

**Impeller Assembly**
- Molded one-piece enclosed impeller with replaceable sintered silicon carbide wear rings.
- High efficiency, low NPSHr design with fully open impeller eye.
- Molded from carbon fiber reinforced ETFE for optimum strength and chemical resistance.
- Patented double weld inner magnet provides extreme corrosion and permeation resistant barrier.

**DRAIN**
- Optional casing drain.
- Standard cast stainless steel blind flange.
- Optional lined drain flange with 3/8” NPT.
- Optional casing flange adapter to 1” ANSI flange.
Our patented design combines a simple, yet proven, off-the-shelf dry run cartridge seal with our long couple bearing frame.

Imagine all the benefits of a Non-metallic mag-drive pump with all the security of a metallic secondary containment. Consult your authorized INNOMAG distributor today or call us for more details on sizing your next application.

Dry-run mechanical seal

The bearing frame bolts in place similar to a standard sealed pump.

Standard wet end

(2) 1/2” NPT connections for drain / leak detector
In the unlikely event of a breach, the process fluid is mechanically sealed from leakage.

Dry running seal eliminates the need for nitrogen purge or seal flush.

Normal extent of process fluid contained by the pump.

No external connections required.

ANSI Group 2 dimensional, or extended length Group 1 centerline mountable.

Standard stuffing box style construction.

Close-coupled JM pump motor mounting available.
### TB-Mag Pump Dimensions - ANSI / ISO

#### Table: TB-Mag Pump Dimensions

<table>
<thead>
<tr>
<th>Series</th>
<th>Model (Size)</th>
<th>ANSI No.</th>
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<th>2E₂</th>
<th>F</th>
<th>O</th>
<th>X</th>
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<th>CP</th>
<th>SF</th>
<th>DF</th>
<th>LB (kg)</th>
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<td>A1 - (1.5x1x6)</td>
<td>AA</td>
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<tr>
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<td>A3 - (3x1.5x6)</td>
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<td>5.25 (133)</td>
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**All ISO products can be Mounted to either IEC or NEMA style Motors.**

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<tr>
<th>Series</th>
<th>Model Size</th>
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<th>2E₂</th>
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<td>FL - (50x32x200LF)</td>
<td>6.29 (160)</td>
<td>8.35 (212)</td>
<td>3.74 (95)</td>
<td>15.94 (405)</td>
<td>8.86 (225)</td>
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<tr>
<td></td>
<td>F4 - (65x40x200)</td>
<td>7.09 (180)</td>
<td>9.84 (250)</td>
<td>3.74 (95)</td>
<td>15.94 (405)</td>
<td>8.86 (225)</td>
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<tr>
<td><strong>TB Mag “C”</strong></td>
<td>G2 - (100x65x200)</td>
<td>7.09 (180)</td>
<td>9.84 (250)</td>
<td>3.74 (95)</td>
<td>15.94 (405)</td>
<td>8.86 (225)</td>
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**Innomag.com**
ALL Pump Models use ONE Impeller for Stated Power Range

**Power Range**

- **G2-100x65x200**
  - to 46.4kW @ 2950 rpm

- **F1-50x32x200**
  - to 18.5kW @ 2950 rpm

- **F4-65x40x200**
  - to 8.7kW @ 2950 rpm

- **E3-65x50x160**
  - to 15hp @ 3500 rpm

- **E1-50x32x160**
  - to 7.5hp @ 3500 rpm

- **CL-2x1x10LF** (low /f_low)
  - to 75hp @ 3500 rpm

- **BL-1.5x1x8LF** (low /f_low)
  - to 30hp @ 3500 rpm

- **W1-2x1.5x8** (ANSI vertical)
  - to 15hp @ 3500 rpm

- **AL-1.5x1x6LF** (low /f_low)
  - to 15hp @ 3500 rpm

- **V1-2x1.5x6** (ANSI vertical)
  - to 15hp @ 3500 rpm

**TB-mag Hydraulic Curves**

**TB-mag Special Pumps**

**TB-mag ISO/JIS**
The U-mag Series

Comfortable with the older, thrust forward designs but want INNOMAG quality? The U-mag series is your solution. Made with the exact same high quality materials as the TB-mag but designed for smaller and more refined applications.

The U-mag series is offered in a variety of fluoroplastic materials including High Purity PFA.

Specifications

- Capacities:
  \( \frac{1}{2} \) - 450 gpm
  (0.1-102 m\(^3\)/hr)

- Power:
  Up to 14 hp
  (10.5 kW)

- Heads:
  Up to 165 ft
  (50 m)

- Temperature:
  -20 to 250°F
  (-29 to 121°C)

- Working Pressure:
  300 psi
  (21 bar)

- Materials:
  CF ETFE (Std)
  High Purity PFA

Apps:

- Chemical processing
- Metal Plating
- Parts washing
- Circuit board mfg.
- Photo processing
- Pharmaceuticals
- Pure Water, RO & DI
- Food processing
- Wet scrubbers
- Semi-conductor
- Heat exchangers

Services:

- Chromic Acid
- Hydrochloric Acid
- HydroFlouric Acid
- Nitric Acid
- Ferric Chloride
- Sodium Hydroxide
- Sodium Hypochlorite
- Sulfuric Acid
**Quick Summary of Features**

- Compact, heavy duty, non-metallic magnetic drive pump.
- Universal flange design - meets ANSI, ISO and JIS piping connections.
- Fluoroplastic ETFE and Ultra High Purity PFA provide universal chemical compatibility.
- Optional Ultra High Purity PFA allows for ultra low contaminants (ppb).
- Powerful neodymium magnets provide maximum torque up to 14 hp (10.5kW).
- Pump housing based on modified concentric volute to minimize radial loads and help extend bearing life.
- Cantilevered pump shaft allows for full opened pump suction, providing for the lowest NPSHr.
- Designed for easy pump service (if required).
- Liquid end and drive end independently serviceable.
- 100% replaceable wear parts including all rotating and stationary rings.
- Heads to 165 ft (50m) / Flows to 450 gpm (102 m³/hr).
## U-mag Dimensions & Flow Curves

### Model (Size) | 2E₁ | 2E₂ | F | G | W | X | Y | Z | Suction Flange | Discharge Flange
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>U0 - 1.5x1x5</strong> (40x25x156mm)</td>
<td>8.00</td>
<td>8.00</td>
<td>5.50</td>
<td>3.69</td>
<td>9.64</td>
<td>3.15</td>
<td>2.34</td>
<td>1.00</td>
<td>40mm</td>
<td>25mm</td>
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<tr>
<td><strong>UL-1.5x1x5LF</strong> (40x25x156mm)</td>
<td>8.00</td>
<td>8.00</td>
<td>5.50</td>
<td>3.69</td>
<td>9.64</td>
<td>3.15</td>
<td>2.34</td>
<td>1.50</td>
<td>40mm</td>
<td>25mm</td>
</tr>
<tr>
<td><strong>U1 - 2x1.5x6</strong> (50x40x156mm)</td>
<td>7.10</td>
<td>7.10</td>
<td>3.94</td>
<td>0.00</td>
<td>6.30</td>
<td>3.15</td>
<td>2.00</td>
<td>3.00</td>
<td>80mm</td>
<td>65mm</td>
</tr>
<tr>
<td><strong>U3 - 3x2.5x6</strong> (80x65x156mm)</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
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<td>6.10</td>
<td>6.10</td>
<td>7.52</td>
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<tr>
<td><strong>U4 - 2.5x2x6</strong> (65x50x156mm)</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
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<td>6.10</td>
<td>6.10</td>
<td>6.10</td>
<td>7.52</td>
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</tbody>
</table>

### Flow Curves

**U-1,5x1x5 LF**

**U-1.5x1x5 LF**

**U-2x1.5x6**

**U-3x2.5x6**

**U-2.5x2x6**

### NEMA

<table>
<thead>
<tr>
<th>Model (Size)</th>
<th>56C</th>
<th>143/5TC</th>
<th>182/4TC</th>
<th>213/5TC</th>
<th>80/90SL</th>
<th>100L/112M</th>
<th>132</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>U0 - 1.5x1x5</strong> (40x25x156mm)</td>
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### JEC

<table>
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<th>Model (Size)</th>
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</table>

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Innomag.com
At Innovative Mag-Drive, we understand that a pump is not your only concern, it’s just one of many items to make your process work. To speed your installation, we offer many accessories and piping adapters for those tough-to-fit spots.

- Priming tanks and priming systems
- Lined specialty pipe and spool pieces
- Low-flow models to save you energy
- Wide variety of power monitors
- Alternative castings and flanges to speed odd installs
- Wide selection of baseplates
- Steam heat jackets
- Vertical pumps
  - W3 - 3 x 2 x 6
  - W1 - 2 x 1.5 x 8
  - V1 - 2 x 1.5 x 6
- Direct mount engine driven options for tanker trucks and remote locations

Please call INNOMAG or your Authorized Dealer for more information.
For Clean Manufacturing
Call INNOMAG or visit us at innomag.com

Your Authorized Distributor:

Innovative Mag-Drive
409 S Vista Ave
Addison, IL 60101
Phone: (630) 543-4240
Fax: (630) 543-4245
www.innomag.com

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