SYSTEM ONE® Centrifugal Pumps
HEAVY-DUTY LARGE VOLUME PUMPS | PRODUCT BROCHURE
Blackmer System One® Centrifugal Pumps stand alone in the crowded centrifugal space. Why? Because System One Pumps are **ANSI PLUS** pumps. That means that they are ANSI pumps that comply with key parts of the API 610 standard, bringing a full set of reliability and ease-of-use features not found in any other ANSI pump.

**HEAVY-DUTY CENTRIFUGAL PUMPS FOR SEVERE & CONTINUOUS DUTY**

Blackmer® **SYSTEM ONE®** Centrifugal Pumps

Designed and built to exacting standards, System One heavy-duty centrifugal pumps are highly reliable and perform exceptionally well in safely transferring critical and valuable fluids in the harshest of service conditions. Blackmer guarantees System One Pumps with our unmatched performance assurance guarantee – five years for the power end and one year for the mechanical seal.

Blackmer is confident in offering these performance assurance guarantees because System One Centrifugal Pumps are designed and constructed to meet the API 610 standard of a minimum 20-year service life and three years of uninterrupted operation. With this standard applied, System One Pumps were overbuilt to protect and support the mechanical seal. This is achieved by providing the stiffest solid shaft on the market, oversized bearings, and numerous other features that protect the pump in even the most aggressive operating conditions. By offering maximum reliability, uptime and extended pump life, System One Centrifugal Pumps are the pumps to turn to when all others fail.

Designed for full curve operation, System One Pumps offer the widest window of operations off the Best Efficiency Point (BEP) of any conventional centrifugal pump. With flow rates up to 4,500 gpm (17,034 L/min) and a standard temperature range of -40° to 400°F (-40° to 204° C), System One Pumps can withstand severe and continuous operating conditions, where uptime is vital for operations with factory consultation.
**Wider Window of Operation Off the BEP (Best Efficiency Point)**

Many processes demand operation off the BEP where higher loads can create damaging vibration.

**Process Pump Challenges:**
- Due to process changes and variations, the majority of process pumps operate off the BEP where radial loads create high stresses
- Conventional pumps are prone to damaging shaft vibration under off-BEP conditions
- Seal and bearing failures result from vibration damage

**System One Is The Solution:**
- Heavy-duty design for the toughest applications in the process industry
- System One Pumps are designed to prevent vibration under high radial loads
- System One Pumps offer the widest operational window off the BEP of any standard process pump
- Seals and bearings last longer for greater system reliability
- When your process demands that pumps vary from the BEP, System One will save you money and prevent lost production

**Warranty & Performance Assurance**

Blackmer offers a five-year power end, and one-year mechanical seal performance assurance guarantee – If any System One power end component fails, a free replacement component will be provided, and if a mechanical seal fails, a spare parts kit will be provided. Blackmer stands behind our System One Pumps because we know they were built to last and operate in the most severe environments without failing.

Blackmer System One Pumps are used by Military and Naval marine vessels around the world, on land and sea – Under the most difficult conditions imaginable. Blackmer System One and Vane Pumps are approved by the US Military. In fact, these pumps can be found in all US Navy Surface Combatant Vessels providing rock-solid reliability when and where it is needed the most.

**Design Standards**

*System One Centrifugal Pumps* can be found on all operating class vessels for the United States Navy. Our pumps have met numerous military standards for over 50 years.

Meets the following military specifications standards:
- MIL-S-901-D
- MIL-STD-167
- MIL-P-19131
- ASTM DF1510
Reliability Features

Blackmer System One® Centrifugal Pumps are designed specifically to operate in severe applications and resist vibration that would otherwise cause frequent maintenance shutdowns.

1 Solid Shaft (no sleeve) with minimal overhang provides superior resistance to deflection. Lowest L3/D4 ratio in the industry.

2 System One Labyrinth Seals provide non-wearing lifetime protection for radial and thrust bearings.

3 Oversized 7310 (pair) Angular Contact Thrust Bearings are standard for high thrust capability, as required by API 610 specifications.

4 Positive Locking Thrust Bearing Retainer Cover for maximum bearing holding power and minimum axial movement.

5 Large Bore Seal Chamber available with optional throat bushing.

6 Optional Seal Chamber Jacket for cooling the mechanical seal.

7 Centerline Casing Support Legs are adjustable for pipe variations and minimize heat effects, as required by API 610 specifications.

8 Rabbet for C-Frame (NEMA) or D-Flange (IEC) Motor Adaptor provides for automatic mechanical motor alignment without special tools or excessive labor.

9 Standard Mechanical Seals Can Be Installed On All System One Pump Frames. Frame A offers an optional seal chamber jacket for cooling the mechanical seal.

10 Impeller is a single piece casting with solid hub, while also threaded to the shaft. Impeller lock bolts and keyed impellers available as options – API 610.

11 Bushing options include carbon, polyurethane and SpiralTrac™

*SpiralTrac is a registered trademark of the manufacturer, EnviroSeal Engineering Products Ltd., Waverly, Nova Scotia.
Ease of Use Features

Designed for pump operators, System One Centrifugal Pumps makes operation, maintenance, and repair simple with these ease of use features.

- **Micrometer Adjustment Nuts** simplify and ensure precise impeller setting for maximum efficiency
- **Full Support Rear Leg** assures bearing frame remains upright during pump disassembly
- **Cast-In Impeller Nut** makes removal easy
- **System One Labyrinth Seals** provide non-wearing lifetime protection for radial and thrust bearings
- **Large Oil Inlet** for easy filling of oil. Close fitting cover minimizes dirt and moisture entry
- **Flinger Filter** constantly cleans oil during pump operation – API 610
- **Two Magnetic Drain Plugs** are provided to maintain clean oil and are removable for insertion of cooling coil – API 610
- **Oil Sight Glass** for constant monitoring of oil level and condition
- **Frame A Adapter** has a 180° unobstructed opening for ease of maintenance
- **Casting Methods** State-of-the-art casting methods provide smoothest possible surfaces for highest efficiency
- **Optional Bearing Oil Temperature Monitor** indicates potential failure of bearings and/or lubrication by an increase in oil temperature
Addresses, Solves, Fixes Common Centrifugal Pain Areas
About 90% of Centrifugal Pump failures are with the seal, bearing and shaft

Packing & Seal
We offer a 1-year mechanical seal guarantee. We are confident in our mechanical seals not failing because System One Pumps are designed and built to prevent this from happening:

- Our low to no deflection shafts are shorter and thicker than competing shafts, saving the mechanical seals from violent wear due to shaft deflection
- Large bore seal chamber lubricates, cleans and cools the seal to prevent premature seal failures. Our seal chambers are designed without a backstop, which eliminates dead space and allows the fluid to move in and move out keeping the mechanical seal face in a cleaner and cooler environment. Unlike traditional ANSI pumps where fluid and debris get trapped right in front of the mechanical seal face, building up with debris and heat which negatively impact the mechanical seal

Seal Chamber Jacket
This optional feature provides an API Plan 2 external cooling to the pump. This will prevent seal failure due to thermal shock, with sudden and drastic temperature changes which can crack the brittle mechanical seal faces.

Centerline Casing Support Legs
The centerline casing support legs allow System One Pumps to operate in high temperatures of up to 400°F. The centerline casing support legs allow the pump to “float,” this design feature gives the pump room to expand both vertically and horizontally due to thermal expansion. This prevents the questionable thermal growth on the casing that happens with many other ANSI pumps which reduces the life and reliability of the mechanical seal.

C-Frame (NEMA) or D-Flange (IEC) Motor Adapter
The design of the C-Frame adapter eliminates any misalignment concerns, removing any unnecessary strain on the pumping elements – especially the mechanical seal. It increases pump reliability by reducing vibration and prolonging mechanical seal life.
Shafts & Shaft Sleeve

- System One shafts are of one-piece solid design, which means no sleeves are used
- Shafts of System One Pumps are much shorter and much thicker than competing ANSI pump shafts
- A shorter and thicker shaft, means low deflection (the degree to which a shaft is displaced under a load):
  - This prevents very common damage due to vibration
  - Increases stability at the seal area, improving operating life of the seal by reducing wear and pressure on the mechanical seal
  - Extends bearing life, because a short shaft overhang reduces bearing load

Blackmer® System One Pumps feature the lowest shaft deflection ratios of all ANSI centrifugal pumps.

API 610 Features

System One heavy-duty centrifugal pumps are designed and constructed to provide maximum service life, comply with key parts of the API 610 standard for centrifugal pumps, and can be a cost-effective alternative to pumps that are in full compliance with the standard.

- Designed and constructed to meet the minimum standard of a 20-year service life and three years uninterrupted operation
- ANSI/ASME class 300 flanges option
- Self-venting top discharge with threaded casing drains are available as an option. Additional available options include flanged drains and side discharge. Flanged drains also an option. Optional side discharge is also available.
- Bearing housings can be removed from service without disturbing the driver. Sufficient cooling is achieved with a large oil sump and deep cooling fins. For extreme temperature operations, a copper coiling coil is an available option, and labyrinth seals are standard equipment.
- Offered with standard and optional materials that comply with the material classes
Frame A/LD17 Pump

- LD17 configuration available for severe duty applications
- Lowest L3/D4 stiffness ratio of any competitive size pump 17 (.65) Frame LD17
- Frame A meets ASME/ANSI dimensional specifications
- Capacities up to 1,400 gpm (320 m³/hr)
- Operating temperature range from -40° to 400°F (-40° to 204°C)
- Military shock standard S901 Grade A
- High Temperature Series configurations available with some Frame A/LD17 sizes

Frame A/LD17 (ASME/ANSI)

Frame A/LD17 (Metric)

LD17 Pump – ASME/ANSI

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>Discharge</th>
<th>Suction</th>
<th>X</th>
<th>D</th>
<th>O</th>
<th>F</th>
<th>2E1</th>
<th>2E2</th>
<th>A</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2 x 3-8</td>
<td>2.0</td>
<td>9.50</td>
<td>8.25</td>
<td>17.75</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>7</td>
<td>3 x 4-8</td>
<td>3.0</td>
<td>11.00</td>
<td>8.25</td>
<td>19.25</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>15.75</td>
<td>15.75</td>
</tr>
<tr>
<td>8</td>
<td>1 x 2-10</td>
<td>1.0</td>
<td>8.50</td>
<td>8.25</td>
<td>16.75</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>15.75</td>
<td>15.75</td>
</tr>
<tr>
<td>9</td>
<td>1.5 x 3-10</td>
<td>1.5</td>
<td>8.50</td>
<td>8.25</td>
<td>16.75</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>16.13</td>
<td>16.13</td>
</tr>
<tr>
<td>10</td>
<td>2 x 3-10</td>
<td>2.0</td>
<td>9.50</td>
<td>8.25</td>
<td>17.75</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>16.38</td>
<td>16.38</td>
</tr>
<tr>
<td>11</td>
<td>3 x 4-10</td>
<td>3.0</td>
<td>11.10</td>
<td>8.25</td>
<td>19.25</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>18.4</td>
<td>18.4</td>
</tr>
<tr>
<td>12</td>
<td>4 x 6-10</td>
<td>4.0</td>
<td>13.50</td>
<td>10.00</td>
<td>23.50</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>20.0</td>
<td>20.0</td>
</tr>
<tr>
<td>13</td>
<td>1.5 x 3-13</td>
<td>1.5</td>
<td>10.50</td>
<td>10.00</td>
<td>23.50</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>14</td>
<td>2 x 3-13</td>
<td>2.0</td>
<td>11.50</td>
<td>10.00</td>
<td>21.50</td>
<td>9.81</td>
<td>9.75</td>
<td>7.25</td>
<td>15.38</td>
<td>15.38</td>
</tr>
<tr>
<td>15</td>
<td>3 x 4-13</td>
<td>3.0</td>
<td>12.50</td>
<td>10.00</td>
<td>22.50</td>
<td>9.81</td>
<td>13.00</td>
<td>7.25</td>
<td>16.63</td>
<td>22.13</td>
</tr>
<tr>
<td>16</td>
<td>4 x 6-13</td>
<td>4.0</td>
<td>13.50</td>
<td>10.00</td>
<td>23.50</td>
<td>9.81</td>
<td>13.00</td>
<td>7.25</td>
<td>17.56</td>
<td>23.07</td>
</tr>
</tbody>
</table>

All dimensions are in inches.

LD17 Pump – Metric

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>Discharge</th>
<th>Suction</th>
<th>X</th>
<th>D</th>
<th>O</th>
<th>F</th>
<th>2E1</th>
<th>2E2</th>
<th>A</th>
<th>A1</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2 x 3-8</td>
<td>50</td>
<td>8.25</td>
<td>214</td>
<td>200</td>
<td>244</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>279</td>
</tr>
<tr>
<td>7</td>
<td>3 x 4-8</td>
<td>80</td>
<td>8.25</td>
<td>241</td>
<td>200</td>
<td>244</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>298</td>
</tr>
<tr>
<td>8</td>
<td>1 x 2-10</td>
<td>25</td>
<td>8.25</td>
<td>216</td>
<td>200</td>
<td>241</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>298</td>
</tr>
<tr>
<td>9</td>
<td>1.5 x 3-10</td>
<td>40</td>
<td>8.25</td>
<td>216</td>
<td>200</td>
<td>241</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>298</td>
</tr>
<tr>
<td>10</td>
<td>2 x 3-10</td>
<td>50</td>
<td>8.25</td>
<td>241</td>
<td>200</td>
<td>244</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>298</td>
</tr>
<tr>
<td>11</td>
<td>3 x 4-10</td>
<td>80</td>
<td>8.25</td>
<td>279</td>
<td>200</td>
<td>244</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>298</td>
</tr>
<tr>
<td>12</td>
<td>4 x 6-10</td>
<td>100</td>
<td>8.25</td>
<td>343</td>
<td>250</td>
<td>353</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>367</td>
</tr>
<tr>
<td>13</td>
<td>1.5 x 3-13</td>
<td>40</td>
<td>8.25</td>
<td>267</td>
<td>250</td>
<td>317</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>381</td>
</tr>
<tr>
<td>14</td>
<td>2 x 3-13</td>
<td>50</td>
<td>8.25</td>
<td>292</td>
<td>250</td>
<td>342</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>391</td>
</tr>
<tr>
<td>15</td>
<td>3 x 4-13</td>
<td>80</td>
<td>8.25</td>
<td>318</td>
<td>250</td>
<td>356</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>422</td>
</tr>
<tr>
<td>16</td>
<td>4 x 6-13</td>
<td>100</td>
<td>8.25</td>
<td>343</td>
<td>250</td>
<td>353</td>
<td>249</td>
<td>250</td>
<td>184</td>
<td>460</td>
</tr>
</tbody>
</table>

All dimensions are in millimeters.
Frame S Pump

- Mid size frame strength and reliability in small frame space
- Heavy duty alternative to standard small frame pumps
- Lowest L3/D4 stiffness ratio of any competitive size pump 26 (1.9) Frame S
- Meets ASME/ANSI dimensional specifications
- Capacities up to 450 gpm (102 m³/hr)
- Operating temperature range from -40˚ to 400˚F (-40˚ to 204˚C)
- Military shock standard S901 Grade A

Frame S (ASME/ANSI)

Frame S (Metric)

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>F₁</th>
<th>2E₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>4.88</td>
<td>5.50</td>
</tr>
<tr>
<td>2</td>
<td>4.88</td>
<td>5.50</td>
</tr>
<tr>
<td>3</td>
<td>4.25</td>
<td>7.50</td>
</tr>
<tr>
<td>4</td>
<td>4.25</td>
<td>7.50</td>
</tr>
</tbody>
</table>

All dimensions are in inches.

<table>
<thead>
<tr>
<th>Pump Size</th>
<th>F₁</th>
<th>2E₁</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>124</td>
<td>140</td>
</tr>
<tr>
<td>2</td>
<td>124</td>
<td>140</td>
</tr>
<tr>
<td>3</td>
<td>101</td>
<td>191</td>
</tr>
<tr>
<td>4</td>
<td>108</td>
<td>191</td>
</tr>
</tbody>
</table>

All dimensions are in millimeters.
Frame M Pump

- Large Frame Pump
- Lowest L3/D4 stiffness ratio of any pump in this size range at 19 (.87) Frame M
- Only AMSE/ANSI B73.1 pump of its size that offers centerline mount for high temperature applications
- Capacities up to 4,500 gpm
- Operating temperature range from -40˚ to 400˚F (-40˚ to 204˚C)
- Military shock standard S901 Grade A
- High Temperature Series configurations available with some Frame M sizes
High Temperature Series
Available in the 450°F Line & 650°F Line

Pre-configured to meet your high temperature requirements of 450°F, 650°F and even 750°F, the System One High Temp Series is available for some Frame A and Frame M Centrifugal Pump models sizes.

Now able to exceed the 400°F (204°C) standard temperature limit of System One Pumps, the System One High Temp Series allows for maximum temperatures of up to 450°F (232°C) with **450°F Line**, 650°F (343°C) with the **650°F Line** or even up to 750°F (398°C) with a special stainless steel frame. Utilizing high temperature flanges and elastomers, along with the unique centerline mount that supports high temperatures, the System One High Temp Series further entrenches these pumps ability to safely transfer critical and valuable fluids reliability in the harshest of service conditions.

- **450°F Line**
  - Maximum fluid temperatures up to 450°F (232°C)
  - Standard item (8-12 week lead time)
  - High temperature flanges standard
  - Centerline mount standard
  - High temperature elastomers standard

- **650°F Line**
  - Maximum fluid temperatures up to 650°F (343°C)
  - Standard item (8-12 week lead time)
  - High temperature flanges standard
  - Centerline mount standard
  - High temperature elastomers standard

- **Frame A**
<table>
<thead>
<tr>
<th>SIZE</th>
<th>450°F Line</th>
<th>650°F Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>2x3-8</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3x4-8</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1x2-10</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1.5x3-10</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2x3-10</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3x4-10</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4x6-10</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1.5x3-13L</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>2x3-13L</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>3x4-13L</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>4x6-13L</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

- **Frame M**
<table>
<thead>
<tr>
<th>SIZE</th>
<th>450°F Line</th>
<th>650°F Line</th>
</tr>
</thead>
<tbody>
<tr>
<td>6x8-13</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8x10-13</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>6x8-15</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>8x10-15</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>