Monocellular PREI range
Based in Lyon, OPTIMEX has first developed a range of products dedicated to the chemical industry, to answer its nearest customers’ needs in leak-proof and normalized pumps. The growing demand for reliable and safer operating pumps in the oil and gas industry, gave OPTIMEX the opportunity to develop its own range of single stage canned motor pumps adapted to this field. This was well coordinated with the introduction of the API 685 standard, exclusively dedicated to seal-less pumps. Our PREI range was thus designed according to this API 685 Standard, and to our customers’ expectations, regarding their critical and severe applications.

50HZ

Pump also available at 3500 and 1750 rpm

60HZ: Pump also available at 3500 and 1750 rpm
Pumps are delivered with a standard documentation list and standard set of tests and inspections:

**STANDARD DOCUMENTATION:**
- Vendor’s data sheet + curve
- Instrumentation list + manuals
- General arrangement drawings
- Cross Sectional drawing with parts list
- Spare part list advised by OPTIMEX
- Operation and maintenance instruction
- Vendor Data Book
- Ex-Proof certificate (ATEX, Ex-GOST R or other upon request and confirmation by OPTIMEX)
- CE declaration of conformity

**STANDARD CONTROLS:**
- Balancing test following ISO 1940
- Hydrostatic tests
- Performance test (QHP) following ISO 9906 with API 685 tolerances (5 points)
- Final sealless test with air
- Motor insulation test
- Balancing test following ISO 1940
- Hydrostatic tests
- Performance test (QHP) following ISO 9906 with API 685 tolerances (5 points)
- Final sealless test with air
- Motor insulation test

**CONSTRUCTION OPTIONS:**
- Welded drain with flange and valve
- SIC30 slide bearings: detailed page 7
- Inducer: for low NPSH application
- Circulation plan selection: detailed page 10
- Hydraulic and motor heating or cooling jacket for crystallizing or polymerizing liquids
- Additional separate instrumentation junction box

**INSRUMENTATION OPTIONS:**
- Control of the liquid temperature at the hottest point of the pump
- Winding overheat protection PT100 or/and PTC
- Control and monitoring of the second containment pressure to detect the stator liner failure
- Control and monitoring of the mobile position, mounted on the rear bearing support, to detect any deviation of thrust balancing or bearings capacity
- Rotating direction indicator with local indication to guarantee the appropriate electrical connection

Other documentation/test/inspection or certificate can be proposed upon request and after OPTIMEX confirmation.

**PREI RANGE DESIGNATION**

Each OPTIMEX pump is identified by a unique serial number (BFXXXX) and a complete designation name that reflects all main characteristics of the pump (regarding hydraulic and motor selection, design specificities and main construction options).

**Pump Designation:**

```
PREI - AR 80/20 IN P15F2 Bd
```

**Construction Options:**
- A: for classified area
- B: filtered
- C: cooled
- D: pressurized
- E: Vertical
- F: Clear liquid injection
- G: Special design

**Additional Options:**
- In: Inducer
- Hp: High pressure design

**Terminal Box Construction:**
- Without indication: standard
- Deported terminal box: Bd

**Insulation Class of the Winding:**
- P: class H (temp. liquids up to 100°C)
- T: class C120 (temp. liquids up to 160°C)
- C: class C400 (temp. liquids up to 360°C)

**Discharge Nozzle Diameter in mm:**

<table>
<thead>
<tr>
<th>Motor Size</th>
<th>Number of Poles</th>
<th>Impeller Maximum Diameter in cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>80/20</td>
<td>2</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>300</td>
</tr>
</tbody>
</table>

**Standard Flanges According to ASME:**
- B16.5, Class 300 RF

**Thrust Balancing System:**
- BL+2 (detailed page 11)

**Loose Flange:**
- Allows adaptability between different motors and hydraulics of the PREI Range

**Motor Frame:**
- With same pressure design as the pump

**Leak Proof Feedthrough:**
- With same design pressure as the pump

**Terminal Box:**
- In “e” protection

**Drainable Second Containment:**
- With welded drain with flange and valve

**IMPORTANT:** Minimum requirement in hazardous area is liquid level control and temperature control.
**MATERIALS**

In accordance with the materials required by API685, OPTIMEX has made a standard selection that covers to its maximum your usual applications, in terms of liquid compatibility and operating temperature range.

<table>
<thead>
<tr>
<th>Pressure casing</th>
<th>S-5 &amp; S-6</th>
<th>S-II</th>
<th>A-II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Castings</td>
<td>A216WCB</td>
<td>A352LCB</td>
<td>A216WCB</td>
</tr>
<tr>
<td>Forgings</td>
<td>A350LF2</td>
<td>A350LF2 Cl1</td>
<td>A350LF2</td>
</tr>
<tr>
<td>Tubes</td>
<td>A106Grb</td>
<td>A333Gr6</td>
<td>A106Grb</td>
</tr>
<tr>
<td>Impeller</td>
<td>A890 Gr1A</td>
<td>A890 Gr1A</td>
<td>A890 Gr1A</td>
</tr>
<tr>
<td>Casing and impeller wear rings</td>
<td>A276 Type 410 +T</td>
<td>A276 Type 410 +T</td>
<td>A312 Type 316L</td>
</tr>
<tr>
<td>Motor Casing</td>
<td>E355</td>
<td>E355</td>
<td>E355</td>
</tr>
<tr>
<td>Shaft</td>
<td>A276 Type 420</td>
<td>A276 Type 420</td>
<td>A312 Type 316L</td>
</tr>
</tbody>
</table>

Standard flanges rating is #300 in accordance with ASME B16.5. Maximum acceptable pressure versus the operating temperature are described in the graphic below.

**SLIDE BEARINGS**

**316L/GRAPHITE**

Slide bearings are one of the major parts that confer such a good reliability to seal-less pumps. In single stage canned motor pumps, the monobloc shaft composed of all the rotating elements of the machine is supported by 2 slide bearings that are totally submerged in the pumped liquid.

Once the pump’s filling is guaranteed (and controlled with the appropriate instrumentation), and the pump is started, the mobile will rotate free from any friction and wearing, thanks to a thin film.

**316Ti/TUNGSTEN CARBIDE COATING/SIC30**

For critical applications with risks of dry running (frequent and delicate start-up or critical liquids for which full characteristics have been transmitted and approved by OPTIMEX), SIC30 bearings are advised and proposed.

Parts and composition are shown above. In case of bearing capacity losses, friction between sleeve in SIC30 and specific coating on shaft sleeve is acceptable for small periods.
Each combination between an hydraulic and a motor match a specific code that gives the corresponding dimensions. As an example, see the underlined selection.

<table>
<thead>
<tr>
<th>DNA</th>
<th>DNR</th>
<th>a</th>
<th>P4</th>
<th>P7</th>
<th>P10</th>
<th>P15</th>
<th>P30</th>
<th>P37</th>
<th>P45</th>
<th>P69</th>
<th>P80</th>
<th>M100</th>
<th>M120</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-10A</td>
<td>6</td>
<td>3</td>
<td>120</td>
<td>280</td>
<td>175</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>30-10A</td>
<td>6</td>
<td>3</td>
<td>180</td>
<td>350</td>
<td>210</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>35-15A</td>
<td>6</td>
<td>3</td>
<td>250</td>
<td>410</td>
<td>260</td>
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<td>-</td>
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<td>-</td>
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</tr>
<tr>
<td>40-25A</td>
<td>6</td>
<td>3</td>
<td>310</td>
<td>500</td>
<td>310</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>45-35A</td>
<td>6</td>
<td>3</td>
<td>370</td>
<td>570</td>
<td>380</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>50-45A</td>
<td>6</td>
<td>3</td>
<td>430</td>
<td>640</td>
<td>460</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>55-55A</td>
<td>6</td>
<td>3</td>
<td>490</td>
<td>710</td>
<td>530</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

As an example, see the underlined selection.
**CIRCULATION PLANS**

According to the operating conditions and fluid properties, OPTIMEX selects the appropriate circulation plan to optimize the pump’s functioning. Above are shown our standard circulations in normal conditions, liquefied gas (pressurized), hot liquids (cooling loop) and liquids with particles (filtered). For critical applications, OPTIMEX can develop customized circulation plans that ensures the right lubrication and cooling of the motor.

### N: NORMAL CIRCULATION

<table>
<thead>
<tr>
<th>Ref. OPTIMEX</th>
<th>Ref. API GBS</th>
<th>Liquid in the motor</th>
<th>Circulation description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>N1</td>
<td>Plan 1-S</td>
<td>Pumped liquid</td>
<td>Injection in the motor from the hydraulic casing at the impeller periphery, circulation through the gap, and return to the pump suction via the hollow shaft.</td>
<td><img src="image1" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### S: OVERPRESSURED CIRCULATION

<table>
<thead>
<tr>
<th>Ref. OPTIMEX</th>
<th>Ref. API GBS</th>
<th>Liquid in the motor</th>
<th>Circulation description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Plan 1-SD</td>
<td>Pumped liquid</td>
<td>Injection in the motor from the hydraulic casing at the impeller periphery, circulation through the gap and return in the hydraulic casing at the impeller periphery.</td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>Pumped liquid</td>
<td>Injection in the motor via an external pipe from the discharge nozzle, overpressure by a large auxiliary impeller, passage through the gap and return to the discharge nozzle via an external pipe.</td>
<td><img src="image3" alt="Diagram" /></td>
</tr>
<tr>
<td>S5</td>
<td></td>
<td>Pumped liquid</td>
<td>Injection in the motor via an external pipe from the discharge nozzle, overpressure by an auxiliary impeller, passage through the gap and return in the hydraulic casing in high pressure zone at the impeller periphery.</td>
<td><img src="image4" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### R: COOLED CIRCULATION

<table>
<thead>
<tr>
<th>Ref. OPTIMEX</th>
<th>Ref. API GBS</th>
<th>Liquid in the motor</th>
<th>Circulation description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Plan 23-S</td>
<td>Pumped liquid</td>
<td>Pumped liquid and motor liquid are identical and they slightly communicate in order to establish an equilibrium between the 2 areas (high and low temperature). On the motor side the liquid circulates in an external heat exchanger, flow is established by an auxiliary impeller. A thermal barrier is built between the hydraulic casing and the motor (oil or water).</td>
<td><img src="image5" alt="Diagram" /></td>
</tr>
<tr>
<td>R3</td>
<td></td>
<td>Pumped liquid</td>
<td>Pumped liquid and motor liquid are identical and they slightly communicate in order to establish an equilibrium between the 2 areas (high and low temperature). On the motor side the liquid circulates in an external heat exchanger, flow is established by a large auxiliary impeller. A thermal barrier is built between the hydraulic casing and the motor (oil or water).</td>
<td><img src="image6" alt="Diagram" /></td>
</tr>
</tbody>
</table>

### F: FILTERED CIRCULATION

<table>
<thead>
<tr>
<th>Ref. OPTIMEX</th>
<th>Ref. API GBS</th>
<th>Liquid in the motor</th>
<th>Circulation description</th>
<th>Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>F3</td>
<td></td>
<td>Pumped liquid</td>
<td>Injection in the motor from the discharge nozzle through a tangential filter, overpressure by a large auxiliary impeller, passage through the gap and return to the discharge nozzle via an external pipe.</td>
<td><img src="image7" alt="Diagram" /></td>
</tr>
<tr>
<td>F5</td>
<td></td>
<td>Pumped liquid</td>
<td>Injection in the motor from the discharge nozzle through a tangential filter, overpressure by a large auxiliary impeller, passage through the gap and return in the hydraulic casing in high pressure zone at the impeller periphery.</td>
<td><img src="image8" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**THRUSTR BALANCING SYSTEM**

Over the years OPTIMEX has developed a performing and reliable thrust balancing system. BL+2 system is composed of two restrictions, one is stable (1), the other one is variable (2). These orifices regulate the pressure into the regulating chamber (3) that insures thrust balance of the complete mobile.

If the mobile moves to the left: restriction orifice (2) is closed and prohibits any balancing with low pressure. As a consequence, pressure increases in regulating chamber (3), the resultant is negative and the mobile moves back forwardly.

If the mobile moves to the right: restriction orifice (2) is widely opened, chamber's (3) pressure is balanced with low pressure given by impeller's rear fins through the balancing hole. As a consequence resultant force is positive, and the system moves back rearwardly.

![Diagram](image9)
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