Zenith® Pumps

H-Series
Gear Pumps

Precise,
 Pulseless,
 Repeatable
Performance

In High-Temperature
Applications.
Zenith® Pumps

In 1926, Zenith Pumps was approached by the synthetic fiber industry to design a pump to provide a precise, pulseless, repeatable flow and assure better quality control. The options then were the same as those in the chemical process industry today—diaphragm, lobe, coarse gear, piston, plunger, and screw pumps. Each had problems with pulsation, flow inaccuracies, multiple seal areas and slippage, which required constant calibration, high maintenance, and extended downtimes.

Zenith Pumps met the challenge and designed a rotary external gear pump of unique precision and simplicity. Manufacturing techniques were developed to hold tolerances to ±0.00005” minimizing internal clearances to assure accurate and precise metering. The pump’s simplistic design of only three moving parts—two metering gears and a drive shaft—provided long life and easy maintenance.

For years since, process engineers have relied on Zenith to provide precision fluid handling solutions for their most difficult pumping applications. Zenith gear pumps can be found wherever precise, pulseless, repeatable metering of fluids is required.

Standard ZeDRIVE with 1/2 hp QM and rear-port HMB pumps.

Features

High Accuracy. Stable, repeatable flows are assured even under varying conditions of pressure, viscosity and temperature.

Minimum Pulsation. Unique design offers virtually pulseless flow without valves or flexible elements to hinder performance.

High Temperature Capability. Operating temperatures to 950°F (510°C).

Maximum Life. Only three moving parts; components are through-hardened tool and die steels to 64 Rc or better. Replaceable sleeve bearings for low-cost rebuilds.

High Volumetric Efficiency. Maximum efficiency is achieved with optimum operating clearances and assured under pressure by built-in alignment dowels.

Precision Construction. Ground and lapped components for close of operating clearances.

Specifications

Pump Type: Rotary external spur gear, single stream.

Rotation: Refer to pump drawing.

Operating Speed: 3–180 rpm depending upon application conditions and fluid viscosity.

Temperature: To 950°F (510°C).

Applications

The H-Series pumps are ideal for metering in such applications as:

<table>
<thead>
<tr>
<th>Adhesives</th>
<th>Foams</th>
<th>Uretahnes</th>
<th>Plasticizers</th>
<th>Monomers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Additives</td>
<td>Coatings</td>
<td>Surfactants</td>
<td>Polyols</td>
<td>Oils</td>
</tr>
<tr>
<td>Asphalt</td>
<td>Inks</td>
<td>Oxide Slurries</td>
<td>Plastics</td>
<td>Pigments</td>
</tr>
<tr>
<td>Abrasives</td>
<td>Fibers</td>
<td>Lubricants</td>
<td>Paints</td>
<td>Tars</td>
</tr>
<tr>
<td>Bottoms</td>
<td>Pitch</td>
<td>Polymers</td>
<td>Resins</td>
<td>Many others</td>
</tr>
</tbody>
</table>
**HPB Pump**

- **Flow Rates:** .00013 to 0.14 gpm (.00048-.526 l/min).
- **Capacities:** .16/.297/.584/1.168/1.752/2.92 cc/rev.
- **Inlet Pressure:** Flooded suction recommended; 40 psi (2.8 kg/cm²) required to energize mechanical face seal.
- **Discharge Pressure:** Limits: 4,000 psi (281 kg/cm²).
- **Viscosity:** 1 to 2,000,000 cps.
- **Mounting:** L-16 Parco-Lubriated cast iron mounting saddle.

- **Materials of Construction:** D2 tool steel–Models 4647 and 5556. M series tool steel–Models 5205 and 5557. Model 5704 available in either D2 or M series.

- **Seals:** Grafoil Packing–Model 5704. Mechanical face with tang slot–Models 4647 and 5205. Mechanical face with outer drive shaft–Models 5556 and 5557.

**HMB Pump**

- **Flow Rates:** .0028 to .476 gpm (.011-1.8 l/min).
- **Capacities:** 3.5/5.5/10.0 cc/rev.
- **Inlet Pressure:** Flooded suction recommended; 40 psi (2.8 kg/cm²) required to energize mechanical face seal.
- **Discharge Pressure:** Limits: 4,000 psi (281 kg/cm²).
- **Viscosity:** 1 to 2,000,000 cps.
- **Mounting:** L-5471 Parco-Lubriated cast iron mounting saddle.

- **Materials of Construction:** M2 tool steel–All standard models.

- **Seals:** Grafoil Packing–Model 5740. Mechanical face with tang slot–Model 4892. Mechanical face with outer drive shaft–Model 5555.
**HLB Pump**

**Flow Rates:** 0.08 to 2.4 gpm (.03-9.0 l/min).

**Capacities:** 10/20/30/50 cc/rev.

**Inlet Pressure:** Flooded suction recommended; 40 psi (2.8 kg/cm²) required to energize mechanical face seal.

**Discharge Pressure:** Limits: 4,000 psi (281 kg/cm²).

**Viscosity:** 1 to 2,000,000 cps.

**Mounting:** L-5139 Parco-Lubrited cast iron mounting saddle.

**Materials of Construction:** D tool steel—All standard models.

**Seals:** Grafoil Packing—Model 5592.
- Mechanical face with tang slot—Model 4729.
- Mechanical face with outer drive shaft—Model 5548.

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**HXB Pump**

**Flow Rates:** 0.55 to 9.5 gpm (.21-36 l/min).

**Capacities:** 70/100/147.5/200 cc/rev.

**Inlet Pressure:** Flooded suction recommended.

**Discharge Pressure:** Limits: 4,000 psi (281 kg/cm²).

**Viscosity:** 1 to 2,000,000 cps.

**Mounting:** L-5427 Parco-Lubrited cast iron mounting saddle.

**Materials of Construction:** M series tool steel—All standard models.

**Seals:** D-110 Packing—Model 4980.
Selection Guide

The following are general guidelines for pump selection and should be confirmed with the factory or sales representative before ordering.

1) Choose appropriate pump capacity based on flow rate. (See Chart 1)
2) Determine pump operating speed (N).
   \[ N = \frac{\text{Flow Rate (cc/min)}}{\text{Pump Capacity (cc/rev)}} \]
3) Determine operating viscosity (V) in poise. If fluid is non-newtonian, follow steps 3a and 3b.
3a) Identify pump’s operating shear rate. (See Chart 2)
3b) Refer to your viscosity vs. shear rate curve for operating viscosity (V) in poise.
4) Refer to Table 1 for pump constant (K).
5) Determine differential pressure (P) (discharge - inlet) in psi.
6) Calculate input torque using the following:
   \[ T_h = 0.01 \cdot P \cdot C \]
   \[ T_v = N \cdot K \cdot V \]
   \[ T_t = T_h + T_v \]
7) Determine maximum torques from Table 2.
8) Choose a speed reduction ratio (R) based on pump operating speed.
   \[ R = 22:1; 4 - 82 \text{ rpm} \]
   \[ R = 11:1; 8 - 160 \text{ rpm} \]
   \[ R = 5:1; 18 - 180 \text{ rpm} \]
9) Drive Horsepower = \[ T_t / (35 \cdot R \cdot 0.87) \]
10) For hp < .5 choose .5 hp.
    For hp between .5 and 1.0 choose 1 hp.
    For larger hp round up to the nearest whole number.

Pump Capacity Selection Chart

[Diagram showing pump capacity selection chart with pump types and flow rates]
Shear Rate vs. Speed

![Shear Rate vs. Speed Chart](image_url)

### Constant (K)

<table>
<thead>
<tr>
<th>Pump</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPB .160</td>
<td>00027</td>
</tr>
<tr>
<td>HPB .297</td>
<td>00029</td>
</tr>
<tr>
<td>HPB .584</td>
<td>00033</td>
</tr>
<tr>
<td>HPB 1168</td>
<td>00041</td>
</tr>
<tr>
<td>HPB 1752</td>
<td>00048</td>
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<tr>
<td>HPB 292</td>
<td>00064</td>
</tr>
<tr>
<td>HMB 3.5</td>
<td>00132</td>
</tr>
<tr>
<td>HMB 5.5</td>
<td>00150</td>
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<tr>
<td>HMB 10</td>
<td>00159</td>
</tr>
<tr>
<td>HLB 10</td>
<td>00267</td>
</tr>
<tr>
<td>HLB 20</td>
<td>00356</td>
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<tr>
<td>HLB 30</td>
<td>00445</td>
</tr>
<tr>
<td>HLB 50</td>
<td>00623</td>
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<tr>
<td>HXB 70</td>
<td>00409</td>
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<tr>
<td>HXB 100</td>
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<td>HXB 1475</td>
<td>00531</td>
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<tr>
<td>HXB 200</td>
<td>00610</td>
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</tbody>
</table>

### Maximum Torque

<table>
<thead>
<tr>
<th>Pump</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HPB .16-297</td>
<td>(All Models)</td>
</tr>
<tr>
<td>HPB .584</td>
<td>(Except 4647)</td>
</tr>
<tr>
<td>HPB 1.168-1.752</td>
<td>(Except 4647)</td>
</tr>
<tr>
<td>HPB 2.92</td>
<td>(Except 4647, 5704)</td>
</tr>
<tr>
<td>HPB 2.92</td>
<td>(5704)</td>
</tr>
<tr>
<td>HPB .584-2.92</td>
<td>(4647)</td>
</tr>
<tr>
<td>HMB 3.5-10</td>
<td>(All Models)</td>
</tr>
<tr>
<td>HLB 10-50</td>
<td>(4729, 5548)</td>
</tr>
<tr>
<td>HLB 10-50</td>
<td>(5592)</td>
</tr>
<tr>
<td>HXB 70</td>
<td>(4980)</td>
</tr>
<tr>
<td>HXB 100</td>
<td>(4980)</td>
</tr>
<tr>
<td>HXB 147.5-200</td>
<td>(4980)</td>
</tr>
</tbody>
</table>

### Notes

- **WARNING**: FAILURE, IMPROPER SELECTION OR IMPROPER USE OF THE PRODUCTS AND/OR SYSTEMS DESCRIBED HEREIN OR RELATED ITEMS CAN CAUSE DEATH, PERSONAL INJURY AND PROPERTY DAMAGE.

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**ISO 9001: 2000 Registered**

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