

Monocellular PREI range



API
685



ERC

**DESIGN,
MANUFACTURING,
REPAIR**

OPTIMEX is exclusively dedicated to conception, manufacturing, tests and after sales service of Canned Motor Pumps. Created in 1998, our company has been growing ever since, and has become a major actor in this field on the international market.

Canned Motor Pumps' technology is characterized by a compact and integrated unit, without mechanical seal. Used for dangerous, toxic and explosive liquids as well as for major and valuable processes, canned motor pumps are chosen for their robustness and reliability. They confer the highest safety level on the market thanks to its double hermetically sealed containment.

We design and manufacture our pumps according to the following standards:

- ISO 2858, ISO15783, API685, directive 2006/42/EC (Electrical machinery) directive 2014/34/EU (ATEX), EAC (Eurasian Conformity), CUTR (Customs Union Technical Regulations For Belarus, Kazakhstan and Russia), directive 2014/68/EU (Pressure Equipment Directive), RCCM level 3, RCCM-X level 2 and 3.
- OPTIMEX answers the quality management requirements established by ISO 9001 and NF EN 13980.



Remaining attentive to its international customers' requirements, OPTIMEX adapts its production to local Ex-proof directives (ATEX, CUTR, CSA, UL...).

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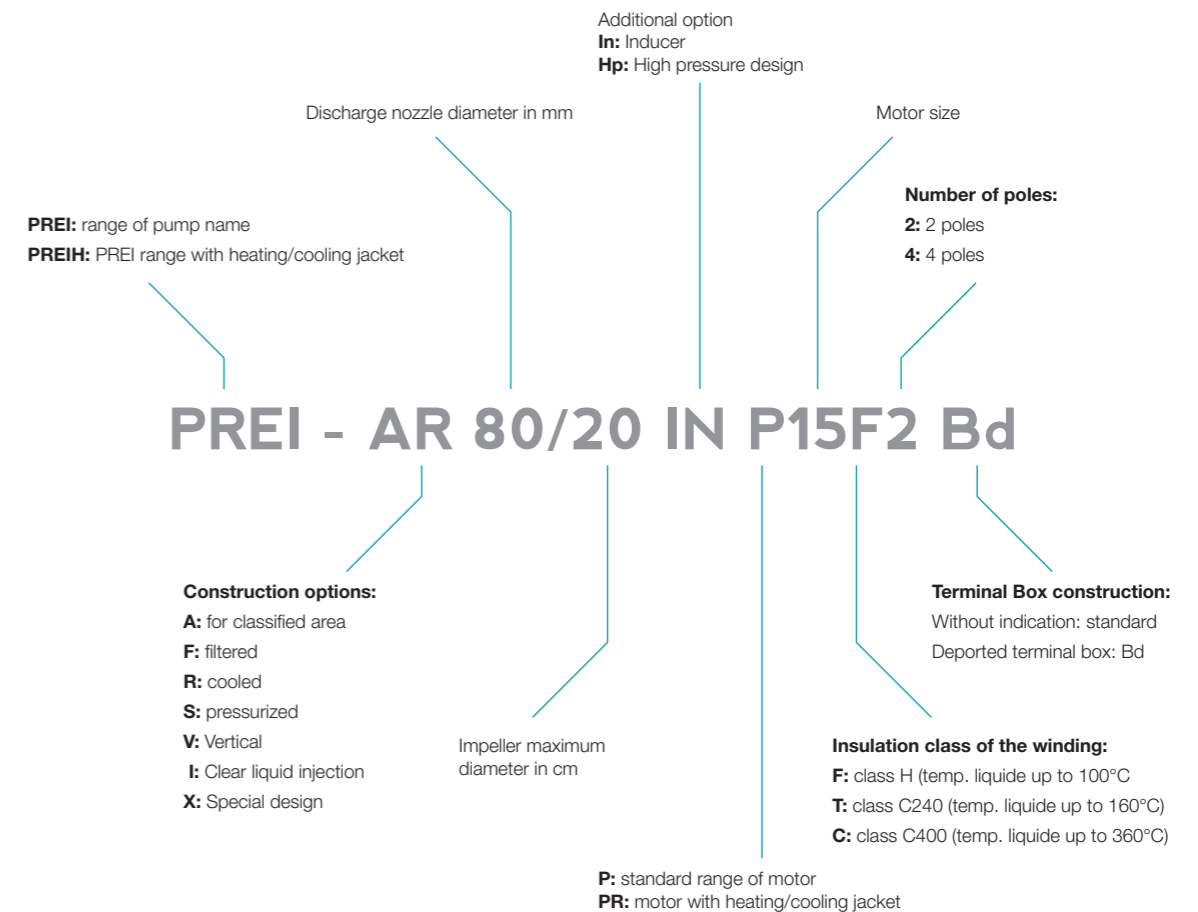
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+ PREI RANGE DESIGNATION

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.

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).



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 Sectionnal drawing with parts list
- Spare part list advised by OPTIMEX
- Operation and maintenance instruction
- Vendor Data Book
- Ex-Proof certificate (ATEX, CUTR 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)
- Balancing system test: axial thrust measurement
- Final sealless test with air
- Motor insulation test

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

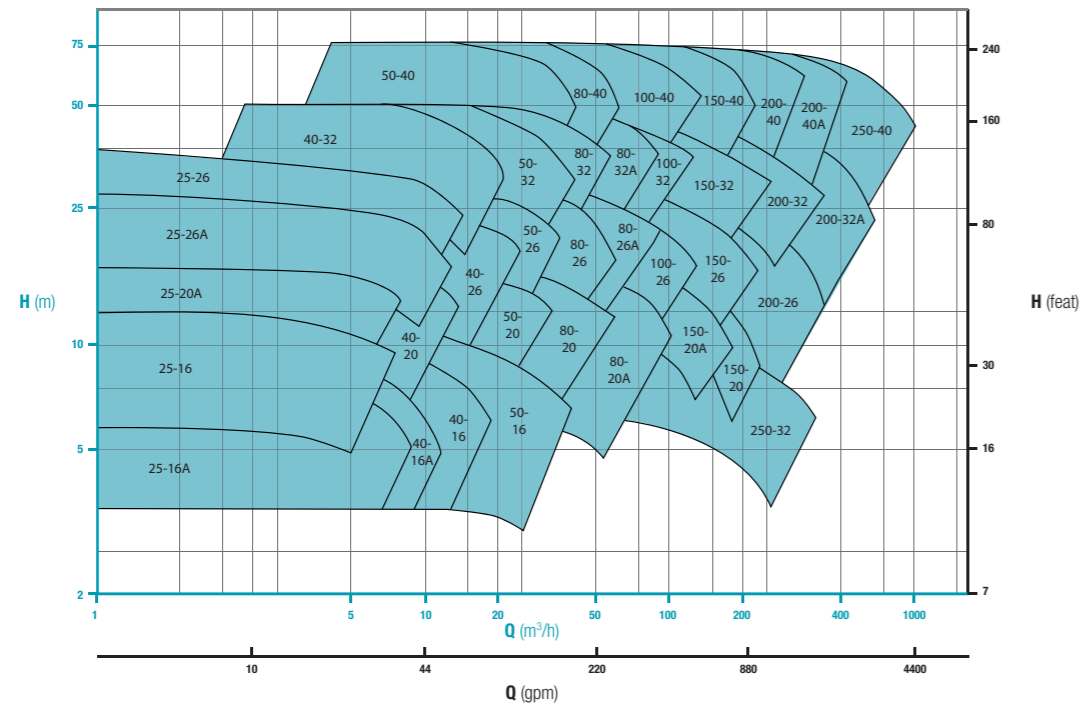
+ PREI RANGE CHARACTERISTICS DIAGRAMS

The performance curve gives a complete picture of the available head and flow, for a given pump line, according to the impeller's diameter and size.

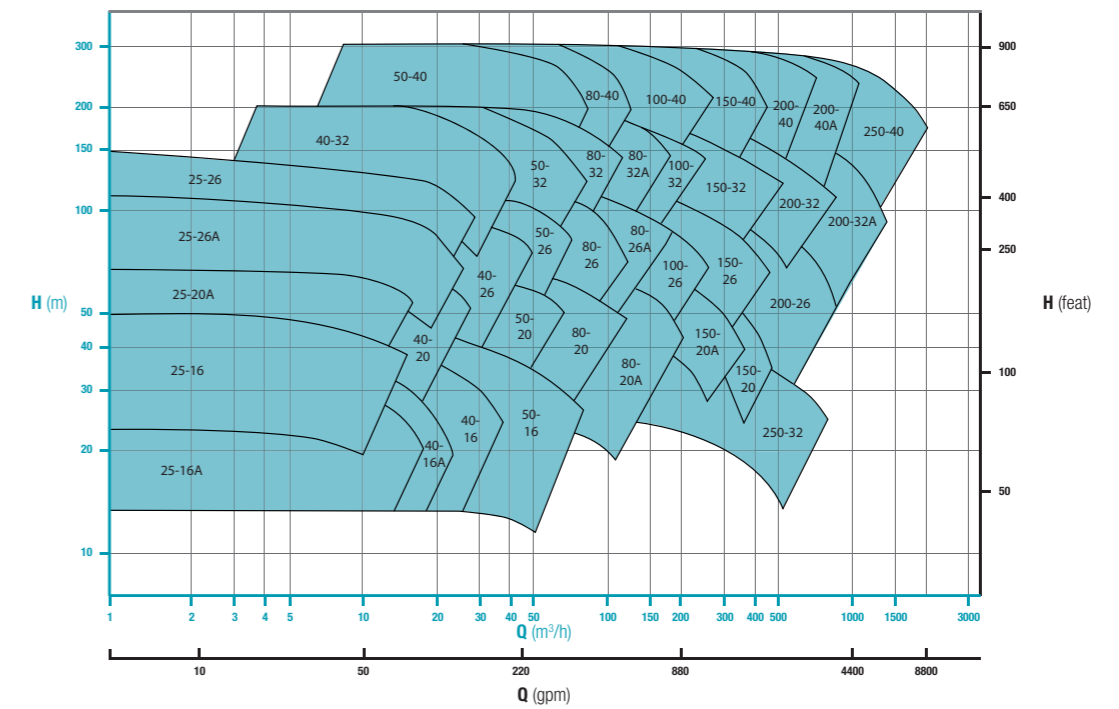
Our pumps are available for two types of power supplies : 50Hz and 60Hz.

The motor can also be driven by a frequency converter in order to have variable speed control.

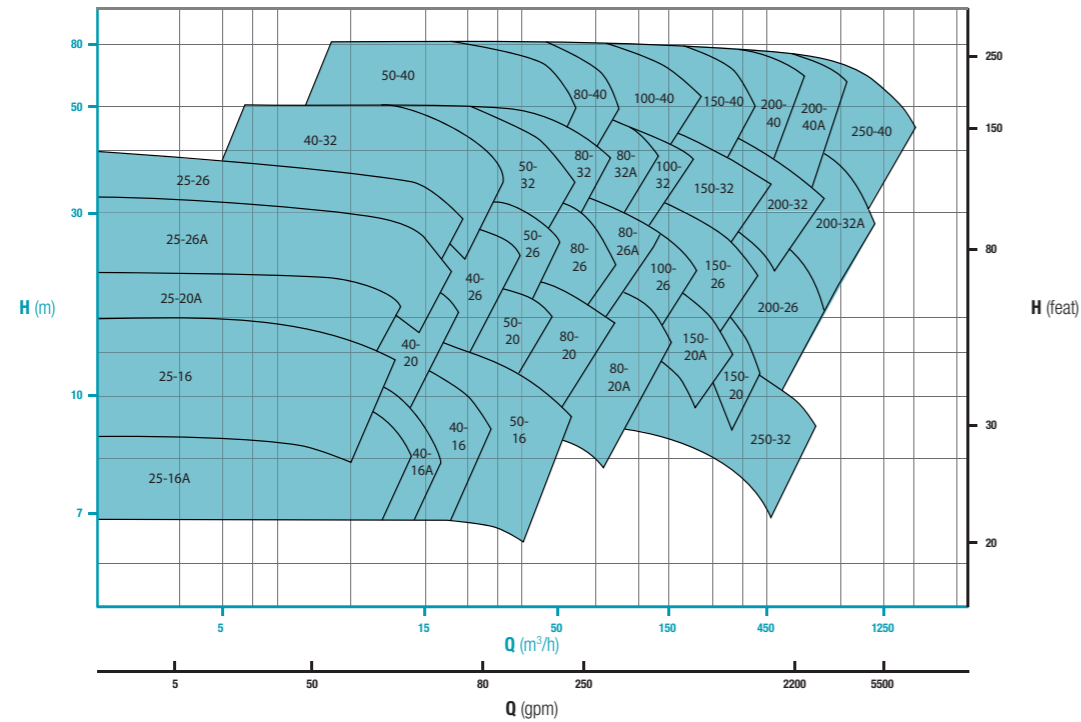
PERFORMANCE CURVE - 50HZ / 1450 RPM



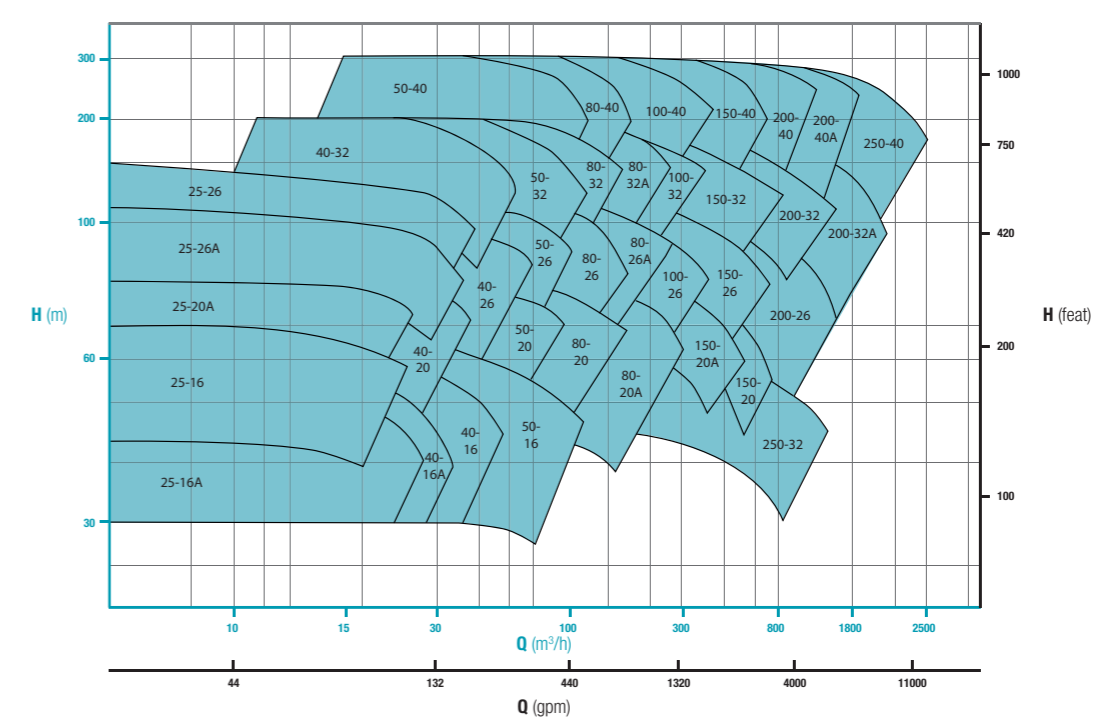
PERFORMANCE CURVE - 50HZ / 2900 RPM



PERFORMANCE CURVE - 60HZ / 1750 RPM



PERFORMANCE CURVE - 60HZ / 3500 RPM



+ SPECIFICATIONS OF DESIGN

STANDARD CONSTRUCTION

- 1 Standard flanges according to ASME B16.5, Class 300 RF
- 2 Thrust balancing system BL+2 (detailed page 13)
- 3 Loose flange: allows adaptability between different motors and hydraulics of the PREI Range
- 4 Motor frame with same pressure design as the pump
- 5 Leak proof feedthrough with same design pressure as the pump
- 6 Terminal box: in "e" protection
- 7 Drainable second containment

CONSTRUCTION OPTIONS

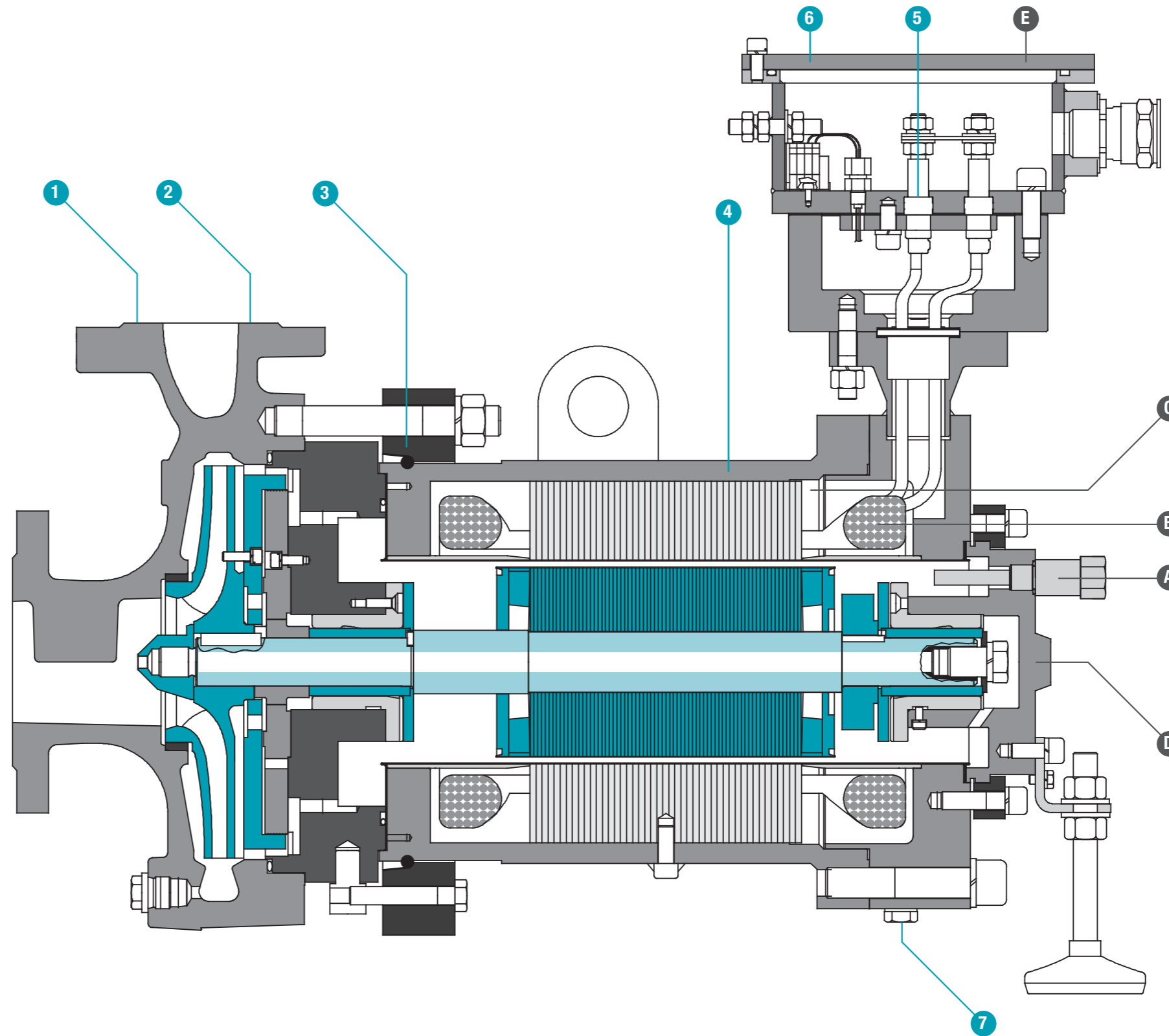
- Welded drain with flange and valve
- SIC30 slide bearings: detailed page 9
- Inducer: for low NPSH application
- Circulation plan selection: detailed page 12
- Hydraulic and motor heating or cooling jacket for crystallizing or polymerizing liquids
- Additional separate instrumentation junction box
- Vertical or horizontal mounting

INSRUMENTATION OPTIONS

- A Control of the liquid temperature at the hottest point of the pump.
- B Winding overheat protection PT100 or/and PTC
- C Control and monitoring of the second containment pressure: to detect the stator liner failure
- D Control and Monitoring of the mobile position, mounted on the rear bearing support: to detect any deviance of thrust balancing or bearings capacity.
- E Rotating direction indicator with local indicator: to guarantee the appropriate electrical connection

Other instrumentation can be supplied for your installation, such as liquid level switch, power controller, frequency converter...

- Moving parts
- Fixed parts
- hermetically sealed casing

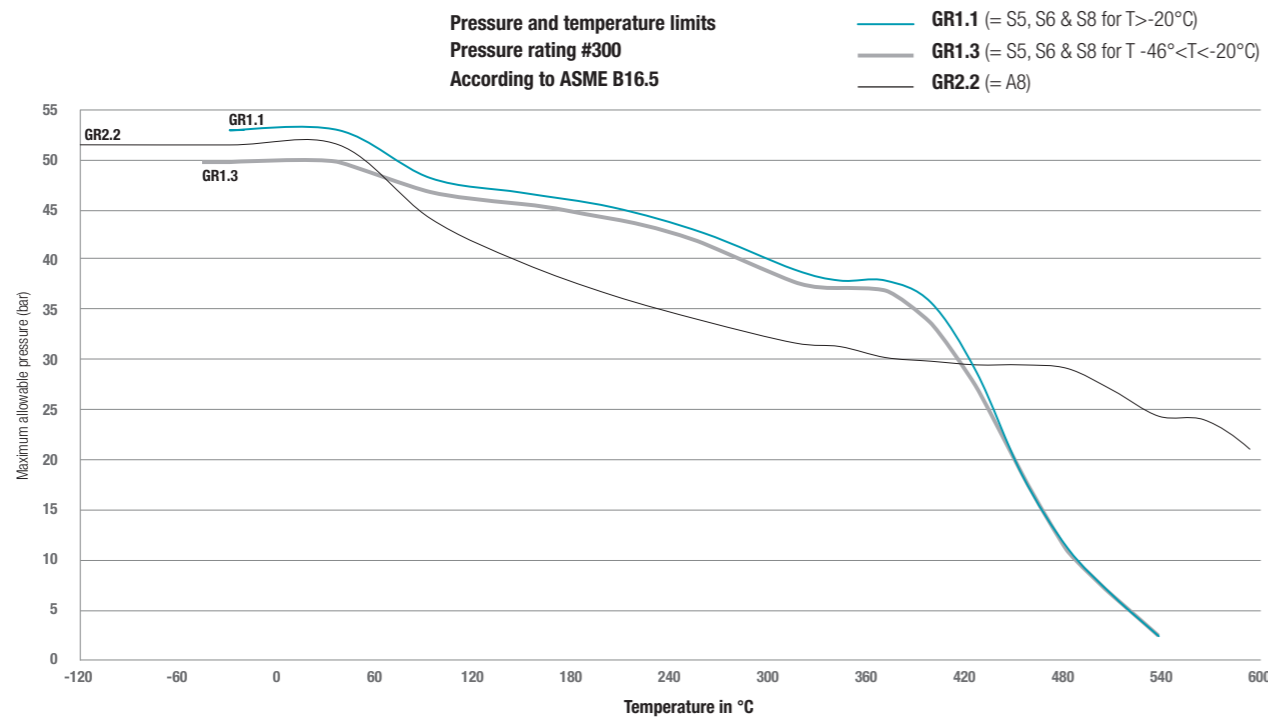


+ MATERIALS

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

		S-5 & S-6		S-8		A-8
		T > -20°C	-46°C < T < -20°C	T > -20°C	-46°C < T < -20°C	T < -46°C
Pressure casing	Castings	A216WCB	A352LCB	A216WCB	A352LCB	A351 GrCF3M
	Forgings	A350LF2	A350LF2 CI1	A350LF2	A350LF2 CI1	A182 Gr F 316L
	Tubes	A106Grb	A333Gr6	A106Grb	A333Gr6	A312 type 316L
	Impeller	A890 Gr1A	A890 Gr1A	A890 Gr1A	A890 Gr1A	A890 Gr1A
	Casing and impeller wear rings	A276 Type 410 +T	A276 Type 410 +T	A312 Type 316L	A312 Type 316L	A312 Type 316L
	Motor Casing	E355	E355	E355	E355	E355
	Shaft	A276 Type 420	A276 Type 420	A312 Type 316L	A312 Type 316L	A312 Type 316L

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



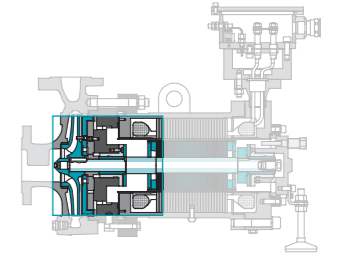
+ SLIDE BEARINGS

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 two slide bearings that are totally submersed in the pumped liquid.

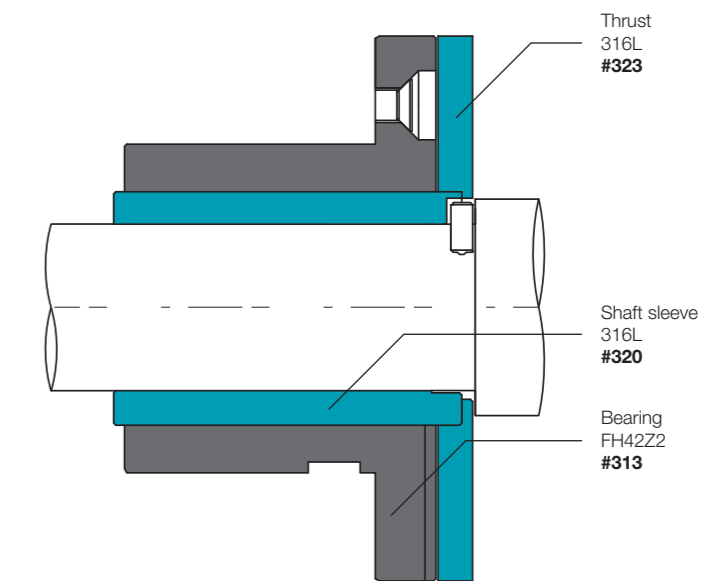
Once the pump's filling is guaranteed (and controlled with appropriate instrumentations) the pump can be started.

The mobile will rotate free from any friction and wearing thanks to a thin film created by the pumped liquid ensuring the radial thrust.



316L/GRAPHITE

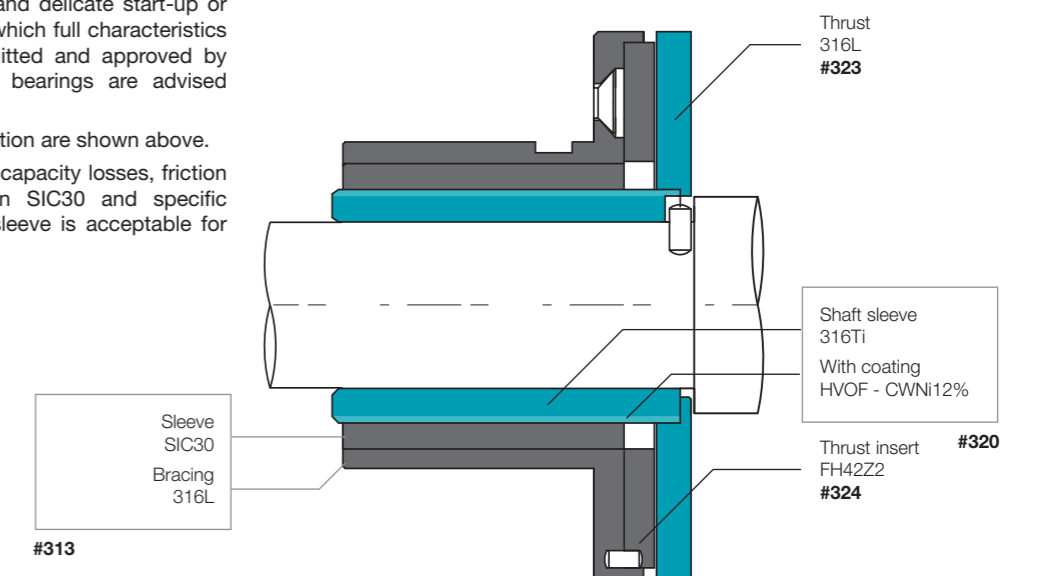
For standard applications, graphite bearings are proposed.



316Ti/TUNGSTEN CARBIDE COATING/SIC30

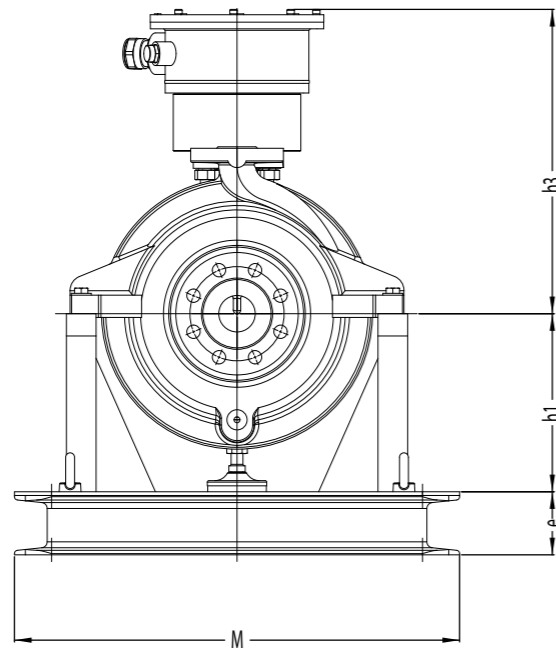
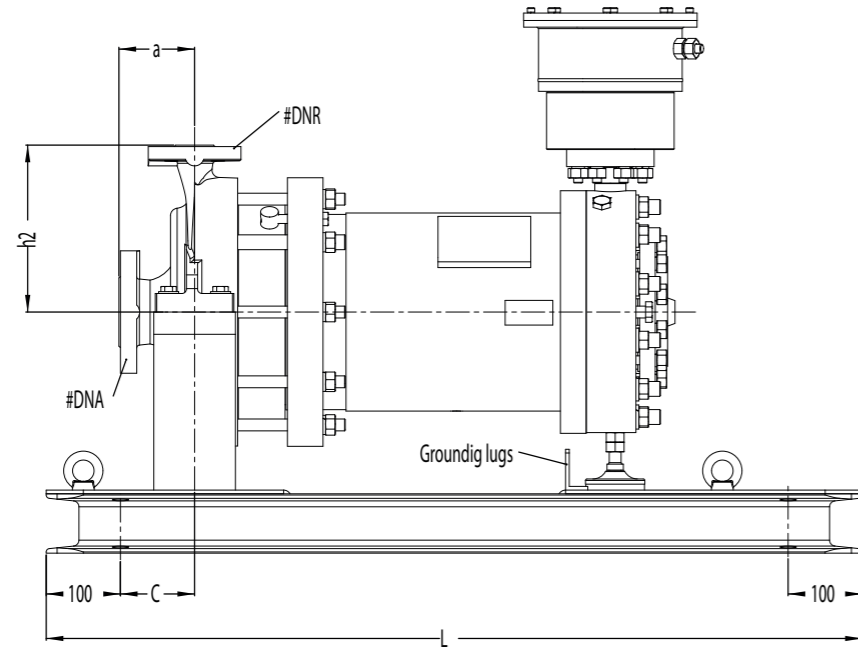
For critical applications with risks of dry running (frequent and delicate start-up or critical liquids for which full characteristics have been transmitted and approved by OPTIMEX), SIC30 bearings are advised and proposed.

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.



+ ARRANGEMENT DRAWING

Here is an arrangement drawing of a standard mono-stage PREI pump. On demand, we can provide more arrangement drawings that would include your construction's option.



HYDRAULIC						P4	P7	P10	P15	P30	P37	P45	P69	P80	M100	M120
	DNA	DNR	a mm	h2 mm	c mm											
25-16A	50	25	80	160	130											
25-16	50	25	80	160	130											
40-16	80	40	100	160	150											
50-16	80	50	100	180	150											
25-20	50	25	80	180	130											
25-20A	50	25	80	180	130											
40-20	80	40	100	200	150											
50-20	80	50	100	200	150											
80-20	100	80	100	225	150											
80-20A	150	80	140	250	190											
100-20	150	100	125	280	175											
150-20A	150	150	160	355	210											
150-20	200	150	200	355	250											
25-26	50	25	100	225	150											
25-26A	50	25	100	225	150											
40-26	80	40	100	225	150											
50-26	80	50	125	225	175											
80-26	100	80	125	280	175											
80-26A	150	80	125	280	175											
100-26	150	100	140	280	190											
150-26	200	150	165	380	215											
200-26	200	200	236	450	286											
40-32	80	40	125	250	175											
50-32	80	50	125	280	175											
80-32	100	80	125	315	175											
80-32A	150	80	140	315	190											
100-32	150	100	140	315	190											
150-32	200	150	170	400	220											
200-32	200	200	236	450	286											
50-40	80	50	150	335	200											
80-40	100	80	140	400	190											
100-40	150	100	170	400	220											
150-40	200	150	170	450	220											

Each combination between an hydraulic and a motor matches a specific code that gives the corresponding dimensions. As an exemple, see the underlined selection.

	h1 mm	L mm	h3 mm	M mm	e mm
1000	220	1000	335	400	85
1010	220	1000	335	500	85
1020	240	1000	335	500	85
1100	220	1200	335	400	85
1110	260	1000	335	500	85
1120	260	1200	335	600	85
1200	220	1200	335	500	85
1210	240	1200	335	500	85
1220	260	1200	335	500	85
1230	280	1200	335	500	85
1300	220	1200	410	400	85
1310	220	1200	410	500	85
1320	240	1200	410	500	85
1330	260	1200	410	500	85
1340	280	1200	410	500	85
1350	280	1200	410	600	85
1360	260	1200	410	600	85
1400	260	1400	410	500	85
1410	280	1400	410	500	85
1420	280	1400	410	600	85
1430	320	1400	410	600	85
1440	280	1200	410	600	85
1500	320	1600	410	600	85
1510	220	1400	410	400	85
1600	260	1800	160	500	105
1605	280	1800	160	500	105
1610	280	2000	160	600	105
1615	320	2000	160	600	105
1620	260	1800	160	600	105
1625	280	1800	160	600	105
1630	300	2000	160	600	105
1635	340	2000	160	800	105
1640	300	1800	160	600	105

	h1 mm	L mm	h3 mm	M mm	e mm
1645	320	1800	160	600	105
1650	360	1800	160	800	105
1655	380	2000	160	800	105
1700	260	1800	460	500	105
1705	280	1800	460	500	105
1710	280	2000	460	600	105
1715	320	2000	460	600	105
1720	260	1800	460	600	105
1725	280	1800	460	600	105
1730	300	2000	460	600	105
1735	340	2000	460	800	105
1740	300	1800	460	600	105
1745	320	1800	460	600	105
1750	360	1800	460	800	105
1755	380	2000	460	800	105
1800	320	2000	460	600	105
1810	340	2200	460	800	105
1820	360	2000	460	800	105
1900	280	2000	515	600	105
1910	300	2000	515	600	105
1920	340	2200	515	800	105
1930	320	2000	515	600	105
1940	340	2000	515	800	105
1950	380	2000	515	800	105
1960	360	2000	515	800	105
1970	380	2000	515	900	105
2000	300	2600	515	600	105
2020	320	2600	515	600	105
2030	340	2600	515	800	105
2030	380	2600	515	800	105
2040	360	2600	515	800	105
2050	380	2600	515	900	105

+ CIRCULATION PLANS

According to the operating conditions and fluid properties, OPTIMEX selects the appropriate circulation plan to optimize the pump's functioning. Below 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 ensure the right lubrication and cooling of the motor.

N: NORMAL CIRCULATION

Réf. OPTIMEX	Réf. API 685	Liquid in the motor	Circulation description	Diagram
N1	Plan 1-S	Pumped liquid	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.	

S: OVERPRESSURED CIRCULATION

Réf. OPTIMEX	Réf. API 685	Liquid in the motor	Circulation description	Diagram
S1	Plan 1-SD	Pumped liquid	Injection in the motor from the hydraulic casing (at the impeller periphery), passage through the hollow shaft, overpressure by an auxiliary impeller, circulation through the gap and return in the hydraulic casing at the impeller periphery.	
S3	-	Pumped liquid	Injection in the motor from the discharge nozzle, overpressure by a large auxiliary impeller, passage through the gap and return to the discharge nozzle via an external pipe.	
S5	-	Pumped liquid	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.	

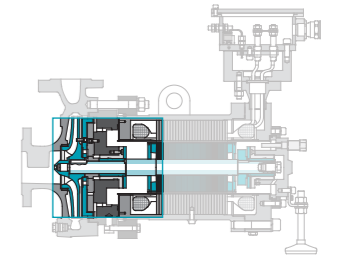
R: COOLED CIRCULATION

Réf. OPTIMEX	Réf. API 685	Liquid in the motor	Circulation description	Diagram
R1	Plan 23-S	Pumped liquid	Pumped liquid and motor liquid are identical and they slightly communicate in order to establish an equipressure 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 (air or water).	
R3	-	Pumped liquid	Pumped liquid and motor liquid are identical and they slightly communicate in order to establish an equipressure 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 (air or water).	

F: FILTERED CIRCULATION

Réf. OPTIMEX	Réf. API 685	Liquid in the motor	Circulation description	Diagram
F3	-	Pumped liquid	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.	
F5	-	Pumped liquid	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.	

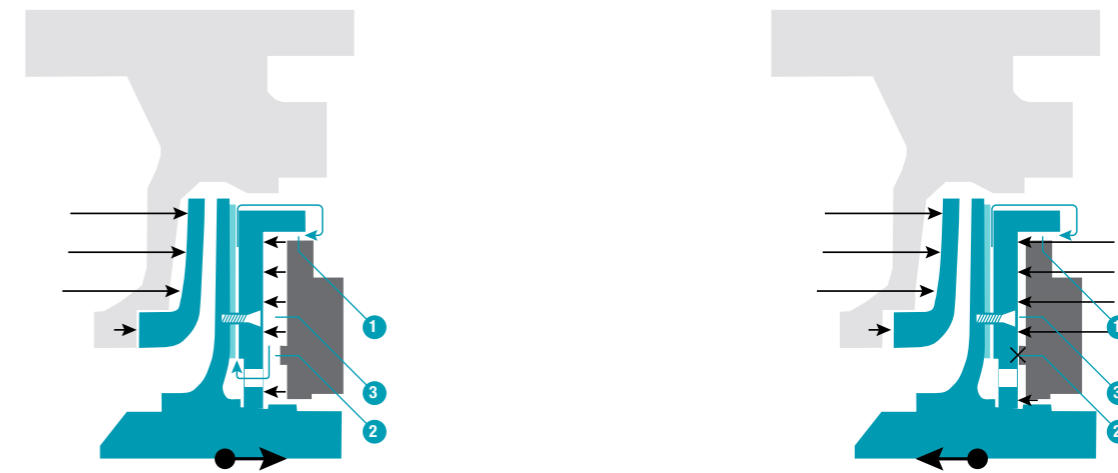
+ THRUST BALANCING SYSTEM



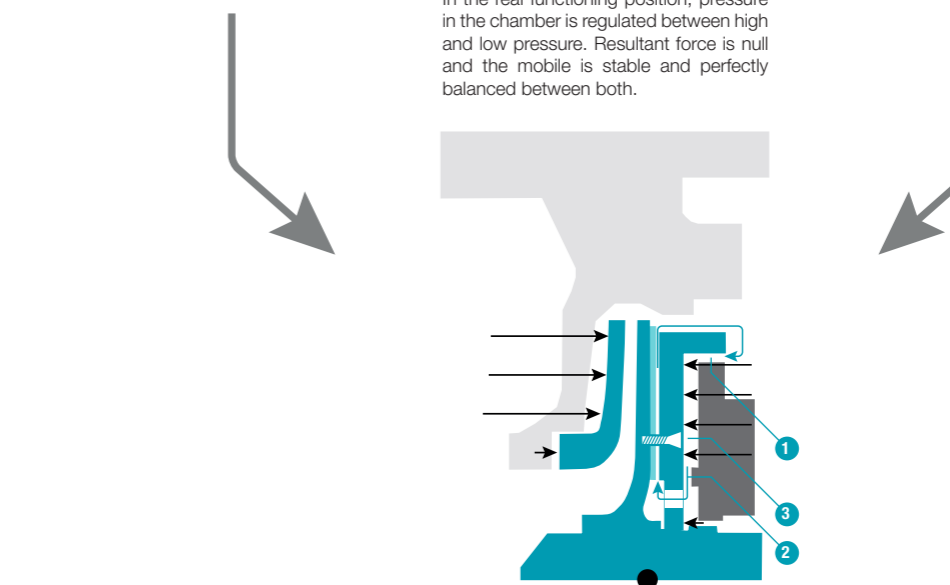
Over the years OPTIMEX has developed a performing and reliable thrust balancing system. BL+2 system is composed of two restrictions, one is stable (1), the other one is variable (2). These orifices regulate the pressure into the regulating chamber (3) that insures thrust balance of the complete mobile.

If the mobile moves to the left: restriction orifice (2) is 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.

If the mobile moves to the right: 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.



In the real functioning position, pressure in the chamber is regulated between high and low pressure. Resultant force is null and the mobile is stable and perfectly balanced between both.



- Circulation
- Pressure
- Displacement
- Fixed parts
- Moving parts

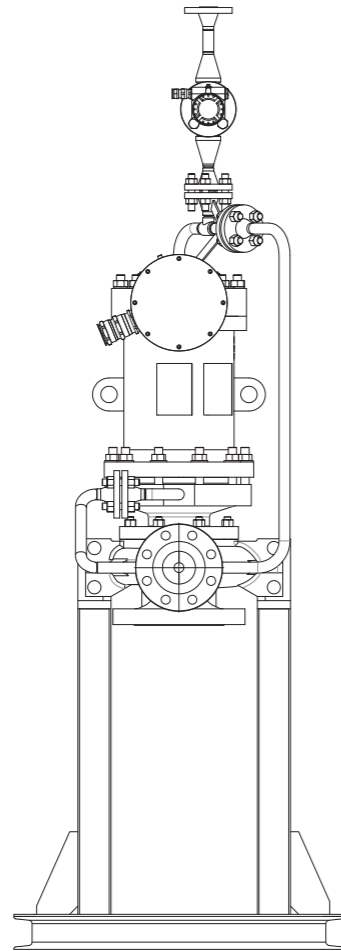
+ DESIGN AND MANUFACTURING FEATURES

In accordance with our customers' various applications and requirements, Optimex is able to manufacture several types of Monostage PREI Canned Motor Pumps.

VERTICAL DESIGNS

N1-V

Vertical mono-stage pumps with chair baseplate:
 • Reduce radial load on slide bearings

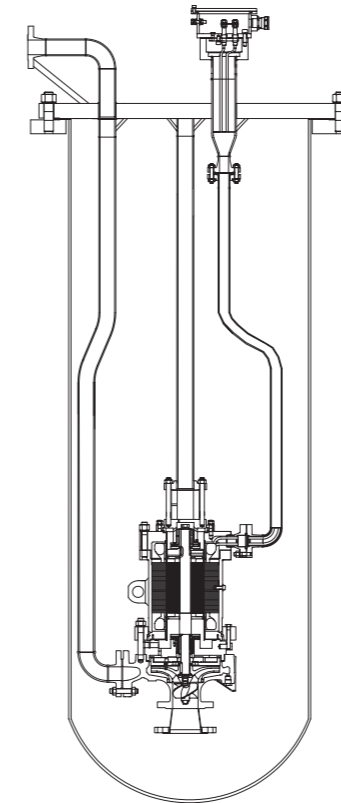


- + ✓ Space saving on the floor
- ✓ Customized arrangement
- ✓ Low viscosity application

SUBMERGED DESIGN

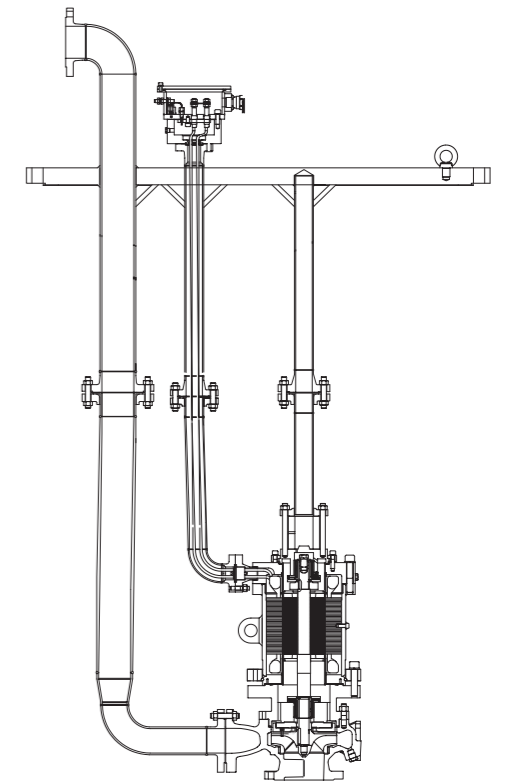
N1-VCc sub

Vertical mono-stage pumps with submerged hydraulic and motor in charge barrel



N1-Vsub

Vertical mono-stage pumps with totally submerged canned motor installed in a tank



- + ✓ Totally submerged solution
- ✓ Without long shaft line
- ✓ Low NPSHa application
- ✓ Possibility to fit on existing tank (via manhole or barrel)
- ✓ Space saving
- ✓ Axial discharge line



OPTIMEX
CANNED MOTOR PUMPS

269, rue de Montepy
69210 Fleurieux sur l'Arbresle
France

Tél : +33 (0)4 72 52 95 74
contact@optimex-pumps.com

www.optimex-pumps.com